

# Computer Algebra Independent Integration Tests

Summer 2023 edition

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1.2.2.5-P-x-a+b-x<sup>2</sup>+c-x<sup>4</sup>-<sup>p</sup>

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# CHAPTER 1

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## INTRODUCTION

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This report gives the result of running the computer algebra independent integration test. The download section in on the main webpage contains links to download the problems in plain text format used for all CAS systems. The number of integrals in this report is [ 111 ]. This is test number [ 42 ].

## 1.1 Listing of CAS systems tested

The following are the CAS systems tested:

1. Mathematica 13.3.1 (August 16, 2023) on windows 10.
2. Rubi 4.16.1 (Dec 19, 2018) on Mathematica 13.3 on windows 10
3. Maple 2023.1 (July, 12, 2023) on windows 10.
4. Maxima 5.47 (June 1, 2023) using Lisp SBCL 2.3.0 on Linux via sagemath 10.1 (Aug 20, 2023).
5. FriCAS 1.3.9 (July 8, 2023) based on sbcl 2.3.0 on Linux via sagemath 10.1 (Aug 20, 2023).
6. Giac/Xcas 1.9.0-57 (June 26, 2023) on Linux via sagemath 10.1 (Aug 20, 2023).
7. Sympy 1.12 (May 10, 2023) Using Python 3.11.3 on Linux.
8. Mupad using Matlab 2021a with Symbolic Math Toolbox Version 8.7 on windows 10.

Maxima and Fricas and Giac are called using Sagemath. This was done using Sagemath `integrate` command by changing the name of the algorithm to use the different CAS systems.

Sympy was run directly in Python not via sagemath.

## 1.2 Results

Important note: A number of problems in this test suite have no antiderivative in closed form. This means the antiderivative of these integrals can not be expressed in terms of elementary, special functions or `Hypergeometric2F1` functions. `RootSum` and `RootOf` are not allowed. If a CAS returns the above integral unevaluated within the time limit, then the result is counted as passed and assigned an A grade.

However, if CAS times out, then it is assigned an F grade even if the integral is not integrable, as this implies CAS could not determine that the integral is not integrable in the time limit.

If a CAS returns an antiderivative to such an integral, it is assigned an A grade automatically and this special result is listed in the introduction section of each individual test report to make it easy to identify as this can be important result to investigate.

The results given in in the table below reflects the above.

System	% solved	% Failed
Rubi	100.00 ( 111 )	0.00 ( 0 )
Mathematica	100.00 ( 111 )	0.00 ( 0 )
Maple	100.00 ( 111 )	0.00 ( 0 )
Mupad	95.50 ( 106 )	4.50 ( 5 )
Giac	95.50 ( 106 )	4.50 ( 5 )
Fricas	83.78 ( 93 )	16.22 ( 18 )
Maxima	74.77 ( 83 )	25.23 ( 28 )
Sympy	40.54 ( 45 )	59.46 ( 66 )

Table 1.1: Percentage solved for each CAS

The table below gives additional break down of the grading of quality of the antiderivatives generated by each CAS. The grading is given using the letters A,B,C and F with A being the best quality. The grading is accomplished by comparing the antiderivative generated with the optimal antiderivatives included in the test suite. The following table describes the meaning of these grades.

grade	description
A	Integral was solved and antiderivative is optimal in quality and leaf size.
B	Integral was solved and antiderivative is optimal in quality but leaf size is larger than twice the optimal antiderivatives leaf size.
C	Integral was solved and antiderivative is non-optimal in quality. This can be due to one or more of the following reasons <ol style="list-style-type: none"> <li>1. antiderivative contains a hypergeometric function and the optimal antiderivative does not.</li> <li>2. antiderivative contains a special function and the optimal antiderivative does not.</li> <li>3. antiderivative contains the imaginary unit and the optimal antiderivative does not.</li> </ol>
F	Integral was not solved. Either the integral was returned unevaluated within the time limit, or it timed out, or CAS hanged or crashed or an exception was raised.

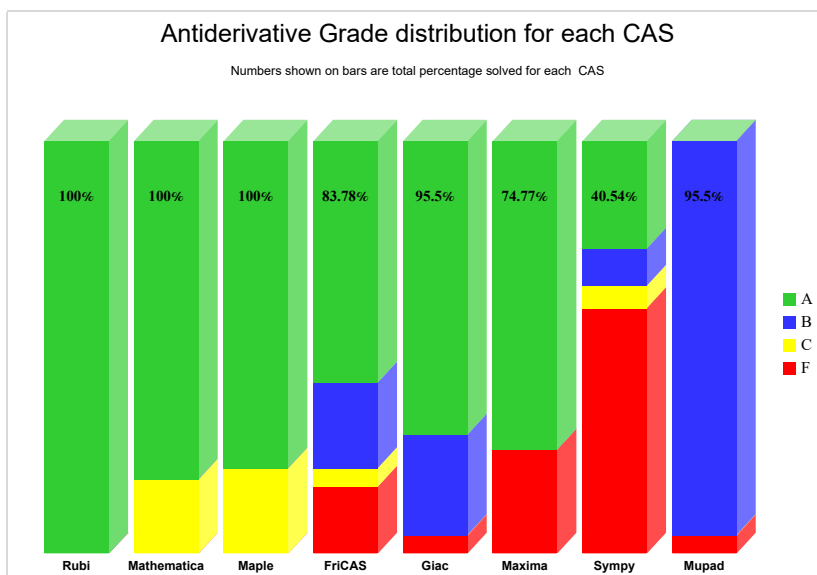
Table 1.2: Description of grading applied to integration result

Grading is implemented for all CAS systems. Based on the above, the following table summarizes the grading for this test suite.

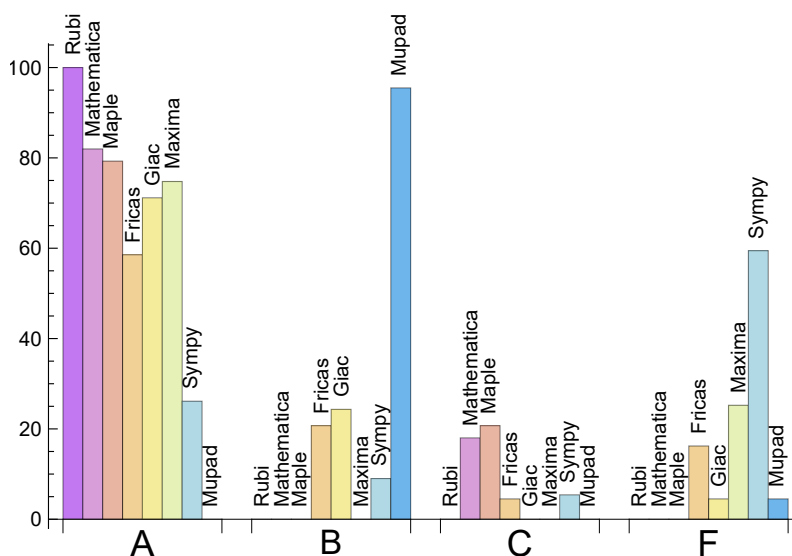
System	% A grade	% B grade	% C grade	% F grade
Rubi	100.000	0.000	0.000	0.000
Mathematica	81.982	0.000	18.018	0.000
Maple	79.279	0.000	20.721	0.000
Maxima	74.775	0.000	0.000	25.225
Giac	71.171	24.324	0.000	4.505
Fricas	58.559	20.721	4.505	16.216
Sympy	26.126	9.009	5.405	59.459
Mupad	0.000	95.495	0.000	4.505

Table 1.3: Antiderivative Grade distribution of each CAS

The following is a Bar chart illustration of the data in the above table.



The figure below compares the grades of the CAS systems.



The following table shows the distribution of the different types of failures for each CAS. There are 3 types failures. The first is when CAS returns the input within the time limit, which means it could not solve it. This is the typical failure and given as **F**.

The second failure is due to time out. CAS could not solve the integral within the 3 minutes time limit which is assigned. This is assigned **F(-1)**.

The third is due to an exception generated, indicated as **F(-2)**. This most likely indicates an interface problem between sagemath and the CAS (applicable only to FriCAS, Maxima and Giac) or it could be an indication of an internal error in the CAS itself. This type of error requires more investigation to determine the cause.

System	Number failed	Percentage normal failure	Percentage time-out failure	Percentage exception failure
Rubi	0	0.00	0.00	0.00
Mathematica	0	0.00	0.00	0.00
Maple	0	0.00	0.00	0.00
Mupad	5	0.00	100.00	0.00
Giac	5	100.00	0.00	0.00
Fricas	18	0.00	100.00	0.00
Maxima	28	100.00	0.00	0.00
Sympy	66	12.12	87.88	0.00

Table 1.4: Failure statistics for each CAS

## 1.3 Time and leaf size Performance

The table below summarizes the performance of each CAS system in terms of time used and leaf size of results.

Mean size is the average leaf size produced by the CAS (before any normalization). The Normalized mean is relative to the mean size of the optimal anti-derivative given in the input files.

For example, if CAS has **Normalized mean** of 3, then the mean size of its leaf size is 3 times as large as the mean size of the optimal leaf size.

Median size is value of leaf size where half the values are larger than this and half are smaller (before any normalization). i.e. The Middle value.

Similarly the **Normalized median** is relative to the median leaf size of the optimal.

For example, if a CAS has Normalized median of 1.2, then its median is 1.2 as large as the median leaf size of the optimal.



System	Mean time (sec)
Maxima	0.21
Rubi	0.43
Giac	0.76
Maple	0.93
Mathematica	1.35
Mupad	6.07
Fricas	7.07
Sympy	10.70

Table 1.5: Time performance for each CAS

System	Mean size	Normalized mean	Median size	Normalized median
Maxima	100.89	0.88	88.00	0.87
Maple	197.41	0.90	107.00	0.93
Rubi	217.75	1.00	140.00	1.00
Mathematica	260.32	1.08	146.00	1.02
Sympy	620.93	6.32	122.00	1.19
Giac	1853.60	3.90	124.00	0.98
Mupad	5695.50	9.58	132.00	1.00
Fricas	61061.85	246.12	141.00	1.27

Table 1.6: Leaf size performance for each CAS

## 1.4 Performance based on number of rules Rubi used

This section shows how each CAS performed based on the number of rules Rubi needed to solve the same integral. One diagram is given for each CAS.

On the  $y$  axis is the percentage solved which Rubi itself needed the number of rules given the  $x$  axis. These plots show that as more rules are needed then most CAS system percentage of solving decreases which indicates the integral is becoming more complicated to solve.

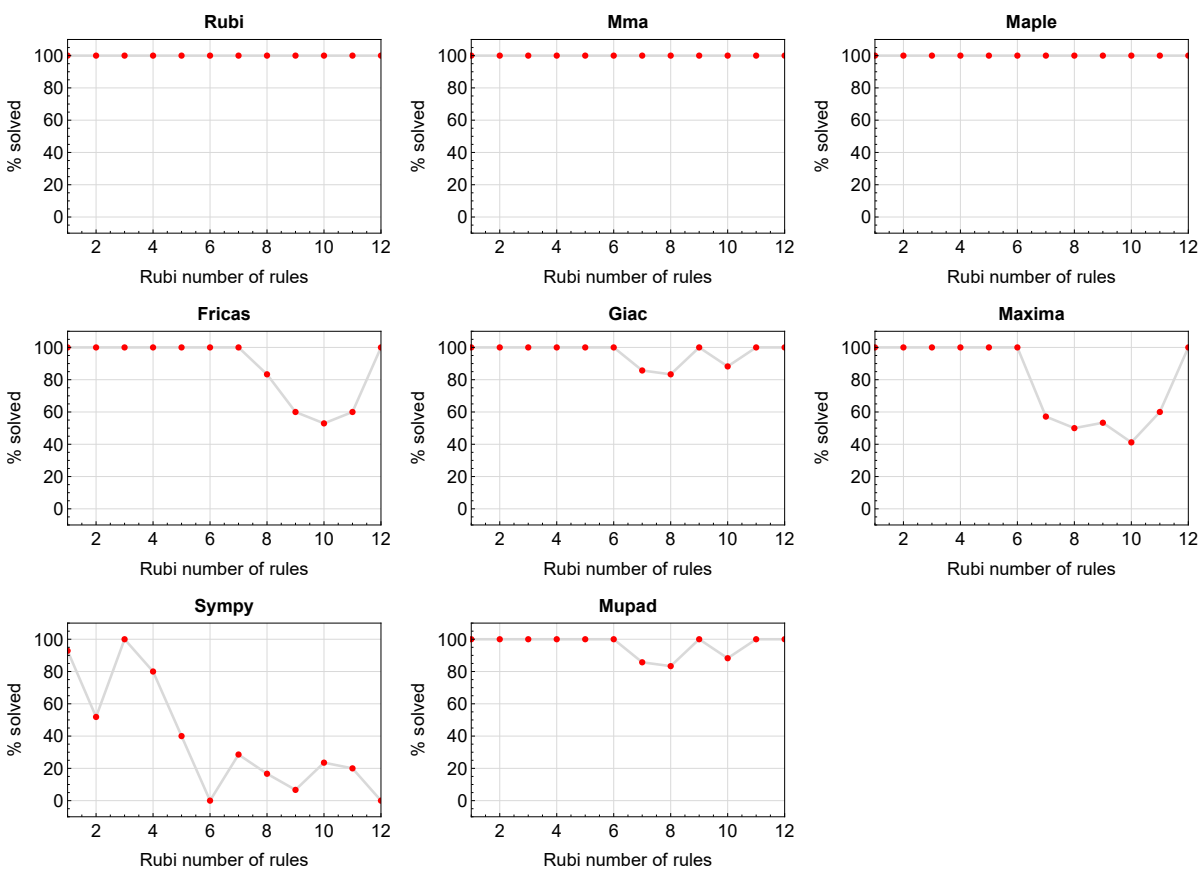


Figure 1.1: Solving statistics per number of Rubi rules used

## 1.5 Performance based on number of steps Rubi used

This section shows how each CAS performed based on the number of steps Rubi needed to solve the same integral. Note that the number of steps Rubi needed can be much higher than the number of rules, as the same rule could be used more than once.

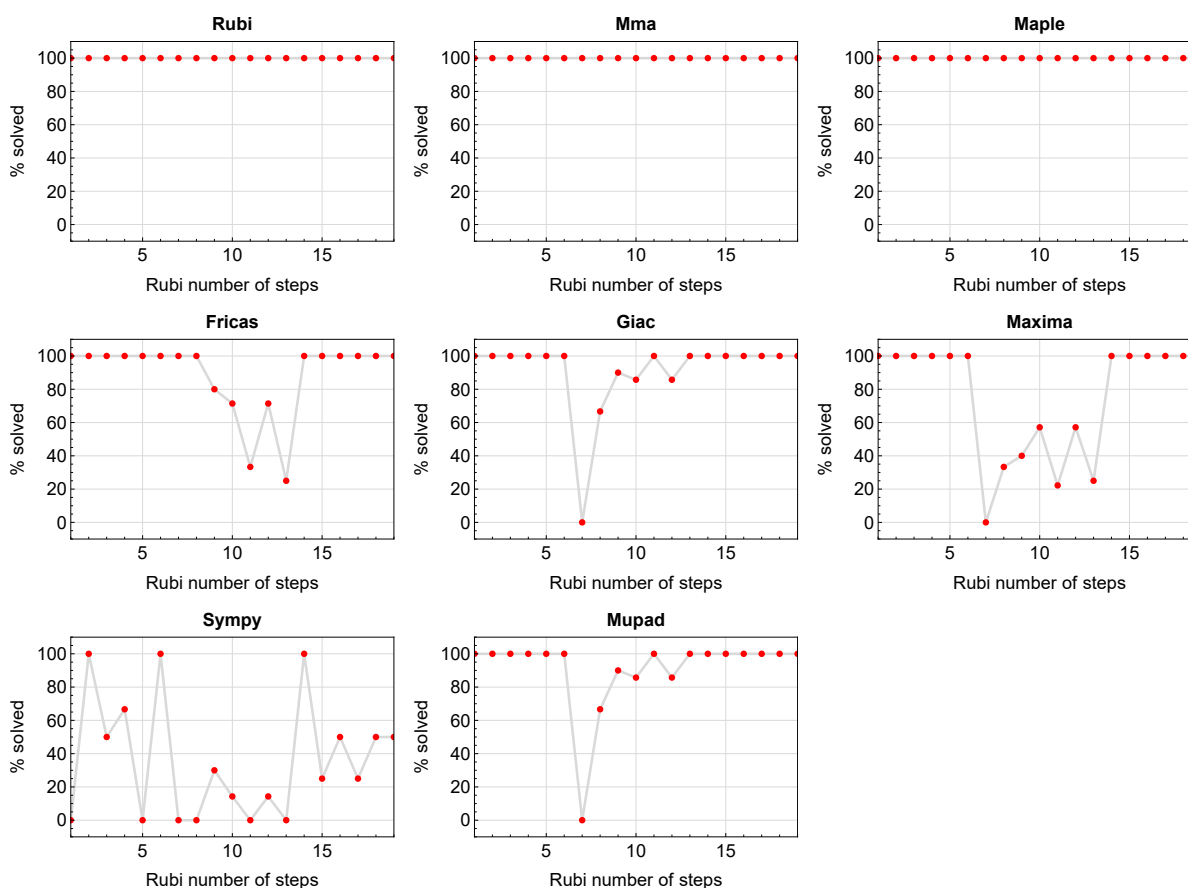


Figure 1.2: Solving statistics per number of Rubi steps used

The above diagram show that the percentage of solved intergals decreases for most CAS systems as the number of steps increases. As expected, for integrals that required less steps by Rubi, CAS systems had more success which indicates the integral was not as hard to solve. As Rubi needed more steps to solve the integral, the solved percentage decreased for most CAS systems which indicates the integral is becoming harder to solve.

## 1.6 Solved integrals histogram based on leaf size of result

The following shows the distribution of solved integrals for each CAS system based on leaf size of the antiderivatives produced by each CAS. It shows that most integrals solved produced leaf size less than about 100 to 150. The bin size used is 40.

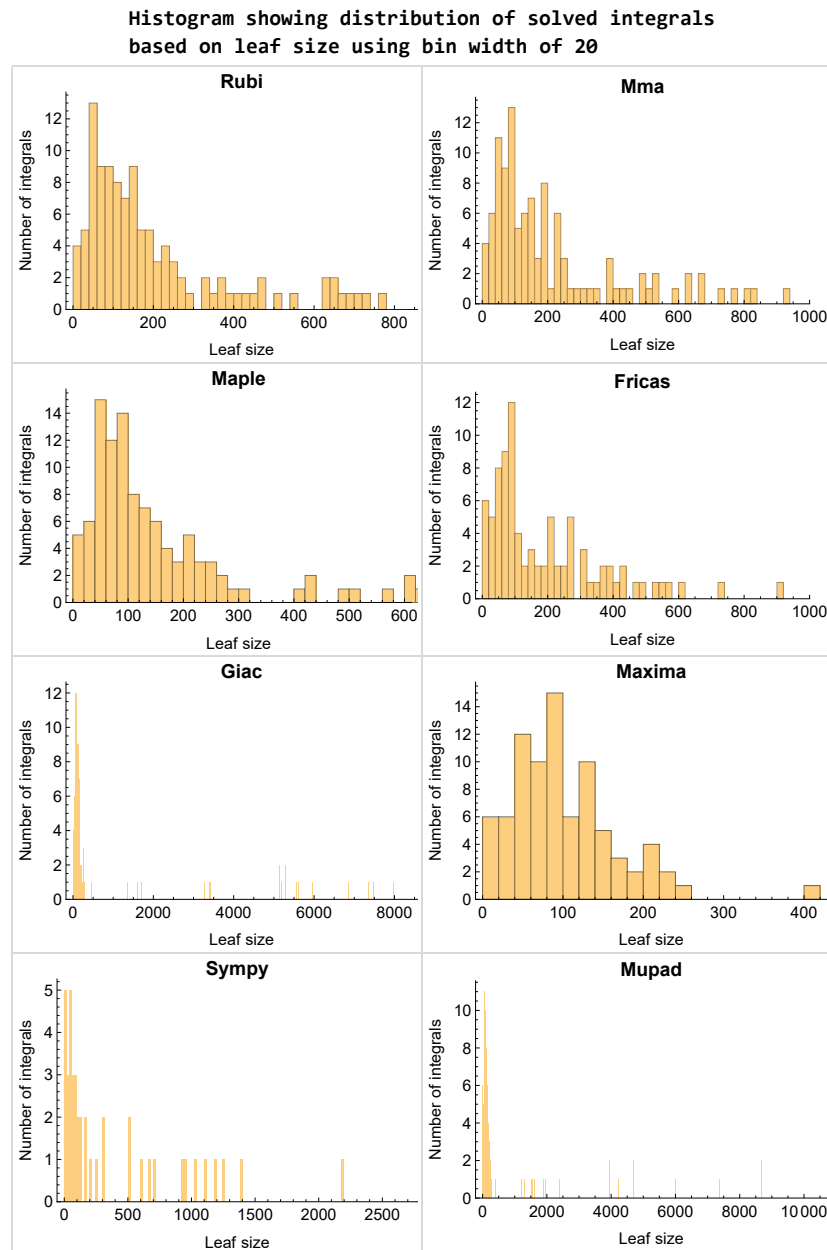


Figure 1.3: Solved integrals based on leaf size distribution

## 1.7 Solved integrals histogram based on CPU time used

The following shows the distribution of solved integrals for each CAS system based on CPU time used in seconds. The bin size used is 0.1 second.

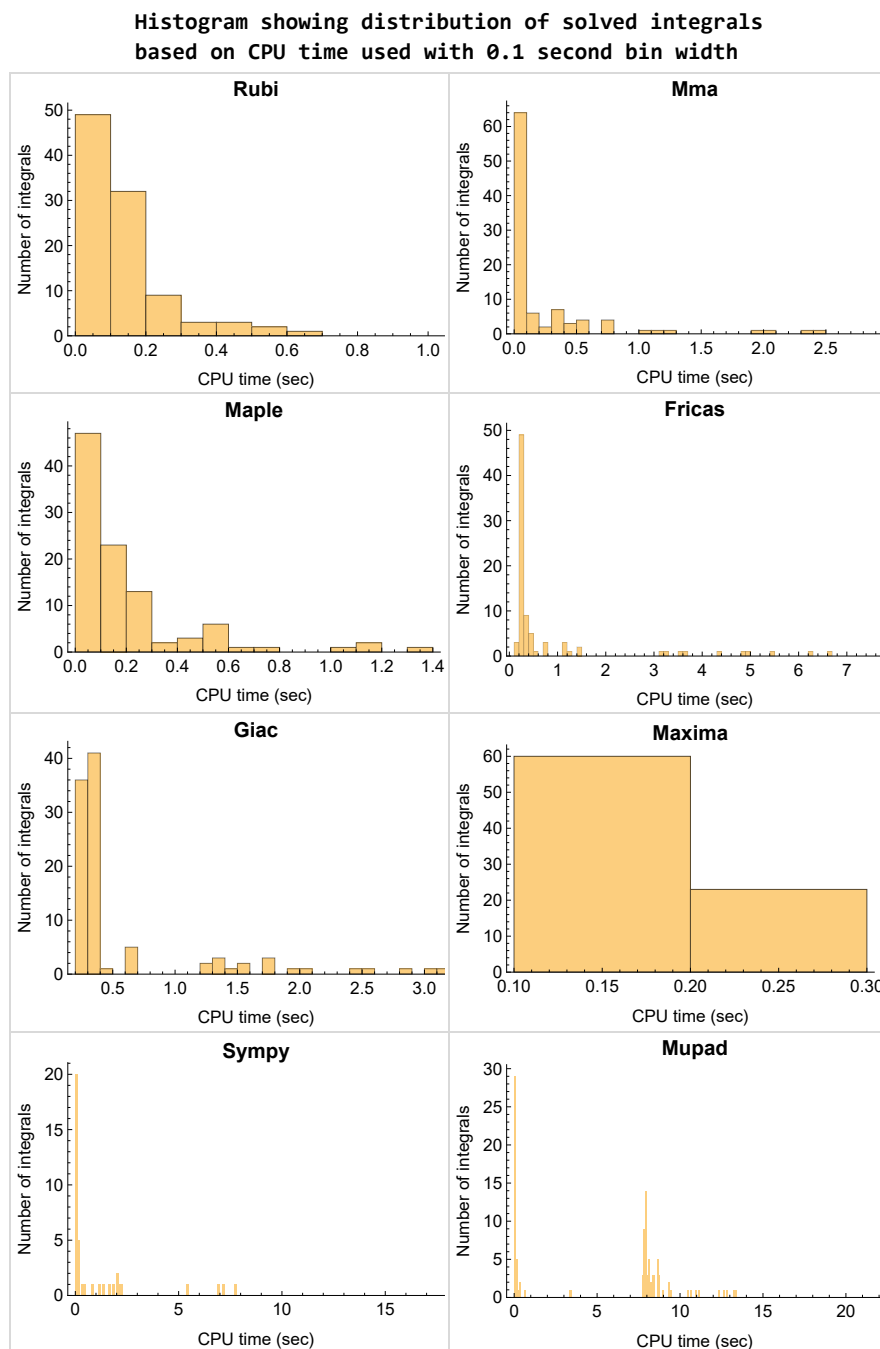


Figure 1.4: Solved integrals histogram based on CPU time used

## 1.8 Leaf size vs. CPU time used

The following shows the relation between the CPU time used to solve an integral and the leaf size of the antiderivative.

The result for Fricas, Maxima and Giac is shifted more to the right than the other CAS system due to the use of sagemath to call them, which causes an initial slight delay in the timing to start the integration due to overhead of starting a new process each time. This should also be taken into account when looking at the timing of these three CAS systems. Direct calls not using sagemath would result in faster timings, but current implementation uses sagemath as this makes testing much easier to do.

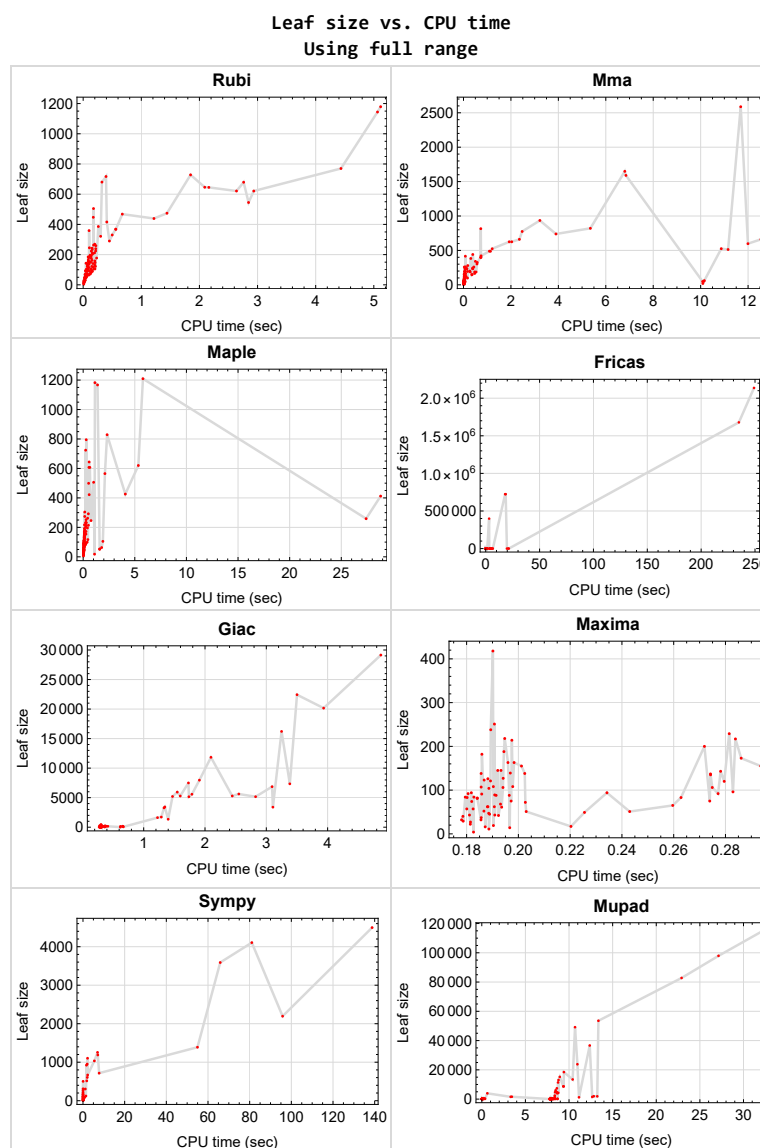


Figure 1.5: Leaf size vs. CPU time. Full range

## 1.9 list of integrals with no known antiderivative

{}

## 1.10 List of integrals solved by CAS but has no known antiderivative

**Rubi** {}

**Mathematica** {}

**Maple** {}

**Maxima** {}

**Fricas** {}

**Sympy** {}

**Giac** {}

**Mupad** {}

## 1.11 list of integrals solved by CAS but failed verification

The following are integrals solved by CAS but the verification phase failed to verify the anti-derivative produced is correct. This does not necessarily mean that the anti-derivative is wrong as additional methods of verification might be needed, or more time is needed (3 minutes time limit was used). These integrals are listed here to make it possible to do further investigation to determine why the result could not be verified.

**Rubi** {}

**Mathematica** {}

**Maple** {}

**Maxima** Verification phase not currently implemented.

**Fricas** Verification phase not currently implemented.

**Sympy** Verification phase not currently implemented.

**Giac** Verification phase not currently implemented.

**Mupad** Verification phase not currently implemented.

## 1.12 Timing

The command `AbsoluteTiming[]` was used in Mathematica to obtain the elapsed time for each integrate call. In Maple, the command `Usage` was used as in the following example

```
cpu_time := Usage(assign ('result_of_int',int(expr,x)),output='realtime')
```

For all other CAS systems, the elapsed time to complete each integral was found by taking the difference between the time after the call completed from the time before the call was made. This was done using Python's `time.time()` call.

All elapsed times shown are in seconds. A time limit of 3 CPU minutes was used for each integral. If the integrate command did not complete within this time limit, the integral was aborted and considered to have failed and assigned an F grade. The time used by failed integrals due to time out was not counted in the final statistics.

## 1.13 Verification

A verification phase was applied on the result of integration for Rubi and Mathematica.

Future version of this report will implement verification for the other CAS systems. For the integrals whose result was not run through a verification phase, it is assumed that the antiderivative was correct.

Verification phase also had 3 minutes time out. An integral whose result was not verified could still be correct, but further investigation is needed on those integrals. These integrals were marked in the summary table below and also in each integral separate section so they are easy to identify and locate.

## 1.14 Important notes about some of the results

### Important note about Maxima results

Since tests were run in a batch mode, and using an automated script, then any integral where Maxima needed an interactive response from the user to answer a question during the evaluation of the integral will fail.

The exception raised is `ValueError`. Therefore Maxima results is lower than what would result if Maxima was run directly and each question was answered correctly.

The percentage of such failures were not counted for each test file, but for an example, for the `Timofeev` test file, there were about 14 such integrals out of total 705, or about 2 percent. This percentage can be higher or lower depending on the specific input test file.

Such integrals can be identified by looking at the output of the integration in each section for Maxima. The exception message will indicate the cause of error.



Maxima integrate was run using SageMath with the following settings set by default

```
'besselexpand : true'
'display2d : false'
'domain : complex'
'keepfloat : true'
'load(to_poly_solve)'
'load(simplify_sum)'
'load(abs_integrate)' 'load(diag)'
```

SageMath automatic loading of Maxima `abs_integrate` was found to cause some problems. So the following code was added to disable this effect.

```
from sage.interfaces.maxima_lib import maxima_lib
maxima_lib.set('extra_definite_integration_methods', '[]')
maxima_lib.set('extra_integration_methods', '[]')
```

See <https://ask.sagemath.org/question/43088/integrate-results-that-are-different-from-using-maxima/> for reference.

## Important note about FriCAS result

There were few integrals which failed due to SageMath interface and not because FriCAS system could not do the integration.

These will fail With error `Exception raised: NotImplementedError`.

The number of such cases seems to be very small. About 1 or 2 percent of all integrals. These can be identified by looking at the exception message given in the result.

## Important note about finding leaf size of antiderivative

For Mathematica, Rubi, and Maple, the builtin system function `LeafSize` was used to find the leaf size of each antiderivative.

The other CAS systems (SageMath and Sympy) do not have special builtin function for this purpose at this time. Therefore the leaf size for Fricas and Sympy antiderivative was determined using the following function, thanks to user `slelievre` at [https://ask.sagemath.org/question/57123/could-we-have-a-leaf\\_count-function-in-base-sagemath/](https://ask.sagemath.org/question/57123/could-we-have-a-leaf_count-function-in-base-sagemath/)

```
def tree_size(expr):
    r"""
    Return the tree size of this expression.
    """
    if expr not in SR:
        # deal with lists, tuples, vectors
        return 1 + sum(tree_size(a) for a in expr)
    expr = SR(expr)
```

```
x, aa = expr.operator(), expr.operands()
if x is None:
    return 1
else:
    return 1 + sum(tree_size(a) for a in aa)
```

For Sympy, which was called directly from Python, the following code was used to obtain the leafsize of its result

```
try:
    # 1.7 is a fudge factor since it is low side from actual leaf count
    leafCount = round(1.7*count_ops(anti))

except Exception as ee:
    leafCount =1
```

## Important note about Mupad results

Matlab's symbolic toolbox does not have a leaf count function to measure the size of the antiderivative. Maple was used to determine the leaf size of Mupad output by post processing Mupad result.

Currently no grading of the antiderivative for Mupad is implemented. If it can integrate the problem, it was assigned a B grade automatically as a placeholder. In the future, when grading function is implemented for Mupad, the tests will be rerun again.

The following is an example of using Matlab's symbolic toolbox (Mupad) to solve an integral

```
integrand = evalin(symengine, 'cos(x)*sin(x)')
the_variable = evalin(symengine, 'x')
anti = int(integrand, the_variable)
```

Which gives  $\sin(x)^2/2$

## 1.15 Design of the test system

The following diagram gives a high level view of the current test build system.



### High level overview of the CAS independent integration test build system

One record (line) per one integral result. The line is CSV comma separated. This is description of each record

1. integer. the problem number.
2. integer. 0 for failed, 1 for passed, -1 for timeout, -2 for CAS specific exception. (this is not the grade field)
3. integer. Leaf size of result.
4. integer. Leaf size of the optimal antiderivative.
5. number. CPU time used to solve this integral. 0 if failed.
6. string. The integral in Latex format
7. string. The input used in CAS own syntax.
8. string. The result (antiderivative) produced by CAS in Latex format
9. string. The optimal antiderivative in Latex format.
10. integer. 0 or 1. Indicates if problem has known antiderivative or not
11. String. The result (antiderivative) in CAS own syntax.
12. String. The grade of the antiderivative. Can be "A", "B", "C", or "F"
13. String. Small string description of why the grade was given.
14. integer. 1 if result was verified or 0 if not verified. (For mma, rubi and maple only)

The following fields are present only in *Rubi Table file*

15. integer. Number of steps used.
16. integer. Number of rules used.
17. integer. Integrand leaf size.
18. real number. Ratio. Field 16 over field 17
19. String of form "{n,n,...}" which is list of the rules used by Rubi
20. String. The optimal antiderivative in Mathematica syntax

Nasser M. Abbasi  
June 27, 2023  
Design v1.0a



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## CHAPTER 2

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# DETAILED SUMMARY TABLES OF RESULTS

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2.2	Detailed conclusion table per each integral for all CAS systems . . . . .	25
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## 2.1 List of integrals sorted by grade for each CAS

Rubi . . . . .	22
Mma . . . . .	22
Maple . . . . .	23
Fricas . . . . .	23
Maxima . . . . .	23
Giac . . . . .	24
Mupad . . . . .	24
Sympy . . . . .	24

### Rubi

**A grade** { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111 }

**B grade** { }

**C grade** { }

**F normal fail** { }

**F(-1) timedout fail** { }

**F(-2) exception fail** { }

### Mma

**A grade** { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 108, 109, 110, 111 }

**B grade** { }

**C grade** { 15, 16, 17, 18, 19, 31, 32, 33, 34, 35, 47, 48, 49, 50, 51, 103, 104, 105, 106, 107 }

**F normal fail** { }

**F(-1) timedout fail** { }

**F(-2) exception fail** { }

## Maple

**A grade** { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 60, 61, 62, 63, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111 }

**B grade** { }

**C grade** { 20, 21, 22, 23, 24, 25, 36, 37, 38, 39, 40, 41, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 66 }

**F normal fail** { }

**F(-1) timedout fail** { }

**F(-2) exception fail** { }

## Fricas

**A grade** { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 31, 32, 33, 34, 35, 47, 48, 49, 60, 61, 62, 63, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 103, 104, 105, 106, 108, 109, 110, 111 }

**B grade** { 26, 27, 28, 29, 30, 42, 43, 44, 45, 46, 50, 51, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 107 }

**C grade** { 20, 21, 22, 36, 64 }

**F normal fail** { }

**F(-1) timedout fail** { 23, 24, 25, 37, 38, 39, 40, 41, 52, 53, 54, 55, 56, 57, 58, 59, 65, 66 }

**F(-2) exception fail** { }

## Maxima

**A grade** { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 60, 61, 62, 63, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 108, 109, 110, 111 }

**B grade** { }

**C grade** { }

**F normal fail** { 20, 21, 22, 23, 24, 25, 36, 37, 38, 39, 40, 41, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 66, 103, 104, 105, 106, 107 }

**F(-1) timedout fail** { }

**F(-2) exception fail** { }

## Giac

**A grade** { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 60, 61, 62, 63, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102 }

**B grade** { 20, 21, 22, 23, 24, 25, 36, 37, 38, 39, 40, 41, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 66, 108, 109, 110, 111 }

**C grade** { }

**F normal fail** { 103, 104, 105, 106, 107 }

**F(-1) timedout fail** { }

**F(-2) exception fail** { }

## Mupad

**A grade** { }

**B grade** { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 108, 109, 110, 111 }

**C grade** { }

**F normal fail** { }

**F(-1) timedout fail** { 103, 104, 105, 106, 107 }

**F(-2) exception fail** { }

## Sympy

**A grade** { 1, 2, 3, 4, 5, 6, 7, 8, 9, 60, 61, 62, 63, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 85, 91, 97 }

**B grade** { 10, 11, 26, 42, 80, 81, 82, 86, 92, 98 }

**C grade** { 15, 16, 31, 32, 47, 48 }

**F normal fail** { 103, 104, 105, 106, 108, 109, 110, 111 }

**F(-1) timedout fail** { 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 33, 34, 35, 36, 37, 38, 39, 40, 41, 43, 44, 45, 46, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 66, 83, 84, 87, 88, 89, 90, 93, 94, 95, 96, 99, 100, 101, 102, 107 }

**F(-2) exception fail** { }



## 2.2 Detailed conclusion table per each integral for all CAS systems

Detailed conclusion table per each integral is given by the table below. The elapsed time is in seconds. For failed result it is given as **F(-1)** if the failure was due to timeout. It is given as **F(-2)** if the failure was due to an exception being raised, which could indicate a bug in the system. If the failure was due to integral not being evaluated within the time limit, then it is given as **F**.

In this table, the column **N.S.** means **normalized size** and is defined as  $\frac{\text{antiderivative leaf size}}{\text{optimal antiderivative leaf size}}$ . To make the table fit the page, the name **Mathematica** was abbreviated to **MMA**.

Problem 1	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	50	50	50	41	40	40	46	40	40
N.S.	1	1.00	1.00	0.82	0.80	0.80	0.92	0.80	0.80
time (sec)	N/A	0.028	0.016	0.021	0.179	0.233	0.017	0.297	0.016

Problem 2	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	69	69	69	58	57	57	65	61	59
N.S.	1	1.00	1.00	0.84	0.83	0.83	0.94	0.88	0.86
time (sec)	N/A	0.032	0.022	0.067	0.180	0.239	0.018	0.361	0.019

Problem 3	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	88	88	88	75	74	74	83	82	78
N.S.	1	1.00	1.00	0.85	0.84	0.84	0.94	0.93	0.89
time (sec)	N/A	0.047	0.031	0.141	0.182	0.232	0.018	0.290	7.853

Problem 4	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	105	105	105	90	89	89	102	103	95
N.S.	1	1.00	1.00	0.86	0.85	0.85	0.97	0.98	0.90
time (sec)	N/A	0.062	0.031	0.234	0.191	0.237	0.019	0.366	7.905

Problem 5	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	122	122	122	105	104	104	121	124	112
N.S.	1	1.00	1.00	0.86	0.85	0.85	0.99	1.02	0.92
time (sec)	N/A	0.071	0.032	1.908	0.189	0.246	0.020	0.294	0.048

Problem 6	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	112	112	97	95	94	94	116	100	94
N.S.	1	1.00	0.87	0.85	0.84	0.84	1.04	0.89	0.84
time (sec)	N/A	0.086	0.039	0.099	0.182	0.243	0.024	0.369	0.047

Problem 7	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	154	154	154	139	138	138	165	151	138
N.S.	1	1.00	1.00	0.90	0.90	0.90	1.07	0.98	0.90
time (sec)	N/A	0.087	0.038	0.133	0.202	0.237	0.033	0.306	7.852

Problem 8	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	196	196	196	183	182	182	209	202	182
N.S.	1	1.00	1.00	0.93	0.93	0.93	1.07	1.03	0.93
time (sec)	N/A	0.118	0.044	0.151	0.186	0.250	0.031	0.378	7.879

Problem 9	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	234	234	234	219	218	218	258	253	220
N.S.	1	1.00	1.00	0.94	0.93	0.93	1.10	1.08	0.94
time (sec)	N/A	0.156	0.061	0.232	0.195	0.242	0.033	0.319	0.083

Problem 10	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	B	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	45	45	50	50	43	43	515	47	51
N.S.	1	1.00	1.11	1.11	0.96	0.96	11.44	1.04	1.13
time (sec)	N/A	0.023	0.017	0.050	0.181	0.262	1.809	0.287	7.813

Problem 11	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	B	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	51	51	58	62	51	51	2195	55	63
N.S.	1	1.00	1.14	1.22	1.00	1.00	43.04	1.08	1.24
time (sec)	N/A	0.036	0.022	0.058	0.203	0.289	95.810	0.364	7.763

Problem 12	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	57	57	68	74	61	61	0	65	75
N.S.	1	1.00	1.19	1.30	1.07	1.07	0.00	1.14	1.32
time (sec)	N/A	0.047	0.027	0.069	0.194	0.416	0.000	0.301	7.797

Problem 13	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	64	64	81	89	72	72	0	76	90
N.S.	1	1.00	1.27	1.39	1.12	1.12	0.00	1.19	1.41
time (sec)	N/A	0.094	0.035	0.084	0.203	1.139	0.000	0.311	7.904

Problem 14	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	76	76	98	107	88	88	0	92	108
N.S.	1	1.00	1.29	1.41	1.16	1.16	0.00	1.21	1.42
time (sec)	N/A	0.123	0.045	0.091	0.196	4.998	0.000	0.299	8.146

Problem 15	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	C	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	92	92	98	68	65	65	923	65	118
N.S.	1	1.00	1.07	0.74	0.71	0.71	10.03	0.71	1.28
time (sec)	N/A	0.051	0.169	0.122	0.260	0.267	1.662	0.304	0.128

Problem 16	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	C	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	104	104	121	82	75	75	3589	75	159
N.S.	1	1.00	1.16	0.79	0.72	0.72	34.51	0.72	1.53
time (sec)	N/A	0.060	0.110	0.226	0.274	0.289	65.868	0.297	7.978

Problem 17	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	127	127	150	90	83	83	0	83	199
N.S.	1	1.00	1.18	0.71	0.65	0.65	0.00	0.65	1.57
time (sec)	N/A	0.075	0.363	0.267	0.263	0.409	0.000	0.300	8.105

Problem 18	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	136	136	165	99	92	92	0	92	1209
N.S.	1	1.00	1.21	0.73	0.68	0.68	0.00	0.68	8.89
time (sec)	N/A	0.097	0.471	0.386	0.277	1.119	0.000	0.318	11.144

Problem 19	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	151	151	187	117	106	106	0	106	1509
N.S.	1	1.00	1.24	0.77	0.70	0.70	0.00	0.70	9.99
time (sec)	N/A	0.120	0.472	0.457	0.275	4.389	0.000	0.304	12.662

Problem 20	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F	C	F(-1)	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	189	189	194	43	0	398481	0	1342	1308
N.S.	1	1.00	1.03	0.23	0.00	2108.37	0.00	7.10	6.92
time (sec)	N/A	0.132	0.172	0.084	0.000	3.158	0.000	1.399	8.363

Problem 21	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F	C	F(-1)	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	211	211	234	48	0	723401	0	1714	3942
N.S.	1	1.00	1.11	0.23	0.00	3428.44	0.00	8.12	18.68
time (sec)	N/A	0.158	0.136	0.070	0.000	18.016	0.000	1.287	8.641

Problem 22	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F	C	F(-1)	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	245	245	280	53	0	2136355	0	3270	15179
N.S.	1	1.00	1.14	0.22	0.00	8719.82	0.00	13.35	61.96
time (sec)	N/A	0.107	0.181	0.067	0.000	249.076	0.000	1.331	8.942

Problem 23	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F	F(-1)	F(-1)	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	290	290	383	78	0	0	0	5199	5981
N.S.	1	1.00	1.32	0.27	0.00	0.00	0.00	17.93	20.62
time (sec)	N/A	0.452	0.308	0.102	0.000	0.000	0.000	1.470	8.465

Problem 24	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	321	321	441	99	0	0	0	5941	11383
N.S.	1	1.00	1.37	0.31	0.00	0.00	0.00	18.51	35.46
time (sec)	N/A	0.301	0.392	0.096	0.000	0.000	0.000	1.547	8.741

Problem 25	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	545	545	816	246	0	0	0	11830	49150
N.S.	1	1.00	1.50	0.45	0.00	0.00	0.00	21.71	90.18
time (sec)	N/A	2.845	0.729	0.762	0.000	0.000	0.000	2.097	10.688

Problem 26	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	B	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	94	94	90	83	83	169	604	87	84
N.S.	1	1.00	0.96	0.88	0.88	1.80	6.43	0.93	0.89
time (sec)	N/A	0.039	0.038	0.081	0.180	0.278	2.041	0.298	0.053

Problem 27	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	<b>F(-1)</b>	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	115	115	112	105	106	217	0	109	107
N.S.	1	1.00	0.97	0.91	0.92	1.89	0.00	0.95	0.93
time (sec)	N/A	0.099	0.054	0.088	0.194	0.315	0.000	0.315	0.060

Problem 28	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	<b>F(-1)</b>	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	138	138	134	125	127	262	0	130	128
N.S.	1	1.00	0.97	0.91	0.92	1.90	0.00	0.94	0.93
time (sec)	N/A	0.100	0.039	0.102	0.194	0.486	0.000	0.295	7.876

Problem 29	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	150	150	159	143	145	304	0	152	146
N.S.	1	1.00	1.06	0.95	0.97	2.03	0.00	1.01	0.97
time (sec)	N/A	0.127	0.049	0.103	0.193	1.405	0.000	0.302	7.980

Problem 30	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	162	162	185	161	163	346	0	173	164
N.S.	1	1.00	1.14	0.99	1.01	2.14	0.00	1.07	1.01
time (sec)	N/A	0.152	0.059	0.123	0.198	6.239	0.000	0.306	0.347

Problem 31	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	C	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	140	140	146	124	96	154	952	96	149
N.S.	1	1.00	1.04	0.89	0.69	1.10	6.80	0.69	1.06
time (sec)	N/A	0.067	0.351	0.153	0.283	0.277	2.014	0.303	0.145

Problem 32	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	C	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	165	165	186	154	120	212	4106	124	201
N.S.	1	1.00	1.13	0.93	0.73	1.28	24.88	0.75	1.22
time (sec)	N/A	0.088	0.282	0.268	0.280	0.301	81.025	0.324	0.180

Problem 33	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	179	179	200	172	135	239	0	138	237
N.S.	1	1.00	1.12	0.96	0.75	1.34	0.00	0.77	1.32
time (sec)	N/A	0.096	0.267	0.276	0.274	0.464	0.000	0.331	8.138

Problem 34	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	187	187	234	196	143	255	0	151	1547
N.S.	1	1.00	1.25	1.05	0.76	1.36	0.00	0.81	8.27
time (sec)	N/A	0.114	0.387	0.412	0.278	1.101	0.000	0.415	3.309

Problem 35	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	194	194	243	214	155	279	0	165	1894
N.S.	1	1.00	1.25	1.10	0.80	1.44	0.00	0.85	9.76
time (sec)	N/A	0.140	0.388	0.506	0.294	4.866	0.000	0.298	13.239

Problem 36	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F	C	F(-1)	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	330	330	341	209	0	1678440	0	3426	2382
N.S.	1	1.00	1.03	0.63	0.00	5086.18	0.00	10.38	7.22
time (sec)	N/A	0.500	0.503	0.247	0.000	235.031	0.000	1.345	8.365

Problem 37	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F	F(-1)	F(-1)	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	368	368	398	232	0	0	0	5156	4707
N.S.	1	1.00	1.08	0.63	0.00	0.00	0.00	14.01	12.79
time (sec)	N/A	0.562	0.720	0.260	0.000	0.000	0.000	1.737	8.403

Problem 38	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F	F(-1)	F(-1)	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	386	386	421	252	0	0	0	5573	7373
N.S.	1	1.00	1.09	0.65	0.00	0.00	0.00	14.44	19.10
time (sec)	N/A	0.261	0.741	0.279	0.000	0.000	0.000	1.787	8.609



Problem 39	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	439	439	489	274	0	0	0	7495	13024
N.S.	1	1.00	1.11	0.62	0.00	0.00	0.00	17.07	29.67
time (sec)	N/A	1.218	1.093	0.154	0.000	0.000	0.000	1.730	8.795

Problem 40	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	468	468	524	304	0	0	0	7962	18449
N.S.	1	1.00	1.12	0.65	0.00	0.00	0.00	17.01	39.42
time (sec)	N/A	0.674	1.211	0.154	0.000	0.000	0.000	1.908	9.411

Problem 41	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	770	770	935	506	0	0	0	20159	82785
N.S.	1	1.00	1.21	0.66	0.00	0.00	0.00	26.18	107.51
time (sec)	N/A	4.435	3.220	1.013	0.000	0.000	0.000	3.934	22.902

Problem 42	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	B	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	143	143	128	107	121	307	668	115	118
N.S.	1	1.00	0.90	0.75	0.85	2.15	4.67	0.80	0.83
time (sec)	N/A	0.049	0.068	0.090	0.189	0.291	2.230	0.313	0.053

Problem 43	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	<b>F(-1)</b>	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	175	175	161	139	155	389	0	149	151
N.S.	1	1.00	0.92	0.79	0.89	2.22	0.00	0.85	0.86
time (sec)	N/A	0.141	0.088	0.117	0.201	0.316	0.000	0.320	0.063

Problem 44	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	204	204	193	169	188	470	0	182	182
N.S.	1	1.00	0.95	0.83	0.92	2.30	0.00	0.89	0.89
time (sec)	N/A	0.162	0.062	0.109	0.194	0.505	0.000	0.310	7.862

Problem 45	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	224	224	231	193	214	544	0	216	209
N.S.	1	1.00	1.03	0.86	0.96	2.43	0.00	0.96	0.93
time (sec)	N/A	0.215	0.087	0.124	0.197	1.450	0.000	0.364	0.151

Problem 46	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	239	239	261	217	238	616	0	249	233
N.S.	1	1.00	1.09	0.91	1.00	2.58	0.00	1.04	0.97
time (sec)	N/A	0.216	0.085	0.131	0.189	6.601	0.000	0.282	0.372

Problem 47	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	C	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	185	185	186	158	137	278	1103	125	185
N.S.	1	1.00	1.01	0.85	0.74	1.50	5.96	0.68	1.00
time (sec)	N/A	0.086	0.530	0.183	0.274	0.294	2.187	0.287	0.153

Problem 48	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	C	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	223	223	235	202	173	384	4496	165	249
N.S.	1	1.00	1.05	0.91	0.78	1.72	20.16	0.74	1.12
time (sec)	N/A	0.141	0.390	0.277	0.286	0.309	138.761	0.325	7.974

Problem 49	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	243	243	259	232	200	435	0	192	295
N.S.	1	1.00	1.07	0.95	0.82	1.79	0.00	0.79	1.21
time (sec)	N/A	0.153	0.435	0.304	0.272	0.487	0.000	0.307	8.066

Problem 50	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	263	263	303	262	217	485	0	222	1611
N.S.	1	1.00	1.15	1.00	0.83	1.84	0.00	0.84	6.13
time (sec)	N/A	0.179	0.568	0.432	0.284	1.221	0.000	0.307	3.443

Problem 51	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	269	269	325	292	229	521	0	249	1963
N.S.	1	1.00	1.21	1.09	0.85	1.94	0.00	0.93	7.30
time (sec)	N/A	0.200	0.580	0.505	0.281	5.488	0.000	0.295	12.838

Problem 52	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F	F(-1)	F(-1)	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	474	474	488	499	0	0	0	3389	4225
N.S.	1	1.00	1.03	1.05	0.00	0.00	0.00	7.15	8.91
time (sec)	N/A	1.442	1.137	0.528	0.000	0.000	0.000	3.107	8.771

Problem 53	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F	F(-1)	F(-1)	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	621	621	625	607	0	0	0	5284	8689
N.S.	1	1.00	1.01	0.98	0.00	0.00	0.00	8.51	13.99
time (sec)	N/A	2.935	1.929	0.648	0.000	0.000	0.000	2.444	9.384

Problem 54	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	646	646	661	644	0	0	0	5619	13431
N.S.	1	1.00	1.02	1.00	0.00	0.00	0.00	8.70	20.79
time (sec)	N/A	2.091	2.357	0.579	0.000	0.000	0.000	2.552	10.415

Problem 55	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	679	679	739	724	0	0	0	6854	23811
N.S.	1	1.00	1.09	1.07	0.00	0.00	0.00	10.09	35.07
time (sec)	N/A	2.761	3.899	0.240	0.000	0.000	0.000	3.094	10.961

Problem 56	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	728	728	821	795	0	0	0	7340	36653
N.S.	1	1.00	1.13	1.09	0.00	0.00	0.00	10.08	50.35
time (sec)	N/A	1.848	5.350	0.296	0.000	0.000	0.000	3.383	12.374

Problem 57	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	1150	1144	1590	1167	0	0	0	22429	114377
N.S.	1	0.99	1.38	1.01	0.00	0.00	0.00	19.50	99.46
time (sec)	N/A	5.063	6.849	1.392	0.000	0.000	0.000	3.501	32.044

Problem 58	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	645	645	775	422	0	0	0	16214	53538
N.S.	1	1.00	1.20	0.65	0.00	0.00	0.00	25.14	83.00
time (sec)	N/A	2.162	2.474	0.583	0.000	0.000	0.000	3.249	13.368

Problem 59	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	F	F(-1)	F(-1)	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	1177	1179	1649	1182	0	0	0	29142	97905
N.S.	1	1.00	1.40	1.00	0.00	0.00	0.00	24.76	83.18
time (sec)	N/A	5.117	6.801	1.140	0.000	0.000	0.000	4.868	27.137

Problem 60	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	416	416	416	412	418	418	503	463	398
N.S.	1	1.00	1.00	0.99	1.00	1.00	1.21	1.11	0.96
time (sec)	N/A	0.407	0.078	28.809	0.190	0.258	0.053	0.304	0.298

Problem 61	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	259	259	259	259	251	251	309	285	246
N.S.	1	1.00	1.00	1.00	0.97	0.97	1.19	1.10	0.95
time (sec)	N/A	0.218	0.035	27.405	0.191	0.270	0.041	0.298	8.113

Problem 62	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	154	154	154	141	138	138	165	151	138
N.S.	1	1.00	1.00	0.92	0.90	0.90	1.07	0.98	0.90
time (sec)	N/A	0.100	0.027	0.134	0.186	0.276	0.027	0.387	0.069

Problem 63	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	20	20	20	17	16	16	15	16	16
N.S.	1	1.00	1.00	0.85	0.80	0.80	0.75	0.80	0.80
time (sec)	N/A	0.021	0.004	0.025	0.187	0.258	0.028	0.619	0.016

Problem 64	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	C	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	211	211	234	48	0	723401	0	1616	3942
N.S.	1	1.00	1.11	0.23	0.00	3428.44	0.00	7.66	18.68
time (sec)	N/A	0.195	0.143	0.063	0.000	18.527	0.000	1.225	0.637

Problem 65	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	368	368	398	232	0	0	0	5159	4707
N.S.	1	1.00	1.08	0.63	0.00	0.00	0.00	14.02	12.79
time (sec)	N/A	0.560	0.738	0.243	0.000	0.000	0.000	2.825	8.620

Problem 66	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	C	<b>F</b>	<b>F(-1)</b>	<b>F(-1)</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	621	621	625	607	0	0	0	5280	8689
N.S.	1	1.00	1.01	0.98	0.00	0.00	0.00	8.50	13.99
time (sec)	N/A	2.638	2.034	0.558	0.000	0.000	0.000	1.596	9.343

Problem 67	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	4	4	4	5	4	4	3	5	4
N.S.	1	1.00	1.00	1.25	1.00	1.00	0.75	1.25	1.00
time (sec)	N/A	0.009	0.002	0.025	0.183	0.269	0.024	0.279	0.012

Problem 68	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	14	14	16	15	14	14	12	15	14
N.S.	1	1.00	1.14	1.07	1.00	1.00	0.86	1.07	1.00
time (sec)	N/A	0.017	0.017	0.033	0.197	0.262	0.057	0.315	7.856

Problem 69	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	31	31	30	28	27	27	26	28	27
N.S.	1	1.00	0.97	0.90	0.87	0.87	0.84	0.90	0.87
time (sec)	N/A	0.034	0.023	0.034	0.181	0.262	0.077	0.306	0.022

Problem 70	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	51	51	45	45	43	43	41	47	44
N.S.	1	1.00	0.88	0.88	0.84	0.84	0.80	0.92	0.86
time (sec)	N/A	0.056	0.022	0.039	0.191	0.261	0.082	0.299	0.022

Problem 71	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	68	68	68	65	62	62	63	72	64
N.S.	1	1.00	1.00	0.96	0.91	0.91	0.93	1.06	0.94
time (sec)	N/A	0.079	0.023	0.042	0.188	0.244	0.099	0.298	0.020

Problem 72	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	92	92	92	88	84	84	88	103	87
N.S.	1	1.00	1.00	0.96	0.91	0.91	0.96	1.12	0.95
time (sec)	N/A	0.111	0.042	0.045	0.183	0.251	0.126	0.295	0.023

Problem 73	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	11	11	11	12	11	11	8	13	8
N.S.	1	1.00	1.00	1.09	1.00	1.00	0.73	1.18	0.73
time (sec)	N/A	0.007	0.045	0.032	0.189	0.254	0.044	0.309	0.051

Problem 74	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	22	22	23	24	22	22	29	24	22
N.S.	1	1.00	1.05	1.09	1.00	1.00	1.32	1.09	1.00
time (sec)	N/A	0.012	0.016	0.038	0.181	0.247	0.165	0.290	7.893

Problem 75	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	29	29	30	31	29	29	44	31	29
N.S.	1	1.00	1.03	1.07	1.00	1.00	1.52	1.07	1.00
time (sec)	N/A	0.033	0.042	0.044	0.179	0.239	0.301	0.304	0.043

Problem 76	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	47	47	44	47	45	45	66	47	45
N.S.	1	1.00	0.94	1.00	0.96	0.96	1.40	1.00	0.96
time (sec)	N/A	0.047	0.070	0.052	0.189	0.253	0.480	0.302	0.039

Problem 77	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	66	66	67	65	62	62	94	67	63
N.S.	1	1.00	1.02	0.98	0.94	0.94	1.42	1.02	0.95
time (sec)	N/A	0.057	0.039	0.056	0.191	0.256	0.850	0.308	0.043

Problem 78	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	90	90	91	88	84	84	122	95	86
N.S.	1	1.00	1.01	0.98	0.93	0.93	1.36	1.06	0.96
time (sec)	N/A	0.072	0.029	0.061	0.179	0.249	1.394	0.299	0.051



Problem 79	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	29	29	29	20	19	19	19	22	19
N.S.	1	1.00	1.00	0.69	0.66	0.66	0.66	0.76	0.66
time (sec)	N/A	0.013	0.007	0.038	0.190	0.251	0.063	0.285	0.041

Problem 80	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	B	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	42	42	39	38	32	32	304	35	38
N.S.	1	1.00	0.93	0.90	0.76	0.76	7.24	0.83	0.90
time (sec)	N/A	0.032	0.014	0.046	0.178	0.261	1.109	0.274	7.785

Problem 81	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	B	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	47	47	44	47	37	37	716	40	47
N.S.	1	1.00	0.94	1.00	0.79	0.79	15.23	0.85	1.00
time (sec)	N/A	0.041	0.017	0.056	0.186	0.250	7.753	0.306	0.066

Problem 82	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	B	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	57	57	55	59	47	47	1389	50	59
N.S.	1	1.00	0.96	1.04	0.82	0.82	24.37	0.88	1.04
time (sec)	N/A	0.055	0.031	0.059	0.189	0.268	54.944	0.301	7.872

Problem 83	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	74	74	71	78	62	62	0	65	78
N.S.	1	1.00	0.96	1.05	0.84	0.84	0.00	0.88	1.05
time (sec)	N/A	0.072	0.028	0.073	0.188	0.284	0.000	0.286	8.034

Problem 84	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	96	96	91	99	82	82	0	87	99
N.S.	1	1.00	0.95	1.03	0.85	0.85	0.00	0.91	1.03
time (sec)	N/A	0.093	0.034	0.076	0.184	0.315	0.000	0.302	7.928

Problem 85	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	46	46	42	33	32	45	34	36	32
N.S.	1	1.00	0.91	0.72	0.70	0.98	0.74	0.78	0.70
time (sec)	N/A	0.034	0.017	0.060	0.186	0.266	0.138	0.293	0.030

Problem 86	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	B	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	71	71	66	64	57	93	1188	61	64
N.S.	1	1.00	0.93	0.90	0.80	1.31	16.73	0.86	0.90
time (sec)	N/A	0.122	0.034	0.069	0.183	0.279	7.105	0.299	7.948

Problem 87	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	82	82	77	79	68	116	0	72	79
N.S.	1	1.00	0.94	0.96	0.83	1.41	0.00	0.88	0.96
time (sec)	N/A	0.138	0.043	0.076	0.193	0.340	0.000	0.301	7.902

Problem 88	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	95	95	90	94	81	141	0	85	94
N.S.	1	1.00	0.95	0.99	0.85	1.48	0.00	0.89	0.99
time (sec)	N/A	0.154	0.041	0.083	0.184	0.722	0.000	0.286	7.943

Problem 89	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	106	106	102	109	92	164	0	96	108
N.S.	1	1.00	0.96	1.03	0.87	1.55	0.00	0.91	1.02
time (sec)	N/A	0.185	0.045	0.098	0.181	3.260	0.000	0.291	8.113

Problem 90	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	122	122	118	127	108	200	0	112	127
N.S.	1	1.00	0.97	1.04	0.89	1.64	0.00	0.92	1.04
time (sec)	N/A	0.211	0.050	0.116	0.190	19.688	0.000	0.297	8.369

Problem 91	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	56	56	48	40	42	72	46	46	42
N.S.	1	1.00	0.86	0.71	0.75	1.29	0.82	0.82	0.75
time (sec)	N/A	0.045	0.019	0.064	0.192	0.254	0.149	0.313	0.027

Problem 92	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	B	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	89	89	80	78	75	153	1255	79	79
N.S.	1	1.00	0.90	0.88	0.84	1.72	14.10	0.89	0.89
time (sec)	N/A	0.159	0.035	0.073	0.197	0.270	6.979	0.290	0.057

Problem 93	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	105	105	97	96	91	191	0	95	97
N.S.	1	1.00	0.92	0.91	0.87	1.82	0.00	0.90	0.92
time (sec)	N/A	0.202	0.055	0.081	0.186	0.340	0.000	0.304	0.077

Problem 94	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	117	117	114	114	107	229	0	111	115
N.S.	1	1.00	0.97	0.97	0.91	1.96	0.00	0.95	0.98
time (sec)	N/A	0.174	0.043	0.100	0.186	0.725	0.000	0.300	7.978

Problem 95	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	131	131	136	132	123	267	0	127	133
N.S.	1	1.00	1.04	1.01	0.94	2.04	0.00	0.97	1.02
time (sec)	N/A	0.198	0.060	0.124	0.187	3.518	0.000	0.290	8.236

Problem 96	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	147	147	153	150	139	305	0	143	151
N.S.	1	1.00	1.04	1.02	0.95	2.07	0.00	0.97	1.03
time (sec)	N/A	0.205	0.063	0.125	0.197	21.463	0.000	0.297	8.666

Problem 97	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	A	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	68	68	60	47	52	103	53	56	52
N.S.	1	1.00	0.88	0.69	0.76	1.51	0.78	0.82	0.76
time (sec)	N/A	0.038	0.021	0.067	0.187	0.251	0.157	0.295	0.026

Problem 98	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	B	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	105	105	97	92	88	211	1034	92	90
N.S.	1	1.00	0.92	0.88	0.84	2.01	9.85	0.88	0.86
time (sec)	N/A	0.134	0.060	0.077	0.191	0.279	5.457	0.300	0.058

Problem 99	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	122	122	121	113	108	267	0	112	113
N.S.	1	1.00	0.99	0.93	0.89	2.19	0.00	0.92	0.93
time (sec)	N/A	0.148	0.042	0.080	0.198	0.361	0.000	0.285	7.901

Problem 100	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	141	141	144	134	126	321	0	130	131
N.S.	1	1.00	1.02	0.95	0.89	2.28	0.00	0.92	0.93
time (sec)	N/A	0.167	0.052	0.088	0.188	0.777	0.000	0.288	8.211

Problem 101	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	158	158	169	155	145	376	0	149	152
N.S.	1	1.00	1.07	0.98	0.92	2.38	0.00	0.94	0.96
time (sec)	N/A	0.201	0.062	0.111	0.192	3.629	0.000	0.293	8.431

Problem 102	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	F(-1)	A	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	177	177	195	176	163	430	0	167	170
N.S.	1	1.00	1.10	0.99	0.92	2.43	0.00	0.94	0.96
time (sec)	N/A	0.231	0.071	0.129	0.196	20.839	0.000	0.299	8.687

Problem 103	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	F	A	F	F	F(-1)
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	717	717	2588	1209	0	911	0	0	0
N.S.	1	1.00	3.61	1.69	0.00	1.27	0.00	0.00	0.00
time (sec)	N/A	0.393	11.689	5.791	0.000	0.313	0.000	0.000	0.000

Problem 104	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	<b>F</b>	A	<b>F</b>	<b>F</b>	<b>F(-1)</b>
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	505	505	661	620	0	574	0	0	0
N.S.	1	1.00	1.31	1.23	0.00	1.14	0.00	0.00	0.00
time (sec)	N/A	0.178	12.543	5.344	0.000	0.255	0.000	0.000	0.000

Problem 105	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	<b>F</b>	A	<b>F</b>	<b>F</b>	<b>F(-1)</b>
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	359	359	525	426	0	376	0	0	0
N.S.	1	1.00	1.46	1.19	0.00	1.05	0.00	0.00	0.00
time (sec)	N/A	0.102	10.869	4.082	0.000	0.189	0.000	0.000	0.000

Problem 106	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	<b>F</b>	A	<b>F</b>	<b>F</b>	<b>F(-1)</b>
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	447	447	513	565	0	723	0	0	0
N.S.	1	1.00	1.15	1.26	0.00	1.62	0.00	0.00	0.00
time (sec)	N/A	0.174	11.157	2.107	0.000	0.115	0.000	0.000	0.000

Problem 107	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	C	A	<b>F</b>	B	<b>F(-1)</b>	<b>F</b>	<b>F(-1)</b>
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	680	680	598	829	0	1948	0	0	0
N.S.	1	1.00	0.88	1.22	0.00	2.86	0.00	0.00	0.00
time (sec)	N/A	0.323	11.995	2.319	0.000	0.145	0.000	0.000	0.000

Problem 108	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	<b>F</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	19	19	19	18	17	17	0	60	17
N.S.	1	1.00	1.00	0.95	0.89	0.89	0.00	3.16	0.89
time (sec)	N/A	0.014	10.093	1.102	0.220	0.270	0.000	0.669	8.012

Problem 109	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	<b>F</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	57	57	51	52	51	82	0	138	51
N.S.	1	1.00	0.89	0.91	0.89	1.44	0.00	2.42	0.89
time (sec)	N/A	0.041	10.135	1.599	0.243	0.275	0.000	0.662	7.918

Problem 110	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	<b>F</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	57	57	48	53	49	80	0	136	51
N.S.	1	1.00	0.84	0.93	0.86	1.40	0.00	2.39	0.89
time (sec)	N/A	0.055	10.083	1.596	0.226	0.276	0.000	0.622	7.940

Problem 111	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	<b>F</b>	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	69	69	61	63	94	92	0	164	62
N.S.	1	1.00	0.88	0.91	1.36	1.33	0.00	2.38	0.90
time (sec)	N/A	0.058	10.155	1.790	0.234	0.286	0.000	0.656	7.995

## 2.3 Detailed conclusion table specific for Rubi results

The following table is specific to Rubi only. It gives additional statistics for each integral. the column **steps** is the number of steps used by Rubi to obtain the antiderivative. The **rules** column is the number of unique rules used. The **integrand size** column is the leaf size of the integrand. Finally the ratio  $\frac{\text{number of rules}}{\text{integrand size}}$  is also given. The larger this ratio is, the harder the integral is to solve. In this test file, problem number [47] had the largest ratio of [.687500000000000000]

Table 2.1: Rubi specific breakdown of results for each integral

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
1	A	2	1	1.00	18	0.056
2	A	2	1	1.00	23	0.043
3	A	2	1	1.00	28	0.036
4	A	2	1	1.00	33	0.030
5	A	2	1	1.00	38	0.026
6	A	2	1	1.00	20	0.050
7	A	2	1	1.00	25	0.040
8	A	2	1	1.00	30	0.033
9	A	2	1	1.00	35	0.029
10	A	10	7	1.00	18	0.389
11	A	9	7	1.00	23	0.304
12	A	8	6	1.00	28	0.214
13	A	10	7	1.00	33	0.212
14	A	12	8	1.00	38	0.210
15	A	15	8	1.00	16	0.500
16	A	14	8	1.00	21	0.381
17	A	15	7	1.00	26	0.269
18	A	17	8	1.00	31	0.258
19	A	19	9	1.00	36	0.250
20	A	9	7	1.00	20	0.350
21	A	8	7	1.00	25	0.280
22	A	9	8	1.00	30	0.267
23	A	11	9	1.00	35	0.257
24	A	13	10	1.00	40	0.250

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Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
25	A	13	10	1.00	55	0.182
26	A	12	9	1.00	18	0.500
27	A	11	9	1.00	23	0.391
28	A	10	8	1.00	28	0.286
29	A	10	8	1.00	33	0.242
30	A	11	9	1.00	38	0.237
31	A	17	10	1.00	16	0.625
32	A	16	10	1.00	21	0.476
33	A	15	9	1.00	26	0.346
34	A	15	9	1.00	31	0.290
35	A	16	10	1.00	36	0.278
36	A	11	9	1.00	20	0.450
37	A	10	9	1.00	25	0.360
38	A	9	8	1.00	30	0.267
39	A	9	8	1.00	35	0.229
40	A	10	9	1.00	40	0.225
41	A	13	11	1.00	55	0.200
42	A	14	10	1.00	18	0.556
43	A	13	9	1.00	23	0.391
44	A	12	9	1.00	28	0.321
45	A	12	10	1.00	33	0.303
46	A	13	11	1.00	38	0.290
47	A	19	11	1.00	16	0.688
48	A	18	10	1.00	21	0.476
49	A	17	10	1.00	26	0.385
50	A	17	11	1.00	31	0.355
51	A	18	12	1.00	36	0.333
52	A	13	10	1.00	20	0.500
53	A	12	9	1.00	25	0.360
54	A	11	9	1.00	30	0.300
55	A	11	10	1.00	35	0.286
56	A	12	11	1.00	40	0.275
57	A	11	9	0.99	55	0.164
58	A	11	10	1.00	50	0.200
59	A	13	10	1.00	50	0.200

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Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
60	A	2	1	1.00	63	0.016
61	A	2	1	1.00	63	0.016
62	A	2	1	1.00	61	0.016
63	A	2	1	1.00	63	0.016
64	A	9	8	1.00	63	0.127
65	A	11	10	1.00	63	0.159
66	A	13	10	1.00	63	0.159
67	A	2	2	1.00	26	0.077
68	A	3	2	1.00	31	0.065
69	A	3	2	1.00	36	0.056
70	A	3	2	1.00	41	0.049
71	A	3	2	1.00	46	0.043
72	A	3	2	1.00	51	0.039
73	A	4	3	1.00	21	0.143
74	A	4	3	1.00	26	0.115
75	A	6	4	1.00	31	0.129
76	A	6	4	1.00	36	0.111
77	A	6	4	1.00	41	0.098
78	A	6	4	1.00	46	0.087
79	A	3	2	1.00	16	0.125
80	A	3	2	1.00	21	0.095
81	A	3	2	1.00	26	0.077
82	A	3	2	1.00	31	0.065
83	A	3	2	1.00	36	0.056
84	A	3	2	1.00	41	0.049
85	A	3	2	1.00	26	0.077
86	A	3	2	1.00	31	0.065
87	A	3	2	1.00	36	0.056
88	A	3	2	1.00	41	0.049
89	A	3	2	1.00	46	0.043
90	A	3	2	1.00	51	0.039
91	A	9	5	1.00	21	0.238
92	A	9	5	1.00	26	0.192
93	A	9	5	1.00	31	0.161
94	A	3	2	1.00	36	0.056

Continued on next page

Table 2.1 – continued from previous page

#	grade	number of steps used	number of unique rules	normalized antiderivative leaf size	integrand leaf size	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
95	A	3	2	1.00	41	0.049
96	A	3	2	1.00	46	0.043
97	A	3	2	1.00	16	0.125
98	A	3	2	1.00	21	0.095
99	A	3	2	1.00	26	0.077
100	A	3	2	1.00	31	0.065
101	A	3	2	1.00	36	0.056
102	A	3	2	1.00	41	0.049
103	A	12	10	1.00	32	0.312
104	A	10	10	1.00	32	0.312
105	A	8	8	1.00	32	0.250
106	A	7	7	1.00	32	0.219
107	A	9	8	1.00	32	0.250
108	A	1	1	1.00	28	0.036
109	A	5	5	1.00	31	0.161
110	A	5	5	1.00	33	0.152
111	A	4	4	1.00	36	0.111



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# CHAPTER 3

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## LISTING OF INTEGRALS

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3.62	$\int (a+bx^2+cx^4) (ad+aex+(bd+af)x^2+bex^3+(cd+bf)x^4+cex^5+cfx^6) dx$	905
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3.70	$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx$	964
3.71	$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx$	968
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3.75	$\int \frac{(2-3x+x^2)(d+ex+fx^2)}{4-5x^2+x^4} dx$	986
3.76	$\int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx$	990
3.77	$\int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx$	994
3.78	$\int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx$	999
3.79	$\int \frac{2+x}{4-5x^2+x^4} dx$	1005
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3.81	$\int \frac{(2+x)(d+ex+fx^2)}{4-5x^2+x^4} dx$	1013
3.82	$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx$	1018
3.83	$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx$	1023
3.84	$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx$	1028
3.85	$\int \frac{2-x-2x^2+x^3}{(4-5x^2+x^4)^2} dx$	1033
3.86	$\int \frac{(d+ex)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx$	1037
3.87	$\int \frac{(d+ex+fx^2)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx$	1042
3.88	$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx$	1047
3.89	$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx$	1052
3.90	$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx$	1057
3.91	$\int \frac{2-3x+x^2}{(4-5x^2+x^4)^2} dx$	1062

3.92	$\int \frac{(d+ex)(2-3x+x^2)}{(4-5x^2+x^4)^2} dx$	1067
3.93	$\int \frac{(2-3x+x^2)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx$	1074
3.94	$\int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx$	1081
3.95	$\int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx$	1087
3.96	$\int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx$	1093
3.97	$\int \frac{2+x}{(4-5x^2+x^4)^2} dx$	1099
3.98	$\int \frac{(2+x)(d+ex)}{(4-5x^2+x^4)^2} dx$	1103
3.99	$\int \frac{(2+x)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx$	1109
3.100	$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx$	1114
3.101	$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx$	1120
3.102	$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx$	1126
3.103	$\int (d+ex+fx^2+gx^3)(a+bx^2+cx^4)^{3/2} dx$	1133
3.104	$\int (d+ex+fx^2+gx^3)\sqrt{a+bx^2+cx^4} dx$	1144
3.105	$\int \frac{d+ex+fx^2+gx^3}{\sqrt{a+bx^2+cx^4}} dx$	1153
3.106	$\int \frac{d+ex+fx^2+gx^3}{(a+bx^2+cx^4)^{3/2}} dx$	1160
3.107	$\int \frac{d+ex+fx^2+gx^3}{(a+bx^2+cx^4)^{5/2}} dx$	1167
3.108	$\int \frac{ag-cgx^4}{(a+bx^2+cx^4)^{3/2}} dx$	1176
3.109	$\int \frac{ag+ex-cgx^4}{(a+bx^2+cx^4)^{3/2}} dx$	1180
3.110	$\int \frac{ag+fx^3-cgx^4}{(a+bx^2+cx^4)^{3/2}} dx$	1185
3.111	$\int \frac{ag+ex+fx^3-cgx^4}{(a+bx^2+cx^4)^{3/2}} dx$	1190



### 3.1 $\int (d + ex) (a + bx^2 + cx^4) dx$

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#### Optimal result

Integrand size = 18, antiderivative size = 50

$$\int (d + ex) (a + bx^2 + cx^4) dx = adx + \frac{1}{2}aex^2 + \frac{1}{3}bdx^3 + \frac{1}{4}bex^4 + \frac{1}{5}cdx^5 + \frac{1}{6}cex^6$$

[Out]  $a*d*x+1/2*a*e*x^2+1/3*b*d*x^3+1/4*b*e*x^4+1/5*c*d*x^5+1/6*c*e*x^6$

#### Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 50, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.056$ , Rules used = {1685}

$$\int (d + ex) (a + bx^2 + cx^4) dx = adx + \frac{1}{2}aex^2 + \frac{1}{3}bdx^3 + \frac{1}{4}bex^4 + \frac{1}{5}cdx^5 + \frac{1}{6}cex^6$$

[In]  $\text{Int}[(d + e*x)*(a + b*x^2 + c*x^4), x]$

[Out]  $a*d*x + (a*e*x^2)/2 + (b*d*x^3)/3 + (b*e*x^4)/4 + (c*d*x^5)/5 + (c*e*x^6)/6$

#### Rule 1685

$\text{Int}[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x\_Symbol] \rightarrow \text{Int}[\text{ExpandIntegrand}[Pq*(a + b*x^2 + c*x^4)^p, x], x] /; \text{FreeQ}\{a, b, c, x\} \&\& \text{PolyQ}[Pq, x] \&\& \text{IGtQ}[p, 0]$

#### Rubi steps

$$\begin{aligned} \text{integral} &= \int (ad + aex + bdx^2 + bex^3 + cdx^4 + cex^5) dx \\ &= adx + \frac{1}{2}aex^2 + \frac{1}{3}bdx^3 + \frac{1}{4}bex^4 + \frac{1}{5}cdx^5 + \frac{1}{6}cex^6 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.02 (sec) , antiderivative size = 50, normalized size of antiderivative = 1.00

$$\int (d + ex) (a + bx^2 + cx^4) dx = adx + \frac{1}{2}aex^2 + \frac{1}{3}bdx^3 + \frac{1}{4}bex^4 + \frac{1}{5}cdx^5 + \frac{1}{6}cex^6$$

[In] Integrate[(d + e\*x)\*(a + b\*x^2 + c\*x^4),x]

[Out] a\*d\*x + (a\*e\*x^2)/2 + (b\*d\*x^3)/3 + (b\*e\*x^4)/4 + (c\*d\*x^5)/5 + (c\*e\*x^6)/6

**Maple [A] (verified)**

Time = 0.02 (sec) , antiderivative size = 41, normalized size of antiderivative = 0.82

method	result	size
gospers	$adx + \frac{1}{2}aex^2 + \frac{1}{3}x^3bd + \frac{1}{4}bex^4 + \frac{1}{5}cdx^5 + \frac{1}{6}cex^6$	41
default	$adx + \frac{1}{2}aex^2 + \frac{1}{3}x^3bd + \frac{1}{4}bex^4 + \frac{1}{5}cdx^5 + \frac{1}{6}cex^6$	41
norman	$adx + \frac{1}{2}aex^2 + \frac{1}{3}x^3bd + \frac{1}{4}bex^4 + \frac{1}{5}cdx^5 + \frac{1}{6}cex^6$	41
risch	$adx + \frac{1}{2}aex^2 + \frac{1}{3}x^3bd + \frac{1}{4}bex^4 + \frac{1}{5}cdx^5 + \frac{1}{6}cex^6$	41
parallelrisch	$adx + \frac{1}{2}aex^2 + \frac{1}{3}x^3bd + \frac{1}{4}bex^4 + \frac{1}{5}cdx^5 + \frac{1}{6}cex^6$	41

[In] int((e\*x+d)\*(c\*x^4+b\*x^2+a),x,method=\_RETURNVERBOSE)

[Out] a\*d\*x+1/2\*a\*e\*x^2+1/3\*x^3\*b\*d+1/4\*b\*e\*x^4+1/5\*c\*d\*x^5+1/6\*c\*e\*x^6

**Fricas [A] (verification not implemented)**

none

Time = 0.23 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.80

$$\int (d + ex) (a + bx^2 + cx^4) dx = \frac{1}{6}cex^6 + \frac{1}{5}cdx^5 + \frac{1}{4}bex^4 + \frac{1}{3}bdx^3 + \frac{1}{2}aex^2 + adx$$

[In] integrate((e\*x+d)\*(c\*x^4+b\*x^2+a),x, algorithm="fricas")

[Out] 1/6\*c\*e\*x^6 + 1/5\*c\*d\*x^5 + 1/4\*b\*e\*x^4 + 1/3\*b\*d\*x^3 + 1/2\*a\*e\*x^2 + a\*d\*x

**Sympy [A] (verification not implemented)**

Time = 0.02 (sec) , antiderivative size = 46, normalized size of antiderivative = 0.92

$$\int (d + ex) (a + bx^2 + cx^4) dx = adx + \frac{aex^2}{2} + \frac{bdx^3}{3} + \frac{bex^4}{4} + \frac{cdx^5}{5} + \frac{cex^6}{6}$$

[In] integrate((e\*x+d)\*(c\*x\*\*4+b\*x\*\*2+a),x)

[Out] a\*d\*x + a\*e\*x\*\*2/2 + b\*d\*x\*\*3/3 + b\*e\*x\*\*4/4 + c\*d\*x\*\*5/5 + c\*e\*x\*\*6/6

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.80

$$\int (d + ex) (a + bx^2 + cx^4) dx = \frac{1}{6} cex^6 + \frac{1}{5} cdx^5 + \frac{1}{4} bex^4 + \frac{1}{3} bdx^3 + \frac{1}{2} aex^2 + adx$$

[In] integrate((e\*x+d)\*(c\*x^4+b\*x^2+a),x, algorithm="maxima")

[Out] 1/6\*c\*e\*x^6 + 1/5\*c\*d\*x^5 + 1/4\*b\*e\*x^4 + 1/3\*b\*d\*x^3 + 1/2\*a\*e\*x^2 + a\*d\*x

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.80

$$\int (d + ex) (a + bx^2 + cx^4) dx = \frac{1}{6} cex^6 + \frac{1}{5} cdx^5 + \frac{1}{4} bex^4 + \frac{1}{3} bdx^3 + \frac{1}{2} aex^2 + adx$$

[In] integrate((e\*x+d)\*(c\*x^4+b\*x^2+a),x, algorithm="giac")

[Out] 1/6\*c\*e\*x^6 + 1/5\*c\*d\*x^5 + 1/4\*b\*e\*x^4 + 1/3\*b\*d\*x^3 + 1/2\*a\*e\*x^2 + a\*d\*x

**Mupad [B] (verification not implemented)**

Time = 0.02 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.80

$$\int (d + ex) (a + bx^2 + cx^4) dx = \frac{cex^6}{6} + \frac{cdx^5}{5} + \frac{bex^4}{4} + \frac{bdx^3}{3} + \frac{aex^2}{2} + adx$$

[In] int((d + e\*x)\*(a + b\*x^2 + c\*x^4),x)

[Out] a\*d\*x + (a\*e\*x^2)/2 + (b\*d\*x^3)/3 + (b\*e\*x^4)/4 + (c\*d\*x^5)/5 + (c\*e\*x^6)/6

## 3.2 $\int (d + ex + fx^2)(a + bx^2 + cx^4) dx$

Optimal result	60
Rubi [A] (verified)	60
Mathematica [A] (verified)	61
Maple [A] (verified)	61
Fricas [A] (verification not implemented)	62
Sympy [A] (verification not implemented)	62
Maxima [A] (verification not implemented)	62
Giac [A] (verification not implemented)	63
Mupad [B] (verification not implemented)	63

### Optimal result

Integrand size = 23, antiderivative size = 69

$$\int (d + ex + fx^2)(a + bx^2 + cx^4) dx = adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + \frac{1}{4}bex^4 + \frac{1}{5}(cd + bf)x^5 + \frac{1}{6}cex^6 + \frac{1}{7}cfx^7$$

[Out] a\*d\*x+1/2\*a\*e\*x^2+1/3\*(a\*f+b\*d)\*x^3+1/4\*b\*e\*x^4+1/5\*(b\*f+c\*d)\*x^5+1/6\*c\*e\*x^6+1/7\*c\*f\*x^7

### Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.043$ , Rules used = {1671}

$$\int (d + ex + fx^2)(a + bx^2 + cx^4) dx = \frac{1}{3}x^3(af + bd) + adx + \frac{1}{2}aex^2 + \frac{1}{5}x^5(bf + cd) + \frac{1}{4}bex^4 + \frac{1}{6}cex^6 + \frac{1}{7}cfx^7$$

[In] Int[(d + e\*x + f\*x^2)\*(a + b\*x^2 + c\*x^4),x]

[Out] a\*d\*x + (a\*e\*x^2)/2 + ((b\*d + a\*f)\*x^3)/3 + (b\*e\*x^4)/4 + ((c\*d + b\*f)\*x^5)/5 + (c\*e\*x^6)/6 + (c\*f\*x^7)/7

#### Rule 1671

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(p\_), x\_Symbol] :> Int[Expand Integrand[Pq\*(a + b\*x + c\*x^2)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, -2]

Rubi steps

$$\begin{aligned} \text{integral} &= \int (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx \\ &= adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + \frac{1}{4}bex^4 + \frac{1}{5}(cd + bf)x^5 + \frac{1}{6}cex^6 + \frac{1}{7}cfx^7 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.02 (sec) , antiderivative size = 69, normalized size of antiderivative = 1.00

$$\begin{aligned} \int (d + ex + fx^2) (a + bx^2 + cx^4) dx &= adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + \frac{1}{4}bex^4 \\ &\quad + \frac{1}{5}(cd + bf)x^5 + \frac{1}{6}cex^6 + \frac{1}{7}cfx^7 \end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2)\*(a + b\*x^2 + c\*x^4),x]

[Out] a\*d\*x + (a\*e\*x^2)/2 + ((b\*d + a\*f)\*x^3)/3 + (b\*e\*x^4)/4 + ((c\*d + b\*f)\*x^5)/5 + (c\*e\*x^6)/6 + (c\*f\*x^7)/7

**Maple [A] (verified)**

Time = 0.07 (sec) , antiderivative size = 58, normalized size of antiderivative = 0.84

method	result	size
default	$adx + \frac{ae x^2}{2} + \frac{(af+bd)x^3}{3} + \frac{be x^4}{4} + \frac{(bf+cd)x^5}{5} + \frac{ce x^6}{6} + \frac{cf x^7}{7}$	58
norman	$\frac{cf x^7}{7} + \frac{ce x^6}{6} + \left(\frac{bf}{5} + \frac{cd}{5}\right) x^5 + \frac{be x^4}{4} + \left(\frac{af}{3} + \frac{bd}{3}\right) x^3 + \frac{ae x^2}{2} + adx$	60
gospers	$\frac{1}{7}cf x^7 + \frac{1}{6}ce x^6 + \frac{1}{5}x^5bf + \frac{1}{5}cd x^5 + \frac{1}{4}be x^4 + \frac{1}{3}x^3af + \frac{1}{3}x^3bd + \frac{1}{2}ae x^2 + adx$	62
risch	$\frac{1}{7}cf x^7 + \frac{1}{6}ce x^6 + \frac{1}{5}x^5bf + \frac{1}{5}cd x^5 + \frac{1}{4}be x^4 + \frac{1}{3}x^3af + \frac{1}{3}x^3bd + \frac{1}{2}ae x^2 + adx$	62
parallelrisch	$\frac{1}{7}cf x^7 + \frac{1}{6}ce x^6 + \frac{1}{5}x^5bf + \frac{1}{5}cd x^5 + \frac{1}{4}be x^4 + \frac{1}{3}x^3af + \frac{1}{3}x^3bd + \frac{1}{2}ae x^2 + adx$	62

[In] int((f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a),x,method=\_RETURNVERBOSE)

[Out] a\*d\*x+1/2\*a\*e\*x^2+1/3\*(a\*f+b\*d)\*x^3+1/4\*b\*e\*x^4+1/5\*(b\*f+c\*d)\*x^5+1/6\*c\*e\*x^6+1/7\*c\*f\*x^7

**Fricas [A] (verification not implemented)**

none

Time = 0.24 (sec) , antiderivative size = 57, normalized size of antiderivative = 0.83

$$\int (d + ex + fx^2) (a + bx^2 + cx^4) dx = \frac{1}{7} cfx^7 + \frac{1}{6} cex^6 + \frac{1}{4} bex^4 + \frac{1}{5} (cd + bf)x^5 + \frac{1}{2} aex^2 + \frac{1}{3} (bd + af)x^3 + adx$$

[In] integrate((f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a),x, algorithm="fricas")

[Out] 1/7\*c\*f\*x^7 + 1/6\*c\*e\*x^6 + 1/4\*b\*e\*x^4 + 1/5\*(c\*d + b\*f)\*x^5 + 1/2\*a\*e\*x^2 + 1/3\*(b\*d + a\*f)\*x^3 + a\*d\*x

**Sympy [A] (verification not implemented)**

Time = 0.02 (sec) , antiderivative size = 65, normalized size of antiderivative = 0.94

$$\int (d + ex + fx^2) (a + bx^2 + cx^4) dx = adx + \frac{aex^2}{2} + \frac{bex^4}{4} + \frac{cex^6}{6} + \frac{cfx^7}{7} + x^5 \left( \frac{bf}{5} + \frac{cd}{5} \right) + x^3 \left( \frac{af}{3} + \frac{bd}{3} \right)$$

[In] integrate((f\*x\*\*2+e\*x+d)\*(c\*x\*\*4+b\*x\*\*2+a),x)

[Out] a\*d\*x + a\*e\*x\*\*2/2 + b\*e\*x\*\*4/4 + c\*e\*x\*\*6/6 + c\*f\*x\*\*7/7 + x\*\*5\*(b\*f/5 + c\*d/5) + x\*\*3\*(a\*f/3 + b\*d/3)

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 57, normalized size of antiderivative = 0.83

$$\int (d + ex + fx^2) (a + bx^2 + cx^4) dx = \frac{1}{7} cfx^7 + \frac{1}{6} cex^6 + \frac{1}{4} bex^4 + \frac{1}{5} (cd + bf)x^5 + \frac{1}{2} aex^2 + \frac{1}{3} (bd + af)x^3 + adx$$

[In] integrate((f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a),x, algorithm="maxima")

[Out] 1/7\*c\*f\*x^7 + 1/6\*c\*e\*x^6 + 1/4\*b\*e\*x^4 + 1/5\*(c\*d + b\*f)\*x^5 + 1/2\*a\*e\*x^2 + 1/3\*(b\*d + a\*f)\*x^3 + a\*d\*x

**Giac [A] (verification not implemented)**

none

Time = 0.36 (sec) , antiderivative size = 61, normalized size of antiderivative = 0.88

$$\int (d + ex + fx^2)(a + bx^2 + cx^4) dx = \frac{1}{7} cfx^7 + \frac{1}{6} cex^6 + \frac{1}{5} cdx^5 + \frac{1}{5} bfx^5 \\ + \frac{1}{4} be x^4 + \frac{1}{3} bdx^3 + \frac{1}{3} afx^3 + \frac{1}{2} aex^2 + adx$$

[In] integrate((f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a),x, algorithm="giac")

[Out] 1/7\*c\*f\*x^7 + 1/6\*c\*e\*x^6 + 1/5\*c\*d\*x^5 + 1/5\*b\*f\*x^5 + 1/4\*b\*e\*x^4 + 1/3\*b\*d\*x^3 + 1/3\*a\*f\*x^3 + 1/2\*a\*e\*x^2 + a\*d\*x

**Mupad [B] (verification not implemented)**

Time = 0.02 (sec) , antiderivative size = 59, normalized size of antiderivative = 0.86

$$\int (d + ex + fx^2)(a + bx^2 + cx^4) dx = \frac{cfx^7}{7} + \frac{cex^6}{6} + \left(\frac{cd}{5} + \frac{bf}{5}\right) x^5 + \frac{be x^4}{4} \\ + \left(\frac{bd}{3} + \frac{af}{3}\right) x^3 + \frac{aex^2}{2} + adx$$

[In] int((d + e\*x + f\*x^2)\*(a + b\*x^2 + c\*x^4),x)

[Out] x^3\*((b\*d)/3 + (a\*f)/3) + x^5\*((c\*d)/5 + (b\*f)/5) + a\*d\*x + (a\*e\*x^2)/2 + (b\*e\*x^4)/4 + (c\*e\*x^6)/6 + (c\*f\*x^7)/7

### 3.3 $\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4) dx$

Optimal result	64
Rubi [A] (verified)	64
Mathematica [A] (verified)	65
Maple [A] (verified)	65
Fricas [A] (verification not implemented)	66
Sympy [A] (verification not implemented)	66
Maxima [A] (verification not implemented)	66
Giac [A] (verification not implemented)	67
Mupad [B] (verification not implemented)	67

#### Optimal result

Integrand size = 28, antiderivative size = 88

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4) dx = adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + \frac{1}{4}(be + ag)x^4 + \frac{1}{5}(cd + bf)x^5 + \frac{1}{6}(ce + bg)x^6 + \frac{1}{7}cfx^7 + \frac{1}{8}cgx^8$$

[Out] a\*d\*x+1/2\*a\*e\*x^2+1/3\*(a\*f+b\*d)\*x^3+1/4\*(a\*g+b\*e)\*x^4+1/5\*(b\*f+c\*d)\*x^5+1/6\*(b\*g+c\*e)\*x^6+1/7\*c\*f\*x^7+1/8\*c\*g\*x^8

#### Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 88, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.036$ , Rules used = {1685}

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4) dx = \frac{1}{3}x^3(af + bd) + \frac{1}{4}x^4(ag + be) + adx + \frac{1}{2}aex^2 + \frac{1}{5}x^5(bf + cd) + \frac{1}{6}x^6(bg + ce) + \frac{1}{7}cfx^7 + \frac{1}{8}cgx^8$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)\*(a + b\*x^2 + c\*x^4), x]

[Out] a\*d\*x + (a\*e\*x^2)/2 + ((b\*d + a\*f)\*x^3)/3 + ((b\*e + a\*g)\*x^4)/4 + ((c\*d + b\*f)\*x^5)/5 + ((c\*e + b\*g)\*x^6)/6 + (c\*f\*x^7)/7 + (c\*g\*x^8)/8

#### Rule 1685

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] :> Int[ExpandIntegrand[Pq\*(a + b\*x^2 + c\*x^4)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, 0]



Rubi steps

$$\begin{aligned} \text{integral} &= \int (ad+aux+(bd+af)x^2+(be+ag)x^3+(cd+bf)x^4+(ce+bg)x^5+cfx^6+cgx^7) dx \\ &= adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd+af)x^3 + \frac{1}{4}(be+ag)x^4 + \frac{1}{5}(cd+bf)x^5 + \frac{1}{6}(ce+bg)x^6 + \frac{1}{7}cfx^7 \\ &\quad + \frac{1}{8}cgx^8 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.03 (sec) , antiderivative size = 88, normalized size of antiderivative = 1.00

$$\int (d+ex+fx^2+gx^3)(a+bx^2+cx^4) dx = adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd+af)x^3 + \frac{1}{4}(be+ag)x^4 + \frac{1}{5}(cd+bf)x^5 + \frac{1}{6}(ce+bg)x^6 + \frac{1}{7}cfx^7 + \frac{1}{8}cgx^8$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)\*(a + b\*x^2 + c\*x^4), x]

[Out] a\*d\*x + (a\*e\*x^2)/2 + ((b\*d + a\*f)\*x^3)/3 + ((b\*e + a\*g)\*x^4)/4 + ((c\*d + b\*f)\*x^5)/5 + ((c\*e + b\*g)\*x^6)/6 + (c\*f\*x^7)/7 + (c\*g\*x^8)/8

**Maple [A] (verified)**

Time = 0.14 (sec) , antiderivative size = 75, normalized size of antiderivative = 0.85

method	result
default	$adx + \frac{ae x^2}{2} + \frac{(af+bd)x^3}{3} + \frac{(ag+be)x^4}{4} + \frac{(bf+cd)x^5}{5} + \frac{(bg+ec)x^6}{6} + \frac{cf x^7}{7} + \frac{cg x^8}{8}$
norman	$\frac{cg x^8}{8} + \frac{cf x^7}{7} + \left(\frac{bg}{6} + \frac{ec}{6}\right) x^6 + \left(\frac{bf}{5} + \frac{cd}{5}\right) x^5 + \left(\frac{ag}{4} + \frac{be}{4}\right) x^4 + \left(\frac{af}{3} + \frac{bd}{3}\right) x^3 + \frac{ae x^2}{2} + adx$
gospers	$\frac{1}{8}cg x^8 + \frac{1}{7}cf x^7 + \frac{1}{6}x^6bg + \frac{1}{6}ce x^6 + \frac{1}{5}x^5bf + \frac{1}{5}cd x^5 + \frac{1}{4}x^4ag + \frac{1}{4}be x^4 + \frac{1}{3}x^3af + \frac{1}{3}x^3bd + \frac{1}{2}ae x^2 + adx$
risch	$\frac{1}{8}cg x^8 + \frac{1}{7}cf x^7 + \frac{1}{6}x^6bg + \frac{1}{6}ce x^6 + \frac{1}{5}x^5bf + \frac{1}{5}cd x^5 + \frac{1}{4}x^4ag + \frac{1}{4}be x^4 + \frac{1}{3}x^3af + \frac{1}{3}x^3bd + \frac{1}{2}ae x^2 + adx$
parallelrisch	$\frac{1}{8}cg x^8 + \frac{1}{7}cf x^7 + \frac{1}{6}x^6bg + \frac{1}{6}ce x^6 + \frac{1}{5}x^5bf + \frac{1}{5}cd x^5 + \frac{1}{4}x^4ag + \frac{1}{4}be x^4 + \frac{1}{3}x^3af + \frac{1}{3}x^3bd + \frac{1}{2}ae x^2 + adx$

[In] int((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a), x, method=\_RETURNVERBOSE)

[Out] a\*d\*x+1/2\*a\*e\*x^2+1/3\*(a\*f+b\*d)\*x^3+1/4\*(a\*g+b\*e)\*x^4+1/5\*(b\*f+c\*d)\*x^5+1/6\*(b\*g+c\*e)\*x^6+1/7\*c\*f\*x^7+1/8\*c\*g\*x^8

**Fricas [A] (verification not implemented)**

none

Time = 0.23 (sec) , antiderivative size = 74, normalized size of antiderivative = 0.84

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4) dx = \frac{1}{8}cgx^8 + \frac{1}{7}cfx^7 + \frac{1}{6}(ce + bg)x^6 + \frac{1}{5}(cd + bf)x^5 + \frac{1}{4}(be + ag)x^4 + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + adx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a),x, algorithm="fricas")

[Out] 1/8\*c\*g\*x^8 + 1/7\*c\*f\*x^7 + 1/6\*(c\*e + b\*g)\*x^6 + 1/5\*(c\*d + b\*f)\*x^5 + 1/4\*(b\*e + a\*g)\*x^4 + 1/2\*a\*e\*x^2 + 1/3\*(b\*d + a\*f)\*x^3 + a\*d\*x

**Sympy [A] (verification not implemented)**

Time = 0.02 (sec) , antiderivative size = 83, normalized size of antiderivative = 0.94

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4) dx = adx + \frac{aex^2}{2} + \frac{cfx^7}{7} + \frac{cgx^8}{8} + x^6\left(\frac{bg}{6} + \frac{ce}{6}\right) + x^5\left(\frac{bf}{5} + \frac{cd}{5}\right) + x^4\left(\frac{ag}{4} + \frac{be}{4}\right) + x^3\left(\frac{af}{3} + \frac{bd}{3}\right)$$

[In] integrate((g\*x\*\*3+f\*x\*\*2+e\*x+d)\*(c\*x\*\*4+b\*x\*\*2+a),x)

[Out] a\*d\*x + a\*e\*x\*\*2/2 + c\*f\*x\*\*7/7 + c\*g\*x\*\*8/8 + x\*\*6\*(b\*g/6 + c\*e/6) + x\*\*5\*(b\*f/5 + c\*d/5) + x\*\*4\*(a\*g/4 + b\*e/4) + x\*\*3\*(a\*f/3 + b\*d/3)

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 74, normalized size of antiderivative = 0.84

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4) dx = \frac{1}{8}cgx^8 + \frac{1}{7}cfx^7 + \frac{1}{6}(ce + bg)x^6 + \frac{1}{5}(cd + bf)x^5 + \frac{1}{4}(be + ag)x^4 + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + adx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a),x, algorithm="maxima")

[Out] 1/8\*c\*g\*x^8 + 1/7\*c\*f\*x^7 + 1/6\*(c\*e + b\*g)\*x^6 + 1/5\*(c\*d + b\*f)\*x^5 + 1/4\*(b\*e + a\*g)\*x^4 + 1/2\*a\*e\*x^2 + 1/3\*(b\*d + a\*f)\*x^3 + a\*d\*x

**Giac [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 82, normalized size of antiderivative = 0.93

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4) dx = \frac{1}{8} cgx^8 + \frac{1}{7} cfx^7 + \frac{1}{6} cex^6 + \frac{1}{6} bgx^6$$

$$+ \frac{1}{5} cdx^5 + \frac{1}{5} bfx^5 + \frac{1}{4} bex^4 + \frac{1}{4} agx^4$$

$$+ \frac{1}{3} bdx^3 + \frac{1}{3} afx^3 + \frac{1}{2} aex^2 + adx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a),x, algorithm="giac")

```
[Out] 1/8*c*g*x^8 + 1/7*c*f*x^7 + 1/6*c*e*x^6 + 1/6*b*g*x^6 + 1/5*c*d*x^5 + 1/5*b*f*x^5 + 1/4*b*e*x^4 + 1/4*a*g*x^4 + 1/3*b*d*x^3 + 1/3*a*f*x^3 + 1/2*a*e*x^2 + a*d*x
```

**Mupad [B] (verification not implemented)**

Time = 7.85 (sec) , antiderivative size = 78, normalized size of antiderivative = 0.89

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4) dx = \frac{cgx^8}{8} + \frac{cfx^7}{7} + \left(\frac{ce}{6} + \frac{bg}{6}\right) x^6$$

$$+ \left(\frac{cd}{5} + \frac{bf}{5}\right) x^5 + \left(\frac{be}{4} + \frac{ag}{4}\right) x^4$$

$$+ \left(\frac{bd}{3} + \frac{af}{3}\right) x^3 + \frac{aex^2}{2} + adx$$

[In] int((a + b\*x^2 + c\*x^4)\*(d + e\*x + f\*x^2 + g\*x^3),x)

```
[Out] x^3*((b*d)/3 + (a*f)/3) + x^4*((b*e)/4 + (a*g)/4) + x^5*((c*d)/5 + (b*f)/5) + x^6*((c*e)/6 + (b*g)/6) + (c*g*x^8)/8 + a*d*x + (a*e*x^2)/2 + (c*f*x^7)/
```

7

### 3.4 $\int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4) dx$

Optimal result	68
Rubi [A] (verified)	68
Mathematica [A] (verified)	69
Maple [A] (verified)	69
Fricas [A] (verification not implemented)	70
Sympy [A] (verification not implemented)	70
Maxima [A] (verification not implemented)	71
Giac [A] (verification not implemented)	71
Mupad [B] (verification not implemented)	71

#### Optimal result

Integrand size = 33, antiderivative size = 105

$$\begin{aligned} & \int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4) dx \\ &= adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + \frac{1}{4}(be + ag)x^4 + \frac{1}{5}(cd + bf + ah)x^5 \\ & \quad + \frac{1}{6}(ce + bg)x^6 + \frac{1}{7}(cf + bh)x^7 + \frac{1}{8}cgx^8 + \frac{1}{9}chx^9 \end{aligned}$$

[Out] a\*d\*x+1/2\*a\*e\*x^2+1/3\*(a\*f+b\*d)\*x^3+1/4\*(a\*g+b\*e)\*x^4+1/5\*(a\*h+b\*f+c\*d)\*x^5+1/6\*(b\*g+c\*e)\*x^6+1/7\*(b\*h+c\*f)\*x^7+1/8\*c\*g\*x^8+1/9\*c\*h\*x^9

#### Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 105, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.030$ , Rules used = {1685}

$$\begin{aligned} & \int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4) dx \\ &= \frac{1}{5}x^5(ah + bf + cd) + \frac{1}{3}x^3(af + bd) + \frac{1}{4}x^4(ag + be) + adx \\ & \quad + \frac{1}{2}aex^2 + \frac{1}{6}x^6(bg + ce) + \frac{1}{7}x^7(bh + cf) + \frac{1}{8}cgx^8 + \frac{1}{9}chx^9 \end{aligned}$$

[In] Int[(a + b\*x^2 + c\*x^4)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4),x]

[Out] a\*d\*x + (a\*e\*x^2)/2 + ((b\*d + a\*f)\*x^3)/3 + ((b\*e + a\*g)\*x^4)/4 + ((c\*d + b\*f + a\*h)\*x^5)/5 + ((c\*e + b\*g)\*x^6)/6 + ((c\*f + b\*h)\*x^7)/7 + (c\*g\*x^8)/8 + (c\*h\*x^9)/9

Rule 1685

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Int[ExpandIntegrand[Pq*(a + b*x^2 + c*x^4)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned} \text{integral} &= \int (ad + aex + (bd + af)x^2 + (be + ag)x^3 + (cd + bf + ah)x^4 + (ce + bg)x^5 \\ &\quad + (cf + bh)x^6 + cgx^7 + chx^8) dx \\ &= adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + \frac{1}{4}(be + ag)x^4 + \frac{1}{5}(cd + bf + ah)x^5 \\ &\quad + \frac{1}{6}(ce + bg)x^6 + \frac{1}{7}(cf + bh)x^7 + \frac{1}{8}cgx^8 + \frac{1}{9}chx^9 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.03 (sec) , antiderivative size = 105, normalized size of antiderivative = 1.00

$$\begin{aligned} &\int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4) dx \\ &= adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + \frac{1}{4}(be + ag)x^4 + \frac{1}{5}(cd + bf + ah)x^5 \\ &\quad + \frac{1}{6}(ce + bg)x^6 + \frac{1}{7}(cf + bh)x^7 + \frac{1}{8}cgx^8 + \frac{1}{9}chx^9 \end{aligned}$$

[In] Integrate[(a + b\*x^2 + c\*x^4)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4),x]

[Out] a\*d\*x + (a\*e\*x^2)/2 + ((b\*d + a\*f)\*x^3)/3 + ((b\*e + a\*g)\*x^4)/4 + ((c\*d + b\*f + a\*h)\*x^5)/5 + ((c\*e + b\*g)\*x^6)/6 + ((c\*f + b\*h)\*x^7)/7 + (c\*g\*x^8)/8 + (c\*h\*x^9)/9

**Maple [A] (verified)**

Time = 0.23 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.86

method	result
default	$adx + \frac{ae x^2}{2} + \frac{(af+bd)x^3}{3} + \frac{(ag+be)x^4}{4} + \frac{(ah+bf+cd)x^5}{5} + \frac{(bg+ec)x^6}{6} + \frac{(bh+cf)x^7}{7} + \frac{cg x^8}{8} + \frac{ch x^9}{9}$
norman	$\frac{ch x^9}{9} + \frac{cg x^8}{8} + \left(\frac{bh}{7} + \frac{cf}{7}\right) x^7 + \left(\frac{bg}{6} + \frac{ec}{6}\right) x^6 + \left(\frac{ah}{5} + \frac{bf}{5} + \frac{cd}{5}\right) x^5 + \left(\frac{ag}{4} + \frac{be}{4}\right) x^4 + \left(\frac{af}{3} + \frac{bd}{3}\right) x^3 + adx$
gospers	$\frac{1}{9}ch x^9 + \frac{1}{8}cg x^8 + \frac{1}{7}x^7bh + \frac{1}{7}cf x^7 + \frac{1}{6}x^6bg + \frac{1}{6}ce x^6 + \frac{1}{5}x^5ah + \frac{1}{5}x^5bf + \frac{1}{5}cd x^5 + \frac{1}{4}x^4ag + adx$
risch	$\frac{1}{9}ch x^9 + \frac{1}{8}cg x^8 + \frac{1}{7}x^7bh + \frac{1}{7}cf x^7 + \frac{1}{6}x^6bg + \frac{1}{6}ce x^6 + \frac{1}{5}x^5ah + \frac{1}{5}x^5bf + \frac{1}{5}cd x^5 + \frac{1}{4}x^4ag + adx$
parallelrisc	$\frac{1}{9}ch x^9 + \frac{1}{8}cg x^8 + \frac{1}{7}x^7bh + \frac{1}{7}cf x^7 + \frac{1}{6}x^6bg + \frac{1}{6}ce x^6 + \frac{1}{5}x^5ah + \frac{1}{5}x^5bf + \frac{1}{5}cd x^5 + \frac{1}{4}x^4ag + adx$

[In] `int((c*x^4+b*x^2+a)*(h*x^4+g*x^3+f*x^2+e*x+d),x,method=_RETURNVERBOSE)`

[Out]  $a*d*x + 1/2*a*e*x^2 + 1/3*(a*f+b*d)*x^3 + 1/4*(a*g+b*e)*x^4 + 1/5*(a*h+b*f+c*d)*x^5 + 1/6*(b*g+c*e)*x^6 + 1/7*(b*h+c*f)*x^7 + 1/8*c*g*x^8 + 1/9*c*h*x^9$

## Fricas [A] (verification not implemented)

none

Time = 0.24 (sec) , antiderivative size = 89, normalized size of antiderivative = 0.85

$$\begin{aligned} & \int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4) dx \\ &= \frac{1}{9} chx^9 + \frac{1}{8} cgx^8 + \frac{1}{7} (cf + bh)x^7 + \frac{1}{6} (ce + bg)x^6 + \frac{1}{5} (cd + bf + ah)x^5 \\ & \quad + \frac{1}{4} (be + ag)x^4 + \frac{1}{2} aex^2 + \frac{1}{3} (bd + af)x^3 + adx \end{aligned}$$

[In] `integrate((c*x^4+b*x^2+a)*(h*x^4+g*x^3+f*x^2+e*x+d),x, algorithm="fricas")`

[Out]  $1/9*c*h*x^9 + 1/8*c*g*x^8 + 1/7*(c*f + b*h)*x^7 + 1/6*(c*e + b*g)*x^6 + 1/5*(c*d + b*f + a*h)*x^5 + 1/4*(b*e + a*g)*x^4 + 1/2*a*e*x^2 + 1/3*(b*d + a*f)*x^3 + a*d*x$

## Sympy [A] (verification not implemented)

Time = 0.02 (sec) , antiderivative size = 102, normalized size of antiderivative = 0.97

$$\begin{aligned} & \int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4) dx \\ &= adx + \frac{aex^2}{2} + \frac{cgx^8}{8} + \frac{chx^9}{9} + x^7 \left( \frac{bh}{7} + \frac{cf}{7} \right) + x^6 \left( \frac{bg}{6} + \frac{ce}{6} \right) \\ & \quad + x^5 \left( \frac{ah}{5} + \frac{bf}{5} + \frac{cd}{5} \right) + x^4 \left( \frac{ag}{4} + \frac{be}{4} \right) + x^3 \left( \frac{af}{3} + \frac{bd}{3} \right) \end{aligned}$$

[In] `integrate((c*x**4+b*x**2+a)*(h*x**4+g*x**3+f*x**2+e*x+d),x)`

[Out]  $a*d*x + a*e*x**2/2 + c*g*x**8/8 + c*h*x**9/9 + x**7*(b*h/7 + c*f/7) + x**6*(b*g/6 + c*e/6) + x**5*(a*h/5 + b*f/5 + c*d/5) + x**4*(a*g/4 + b*e/4) + x**3*(a*f/3 + b*d/3)$

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 89, normalized size of antiderivative = 0.85

$$\int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4) dx$$

$$= \frac{1}{9} chx^9 + \frac{1}{8} cgx^8 + \frac{1}{7} (cf + bh)x^7 + \frac{1}{6} (ce + bg)x^6 + \frac{1}{5} (cd + bf + ah)x^5$$

$$+ \frac{1}{4} (be + ag)x^4 + \frac{1}{2} aex^2 + \frac{1}{3} (bd + af)x^3 + adx$$

[In] integrate((c\*x^4+b\*x^2+a)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d),x, algorithm="maxima")

```
[Out] 1/9*c*h*x^9 + 1/8*c*g*x^8 + 1/7*(c*f + b*h)*x^7 + 1/6*(c*e + b*g)*x^6 + 1/5
*(c*d + b*f + a*h)*x^5 + 1/4*(b*e + a*g)*x^4 + 1/2*a*e*x^2 + 1/3*(b*d + a*f
)*x^3 + a*d*x
```

**Giac [A] (verification not implemented)**

none

Time = 0.37 (sec) , antiderivative size = 103, normalized size of antiderivative = 0.98

$$\int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4) dx$$

$$= \frac{1}{9} chx^9 + \frac{1}{8} cgx^8 + \frac{1}{7} cfx^7 + \frac{1}{7} bhx^7 + \frac{1}{6} cex^6 + \frac{1}{6} bgx^6 + \frac{1}{5} cdx^5 + \frac{1}{5} bfx^5$$

$$+ \frac{1}{5} ahx^5 + \frac{1}{4} bex^4 + \frac{1}{4} agx^4 + \frac{1}{3} bdx^3 + \frac{1}{3} afx^3 + \frac{1}{2} aex^2 + adx$$

[In] integrate((c\*x^4+b\*x^2+a)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d),x, algorithm="giac")

```
[Out] 1/9*c*h*x^9 + 1/8*c*g*x^8 + 1/7*c*f*x^7 + 1/7*b*h*x^7 + 1/6*c*e*x^6 + 1/6*b
*g*x^6 + 1/5*c*d*x^5 + 1/5*b*f*x^5 + 1/5*a*h*x^5 + 1/4*b*e*x^4 + 1/4*a*g*x^
4 + 1/3*b*d*x^3 + 1/3*a*f*x^3 + 1/2*a*e*x^2 + a*d*x
```

**Mupad [B] (verification not implemented)**

Time = 7.90 (sec) , antiderivative size = 95, normalized size of antiderivative = 0.90

$$\int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4) dx$$

$$= \frac{chx^9}{9} + \frac{cgx^8}{8} + \left(\frac{cf}{7} + \frac{bh}{7}\right)x^7 + \left(\frac{ce}{6} + \frac{bg}{6}\right)x^6 + \left(\frac{cd}{5} + \frac{bf}{5} + \frac{ah}{5}\right)x^5$$

$$+ \left(\frac{be}{4} + \frac{ag}{4}\right)x^4 + \left(\frac{bd}{3} + \frac{af}{3}\right)x^3 + \frac{aex^2}{2} + adx$$

```
[In] int((a + b*x^2 + c*x^4)*(d + e*x + f*x^2 + g*x^3 + h*x^4),x)
```

```
[Out] x^5*((c*d)/5 + (b*f)/5 + (a*h)/5) + x^3*((b*d)/3 + (a*f)/3) + x^4*((b*e)/4  
+ (a*g)/4) + x^6*((c*e)/6 + (b*g)/6) + x^7*((c*f)/7 + (b*h)/7) + (c*g*x^8)/  
8 + (c*h*x^9)/9 + a*d*x + (a*e*x^2)/2
```



### 3.5 $\int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4 + ix^5) dx$

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#### Optimal result

Integrand size = 38, antiderivative size = 122

$$\begin{aligned} & \int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4 + ix^5) dx \\ &= adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + \frac{1}{4}(be + ag)x^4 + \frac{1}{5}(cd + bf + ah)x^5 \\ & \quad + \frac{1}{6}(ce + bg + ai)x^6 + \frac{1}{7}(cf + bh)x^7 + \frac{1}{8}(cg + bi)x^8 + \frac{1}{9}chx^9 + \frac{1}{10}cix^{10} \end{aligned}$$

[Out] a\*d\*x+1/2\*a\*e\*x^2+1/3\*(a\*f+b\*d)\*x^3+1/4\*(a\*g+b\*e)\*x^4+1/5\*(a\*h+b\*f+c\*d)\*x^5+1/6\*(a\*i+b\*g+c\*e)\*x^6+1/7\*(b\*h+c\*f)\*x^7+1/8\*(b\*i+c\*g)\*x^8+1/9\*c\*h\*x^9+1/10\*c\*i\*x^10

#### Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 122, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.026$ , Rules used = {1685}

$$\begin{aligned} & \int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4 + ix^5) dx \\ &= \frac{1}{5}x^5(ah + bf + cd) + \frac{1}{6}x^6(ai + bg + ce) + \frac{1}{3}x^3(af + bd) + \frac{1}{4}x^4(ag + be) \\ & \quad + adx + \frac{1}{2}aex^2 + \frac{1}{7}x^7(bh + cf) + \frac{1}{8}x^8(bi + cg) + \frac{1}{9}chx^9 + \frac{1}{10}cix^{10} \end{aligned}$$

[In] Int[(a + b\*x^2 + c\*x^4)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5),x]

[Out] a\*d\*x + (a\*e\*x^2)/2 + ((b\*d + a\*f)\*x^3)/3 + ((b\*e + a\*g)\*x^4)/4 + ((c\*d + b\*f + a\*h)\*x^5)/5 + ((c\*e + b\*g + a\*i)\*x^6)/6 + ((c\*f + b\*h)\*x^7)/7 + ((c\*g + b\*i)\*x^8)/8 + (c\*h\*x^9)/9 + (c\*i\*x^10)/10

Rule 1685

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Int[ExpandIntegrand[Pq*(a + b*x^2 + c*x^4)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, 0]
```

Rubi steps

$$\begin{aligned} \text{integral} &= \int (ad + aex + (bd + af)x^2 + (be + ag)x^3 + (cd + bf + ah)x^4 + (ce + bg + ai)x^5 \\ &\quad + (cf + bh)x^6 + (cg + bi)x^7 + chx^8 + cix^9) dx \\ &= adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + \frac{1}{4}(be + ag)x^4 + \frac{1}{5}(cd + bf + ah)x^5 \\ &\quad + \frac{1}{6}(ce + bg + ai)x^6 + \frac{1}{7}(cf + bh)x^7 + \frac{1}{8}(cg + bi)x^8 + \frac{1}{9}chx^9 + \frac{1}{10}cix^{10} \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.03 (sec) , antiderivative size = 122, normalized size of antiderivative = 1.00

$$\begin{aligned} &\int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4 + ix^5) dx \\ &= adx + \frac{1}{2}aex^2 + \frac{1}{3}(bd + af)x^3 + \frac{1}{4}(be + ag)x^4 + \frac{1}{5}(cd + bf + ah)x^5 \\ &\quad + \frac{1}{6}(ce + bg + ai)x^6 + \frac{1}{7}(cf + bh)x^7 + \frac{1}{8}(cg + bi)x^8 + \frac{1}{9}chx^9 + \frac{1}{10}cix^{10} \end{aligned}$$

```
[In] Integrate[(a + b*x^2 + c*x^4)*(d + e*x + f*x^2 + g*x^3 + h*x^4 + i*x^5),x]
```

```
[Out] a*d*x + (a*e*x^2)/2 + ((b*d + a*f)*x^3)/3 + ((b*e + a*g)*x^4)/4 + ((c*d + b*f + a*h)*x^5)/5 + ((c*e + b*g + a*i)*x^6)/6 + ((c*f + b*h)*x^7)/7 + ((c*g + b*i)*x^8)/8 + (c*h*x^9)/9 + (c*i*x^10)/10
```

**Maple [A] (verified)**

Time = 1.91 (sec) , antiderivative size = 105, normalized size of antiderivative = 0.86

method	result
default	$adx + \frac{ae x^2}{2} + \frac{(af+bd)x^3}{3} + \frac{(ag+be)x^4}{4} + \frac{(ah+bf+cd)x^5}{5} + \frac{(ai+bg+ec)x^6}{6} + \frac{(bh+cf)x^7}{7} + \frac{(bi+gc)x^8}{8} + \frac{ch x^9}{9}$
norman	$\frac{ci x^{10}}{10} + \frac{ch x^9}{9} + \left(\frac{bi}{8} + \frac{gc}{8}\right) x^8 + \left(\frac{bh}{7} + \frac{cf}{7}\right) x^7 + \left(\frac{ai}{6} + \frac{bg}{6} + \frac{ec}{6}\right) x^6 + \left(\frac{ah}{5} + \frac{bf}{5} + \frac{cd}{5}\right) x^5 + \left(\frac{ag}{4} + \frac{be}{4}\right) x^4 + \frac{1}{2} a e x^2 + a d x$
gosper	$\frac{1}{10} ci x^{10} + \frac{1}{9} ch x^9 + \frac{1}{8} x^8 bi + \frac{1}{8} cg x^8 + \frac{1}{7} x^7 bh + \frac{1}{7} cf x^7 + \frac{1}{6} x^6 ai + \frac{1}{6} x^6 bg + \frac{1}{6} ce x^6 + \frac{1}{5} x^5 ah + \frac{1}{4} x^4 ag + \frac{1}{4} x^4 be + \frac{1}{2} a e x^2 + a d x$
risch	$\frac{1}{10} ci x^{10} + \frac{1}{9} ch x^9 + \frac{1}{8} x^8 bi + \frac{1}{8} cg x^8 + \frac{1}{7} x^7 bh + \frac{1}{7} cf x^7 + \frac{1}{6} x^6 ai + \frac{1}{6} x^6 bg + \frac{1}{6} ce x^6 + \frac{1}{5} x^5 ah + \frac{1}{4} x^4 ag + \frac{1}{4} x^4 be + \frac{1}{2} a e x^2 + a d x$
parallelrisch	$\frac{1}{10} ci x^{10} + \frac{1}{9} ch x^9 + \frac{1}{8} x^8 bi + \frac{1}{8} cg x^8 + \frac{1}{7} x^7 bh + \frac{1}{7} cf x^7 + \frac{1}{6} x^6 ai + \frac{1}{6} x^6 bg + \frac{1}{6} ce x^6 + \frac{1}{5} x^5 ah + \frac{1}{4} x^4 ag + \frac{1}{4} x^4 be + \frac{1}{2} a e x^2 + a d x$

[In] `int((c*x^4+b*x^2+a)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d),x,method=_RETURNVERBOSE)`  
)

[Out] `a*d*x+1/2*a*e*x^2+1/3*(a*f+b*d)*x^3+1/4*(a*g+b*e)*x^4+1/5*(a*h+b*f+c*d)*x^5+1/6*(a*i+b*g+c*e)*x^6+1/7*(b*h+c*f)*x^7+1/8*(b*i+c*g)*x^8+1/9*c*h*x^9+1/10*c*i*x^10`

## Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 104, normalized size of antiderivative = 0.85

$$\int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4 + ix^5) dx$$

$$= \frac{1}{10} cix^{10} + \frac{1}{9} chx^9 + \frac{1}{8} (cg + bi)x^8 + \frac{1}{7} (cf + bh)x^7 + \frac{1}{6} (ce + bg + ai)x^6$$

$$+ \frac{1}{5} (cd + bf + ah)x^5 + \frac{1}{4} (be + ag)x^4 + \frac{1}{2} aex^2 + \frac{1}{3} (bd + af)x^3 + adx$$

[In] `integrate((c*x^4+b*x^2+a)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d),x, algorithm="fricas")`

[Out] `1/10*c*i*x^10 + 1/9*c*h*x^9 + 1/8*(c*g + b*i)*x^8 + 1/7*(c*f + b*h)*x^7 + 1/6*(c*e + b*g + a*i)*x^6 + 1/5*(c*d + b*f + a*h)*x^5 + 1/4*(b*e + a*g)*x^4 + 1/2*a*e*x^2 + 1/3*(b*d + a*f)*x^3 + a*d*x`

## Sympy [A] (verification not implemented)

Time = 0.02 (sec) , antiderivative size = 121, normalized size of antiderivative = 0.99

$$\int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4 + ix^5) dx$$

$$= adx + \frac{aex^2}{2} + \frac{chx^9}{9} + \frac{cix^{10}}{10} + x^8 \left( \frac{bi}{8} + \frac{cg}{8} \right) + x^7 \left( \frac{bh}{7} + \frac{cf}{7} \right)$$

$$+ x^6 \left( \frac{ai}{6} + \frac{bg}{6} + \frac{ce}{6} \right) + x^5 \left( \frac{ah}{5} + \frac{bf}{5} + \frac{cd}{5} \right) + x^4 \left( \frac{ag}{4} + \frac{be}{4} \right) + x^3 \left( \frac{af}{3} + \frac{bd}{3} \right)$$

[In] integrate((c\*x\*\*4+b\*x\*\*2+a)\*(i\*x\*\*5+h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d),x)

[Out] a\*d\*x + a\*e\*x\*\*2/2 + c\*h\*x\*\*9/9 + c\*i\*x\*\*10/10 + x\*\*8\*(b\*i/8 + c\*g/8) + x\*\*7\*(b\*h/7 + c\*f/7) + x\*\*6\*(a\*i/6 + b\*g/6 + c\*e/6) + x\*\*5\*(a\*h/5 + b\*f/5 + c\*d/5) + x\*\*4\*(a\*g/4 + b\*e/4) + x\*\*3\*(a\*f/3 + b\*d/3)

## Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 104, normalized size of antiderivative = 0.85

$$\begin{aligned} & \int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4 + ix^5) dx \\ &= \frac{1}{10} cix^{10} + \frac{1}{9} chx^9 + \frac{1}{8} (cg + bi)x^8 + \frac{1}{7} (cf + bh)x^7 + \frac{1}{6} (ce + bg + ai)x^6 \\ & \quad + \frac{1}{5} (cd + bf + ah)x^5 + \frac{1}{4} (be + ag)x^4 + \frac{1}{2} aex^2 + \frac{1}{3} (bd + af)x^3 + adx \end{aligned}$$

[In] integrate((c\*x^4+b\*x^2+a)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d),x, algorithm="maxima")

[Out] 1/10\*c\*i\*x^10 + 1/9\*c\*h\*x^9 + 1/8\*(c\*g + b\*i)\*x^8 + 1/7\*(c\*f + b\*h)\*x^7 + 1/6\*(c\*e + b\*g + a\*i)\*x^6 + 1/5\*(c\*d + b\*f + a\*h)\*x^5 + 1/4\*(b\*e + a\*g)\*x^4 + 1/2\*a\*e\*x^2 + 1/3\*(b\*d + a\*f)\*x^3 + a\*d\*x

## Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 124, normalized size of antiderivative = 1.02

$$\begin{aligned} & \int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4 + ix^5) dx \\ &= \frac{1}{10} cix^{10} + \frac{1}{9} chx^9 + \frac{1}{8} cgx^8 + \frac{1}{8} bix^8 + \frac{1}{7} cfx^7 + \frac{1}{7} bhx^7 + \frac{1}{6} cex^6 + \frac{1}{6} bgx^6 + \frac{1}{6} aix^6 \\ & \quad + \frac{1}{5} cdx^5 + \frac{1}{5} bfx^5 + \frac{1}{5} ahx^5 + \frac{1}{4} bex^4 + \frac{1}{4} agx^4 + \frac{1}{3} bdx^3 + \frac{1}{3} afx^3 + \frac{1}{2} aex^2 + adx \end{aligned}$$

[In] integrate((c\*x^4+b\*x^2+a)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d),x, algorithm="giac")

[Out] 1/10\*c\*i\*x^10 + 1/9\*c\*h\*x^9 + 1/8\*c\*g\*x^8 + 1/8\*b\*i\*x^8 + 1/7\*c\*f\*x^7 + 1/7\*b\*h\*x^7 + 1/6\*c\*e\*x^6 + 1/6\*b\*g\*x^6 + 1/6\*a\*i\*x^6 + 1/5\*c\*d\*x^5 + 1/5\*b\*f\*x^5 + 1/5\*a\*h\*x^5 + 1/4\*b\*e\*x^4 + 1/4\*a\*g\*x^4 + 1/3\*b\*d\*x^3 + 1/3\*a\*f\*x^3 + 1/2\*a\*e\*x^2 + a\*d\*x

**Mupad [B] (verification not implemented)**

Time = 0.05 (sec) , antiderivative size = 112, normalized size of antiderivative = 0.92

$$\begin{aligned}
& \int (a + bx^2 + cx^4) (d + ex + fx^2 + gx^3 + hx^4 + ix^5) dx \\
&= \frac{ci x^{10}}{10} + \frac{ch x^9}{9} + \left(\frac{cg}{8} + \frac{bi}{8}\right) x^8 + \left(\frac{cf}{7} + \frac{bh}{7}\right) x^7 + \left(\frac{ce}{6} + \frac{bg}{6} + \frac{ai}{6}\right) x^6 \\
&\quad + \left(\frac{cd}{5} + \frac{bf}{5} + \frac{ah}{5}\right) x^5 + \left(\frac{be}{4} + \frac{ag}{4}\right) x^4 + \left(\frac{bd}{3} + \frac{af}{3}\right) x^3 + \frac{aex^2}{2} + adx
\end{aligned}$$

[In] int((a + b\*x^2 + c\*x^4)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5),x)

```
[Out] x^5*((c*d)/5 + (b*f)/5 + (a*h)/5) + x^6*((c*e)/6 + (b*g)/6 + (a*i)/6) + x^3
*((b*d)/3 + (a*f)/3) + x^4*((b*e)/4 + (a*g)/4) + x^7*((c*f)/7 + (b*h)/7) +
x^8*((c*g)/8 + (b*i)/8) + (c*h*x^9)/9 + (c*i*x^10)/10 + a*d*x + (a*e*x^2)/2
```

### 3.6 $\int (d + ex) (a + bx^2 + cx^4)^2 dx$

Optimal result	78
Rubi [A] (verified)	78
Mathematica [A] (verified)	79
Maple [A] (verified)	79
Fricas [A] (verification not implemented)	80
Sympy [A] (verification not implemented)	80
Maxima [A] (verification not implemented)	80
Giac [A] (verification not implemented)	81
Mupad [B] (verification not implemented)	81

#### Optimal result

Integrand size = 20, antiderivative size = 112

$$\int (d + ex) (a + bx^2 + cx^4)^2 dx = a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{2}{3} abdx^3 + \frac{1}{2} abex^4 + \frac{1}{5} (b^2 + 2ac) dx^5 + \frac{1}{6} (b^2 + 2ac) ex^6 + \frac{2}{7} bcdx^7 + \frac{1}{4} bceex^8 + \frac{1}{9} c^2 dx^9 + \frac{1}{10} c^2 ex^{10}$$

[Out] a^2\*d\*x+1/2\*a^2\*e\*x^2+2/3\*a\*b\*d\*x^3+1/2\*a\*b\*e\*x^4+1/5\*(2\*a\*c+b^2)\*d\*x^5+1/6\*(2\*a\*c+b^2)\*e\*x^6+2/7\*b\*c\*d\*x^7+1/4\*b\*c\*e\*x^8+1/9\*c^2\*d\*x^9+1/10\*c^2\*e\*x^10

#### Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 112, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.050$ , Rules used = {1685}

$$\int (d + ex) (a + bx^2 + cx^4)^2 dx = a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{5} dx^5 (2ac + b^2) + \frac{1}{6} ex^6 (2ac + b^2) + \frac{2}{3} abdx^3 + \frac{1}{2} abex^4 + \frac{2}{7} bcdx^7 + \frac{1}{4} bceex^8 + \frac{1}{9} c^2 dx^9 + \frac{1}{10} c^2 ex^{10}$$

[In] Int[(d + e\*x)\*(a + b\*x^2 + c\*x^4)^2,x]

[Out] a^2\*d\*x + (a^2\*e\*x^2)/2 + (2\*a\*b\*d\*x^3)/3 + (a\*b\*e\*x^4)/2 + ((b^2 + 2\*a\*c)\*d\*x^5)/5 + ((b^2 + 2\*a\*c)\*e\*x^6)/6 + (2\*b\*c\*d\*x^7)/7 + (b\*c\*e\*x^8)/4 + (c^2\*d\*x^9)/9 + (c^2\*e\*x^10)/10

#### Rule 1685

Int[(Pq\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_), x\_Symbol] := Int[ExpandIntegrand[Pq\*(a + b\*x^2 + c\*x^4)^p, x], x] /; FreeQ[{a, b, c}, x] && Poly

Q[Pq, x] && IGtQ[p, 0]

Rubi steps

$$\begin{aligned} \text{integral} &= \int (a^2d + a^2ex + 2abdx^2 + 2abex^3 + (b^2 + 2ac) dx^4 + (b^2 + 2ac) ex^5 + 2bcdx^6 \\ &\quad + 2bce x^7 + c^2dx^8 + c^2ex^9) dx \\ &= a^2dx + \frac{1}{2}a^2ex^2 + \frac{2}{3}abdx^3 + \frac{1}{2}abex^4 + \frac{1}{5}(b^2 + 2ac) dx^5 \\ &\quad + \frac{1}{6}(b^2 + 2ac) ex^6 + \frac{2}{7}bcdx^7 + \frac{1}{4}bce x^8 + \frac{1}{9}c^2dx^9 + \frac{1}{10}c^2ex^{10} \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 97, normalized size of antiderivative = 0.87

$$\begin{aligned} &\int (d + ex) (a + bx^2 + cx^4)^2 dx \\ &= \frac{630a^2x(2d + ex) + 42b^2x^5(6d + 5ex) + 45bcx^7(8d + 7ex) + 14c^2x^9(10d + 9ex) + 42a(5bx^3(4d + 3ex) + 2 \\ &\quad + 5ex))}{1260} \end{aligned}$$

[In] Integrate[(d + e\*x)\*(a + b\*x^2 + c\*x^4)^2,x]

[Out] (630\*a^2\*x\*(2\*d + e\*x) + 42\*b^2\*x^5\*(6\*d + 5\*e\*x) + 45\*b\*c\*x^7\*(8\*d + 7\*e\*x) + 14\*c^2\*x^9\*(10\*d + 9\*e\*x) + 42\*a\*(5\*b\*x^3\*(4\*d + 3\*e\*x) + 2\*c\*x^5\*(6\*d + 5\*e\*x)))/1260

**Maple [A] (verified)**

Time = 0.10 (sec) , antiderivative size = 95, normalized size of antiderivative = 0.85

method	result
default	$a^2dx + \frac{a^2ex^2}{2} + \frac{2x^3dab}{3} + \frac{abex^4}{2} + \frac{(2ac+b^2)dx^5}{5} + \frac{(2ac+b^2)ex^6}{6} + \frac{2x^7bcd}{7} + \frac{bce x^8}{4} + \frac{c^2dx^9}{9} + \frac{c^2ex^{10}}{10}$
norman	$\frac{c^2ex^{10}}{10} + \frac{c^2dx^9}{9} + \frac{bce x^8}{4} + \frac{2x^7bcd}{7} + (\frac{1}{3}ace + \frac{1}{6}b^2e) x^6 + (\frac{2}{5}acd + \frac{1}{5}b^2d) x^5 + \frac{abex^4}{2} + \frac{2x^3dab}{3} + \frac{a^2}{2}$
gosper	$\frac{1}{10}c^2ex^{10} + \frac{1}{9}c^2dx^9 + \frac{1}{4}bce x^8 + \frac{2}{7}x^7bcd + \frac{1}{3}x^6ace + \frac{1}{6}x^6b^2e + \frac{2}{5}acd x^5 + \frac{1}{5}x^5b^2d + \frac{1}{2}abex^4 +$
risch	$\frac{1}{10}c^2ex^{10} + \frac{1}{9}c^2dx^9 + \frac{1}{4}bce x^8 + \frac{2}{7}x^7bcd + \frac{1}{3}x^6ace + \frac{1}{6}x^6b^2e + \frac{2}{5}acd x^5 + \frac{1}{5}x^5b^2d + \frac{1}{2}abex^4 +$
parallelrisch	$\frac{1}{10}c^2ex^{10} + \frac{1}{9}c^2dx^9 + \frac{1}{4}bce x^8 + \frac{2}{7}x^7bcd + \frac{1}{3}x^6ace + \frac{1}{6}x^6b^2e + \frac{2}{5}acd x^5 + \frac{1}{5}x^5b^2d + \frac{1}{2}abex^4 +$

[In] int((e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x,method=\_RETURNVERBOSE)

[Out]  $a^2dx + \frac{1}{2}a^2e^x + \frac{2}{3}x^3dab + \frac{1}{2}ab^2e^x + \frac{1}{5}(2ac + b^2)d^5x + \frac{1}{6}(2ac + b^2)e^6x + \frac{2}{7}x^7b^2cd + \frac{1}{4}b^2c^2e^8x + \frac{1}{9}c^2d^9x + \frac{1}{10}c^2e^x + 0$

### Fricas [A] (verification not implemented)

none

Time = 0.24 (sec) , antiderivative size = 94, normalized size of antiderivative = 0.84

$$\int (d + ex)(a + bx^2 + cx^4)^2 dx = \frac{1}{10}c^2ex^{10} + \frac{1}{9}c^2dx^9 + \frac{1}{4}bcex^8 + \frac{2}{7}bcdx^7 + \frac{1}{6}(b^2 + 2ac)ex^6 + \frac{1}{2}abex^4 + \frac{1}{5}(b^2 + 2ac)dx^5 + \frac{2}{3}abdx^3 + \frac{1}{2}a^2ex^2 + a^2dx$$

[In] integrate((e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x, algorithm="fricas")

[Out]  $\frac{1}{10}c^2e^x + \frac{1}{9}c^2d^9x + \frac{1}{4}b^2c^2e^8x + \frac{2}{7}b^2cd^7x + \frac{1}{6}(b^2 + 2ac)e^6x + \frac{1}{2}a^2b^2e^4x + \frac{1}{5}(b^2 + 2ac)d^5x + \frac{2}{3}a^2bd^3x + \frac{1}{2}a^2e^2x + a^2dx$

### Sympy [A] (verification not implemented)

Time = 0.02 (sec) , antiderivative size = 116, normalized size of antiderivative = 1.04

$$\int (d + ex)(a + bx^2 + cx^4)^2 dx = a^2dx + \frac{a^2ex^2}{2} + \frac{2abdx^3}{3} + \frac{abex^4}{2} + \frac{2bcdx^7}{7} + \frac{bcex^8}{4} + \frac{c^2dx^9}{9} + \frac{c^2ex^{10}}{10} + x^6\left(\frac{ace}{3} + \frac{b^2e}{6}\right) + x^5\left(\frac{2acd}{5} + \frac{b^2d}{5}\right)$$

[In] integrate((e\*x+d)\*(c\*x\*\*4+b\*x\*\*2+a)\*\*2,x)

[Out]  $a^2dx + \frac{a^2e^x}{2} + \frac{2ab^2d^3x}{3} + \frac{ab^2e^4x}{2} + \frac{2b^2cd^7x}{7} + \frac{b^2c^2e^8x}{4} + \frac{c^2d^9x}{9} + \frac{c^2e^{10}x}{10} + x^6(a^2cd + \frac{b^2d}{6}) + x^5(2acd + \frac{b^2d}{5})$

### Maxima [A] (verification not implemented)

none

Time = 0.18 (sec) , antiderivative size = 94, normalized size of antiderivative = 0.84

$$\int (d + ex)(a + bx^2 + cx^4)^2 dx = \frac{1}{10}c^2ex^{10} + \frac{1}{9}c^2dx^9 + \frac{1}{4}bcex^8 + \frac{2}{7}bcdx^7 + \frac{1}{6}(b^2 + 2ac)ex^6 + \frac{1}{2}abex^4 + \frac{1}{5}(b^2 + 2ac)dx^5 + \frac{2}{3}abdx^3 + \frac{1}{2}a^2ex^2 + a^2dx$$



[In] integrate((e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x, algorithm="maxima")

[Out]  $\frac{1}{10}c^2e*x^{10} + \frac{1}{9}c^2d*x^9 + \frac{1}{4}b*c*e*x^8 + \frac{2}{7}b*c*d*x^7 + \frac{1}{6}(b^2 + 2*a*c)*e*x^6 + \frac{1}{2}a*b*e*x^4 + \frac{1}{5}(b^2 + 2*a*c)*d*x^5 + \frac{2}{3}a*b*d*x^3 + \frac{1}{2}a^2*e*x^2 + a^2*d*x$

### Giac [A] (verification not implemented)

none

Time = 0.37 (sec) , antiderivative size = 100, normalized size of antiderivative = 0.89

$$\int (d+ex)(a+bx^2+cx^4)^2 dx = \frac{1}{10}c^2ex^{10} + \frac{1}{9}c^2dx^9 + \frac{1}{4}bcex^8 + \frac{2}{7}bcdx^7 + \frac{1}{6}b^2ex^6 + \frac{1}{3}acex^6 + \frac{1}{5}b^2dx^5 + \frac{2}{5}acdx^5 + \frac{1}{2}abex^4 + \frac{2}{3}abdx^3 + \frac{1}{2}a^2ex^2 + a^2dx$$

[In] integrate((e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x, algorithm="giac")

[Out]  $\frac{1}{10}c^2e*x^{10} + \frac{1}{9}c^2d*x^9 + \frac{1}{4}b*c*e*x^8 + \frac{2}{7}b*c*d*x^7 + \frac{1}{6}b^2*e*x^6 + \frac{1}{3}a*c*e*x^6 + \frac{1}{5}b^2*d*x^5 + \frac{2}{5}a*c*d*x^5 + \frac{1}{2}a*b*e*x^4 + \frac{2}{3}a*b*d*x^3 + \frac{1}{2}a^2*e*x^2 + a^2*d*x$

### Mupad [B] (verification not implemented)

Time = 0.05 (sec) , antiderivative size = 94, normalized size of antiderivative = 0.84

$$\int (d+ex)(a+bx^2+cx^4)^2 dx = \frac{a^2ex^2}{2} + \frac{c^2dx^9}{9} + \frac{c^2ex^{10}}{10} + \frac{dx^5(b^2+2ac)}{5} + \frac{ex^6(b^2+2ac)}{6} + a^2dx + \frac{2abd^3x^3}{3} + \frac{abex^4}{2} + \frac{2bcdx^7}{7} + \frac{bcex^8}{4}$$

[In] int((d + e\*x)\*(a + b\*x^2 + c\*x^4)^2,x)

[Out]  $\frac{a^2e*x^2}{2} + \frac{(c^2*d*x^9)}{9} + \frac{(c^2*e*x^{10})}{10} + \frac{(d*x^5*(2*a*c + b^2))}{5} + \frac{(e*x^6*(2*a*c + b^2))}{6} + a^2*d*x + \frac{(2*a*b*d*x^3)}{3} + \frac{(a*b*e*x^4)}{2} + \frac{(2*b*c*d*x^7)}{7} + \frac{(b*c*e*x^8)}{4}$

### 3.7 $\int (d + ex + fx^2) (a + bx^2 + cx^4)^2 dx$

Optimal result	82
Rubi [A] (verified)	82
Mathematica [A] (verified)	83
Maple [A] (verified)	84
Fricas [A] (verification not implemented)	84
Sympy [A] (verification not implemented)	85
Maxima [A] (verification not implemented)	85
Giac [A] (verification not implemented)	86
Mupad [B] (verification not implemented)	86

#### Optimal result

Integrand size = 25, antiderivative size = 154

$$\int (d + ex + fx^2) (a + bx^2 + cx^4)^2 dx = a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{3} a(2bd + af)x^3 + \frac{1}{2} abex^4 + \frac{1}{5} (b^2 d + 2acd + 2abf) x^5 + \frac{1}{6} (b^2 + 2ac) ex^6 + \frac{1}{7} (2bcd + b^2 f + 2acf) x^7 + \frac{1}{4} bce x^8 + \frac{1}{9} c(cd + 2bf)x^9 + \frac{1}{10} c^2 ex^{10} + \frac{1}{11} c^2 fx^{11}$$

[Out] a^2\*d\*x+1/2\*a^2\*e\*x^2+1/3\*a\*(a\*f+2\*b\*d)\*x^3+1/2\*a\*b\*e\*x^4+1/5\*(2\*a\*b\*f+2\*a\*c\*d+b^2\*d)\*x^5+1/6\*(2\*a\*c+b^2)\*e\*x^6+1/7\*(2\*a\*c\*f+b^2\*f+2\*b\*c\*d)\*x^7+1/4\*b\*c\*e\*x^8+1/9\*c\*(2\*b\*f+c\*d)\*x^9+1/10\*c^2\*e\*x^10+1/11\*c^2\*f\*x^11

#### Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 154, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.040$ , Rules used = {1671}

$$\int (d + ex + fx^2) (a + bx^2 + cx^4)^2 dx = a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{7} x^7 (2acf + b^2 f + 2bcd) + \frac{1}{5} x^5 (2abf + 2acd + b^2 d) + \frac{1}{6} ex^6 (2ac + b^2) + \frac{1}{3} ax^3 (af + 2bd) + \frac{1}{2} abex^4 + \frac{1}{9} cx^9 (2bf + cd) + \frac{1}{4} bce x^8 + \frac{1}{10} c^2 ex^{10} + \frac{1}{11} c^2 fx^{11}$$

[In] Int[(d + e\*x + f\*x^2)\*(a + b\*x^2 + c\*x^4)^2,x]

[Out] a^2\*d\*x + (a^2\*e\*x^2)/2 + (a\*(2\*b\*d + a\*f)\*x^3)/3 + (a\*b\*e\*x^4)/2 + ((b^2\*d + 2\*a\*c\*d + 2\*a\*b\*f)\*x^5)/5 + ((b^2 + 2\*a\*c)\*e\*x^6)/6 + ((2\*b\*c\*d + b^2\*f + 2\*a\*c\*f)\*x^7)/7 + (b\*c\*e\*x^8)/4 + (c\*(c\*d + 2\*b\*f)\*x^9)/9 + (c^2\*e\*x^10)/10 + (c^2\*f\*x^11)/11

Rule 1671

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(p\_), x\_Symbol] := Int[Expand Integrand[Pq\*(a + b\*x + c\*x^2)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, -2]

Rubi steps

$$\begin{aligned} \text{integral} &= \int (a^2d + a^2ex + a(2bd + af)x^2 + 2abex^3 + (b^2d + 2acd + 2abf)x^4 + (b^2 + 2ac)ex^5 \\ &\quad + (2bcd + b^2f + 2acf)x^6 + 2bcex^7 + c(cd + 2bf)x^8 + c^2ex^9 + c^2fx^{10}) dx \\ &= a^2dx + \frac{1}{2}a^2ex^2 + \frac{1}{3}a(2bd + af)x^3 + \frac{1}{2}abex^4 + \frac{1}{5}(b^2d + 2acd + 2abf)x^5 + \frac{1}{6}(b^2 + 2ac)ex^6 \\ &\quad + \frac{1}{7}(2bcd + b^2f + 2acf)x^7 + \frac{1}{4}bcex^8 + \frac{1}{9}c(cd + 2bf)x^9 + \frac{1}{10}c^2ex^{10} + \frac{1}{11}c^2fx^{11} \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 154, normalized size of antiderivative = 1.00

$$\begin{aligned} \int (d + ex + fx^2)(a + bx^2 + cx^4)^2 dx &= a^2dx + \frac{1}{2}a^2ex^2 + \frac{1}{3}a(2bd + af)x^3 + \frac{1}{2}abex^4 \\ &\quad + \frac{1}{5}(b^2d + 2acd + 2abf)x^5 + \frac{1}{6}(b^2 + 2ac)ex^6 \\ &\quad + \frac{1}{7}(2bcd + b^2f + 2acf)x^7 + \frac{1}{4}bcex^8 \\ &\quad + \frac{1}{9}c(cd + 2bf)x^9 + \frac{1}{10}c^2ex^{10} + \frac{1}{11}c^2fx^{11} \end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2)\*(a + b\*x^2 + c\*x^4)^2,x]

[Out] a^2\*d\*x + (a^2\*e\*x^2)/2 + (a\*(2\*b\*d + a\*f)\*x^3)/3 + (a\*b\*e\*x^4)/2 + ((b^2\*d + 2\*a\*c\*d + 2\*a\*b\*f)\*x^5)/5 + ((b^2 + 2\*a\*c)\*e\*x^6)/6 + ((2\*b\*c\*d + b^2\*f + 2\*a\*c\*f)\*x^7)/7 + (b\*c\*e\*x^8)/4 + (c\*(c\*d + 2\*b\*f)\*x^9)/9 + (c^2\*e\*x^10)/10 + (c^2\*f\*x^11)/11

**Maple [A] (verified)**

Time = 0.13 (sec) , antiderivative size = 139, normalized size of antiderivative = 0.90

method	result
default	$\frac{c^2 f x^{11}}{11} + \frac{c^2 e x^{10}}{10} + \frac{(2 f b c + c^2 d) x^9}{9} + \frac{b c e x^8}{4} + \frac{(2 b c d + f(2 a c + b^2)) x^7}{7} + \frac{(2 a c + b^2) e x^6}{6} + \frac{(d(2 a c + b^2) + 2 a b f) x^5}{5} + a b$
norman	$\frac{c^2 f x^{11}}{11} + \frac{c^2 e x^{10}}{10} + (\frac{2}{9} f b c + \frac{1}{9} c^2 d) x^9 + \frac{b c e x^8}{4} + (\frac{2}{7} a c f + \frac{1}{7} b^2 f + \frac{2}{7} b c d) x^7 + (\frac{1}{3} a c e + \frac{1}{6} b^2 e) x^6 +$
gosper	$\frac{1}{11} c^2 f x^{11} + \frac{1}{10} c^2 e x^{10} + \frac{2}{9} x^9 f b c + \frac{1}{9} c^2 d x^9 + \frac{1}{4} b c e x^8 + \frac{2}{7} x^7 a c f + \frac{1}{7} x^7 b^2 f + \frac{2}{7} x^7 b c d + \frac{1}{3} x^6 a c e +$
risch	$\frac{1}{11} c^2 f x^{11} + \frac{1}{10} c^2 e x^{10} + \frac{2}{9} x^9 f b c + \frac{1}{9} c^2 d x^9 + \frac{1}{4} b c e x^8 + \frac{2}{7} x^7 a c f + \frac{1}{7} x^7 b^2 f + \frac{2}{7} x^7 b c d + \frac{1}{3} x^6 a c e +$
parallelrisc	$\frac{1}{11} c^2 f x^{11} + \frac{1}{10} c^2 e x^{10} + \frac{2}{9} x^9 f b c + \frac{1}{9} c^2 d x^9 + \frac{1}{4} b c e x^8 + \frac{2}{7} x^7 a c f + \frac{1}{7} x^7 b^2 f + \frac{2}{7} x^7 b c d + \frac{1}{3} x^6 a c e +$

[In] int((f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x,method=\_RETURNVERBOSE)

```
[Out] 1/11*c^2*f*x^11+1/10*c^2*e*x^10+1/9*(2*b*c*f+c^2*d)*x^9+1/4*b*c*e*x^8+1/7*(
2*b*c*d+f*(2*a*c+b^2))*x^7+1/6*(2*a*c+b^2)*e*x^6+1/5*(d*(2*a*c+b^2)+2*a*b*f
)*x^5+1/2*a*b*e*x^4+1/3*(a^2*f+2*a*b*d)*x^3+1/2*a^2*e*x^2+a^2*d*x
```

**Fricas [A] (verification not implemented)**

none

Time = 0.24 (sec) , antiderivative size = 138, normalized size of antiderivative = 0.90

$$\int (d + ex + fx^2) (a + bx^2 + cx^4)^2 dx = \frac{1}{11} c^2 f x^{11} + \frac{1}{10} c^2 e x^{10} + \frac{1}{4} b c e x^8 + \frac{1}{9} (c^2 d + 2 b c f) x^9$$

$$+ \frac{1}{6} (b^2 + 2 a c) e x^6 + \frac{1}{7} (2 b c d + (b^2 + 2 a c) f) x^7$$

$$+ \frac{1}{2} a b e x^4 + \frac{1}{5} (2 a b f + (b^2 + 2 a c) d) x^5$$

$$+ \frac{1}{2} a^2 e x^2 + a^2 d x + \frac{1}{3} (2 a b d + a^2 f) x^3$$

[In] integrate((f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x, algorithm="fricas")

```
[Out] 1/11*c^2*f*x^11 + 1/10*c^2*e*x^10 + 1/4*b*c*e*x^8 + 1/9*(c^2*d + 2*b*c*f)*x
^9 + 1/6*(b^2 + 2*a*c)*e*x^6 + 1/7*(2*b*c*d + (b^2 + 2*a*c)*f)*x^7 + 1/2*a*
b*e*x^4 + 1/5*(2*a*b*f + (b^2 + 2*a*c)*d)*x^5 + 1/2*a^2*e*x^2 + a^2*d*x + 1
/3*(2*a*b*d + a^2*f)*x^3
```

**Sympy [A] (verification not implemented)**

Time = 0.03 (sec) , antiderivative size = 165, normalized size of antiderivative = 1.07

$$\int (d + ex + fx^2) (a + bx^2 + cx^4)^2 dx = a^2 dx + \frac{a^2 ex^2}{2} + \frac{abex^4}{2} + \frac{bcex^8}{4} + \frac{c^2 ex^{10}}{10} + \frac{c^2 fx^{11}}{11} + x^9 \cdot \left( \frac{2bcf}{9} + \frac{c^2 d}{9} \right) + x^7 \cdot \left( \frac{2acf}{7} + \frac{b^2 f}{7} + \frac{2bcd}{7} \right) + x^6 \left( \frac{ace}{3} + \frac{b^2 e}{6} \right) + x^5 \cdot \left( \frac{2abf}{5} + \frac{2acd}{5} + \frac{b^2 d}{5} \right) + x^3 \left( \frac{a^2 f}{3} + \frac{2abd}{3} \right)$$

[In] integrate((f\*x\*\*2+e\*x+d)\*(c\*x\*\*4+b\*x\*\*2+a)\*\*2,x)

[Out] a\*\*2\*d\*x + a\*\*2\*e\*x\*\*2/2 + a\*b\*e\*x\*\*4/2 + b\*c\*e\*x\*\*8/4 + c\*\*2\*e\*x\*\*10/10 + c\*\*2\*f\*x\*\*11/11 + x\*\*9\*(2\*b\*c\*f/9 + c\*\*2\*d/9) + x\*\*7\*(2\*a\*c\*f/7 + b\*\*2\*f/7 + 2\*b\*c\*d/7) + x\*\*6\*(a\*c\*e/3 + b\*\*2\*e/6) + x\*\*5\*(2\*a\*b\*f/5 + 2\*a\*c\*d/5 + b\*\*2\*d/5) + x\*\*3\*(a\*\*2\*f/3 + 2\*a\*b\*d/3)

**Maxima [A] (verification not implemented)**

none

Time = 0.20 (sec) , antiderivative size = 138, normalized size of antiderivative = 0.90

$$\int (d + ex + fx^2) (a + bx^2 + cx^4)^2 dx = \frac{1}{11} c^2 fx^{11} + \frac{1}{10} c^2 ex^{10} + \frac{1}{4} bcex^8 + \frac{1}{9} (c^2 d + 2bcf)x^9 + \frac{1}{6} (b^2 + 2ac)ex^6 + \frac{1}{7} (2bcd + (b^2 + 2ac)f)x^7 + \frac{1}{2} abex^4 + \frac{1}{5} (2abf + (b^2 + 2ac)d)x^5 + \frac{1}{2} a^2 ex^2 + a^2 dx + \frac{1}{3} (2abd + a^2 f)x^3$$

[In] integrate((f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x, algorithm="maxima")

[Out] 1/11\*c^2\*f\*x^11 + 1/10\*c^2\*e\*x^10 + 1/4\*b\*c\*e\*x^8 + 1/9\*(c^2\*d + 2\*b\*c\*f)\*x^9 + 1/6\*(b^2 + 2\*a\*c)\*e\*x^6 + 1/7\*(2\*b\*c\*d + (b^2 + 2\*a\*c)\*f)\*x^7 + 1/2\*a\*b\*e\*x^4 + 1/5\*(2\*a\*b\*f + (b^2 + 2\*a\*c)\*d)\*x^5 + 1/2\*a^2\*e\*x^2 + a^2\*d\*x + 1/3\*(2\*a\*b\*d + a^2\*f)\*x^3

**Giac [A] (verification not implemented)**

none

Time = 0.31 (sec) , antiderivative size = 151, normalized size of antiderivative = 0.98

$$\int (d + ex + fx^2) (a + bx^2 + cx^4)^2 dx = \frac{1}{11} c^2 fx^{11} + \frac{1}{10} c^2 ex^{10} + \frac{1}{9} c^2 dx^9 + \frac{2}{9} bcfx^9$$

$$+ \frac{1}{4} bce x^8 + \frac{2}{7} bcdx^7 + \frac{1}{7} b^2 fx^7 + \frac{2}{7} acfx^7 + \frac{1}{6} b^2 ex^6$$

$$+ \frac{1}{3} ace x^6 + \frac{1}{5} b^2 dx^5 + \frac{2}{5} acdx^5 + \frac{2}{5} abfx^5$$

$$+ \frac{1}{2} abex^4 + \frac{2}{3} abdx^3 + \frac{1}{3} a^2 fx^3 + \frac{1}{2} a^2 ex^2 + a^2 dx$$

[In] integrate((f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x, algorithm="giac")

[Out] 1/11\*c^2\*f\*x^11 + 1/10\*c^2\*e\*x^10 + 1/9\*c^2\*d\*x^9 + 2/9\*b\*c\*f\*x^9 + 1/4\*b\*c\*e\*x^8 + 2/7\*b\*c\*d\*x^7 + 1/7\*b^2\*f\*x^7 + 2/7\*a\*c\*f\*x^7 + 1/6\*b^2\*e\*x^6 + 1/3\*a\*c\*e\*x^6 + 1/5\*b^2\*d\*x^5 + 2/5\*a\*c\*d\*x^5 + 2/5\*a\*b\*f\*x^5 + 1/2\*a\*b\*e\*x^4 + 2/3\*a\*b\*d\*x^3 + 1/3\*a^2\*f\*x^3 + 1/2\*a^2\*e\*x^2 + a^2\*d\*x

**Mupad [B] (verification not implemented)**

Time = 7.85 (sec) , antiderivative size = 138, normalized size of antiderivative = 0.90

$$\int (d + ex + fx^2) (a + bx^2 + cx^4)^2 dx = x^5 \left( \frac{db^2}{5} + \frac{2afb}{5} + \frac{2acd}{5} \right)$$

$$+ x^7 \left( \frac{fb^2}{7} + \frac{2cdb}{7} + \frac{2acf}{7} \right) + x^3 \left( \frac{fa^2}{3} + \frac{2bda}{3} \right)$$

$$+ x^9 \left( \frac{dc^2}{9} + \frac{2bfc}{9} \right) + \frac{a^2 ex^2}{2} + \frac{c^2 ex^{10}}{10} + \frac{c^2 fx^{11}}{11}$$

$$+ \frac{ex^6 (b^2 + 2ac)}{6} + a^2 dx + \frac{abex^4}{2} + \frac{bcex^8}{4}$$

[In] int((d + e\*x + f\*x^2)\*(a + b\*x^2 + c\*x^4)^2,x)

[Out] x^5\*((b^2\*d)/5 + (2\*a\*c\*d)/5 + (2\*a\*b\*f)/5) + x^7\*((b^2\*f)/7 + (2\*b\*c\*d)/7 + (2\*a\*c\*f)/7) + x^3\*((a^2\*f)/3 + (2\*a\*b\*d)/3) + x^9\*((c^2\*d)/9 + (2\*b\*c\*f)/9) + (a^2\*e\*x^2)/2 + (c^2\*e\*x^10)/10 + (c^2\*f\*x^11)/11 + (e\*x^6\*(2\*a\*c + b^2))/6 + a^2\*d\*x + (a\*b\*e\*x^4)/2 + (b\*c\*e\*x^8)/4

### 3.8 $\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^2 dx$

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#### Optimal result

Integrand size = 30, antiderivative size = 196

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^2 dx = a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{3} a(2bd + af)x^3 + \frac{1}{4} a(2be + ag)x^4 + \frac{1}{5} (b^2 d + 2acd + 2abf)x^5 + \frac{1}{6} (b^2 e + 2ace + 2abg)x^6 + \frac{1}{7} (2bcd + b^2 f + 2acf)x^7 + \frac{1}{8} (2bce + b^2 g + 2acg)x^8 + \frac{1}{9} c(cd + 2bf)x^9 + \frac{1}{10} c(ce + 2bg)x^{10} + \frac{1}{11} c^2 fx^{11} + \frac{1}{12} c^2 gx^{12}$$

[Out] a^2\*d\*x+1/2\*a^2\*e\*x^2+1/3\*a\*(a\*f+2\*b\*d)\*x^3+1/4\*a\*(a\*g+2\*b\*e)\*x^4+1/5\*(2\*a\*b\*f+2\*a\*c\*d+b^2\*d)\*x^5+1/6\*(2\*a\*b\*g+2\*a\*c\*e+b^2\*e)\*x^6+1/7\*(2\*a\*c\*f+b^2\*f+2\*b\*c\*d)\*x^7+1/8\*(2\*a\*c\*g+b^2\*g+2\*b\*c\*e)\*x^8+1/9\*c\*(2\*b\*f+c\*d)\*x^9+1/10\*c\*(2\*b\*g+c\*e)\*x^10+1/11\*c^2\*f\*x^11+1/12\*c^2\*g\*x^12

#### Rubi [A] (verified)

Time = 0.12 (sec) , antiderivative size = 196, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.033$ , Rules used

= {1685}

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^2 dx = a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{7} x^7 (2acf + b^2 f + 2bcd) \\ + \frac{1}{5} x^5 (2abf + 2acd + b^2 d) \\ + \frac{1}{8} x^8 (2acg + b^2 g + 2bce) \\ + \frac{1}{6} x^6 (2abg + 2ace + b^2 e) + \frac{1}{3} ax^3 (af + 2bd) \\ + \frac{1}{4} ax^4 (ag + 2be) + \frac{1}{9} cx^9 (2bf + cd) \\ + \frac{1}{10} cx^{10} (2bg + ce) + \frac{1}{11} c^2 fx^{11} + \frac{1}{12} c^2 gx^{12}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)\*(a + b\*x^2 + c\*x^4)^2,x]

[Out] a^2\*d\*x + (a^2\*e\*x^2)/2 + (a\*(2\*b\*d + a\*f)\*x^3)/3 + (a\*(2\*b\*e + a\*g)\*x^4)/4 \\ + ((b^2\*d + 2\*a\*c\*d + 2\*a\*b\*f)\*x^5)/5 + ((b^2\*e + 2\*a\*c\*e + 2\*a\*b\*g)\*x^6)/ \\ 6 + ((2\*b\*c\*d + b^2\*f + 2\*a\*c\*f)\*x^7)/7 + ((2\*b\*c\*e + b^2\*g + 2\*a\*c\*g)\*x^8) \\ /8 + (c\*(c\*d + 2\*b\*f)\*x^9)/9 + (c\*(c\*e + 2\*b\*g)\*x^10)/10 + (c^2\*f\*x^11)/11 \\ + (c^2\*g\*x^12)/12

### Rule 1685

Int[(Pq\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_.), x\_Symbol] :> Int[Expa \\ ndIntegrand[Pq\*(a + b\*x^2 + c\*x^4)^p, x], x] /; FreeQ[{a, b, c}, x] && Poly \\ Q[Pq, x] && IGtQ[p, 0]

### Rubi steps

$$\text{integral} = \int (a^2 d + a^2 ex + a(2bd + af)x^2 + a(2be + ag)x^3 + (b^2 d + 2acd + 2abf) x^4 \\ + (b^2 e + 2ace + 2abg) x^5 + (2bcd + b^2 f + 2acf) x^6 + (2bce + b^2 g + 2acg) x^7 \\ + c(cd + 2bf)x^8 + c(ce + 2bg)x^9 + c^2 fx^{10} + c^2 gx^{11}) dx \\ = a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{3} a(2bd + af)x^3 + \frac{1}{4} a(2be + ag)x^4 + \frac{1}{5} (b^2 d + 2acd + 2abf) x^5 \\ + \frac{1}{6} (b^2 e + 2ace + 2abg) x^6 + \frac{1}{7} (2bcd + b^2 f + 2acf) x^7 + \frac{1}{8} (2bce + b^2 g + 2acg) x^8 \\ + \frac{1}{9} c(cd + 2bf)x^9 + \frac{1}{10} c(ce + 2bg)x^{10} + \frac{1}{11} c^2 fx^{11} + \frac{1}{12} c^2 gx^{12}$$



**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 196, normalized size of antiderivative = 1.00

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^2 dx = a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{3} a(2bd + af)x^3 + \frac{1}{4} a(2be + ag)x^4 + \frac{1}{5} (b^2 d + 2acd + 2abf)x^5 + \frac{1}{6} (b^2 e + 2ace + 2abg)x^6 + \frac{1}{7} (2bcd + b^2 f + 2acf)x^7 + \frac{1}{8} (2bce + b^2 g + 2acg)x^8 + \frac{1}{9} c(cd + 2bf)x^9 + \frac{1}{10} c(ce + 2bg)x^{10} + \frac{1}{11} c^2 f x^{11} + \frac{1}{12} c^2 g x^{12}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)\*(a + b\*x^2 + c\*x^4)^2,x]

```
[Out] a^2*d*x + (a^2*e*x^2)/2 + (a*(2*b*d + a*f)*x^3)/3 + (a*(2*b*e + a*g)*x^4)/4
+ ((b^2*d + 2*a*c*d + 2*a*b*f)*x^5)/5 + ((b^2*e + 2*a*c*e + 2*a*b*g)*x^6)/
6 + ((2*b*c*d + b^2*f + 2*a*c*f)*x^7)/7 + ((2*b*c*e + b^2*g + 2*a*c*g)*x^8)
/8 + (c*(c*d + 2*b*f)*x^9)/9 + (c*(c*e + 2*b*g)*x^10)/10 + (c^2*f*x^11)/11
+ (c^2*g*x^12)/12
```

**Maple [A] (verified)**

Time = 0.15 (sec) , antiderivative size = 183, normalized size of antiderivative = 0.93

method	result
default	$\frac{c^2 g x^{12}}{12} + \frac{c^2 f x^{11}}{11} + \frac{(2gbc+e^2)x^{10}}{10} + \frac{(2fbc+c^2d)x^9}{9} + \frac{(2ebc+g(2ac+b^2))x^8}{8} + \frac{(2bcd+f(2ac+b^2))x^7}{7} + \frac{(e(2ac+b^2)+2b^2d+2abf)x^6}{6} + \frac{(b^2e+2ace+2abg)x^5}{5} + \frac{(2bcd+b^2f+2acf)x^4}{4} + \frac{a^2 dx^3}{3} + \frac{a^2 ex^2}{2} + a^2 dx$
norman	$\frac{c^2 g x^{12}}{12} + \frac{c^2 f x^{11}}{11} + (\frac{1}{5}gbc + \frac{1}{10}e^2) x^{10} + (\frac{2}{9}fbc + \frac{1}{9}c^2 d) x^9 + (\frac{1}{4}acg + \frac{1}{8}b^2 g + \frac{1}{4}ebc) x^8 + (\frac{2}{7}ac$
gosper	$\frac{1}{12}c^2 g x^{12} + \frac{1}{11}c^2 f x^{11} + \frac{1}{5}x^{10}gbc + \frac{1}{10}c^2 e x^{10} + \frac{2}{9}x^9 fbc + \frac{1}{9}c^2 d x^9 + \frac{1}{4}x^8 acg + \frac{1}{8}x^8 b^2 g + \frac{1}{4}bce$
risch	$\frac{1}{12}c^2 g x^{12} + \frac{1}{11}c^2 f x^{11} + \frac{1}{5}x^{10}gbc + \frac{1}{10}c^2 e x^{10} + \frac{2}{9}x^9 fbc + \frac{1}{9}c^2 d x^9 + \frac{1}{4}x^8 acg + \frac{1}{8}x^8 b^2 g + \frac{1}{4}bce$
parallelrisch	$\frac{1}{12}c^2 g x^{12} + \frac{1}{11}c^2 f x^{11} + \frac{1}{5}x^{10}gbc + \frac{1}{10}c^2 e x^{10} + \frac{2}{9}x^9 fbc + \frac{1}{9}c^2 d x^9 + \frac{1}{4}x^8 acg + \frac{1}{8}x^8 b^2 g + \frac{1}{4}bce$

[In] int((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x,method=\_RETURNVERBOSE)

```
[Out] 1/12*c^2*g*x^12+1/11*c^2*f*x^11+1/10*(2*b*c*g+c^2*e)*x^10+1/9*(2*b*c*f+c^2*
d)*x^9+1/8*(2*e*b*c+g*(2*a*c+b^2))*x^8+1/7*(2*b*c*d+f*(2*a*c+b^2))*x^7+1/6*
(e*(2*a*c+b^2)+2*a*b*g)*x^6+1/5*(d*(2*a*c+b^2)+2*a*b*f)*x^5+1/4*(a^2*g+2*a*
b*e)*x^4+1/3*(a^2*f+2*a*b*d)*x^3+1/2*a^2*e*x^2+a^2*d*x
```

**Fricas [A] (verification not implemented)**

none

Time = 0.25 (sec) , antiderivative size = 182, normalized size of antiderivative = 0.93

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^2 dx$$

$$= \frac{1}{12} c^2 g x^{12} + \frac{1}{11} c^2 f x^{11} + \frac{1}{10} (c^2 e + 2bcg) x^{10} + \frac{1}{9} (c^2 d + 2bcf) x^9$$

$$+ \frac{1}{8} (2bce + (b^2 + 2ac)g) x^8 + \frac{1}{7} (2bcd + (b^2 + 2ac)f) x^7 + \frac{1}{6} (2abg + (b^2 + 2ac)e) x^6$$

$$+ \frac{1}{5} (2abf + (b^2 + 2ac)d) x^5 + \frac{1}{2} a^2 e x^2 + \frac{1}{4} (2abe + a^2 g) x^4 + a^2 d x + \frac{1}{3} (2abd + a^2 f) x^3$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x, algorithm="fricas")

[Out] 1/12\*c^2\*g\*x^12 + 1/11\*c^2\*f\*x^11 + 1/10\*(c^2\*e + 2\*b\*c\*g)\*x^10 + 1/9\*(c^2\*d + 2\*b\*c\*f)\*x^9 + 1/8\*(2\*b\*c\*e + (b^2 + 2\*a\*c)\*g)\*x^8 + 1/7\*(2\*b\*c\*d + (b^2 + 2\*a\*c)\*f)\*x^7 + 1/6\*(2\*a\*b\*g + (b^2 + 2\*a\*c)\*e)\*x^6 + 1/5\*(2\*a\*b\*f + (b^2 + 2\*a\*c)\*d)\*x^5 + 1/2\*a^2\*e\*x^2 + 1/4\*(2\*a\*b\*e + a^2\*g)\*x^4 + a^2\*d\*x + 1/3\*(2\*a\*b\*d + a^2\*f)\*x^3

**Sympy [A] (verification not implemented)**

Time = 0.03 (sec) , antiderivative size = 209, normalized size of antiderivative = 1.07

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^2 dx = a^2 dx + \frac{a^2 e x^2}{2} + \frac{c^2 f x^{11}}{11} + \frac{c^2 g x^{12}}{12}$$

$$+ x^{10} \left( \frac{bcg}{5} + \frac{c^2 e}{10} \right) + x^9 \cdot \left( \frac{2bcf}{9} + \frac{c^2 d}{9} \right)$$

$$+ x^8 \left( \frac{acg}{4} + \frac{b^2 g}{8} + \frac{bce}{4} \right)$$

$$+ x^7 \cdot \left( \frac{2acf}{7} + \frac{b^2 f}{7} + \frac{2bcd}{7} \right)$$

$$+ x^6 \left( \frac{abg}{3} + \frac{ace}{3} + \frac{b^2 e}{6} \right)$$

$$+ x^5 \cdot \left( \frac{2abf}{5} + \frac{2acd}{5} + \frac{b^2 d}{5} \right)$$

$$+ x^4 \left( \frac{a^2 g}{4} + \frac{abe}{2} \right) + x^3 \left( \frac{a^2 f}{3} + \frac{2abd}{3} \right)$$

[In] integrate((g\*x\*\*3+f\*x\*\*2+e\*x+d)\*(c\*x\*\*4+b\*x\*\*2+a)\*\*2,x)

[Out] a\*\*2\*d\*x + a\*\*2\*e\*x\*\*2/2 + c\*\*2\*f\*x\*\*11/11 + c\*\*2\*g\*x\*\*12/12 + x\*\*10\*(b\*c\*g/5 + c\*\*2\*e/10) + x\*\*9\*(2\*b\*c\*f/9 + c\*\*2\*d/9) + x\*\*8\*(a\*c\*g/4 + b\*\*2\*g/8 +

$b*c*e/4) + x**7*(2*a*c*f/7 + b**2*f/7 + 2*b*c*d/7) + x**6*(a*b*g/3 + a*c*e/3 + b**2*e/6) + x**5*(2*a*b*f/5 + 2*a*c*d/5 + b**2*d/5) + x**4*(a**2*g/4 + a*b*e/2) + x**3*(a**2*f/3 + 2*a*b*d/3)$

### Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 182, normalized size of antiderivative = 0.93

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^2 dx$$

$$= \frac{1}{12} c^2 g x^{12} + \frac{1}{11} c^2 f x^{11} + \frac{1}{10} (c^2 e + 2 b c g) x^{10} + \frac{1}{9} (c^2 d + 2 b c f) x^9$$

$$+ \frac{1}{8} (2 b c e + (b^2 + 2 a c) g) x^8 + \frac{1}{7} (2 b c d + (b^2 + 2 a c) f) x^7 + \frac{1}{6} (2 a b g + (b^2 + 2 a c) e) x^6$$

$$+ \frac{1}{5} (2 a b f + (b^2 + 2 a c) d) x^5 + \frac{1}{2} a^2 e x^2 + \frac{1}{4} (2 a b e + a^2 g) x^4 + a^2 d x + \frac{1}{3} (2 a b d + a^2 f) x^3$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x, algorithm="maxima")

[Out] 1/12\*c^2\*g\*x^12 + 1/11\*c^2\*f\*x^11 + 1/10\*(c^2\*e + 2\*b\*c\*g)\*x^10 + 1/9\*(c^2\*d + 2\*b\*c\*f)\*x^9 + 1/8\*(2\*b\*c\*e + (b^2 + 2\*a\*c)\*g)\*x^8 + 1/7\*(2\*b\*c\*d + (b^2 + 2\*a\*c)\*f)\*x^7 + 1/6\*(2\*a\*b\*g + (b^2 + 2\*a\*c)\*e)\*x^6 + 1/5\*(2\*a\*b\*f + (b^2 + 2\*a\*c)\*d)\*x^5 + 1/2\*a^2\*e\*x^2 + 1/4\*(2\*a\*b\*e + a^2\*g)\*x^4 + a^2\*d\*x + 1/3\*(2\*a\*b\*d + a^2\*f)\*x^3

### Giac [A] (verification not implemented)

none

Time = 0.38 (sec) , antiderivative size = 202, normalized size of antiderivative = 1.03

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^2 dx = \frac{1}{12} c^2 g x^{12} + \frac{1}{11} c^2 f x^{11} + \frac{1}{10} c^2 e x^{10} + \frac{1}{5} b c g x^{10}$$

$$+ \frac{1}{9} c^2 d x^9 + \frac{2}{9} b c f x^9 + \frac{1}{4} b c e x^8 + \frac{1}{8} b^2 g x^8$$

$$+ \frac{1}{4} a c g x^8 + \frac{2}{7} b c d x^7 + \frac{1}{7} b^2 f x^7 + \frac{2}{7} a c f x^7$$

$$+ \frac{1}{6} b^2 e x^6 + \frac{1}{3} a c e x^6 + \frac{1}{3} a b g x^6 + \frac{1}{5} b^2 d x^5$$

$$+ \frac{2}{5} a c d x^5 + \frac{2}{5} a b f x^5 + \frac{1}{2} a b e x^4 + \frac{1}{4} a^2 g x^4$$

$$+ \frac{2}{3} a b d x^3 + \frac{1}{3} a^2 f x^3 + \frac{1}{2} a^2 e x^2 + a^2 d x$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^2,x, algorithm="giac")

[Out]  $\frac{1}{12}c^2gx^{12} + \frac{1}{11}c^2fx^{11} + \frac{1}{10}c^2ex^{10} + \frac{1}{5}b^2c^2gx^{10} + \frac{1}{9}c^2d^2x^9 + \frac{2}{9}b^2c^2fx^9 + \frac{1}{4}b^2c^2ex^8 + \frac{1}{8}b^2c^2gx^8 + \frac{1}{4}a^2c^2gx^8 + \frac{2}{7}b^2c^2d^2x^7 + \frac{1}{7}b^2c^2fx^7 + \frac{2}{7}a^2c^2fx^7 + \frac{1}{6}b^2c^2ex^6 + \frac{1}{3}a^2c^2ex^6 + \frac{1}{3}a^2b^2gx^6 + \frac{1}{5}b^2d^2x^5 + \frac{2}{5}a^2c^2d^2x^5 + \frac{2}{5}a^2b^2fx^5 + \frac{1}{2}a^2b^2ex^4 + \frac{1}{4}a^2c^2gx^4 + \frac{2}{3}a^2b^2d^2x^3 + \frac{1}{3}a^2c^2fx^3 + \frac{1}{2}a^2c^2ex^2 + a^2d^2x$

### Mupad [B] (verification not implemented)

Time = 7.88 (sec) , antiderivative size = 182, normalized size of antiderivative = 0.93

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^2 dx$$

$$= x^5 \left( \frac{db^2}{5} + \frac{2afb}{5} + \frac{2acd}{5} \right) + x^6 \left( \frac{eb^2}{6} + \frac{agb}{3} + \frac{ace}{3} \right) + x^7 \left( \frac{fb^2}{7} + \frac{2cdb}{7} + \frac{2acf}{7} \right)$$

$$+ x^8 \left( \frac{gb^2}{8} + \frac{ceb}{4} + \frac{acg}{4} \right) + x^3 \left( \frac{fa^2}{3} + \frac{2bda}{3} \right) + x^4 \left( \frac{ga^2}{4} + \frac{bea}{2} \right)$$

$$+ x^9 \left( \frac{dc^2}{9} + \frac{2bfc}{9} \right) + x^{10} \left( \frac{ec^2}{10} + \frac{bgc}{5} \right) + \frac{a^2ex^2}{2} + \frac{c^2fx^{11}}{11} + \frac{c^2gx^{12}}{12} + a^2dx$$

[In] `int((a + b*x^2 + c*x^4)^2*(d + e*x + f*x^2 + g*x^3),x)`

[Out]  $x^5*((b^2*d)/5 + (2*a*c*d)/5 + (2*a*b*f)/5) + x^6*((b^2*e)/6 + (a*c*e)/3 + (a*b*g)/3) + x^7*((b^2*f)/7 + (2*b*c*d)/7 + (2*a*c*f)/7) + x^8*((b^2*g)/8 + (b*c*e)/4 + (a*c*g)/4) + x^3*((a^2*f)/3 + (2*a*b*d)/3) + x^4*((a^2*g)/4 + (a*b*e)/2) + x^9*((c^2*d)/9 + (2*b*c*f)/9) + x^{10}*((c^2*e)/10 + (b*c*g)/5) + (a^2*e*x^2)/2 + (c^2*f*x^{11})/11 + (c^2*g*x^{12})/12 + a^2*d*x$

### 3.9 $\int (a + bx^2 + cx^4)^2 (d + ex + fx^2 + gx^3 + hx^4) dx$

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#### Optimal result

Integrand size = 35, antiderivative size = 234

$$\begin{aligned}
 & \int (a + bx^2 + cx^4)^2 (d + ex + fx^2 + gx^3 + hx^4) dx \\
 &= a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{3} a(2bd + af)x^3 + \frac{1}{4} a(2be + ag)x^4 + \frac{1}{5} (b^2 d + 2abf + a(2cd + ah)) x^5 \\
 &+ \frac{1}{6} (b^2 e + 2ace + 2abg) x^6 + \frac{1}{7} (b^2 f + 2acf + 2b(cd + ah)) x^7 \\
 &+ \frac{1}{8} (2bce + b^2 g + 2acg) x^8 + \frac{1}{9} (c^2 d + b^2 h + 2c(bf + ah)) x^9 \\
 &+ \frac{1}{10} c(ce + 2bg)x^{10} + \frac{1}{11} c(cf + 2bh)x^{11} + \frac{1}{12} c^2 gx^{12} + \frac{1}{13} c^2 hx^{13}
 \end{aligned}$$

```
[Out] a^2*d*x+1/2*a^2*e*x^2+1/3*a*(a*f+2*b*d)*x^3+1/4*a*(a*g+2*b*e)*x^4+1/5*(b^2*d+2*a*b*f+a*(a*h+2*c*d))*x^5+1/6*(2*a*b*g+2*a*c*e+b^2*e)*x^6+1/7*(b^2*f+2*a*c*f+2*b*(a*h+c*d))*x^7+1/8*(2*a*c*g+b^2*g+2*b*c*e)*x^8+1/9*(c^2*d+b^2*h+2*c*(a*h+b*f))*x^9+1/10*c*(2*b*g+c*e)*x^10+1/11*c*(2*b*h+c*f)*x^11+1/12*c^2*g*x^12+1/13*c^2*h*x^13
```

#### Rubi [A] (verified)

Time = 0.16 (sec) , antiderivative size = 234, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.029$ , Rules used

= {1685}

$$\int (a + bx^2 + cx^4)^2 (d + ex + fx^2 + gx^3 + hx^4) dx$$

$$= a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{9} x^9 (2c(ah + bf) + b^2 h + c^2 d) + \frac{1}{7} x^7 (2b(ah + cd) + 2acf + b^2 f)$$

$$+ \frac{1}{5} x^5 (2abf + a(ah + 2cd) + b^2 d) + \frac{1}{8} x^8 (2acg + b^2 g + 2bce)$$

$$+ \frac{1}{6} x^6 (2abg + 2ace + b^2 e) + \frac{1}{3} ax^3 (af + 2bd) + \frac{1}{4} ax^4 (ag + 2be)$$

$$+ \frac{1}{10} cx^{10} (2bg + ce) + \frac{1}{11} cx^{11} (2bh + cf) + \frac{1}{12} c^2 gx^{12} + \frac{1}{13} c^2 hx^{13}$$

[In] Int[(a + b\*x^2 + c\*x^4)^2\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4), x]

[Out] a^2\*d\*x + (a^2\*e\*x^2)/2 + (a\*(2\*b\*d + a\*f)\*x^3)/3 + (a\*(2\*b\*e + a\*g)\*x^4)/4 + ((b^2\*d + 2\*a\*b\*f + a\*(2\*c\*d + a\*h))\*x^5)/5 + ((b^2\*e + 2\*a\*c\*e + 2\*a\*b\*g)\*x^6)/6 + ((b^2\*f + 2\*a\*c\*f + 2\*b\*(c\*d + a\*h))\*x^7)/7 + ((2\*b\*c\*e + b^2\*g + 2\*a\*c\*g)\*x^8)/8 + ((c^2\*d + b^2\*h + 2\*c\*(b\*f + a\*h))\*x^9)/9 + (c\*(c\*e + 2\*b\*g)\*x^10)/10 + (c\*(c\*f + 2\*b\*h)\*x^11)/11 + (c^2\*g\*x^12)/12 + (c^2\*h\*x^13)/13

Rule 1685

Int[(Pq\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_.), x\_Symbol] :> Int[ExpandIntegrand[Pq\*(a + b\*x^2 + c\*x^4)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, 0]

Rubi steps

$$\text{integral} = \int (a^2 d + a^2 ex + a(2bd + af)x^2 + a(2be + ag)x^3 + (b^2 d + 2abf + a(2cd + ah)) x^4$$

$$+ (b^2 e + 2ace + 2abg) x^5 + (b^2 f + 2acf + 2b(cd + ah)) x^6 + (2bce + b^2 g + 2acg) x^7$$

$$+ (c^2 d + b^2 h + 2c(bf + ah)) x^8 + c(ce + 2bg)x^9 + c(cf + 2bh)x^{10} + c^2 gx^{11} + c^2 hx^{12}) dx$$

$$= a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{3} a(2bd + af)x^3 + \frac{1}{4} a(2be + ag)x^4 + \frac{1}{5} (b^2 d + 2abf + a(2cd + ah)) x^5$$

$$+ \frac{1}{6} (b^2 e + 2ace + 2abg) x^6 + \frac{1}{7} (b^2 f + 2acf + 2b(cd + ah)) x^7 + \frac{1}{8} (2bce + b^2 g + 2acg) x^8$$

$$+ \frac{1}{9} (c^2 d + b^2 h + 2c(bf + ah)) x^9 + \frac{1}{10} c(ce + 2bg)x^{10} + \frac{1}{11} c(cf + 2bh)x^{11} + \frac{1}{12} c^2 gx^{12}$$

$$+ \frac{1}{13} c^2 hx^{13}$$

**Mathematica [A] (verified)**

Time = 0.06 (sec) , antiderivative size = 234, normalized size of antiderivative = 1.00

$$\int (a + bx^2 + cx^4)^2 (d + ex + fx^2 + gx^3 + hx^4) dx$$

$$= a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{3} a(2bd + af)x^3 + \frac{1}{4} a(2be + ag)x^4 + \frac{1}{5} (b^2 d + 2acd + 2abf + a^2 h) x^5$$

$$+ \frac{1}{6} (b^2 e + 2ace + 2abg) x^6 + \frac{1}{7} (2bcd + b^2 f + 2acf + 2abh) x^7$$

$$+ \frac{1}{8} (2bce + b^2 g + 2acg) x^8 + \frac{1}{9} (c^2 d + 2bcf + b^2 h + 2ach) x^9$$

$$+ \frac{1}{10} c(ce + 2bg)x^{10} + \frac{1}{11} c(cf + 2bh)x^{11} + \frac{1}{12} c^2 gx^{12} + \frac{1}{13} c^2 hx^{13}$$

`[In] Integrate[(a + b*x^2 + c*x^4)^2*(d + e*x + f*x^2 + g*x^3 + h*x^4),x]`

```
[Out] a^2*d*x + (a^2*e*x^2)/2 + (a*(2*b*d + a*f)*x^3)/3 + (a*(2*b*e + a*g)*x^4)/4
+ ((b^2*d + 2*a*c*d + 2*a*b*f + a^2*h)*x^5)/5 + ((b^2*e + 2*a*c*e + 2*a*b*
g)*x^6)/6 + ((2*b*c*d + b^2*f + 2*a*c*f + 2*a*b*h)*x^7)/7 + ((2*b*c*e + b^2
*g + 2*a*c*g)*x^8)/8 + ((c^2*d + 2*b*c*f + b^2*h + 2*a*c*h)*x^9)/9 + (c*(c*
e + 2*b*g)*x^10)/10 + (c*(c*f + 2*b*h)*x^11)/11 + (c^2*g*x^12)/12 + (c^2*h*
x^13)/13
```

**Maple [A] (verified)**

Time = 0.23 (sec) , antiderivative size = 219, normalized size of antiderivative = 0.94

method	result
default	$\frac{c^2 h x^{13}}{13} + \frac{c^2 g x^{12}}{12} + \frac{(2 b c h + f c^2) x^{11}}{11} + \frac{(2 g b c + e c^2) x^{10}}{10} + \frac{((2 a c + b^2) h + 2 f b c + c^2 d) x^9}{9} + \frac{(2 e b c + g(2 a c + b^2)) x^8}{8} + \frac{(2 a b c d + a^2 h) x^7}{7} + \frac{(2 a c e + a^2 g) x^6}{6} + \frac{(2 a b f + a^2 h) x^5}{5} + \frac{(2 b c d + b^2 f + 2 a c f + 2 a b h) x^4}{4} + \frac{(2 b e + a g) x^3}{3} + \frac{a^2 d x^2}{2} + a^2 x$
norman	$\frac{c^2 h x^{13}}{13} + \frac{c^2 g x^{12}}{12} + \left(\frac{2}{11} b c h + \frac{1}{11} f c^2\right) x^{11} + \left(\frac{1}{5} g b c + \frac{1}{10} e c^2\right) x^{10} + \left(\frac{2}{9} a c h + \frac{1}{9} b^2 h + \frac{2}{9} f b c + \frac{1}{9} c^2 d\right) x^9 + \frac{2 a b c d + a^2 h}{7} x^7 + \frac{2 a c e + a^2 g}{6} x^6 + \frac{2 b e + a g}{5} x^5 + \frac{2 b c d + b^2 f + 2 a c f + 2 a b h}{4} x^4 + \frac{2 b e + a g}{3} x^3 + a^2 d x^2 + a^2 x$
gosper	$\frac{1}{9} x^9 b^2 h + \frac{1}{5} x^5 a^2 h + \frac{1}{8} x^8 b^2 g + \frac{1}{4} x^4 g a^2 + \frac{2}{9} x^9 f b c + \frac{2}{7} x^7 a c f + \frac{2}{5} x^5 a b f + \frac{1}{3} x^3 f a^2 + \frac{1}{7} x^7 b^2 f + \frac{1}{9} c^2 d x^9 + \frac{2}{9} a c h + \frac{1}{9} b^2 h + \frac{2}{9} f b c + \frac{1}{9} c^2 d$
risch	$\frac{1}{9} x^9 b^2 h + \frac{1}{5} x^5 a^2 h + \frac{1}{8} x^8 b^2 g + \frac{1}{4} x^4 g a^2 + \frac{2}{9} x^9 f b c + \frac{2}{7} x^7 a c f + \frac{2}{5} x^5 a b f + \frac{1}{3} x^3 f a^2 + \frac{1}{7} x^7 b^2 f + \frac{1}{9} c^2 d x^9 + \frac{2}{9} a c h + \frac{1}{9} b^2 h + \frac{2}{9} f b c + \frac{1}{9} c^2 d$
parallelrisc	$\frac{1}{9} x^9 b^2 h + \frac{1}{5} x^5 a^2 h + \frac{1}{8} x^8 b^2 g + \frac{1}{4} x^4 g a^2 + \frac{2}{9} x^9 f b c + \frac{2}{7} x^7 a c f + \frac{2}{5} x^5 a b f + \frac{1}{3} x^3 f a^2 + \frac{1}{7} x^7 b^2 f + \frac{1}{9} c^2 d x^9 + \frac{2}{9} a c h + \frac{1}{9} b^2 h + \frac{2}{9} f b c + \frac{1}{9} c^2 d$

`[In] int((c*x^4+b*x^2+a)^2*(h*x^4+g*x^3+f*x^2+e*x+d),x,method=_RETURNVERBOSE)`

```
[Out] 1/13*c^2*h*x^13+1/12*c^2*g*x^12+1/11*(2*b*c*h+c^2*f)*x^11+1/10*(2*b*c*g+c^2
*e)*x^10+1/9*((2*a*c+b^2)*h+2*f*b*c+c^2*d)*x^9+1/8*(2*e*b*c+g*(2*a*c+b^2))*
x^8+1/7*(2*a*b*h+f*(2*a*c+b^2)+2*b*c*d)*x^7+1/6*(e*(2*a*c+b^2)+2*a*b*g)*x^6
+1/5*(a^2*h+2*a*b*f+d*(2*a*c+b^2))*x^5+1/4*(a^2*g+2*a*b*e)*x^4+1/3*(a^2*f+2
*a*b*d)*x^3+1/2*a^2*e*x^2+a^2*d*x
```

**Fricas [A] (verification not implemented)**

none

Time = 0.24 (sec) , antiderivative size = 218, normalized size of antiderivative = 0.93

$$\begin{aligned}
& \int (a + bx^2 + cx^4)^2 (d + ex + fx^2 + gx^3 + hx^4) dx \\
&= \frac{1}{13} c^2 h x^{13} + \frac{1}{12} c^2 g x^{12} + \frac{1}{11} (c^2 f + 2 b c h) x^{11} + \frac{1}{10} (c^2 e + 2 b c g) x^{10} \\
&+ \frac{1}{9} (c^2 d + 2 b c f + (b^2 + 2 a c) h) x^9 + \frac{1}{8} (2 b c e + (b^2 + 2 a c) g) x^8 \\
&+ \frac{1}{7} (2 b c d + 2 a b h + (b^2 + 2 a c) f) x^7 + \frac{1}{6} (2 a b g + (b^2 + 2 a c) e) x^6 \\
&+ \frac{1}{5} (2 a b f + a^2 h + (b^2 + 2 a c) d) x^5 + \frac{1}{2} a^2 e x^2 \\
&+ \frac{1}{4} (2 a b e + a^2 g) x^4 + a^2 d x + \frac{1}{3} (2 a b d + a^2 f) x^3
\end{aligned}$$

```
[In] integrate((c*x^4+b*x^2+a)^2*(h*x^4+g*x^3+f*x^2+e*x+d),x, algorithm="fricas")
```

```
[Out] 1/13*c^2*h*x^13 + 1/12*c^2*g*x^12 + 1/11*(c^2*f + 2*b*c*h)*x^11 + 1/10*(c^2*
*e + 2*b*c*g)*x^10 + 1/9*(c^2*d + 2*b*c*f + (b^2 + 2*a*c)*h)*x^9 + 1/8*(2*b
*c*e + (b^2 + 2*a*c)*g)*x^8 + 1/7*(2*b*c*d + 2*a*b*h + (b^2 + 2*a*c)*f)*x^7
+ 1/6*(2*a*b*g + (b^2 + 2*a*c)*e)*x^6 + 1/5*(2*a*b*f + a^2*h + (b^2 + 2*a*
c)*d)*x^5 + 1/2*a^2*e*x^2 + 1/4*(2*a*b*e + a^2*g)*x^4 + a^2*d*x + 1/3*(2*a*
b*d + a^2*f)*x^3
```

**Sympy [A] (verification not implemented)**

Time = 0.03 (sec) , antiderivative size = 258, normalized size of antiderivative = 1.10

$$\begin{aligned}
& \int (a + bx^2 + cx^4)^2 (d + ex + fx^2 + gx^3 + hx^4) dx \\
&= a^2 d x + \frac{a^2 e x^2}{2} + \frac{c^2 g x^{12}}{12} + \frac{c^2 h x^{13}}{13} + x^{11} \cdot \left( \frac{2 b c h}{11} + \frac{c^2 f}{11} \right) + x^{10} \left( \frac{b c g}{5} + \frac{c^2 e}{10} \right) \\
&+ x^9 \cdot \left( \frac{2 a c h}{9} + \frac{b^2 h}{9} + \frac{2 b c f}{9} + \frac{c^2 d}{9} \right) + x^8 \left( \frac{a c g}{4} + \frac{b^2 g}{8} + \frac{b c e}{4} \right) \\
&+ x^7 \cdot \left( \frac{2 a b h}{7} + \frac{2 a c f}{7} + \frac{b^2 f}{7} + \frac{2 b c d}{7} \right) + x^6 \left( \frac{a b g}{3} + \frac{a c e}{3} + \frac{b^2 e}{6} \right) \\
&+ x^5 \left( \frac{a^2 h}{5} + \frac{2 a b f}{5} + \frac{2 a c d}{5} + \frac{b^2 d}{5} \right) + x^4 \left( \frac{a^2 g}{4} + \frac{a b e}{2} \right) + x^3 \left( \frac{a^2 f}{3} + \frac{2 a b d}{3} \right)
\end{aligned}$$

```
[In] integrate((c*x**4+b*x**2+a)**2*(h*x**4+g*x**3+f*x**2+e*x+d),x)
```



```
[Out] a**2*d*x + a**2*e*x**2/2 + c**2*g*x**12/12 + c**2*h*x**13/13 + x**11*(2*b*c
*h/11 + c**2*f/11) + x**10*(b*c*g/5 + c**2*e/10) + x**9*(2*a*c*h/9 + b**2*h
/9 + 2*b*c*f/9 + c**2*d/9) + x**8*(a*c*g/4 + b**2*g/8 + b*c*e/4) + x**7*(2*
a*b*h/7 + 2*a*c*f/7 + b**2*f/7 + 2*b*c*d/7) + x**6*(a*b*g/3 + a*c*e/3 + b**
2*e/6) + x**5*(a**2*h/5 + 2*a*b*f/5 + 2*a*c*d/5 + b**2*d/5) + x**4*(a**2*g/
4 + a*b*e/2) + x**3*(a**2*f/3 + 2*a*b*d/3)
```

### Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 218, normalized size of antiderivative = 0.93

$$\int (a + bx^2 + cx^4)^2 (d + ex + fx^2 + gx^3 + hx^4) dx$$

$$= \frac{1}{13} c^2 h x^{13} + \frac{1}{12} c^2 g x^{12} + \frac{1}{11} (c^2 f + 2 b c h) x^{11} + \frac{1}{10} (c^2 e + 2 b c g) x^{10}$$

$$+ \frac{1}{9} (c^2 d + 2 b c f + (b^2 + 2 a c) h) x^9 + \frac{1}{8} (2 b c e + (b^2 + 2 a c) g) x^8$$

$$+ \frac{1}{7} (2 b c d + 2 a b h + (b^2 + 2 a c) f) x^7 + \frac{1}{6} (2 a b g + (b^2 + 2 a c) e) x^6$$

$$+ \frac{1}{5} (2 a b f + a^2 h + (b^2 + 2 a c) d) x^5 + \frac{1}{2} a^2 e x^2$$

$$+ \frac{1}{4} (2 a b e + a^2 g) x^4 + a^2 d x + \frac{1}{3} (2 a b d + a^2 f) x^3$$

```
[In] integrate((c*x^4+b*x^2+a)^2*(h*x^4+g*x^3+f*x^2+e*x+d),x, algorithm="maxima"
)
```

```
[Out] 1/13*c^2*h*x^13 + 1/12*c^2*g*x^12 + 1/11*(c^2*f + 2*b*c*h)*x^11 + 1/10*(c^2
*e + 2*b*c*g)*x^10 + 1/9*(c^2*d + 2*b*c*f + (b^2 + 2*a*c)*h)*x^9 + 1/8*(2*b
*c*e + (b^2 + 2*a*c)*g)*x^8 + 1/7*(2*b*c*d + 2*a*b*h + (b^2 + 2*a*c)*f)*x^7
+ 1/6*(2*a*b*g + (b^2 + 2*a*c)*e)*x^6 + 1/5*(2*a*b*f + a^2*h + (b^2 + 2*a*
c)*d)*x^5 + 1/2*a^2*e*x^2 + 1/4*(2*a*b*e + a^2*g)*x^4 + a^2*d*x + 1/3*(2*a*
b*d + a^2*f)*x^3
```

### Giac [A] (verification not implemented)

none

Time = 0.32 (sec) , antiderivative size = 253, normalized size of antiderivative = 1.08

$$\int (a + bx^2 + cx^4)^2 (d + ex + fx^2 + gx^3 + hx^4) dx$$

$$= \frac{1}{13} c^2 h x^{13} + \frac{1}{12} c^2 g x^{12} + \frac{1}{11} c^2 f x^{11} + \frac{2}{11} b c h x^{11} + \frac{1}{10} c^2 e x^{10} + \frac{1}{5} b c g x^{10} + \frac{1}{9} c^2 d x^9$$

$$+ \frac{2}{9} b c f x^9 + \frac{1}{9} b^2 h x^9 + \frac{2}{9} a c h x^9 + \frac{1}{4} b c e x^8 + \frac{1}{8} b^2 g x^8 + \frac{1}{4} a c g x^8 + \frac{2}{7} b c d x^7 + \frac{1}{7} b^2 f x^7$$

$$+ \frac{2}{7} a c f x^7 + \frac{2}{7} a b h x^7 + \frac{1}{6} b^2 e x^6 + \frac{1}{3} a c e x^6 + \frac{1}{3} a b g x^6 + \frac{1}{5} b^2 d x^5 + \frac{2}{5} a c d x^5$$

$$+ \frac{2}{5} a b f x^5 + \frac{1}{5} a^2 h x^5 + \frac{1}{2} a b e x^4 + \frac{1}{4} a^2 g x^4 + \frac{2}{3} a b d x^3 + \frac{1}{3} a^2 f x^3 + \frac{1}{2} a^2 e x^2 + a^2 d x$$

[In] integrate((c\*x^4+b\*x^2+a)^2\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d),x, algorithm="giac")

[Out] 1/13\*c^2\*h\*x^13 + 1/12\*c^2\*g\*x^12 + 1/11\*c^2\*f\*x^11 + 2/11\*b\*c\*h\*x^11 + 1/10\*c^2\*e\*x^10 + 1/5\*b\*c\*g\*x^10 + 1/9\*c^2\*d\*x^9 + 2/9\*b\*c\*f\*x^9 + 1/9\*b^2\*h\*x^9 + 2/9\*a\*c\*h\*x^9 + 1/4\*b\*c\*e\*x^8 + 1/8\*b^2\*g\*x^8 + 1/4\*a\*c\*g\*x^8 + 2/7\*b\*c\*d\*x^7 + 1/7\*b^2\*f\*x^7 + 2/7\*a\*c\*f\*x^7 + 2/7\*a\*b\*h\*x^7 + 1/6\*b^2\*e\*x^6 + 1/3\*a\*c\*e\*x^6 + 1/3\*a\*b\*g\*x^6 + 1/5\*b^2\*d\*x^5 + 2/5\*a\*c\*d\*x^5 + 2/5\*a\*b\*f\*x^5 + 1/5\*a^2\*h\*x^5 + 1/2\*a\*b\*e\*x^4 + 1/4\*a^2\*g\*x^4 + 2/3\*a\*b\*d\*x^3 + 1/3\*a^2\*f\*x^3 + 1/2\*a^2\*e\*x^2 + a^2\*d\*x

### Mupad [B] (verification not implemented)

Time = 0.08 (sec) , antiderivative size = 220, normalized size of antiderivative = 0.94

$$\int (a + bx^2 + cx^4)^2 (d + ex + fx^2 + gx^3 + hx^4) dx$$

$$= x^6 \left( \frac{eb^2}{6} + \frac{agb}{3} + \frac{ace}{3} \right) + x^8 \left( \frac{gb^2}{8} + \frac{ceb}{4} + \frac{acg}{4} \right) + x^3 \left( \frac{fa^2}{3} + \frac{2bda}{3} \right)$$

$$+ x^4 \left( \frac{ga^2}{4} + \frac{bea}{2} \right) + x^{10} \left( \frac{ec^2}{10} + \frac{bgc}{5} \right) + x^{11} \left( \frac{fc^2}{11} + \frac{2bhc}{11} \right)$$

$$+ x^5 \left( \frac{ha^2}{5} + \frac{2fab}{5} + \frac{2cda}{5} + \frac{db^2}{5} \right) + x^7 \left( \frac{b^2f}{7} + \frac{2bcd}{7} + \frac{2acf}{7} + \frac{2abh}{7} \right)$$

$$+ x^9 \left( \frac{hb^2}{9} + \frac{2fbc}{9} + \frac{dc^2}{9} + \frac{2ahc}{9} \right) + \frac{a^2ex^2}{2} + \frac{c^2gx^{12}}{12} + \frac{c^2hx^{13}}{13} + a^2dx$$

[In] int((a + b\*x^2 + c\*x^4)^2\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4),x)

[Out] x^6\*((b^2\*e)/6 + (a\*c\*e)/3 + (a\*b\*g)/3) + x^8\*((b^2\*g)/8 + (b\*c\*e)/4 + (a\*c\*g)/4) + x^3\*((a^2\*f)/3 + (2\*a\*b\*d)/3) + x^4\*((a^2\*g)/4 + (a\*b\*e)/2) + x^10\*((c^2\*e)/10 + (b\*c\*g)/5) + x^11\*((c^2\*f)/11 + (2\*b\*c\*h)/11) + x^5\*((b^2\*d)/5 + (a^2\*h)/5 + (2\*a\*c\*d)/5 + (2\*a\*b\*f)/5) + x^7\*((b^2\*f)/7 + (2\*b\*c\*d)/7 + (2\*a\*c\*f)/7 + (2\*a\*b\*h)/7) + x^9\*((c^2\*d)/9 + (b^2\*h)/9 + (2\*b\*c\*f)/9 + (2\*a\*c\*h)/9) + (a^2\*e\*x^2)/2 + (c^2\*g\*x^12)/12 + (c^2\*h\*x^13)/13 + a^2\*d\*x

### 3.10 $\int \frac{d+ex}{4-5x^2+x^4} dx$

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#### Optimal result

Integrand size = 18, antiderivative size = 45

$$\int \frac{d+ex}{4-5x^2+x^4} dx = -\frac{1}{6}d\operatorname{arctanh}\left(\frac{x}{2}\right) + \frac{1}{3}d\operatorname{arctanh}(x) - \frac{1}{6}e\log(1-x^2) + \frac{1}{6}e\log(4-x^2)$$

[Out]  $-1/6*d*\operatorname{arctanh}(1/2*x)+1/3*d*\operatorname{arctanh}(x)-1/6*e*\ln(-x^2+1)+1/6*e*\ln(-x^2+4)$

#### Rubi [A] (verified)

Time = 0.02 (sec), antiderivative size = 45, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 7,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.389$ , Rules used = {1687, 12, 1107, 213, 1121, 630, 31}

$$\int \frac{d+ex}{4-5x^2+x^4} dx = -\frac{1}{6}d\operatorname{arctanh}\left(\frac{x}{2}\right) + \frac{1}{3}d\operatorname{arctanh}(x) - \frac{1}{6}e\log(1-x^2) + \frac{1}{6}e\log(4-x^2)$$

[In]  $\operatorname{Int}[(d + e*x)/(4 - 5*x^2 + x^4), x]$

[Out]  $-1/6*(d*\operatorname{ArcTanh}[x/2]) + (d*\operatorname{ArcTanh}[x])/3 - (e*\operatorname{Log}[1 - x^2])/6 + (e*\operatorname{Log}[4 - x^2])/6$

#### Rule 12

$\operatorname{Int}[(a_*)*(u_), x\_Symbol] \rightarrow \operatorname{Dist}[a, \operatorname{Int}[u, x], x] /; \operatorname{FreeQ}[a, x] \ \&\& \ !\operatorname{Match} Q[u, (b_)*(v_)] /; \operatorname{FreeQ}[b, x]$

#### Rule 31

$\operatorname{Int}[(a_*) + (b_*)*(x_)^{(-1)}, x\_Symbol] \rightarrow \operatorname{Simp}[\operatorname{Log}[\operatorname{RemoveContent}[a + b*x, x]]/b, x] /; \operatorname{FreeQ}[\{a, b\}, x]$

Rule 213

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[b, 2])^(-1))\*ArcTanh[Rt[b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a, 0] || GtQ[b, 0])

Rule 630

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[c/q, Int[1/Simp[b/2 - q/2 + c\*x, x], x] - Dist[c/q, Int[1/Simp[b/2 + q/2 + c\*x, x], x], x]] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[b^2 - 4\*a\*c] && PerfectSquareQ[b^2 - 4\*a\*c]

Rule 1107

Int[((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(-1), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[c/q, Int[1/(b/2 - q/2 + c\*x^2), x], x] - Dist[c/q, Int[1/(b/2 + q/2 + c\*x^2), x], x]] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[b^2 - 4\*a\*c]

Rule 1121

Int[(x\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_.), x\_Symbol] := Dist[1/2, Subst[Int[(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]

Rule 1687

Int[(Pq\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d}{4 - 5x^2 + x^4} dx + \int \frac{ex}{4 - 5x^2 + x^4} dx \\
 &= d \int \frac{1}{4 - 5x^2 + x^4} dx + e \int \frac{x}{4 - 5x^2 + x^4} dx \\
 &= \frac{1}{3}d \int \frac{1}{-4 + x^2} dx - \frac{1}{3}d \int \frac{1}{-1 + x^2} dx + \frac{1}{2}e \text{Subst}\left(\int \frac{1}{4 - 5x + x^2} dx, x, x^2\right) \\
 &= -\frac{1}{6}d \tanh^{-1}\left(\frac{x}{2}\right) + \frac{1}{3}d \tanh^{-1}(x) + \frac{1}{6}e \text{Subst}\left(\int \frac{1}{-4 + x} dx, x, x^2\right) \\
 &\quad - \frac{1}{6}e \text{Subst}\left(\int \frac{1}{-1 + x} dx, x, x^2\right)
 \end{aligned}$$

$$= -\frac{1}{6}d \tanh^{-1}\left(\frac{x}{2}\right) + \frac{1}{3}d \tanh^{-1}(x) - \frac{1}{6}e \log(1-x^2) + \frac{1}{6}e \log(4-x^2)$$

### Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 50, normalized size of antiderivative = 1.11

$$\int \frac{d+ex}{4-5x^2+x^4} dx = \frac{1}{12}(-2(d+e)\log(1-x) + (d+2e)\log(2-x) + 2(d-e)\log(1+x) - (d-2e)\log(2+x))$$

[In] Integrate[(d + e\*x)/(4 - 5\*x^2 + x^4),x]

[Out] (-2\*(d + e)\*Log[1 - x] + (d + 2\*e)\*Log[2 - x] + 2\*(d - e)\*Log[1 + x] - (d - 2\*e)\*Log[2 + x])/12

### Maple [A] (verified)

Time = 0.05 (sec) , antiderivative size = 50, normalized size of antiderivative = 1.11

method	result	size
default	$\left(-\frac{d}{12} + \frac{e}{6}\right) \ln(x+2) + \left(\frac{d}{6} - \frac{e}{6}\right) \ln(x+1) + \left(-\frac{d}{6} - \frac{e}{6}\right) \ln(x-1) + \left(\frac{d}{12} + \frac{e}{6}\right) \ln(x-2)$	50
norman	$\left(-\frac{d}{12} + \frac{e}{6}\right) \ln(x+2) + \left(\frac{d}{6} - \frac{e}{6}\right) \ln(x+1) + \left(-\frac{d}{6} - \frac{e}{6}\right) \ln(x-1) + \left(\frac{d}{12} + \frac{e}{6}\right) \ln(x-2)$	50
parallelrisch	$\frac{\ln(x-2)d}{12} + \frac{\ln(x-2)e}{6} - \frac{\ln(x-1)d}{6} - \frac{\ln(x-1)e}{6} + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} - \frac{\ln(x+2)d}{12} + \frac{\ln(x+2)e}{6}$	58
risch	$\frac{\ln(2-x)d}{12} + \frac{\ln(2-x)e}{6} - \frac{\ln(x+2)d}{12} + \frac{\ln(x+2)e}{6} - \frac{\ln(1-x)d}{6} - \frac{\ln(1-x)e}{6} + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6}$	66

[In] int((e\*x+d)/(x^4-5\*x^2+4),x,method=\_RETURNVERBOSE)

[Out] (-1/12\*d+1/6\*e)\*ln(x+2)+(1/6\*d-1/6\*e)\*ln(x+1)+(-1/6\*d-1/6\*e)\*ln(x-1)+(1/12\*d+1/6\*e)\*ln(x-2)

### Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 43, normalized size of antiderivative = 0.96

$$\int \frac{d+ex}{4-5x^2+x^4} dx = -\frac{1}{12}(d-2e)\log(x+2) + \frac{1}{6}(d-e)\log(x+1) - \frac{1}{6}(d+e)\log(x-1) + \frac{1}{12}(d+2e)\log(x-2)$$

[In] integrate((e\*x+d)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out] -1/12\*(d - 2\*e)\*log(x + 2) + 1/6\*(d - e)\*log(x + 1) - 1/6\*(d + e)\*log(x - 1) + 1/12\*(d + 2\*e)\*log(x - 2)

**Sympy [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 515 vs.  $2(34) = 68$ .

Time = 1.81 (sec) , antiderivative size = 515, normalized size of antiderivative = 11.44

$$\int \frac{d+ex}{4-5x^2+x^4} dx =$$

$$\frac{(d-2e) \log\left(x + \frac{-35d^4e + \frac{51d^4(d-2e)}{2} - 180d^2e^3 - 90d^2e^2(d-2e) + 41d^2e(d-2e)^2 - \frac{15d^2(d-2e)^3}{2} + 320e^5 - 96e^4(d-2e) - 80e^3(d-2e)^2 + 24e^2}{9d^5 - 160d^3e^2 + 256de^4}\right)}{12}$$

$$+ \frac{(d-e) \log\left(x + \frac{-35d^4e - 51d^4(d-e) - 180d^2e^3 + 180d^2e^2(d-e) + 164d^2e(d-e)^2 + 60d^2(d-e)^3 + 320e^5 + 192e^4(d-e) - 320e^3(d-e)^2 - 192e^2}{9d^5 - 160d^3e^2 + 256de^4}\right)}{6}$$

$$- \frac{(d+e) \log\left(x + \frac{-35d^4e + 51d^4(d+e) - 180d^2e^3 - 180d^2e^2(d+e) + 164d^2e(d+e)^2 - 60d^2(d+e)^3 + 320e^5 - 192e^4(d+e) - 320e^3(d+e)^2 + 192e^2}{9d^5 - 160d^3e^2 + 256de^4}\right)}{6}$$

$$+ \frac{(d+2e) \log\left(x + \frac{-35d^4e - \frac{51d^4(d+2e)}{2} - 180d^2e^3 + 90d^2e^2(d+2e) + 41d^2e(d+2e)^2 + \frac{15d^2(d+2e)^3}{2} + 320e^5 + 96e^4(d+2e) - 80e^3(d+2e)^2 - 24e^2}{9d^5 - 160d^3e^2 + 256de^4}\right)}{12}$$

[In] integrate((e\*x+d)/(x\*\*4-5\*x\*\*2+4), x)

[Out]  $-(d - 2e) \cdot \log\left(x + \frac{(-35d^4e + 51d^4(d - 2e)/2 - 180d^2e^3 - 90d^2e^2(d - 2e) + 41d^2e(d - 2e)^2 - 15d^2(d - 2e)^3/2 + 320e^5 - 96e^4(d - 2e) - 80e^3(d - 2e)^2 + 24e^2(d - 2e)^3)}{9d^5 - 160d^3e^2 + 256de^4}\right)/12$

$+(d - e) \cdot \log\left(x + \frac{(-35d^4e - 51d^4(d - e) - 180d^2e^3 + 180d^2e^2(d - e) + 164d^2e(d - e)^2 + 60d^2(d - e)^3 + 320e^5 + 192e^4(d - e) - 320e^3(d - e)^2 - 192e^2(d - e)^3)}{9d^5 - 160d^3e^2 + 256de^4}\right)/6$

$-(d + e) \cdot \log\left(x + \frac{(-35d^4e + 51d^4(d + e) - 180d^2e^3 - 180d^2e^2(d + e) + 164d^2e(d + e)^2 - 60d^2(d + e)^3 + 320e^5 - 192e^4(d + e) - 320e^3(d + e)^2 + 192e^2(d + e)^3)}{9d^5 - 160d^3e^2 + 256de^4}\right)/6$

$+(d + 2e) \cdot \log\left(x + \frac{(-35d^4e - 51d^4(d + 2e)/2 - 180d^2e^3 + 90d^2e^2(d + 2e) + 41d^2e(d + 2e)^2 + 15d^2(d + 2e)^3/2 + 320e^5 + 96e^4(d + 2e) - 80e^3(d + 2e)^2 - 24e^2(d + 2e)^3)}{9d^5 - 160d^3e^2 + 256de^4}\right)/12$

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 43, normalized size of antiderivative = 0.96

$$\int \frac{d + ex}{4 - 5x^2 + x^4} dx = -\frac{1}{12} (d - 2e) \log(x + 2) + \frac{1}{6} (d - e) \log(x + 1) \\ - \frac{1}{6} (d + e) \log(x - 1) + \frac{1}{12} (d + 2e) \log(x - 2)$$

[In] integrate((e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] -1/12\*(d - 2\*e)\*log(x + 2) + 1/6\*(d - e)\*log(x + 1) - 1/6\*(d + e)\*log(x - 1) + 1/12\*(d + 2\*e)\*log(x - 2)

**Giac [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 47, normalized size of antiderivative = 1.04

$$\int \frac{d + ex}{4 - 5x^2 + x^4} dx = -\frac{1}{12} (d - 2e) \log(|x + 2|) + \frac{1}{6} (d - e) \log(|x + 1|) \\ - \frac{1}{6} (d + e) \log(|x - 1|) + \frac{1}{12} (d + 2e) \log(|x - 2|)$$

[In] integrate((e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] -1/12\*(d - 2\*e)\*log(abs(x + 2)) + 1/6\*(d - e)\*log(abs(x + 1)) - 1/6\*(d + e)\*log(abs(x - 1)) + 1/12\*(d + 2\*e)\*log(abs(x - 2))

**Mupad [B] (verification not implemented)**

Time = 7.81 (sec) , antiderivative size = 51, normalized size of antiderivative = 1.13

$$\int \frac{d + ex}{4 - 5x^2 + x^4} dx = \ln(x + 1) \left( \frac{d}{6} - \frac{e}{6} \right) - \ln(x - 1) \left( \frac{d}{6} + \frac{e}{6} \right) \\ + \ln(x - 2) \left( \frac{d}{12} + \frac{e}{6} \right) - \ln(x + 2) \left( \frac{d}{12} - \frac{e}{6} \right)$$

[In] int((d + e\*x)/(x^4 - 5\*x^2 + 4),x)

[Out] log(x + 1)\*(d/6 - e/6) - log(x - 1)\*(d/6 + e/6) + log(x - 2)\*(d/12 + e/6) - log(x + 2)\*(d/12 - e/6)

### 3.11 $\int \frac{d+ex+fx^2}{4-5x^2+x^4} dx$

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#### Optimal result

Integrand size = 23, antiderivative size = 51

$$\int \frac{d+ex+fx^2}{4-5x^2+x^4} dx = -\frac{1}{6}(d+4f)\operatorname{arctanh}\left(\frac{x}{2}\right) + \frac{1}{3}(d+f)\operatorname{arctanh}(x) \\ - \frac{1}{6}e \log(1-x^2) + \frac{1}{6}e \log(4-x^2)$$

[Out]  $-1/6*(d+4*f)*\operatorname{arctanh}(1/2*x)+1/3*(d+f)*\operatorname{arctanh}(x)-1/6*e*\ln(-x^2+1)+1/6*e*\ln(-x^2+4)$

#### Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 51, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 7,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.304$ , Rules used = {1687, 1180, 213, 12, 1121, 630, 31}

$$\int \frac{d+ex+fx^2}{4-5x^2+x^4} dx = -\frac{1}{6}\operatorname{arctanh}\left(\frac{x}{2}\right)(d+4f) + \frac{1}{3}\operatorname{arctanh}(x)(d+f) \\ - \frac{1}{6}e \log(1-x^2) + \frac{1}{6}e \log(4-x^2)$$

[In]  $\operatorname{Int}[(d+e*x+f*x^2)/(4-5*x^2+x^4),x]$

[Out]  $-1/6*((d+4*f)*\operatorname{ArcTanh}[x/2]) + ((d+f)*\operatorname{ArcTanh}[x])/3 - (e*\operatorname{Log}[1-x^2])/6 + (e*\operatorname{Log}[4-x^2])/6$

#### Rule 12

$\operatorname{Int}[(a_*)*(u_), x\_Symbol] \rightarrow \operatorname{Dist}[a, \operatorname{Int}[u, x], x] /; \operatorname{FreeQ}[a, x] \ \&\amp; \ !\operatorname{Match} Q[u, (b_)*(v_)] /; \operatorname{FreeQ}[b, x]$



Rule 31

`Int[((a_) + (b_.)*(x_))^-1, x_Symbol] := Simp[Log[RemoveContent[a + b*x, x]]/b, x] /; FreeQ[{a, b}, x]`

Rule 213

`Int[((a_) + (b_.)*(x_)^2)^-1, x_Symbol] := Simp[(-Rt[-a, 2]*Rt[b, 2])^-1)*ArcTanh[Rt[b, 2]*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a, 0] || GtQ[b, 0])`

Rule 630

`Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^-1, x_Symbol] := With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[c/q, Int[1/Simp[b/2 - q/2 + c*x, x], x] - Dist[c/q, Int[1/Simp[b/2 + q/2 + c*x, x], x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && PosQ[b^2 - 4*a*c] && PerfectSquareQ[b^2 - 4*a*c]`

Rule 1121

`Int[(x_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Dist[1/2, Subst[Int[(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]`

Rule 1180

`Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2 - q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2 + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]`

Rule 1687

`Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]`

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{ex}{4 - 5x^2 + x^4} dx + \int \frac{d + fx^2}{4 - 5x^2 + x^4} dx \\ &= e \int \frac{x}{4 - 5x^2 + x^4} dx - \frac{1}{3}(d + f) \int \frac{1}{-1 + x^2} dx + \frac{1}{3}(d + 4f) \int \frac{1}{-4 + x^2} dx \end{aligned}$$

$$\begin{aligned}
&= -\frac{1}{6}(d+4f) \tanh^{-1}\left(\frac{x}{2}\right) + \frac{1}{3}(d+f) \tanh^{-1}(x) + \frac{1}{2}e\text{Subst}\left(\int \frac{1}{4-5x+x^2} dx, x, x^2\right) \\
&= -\frac{1}{6}(d+4f) \tanh^{-1}\left(\frac{x}{2}\right) + \frac{1}{3}(d+f) \tanh^{-1}(x) \\
&\quad + \frac{1}{6}e\text{Subst}\left(\int \frac{1}{-4+x} dx, x, x^2\right) - \frac{1}{6}e\text{Subst}\left(\int \frac{1}{-1+x} dx, x, x^2\right) \\
&= -\frac{1}{6}(d+4f) \tanh^{-1}\left(\frac{x}{2}\right) + \frac{1}{3}(d+f) \tanh^{-1}(x) - \frac{1}{6}e \log(1-x^2) + \frac{1}{6}e \log(4-x^2)
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 58, normalized size of antiderivative = 1.14

$$\begin{aligned}
\int \frac{d+ex+fx^2}{4-5x^2+x^4} dx &= \frac{1}{12}(-2(d+e+f) \log(1-x) + (d+2e+4f) \log(2-x) \\
&\quad + 2(d-e+f) \log(1+x) - (d-2e+4f) \log(2+x))
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2)/(4 - 5\*x^2 + x^4), x]

[Out] (-2\*(d + e + f)\*Log[1 - x] + (d + 2\*e + 4\*f)\*Log[2 - x] + 2\*(d - e + f)\*Log[1 + x] - (d - 2\*e + 4\*f)\*Log[2 + x])/12

### Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 62, normalized size of antiderivative = 1.22

method	result
default	$\left(-\frac{d}{12} + \frac{e}{6} - \frac{f}{3}\right) \ln(x+2) + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6}\right) \ln(x+1) + \left(-\frac{d}{6} - \frac{e}{6} - \frac{f}{6}\right) \ln(x-1) + \left(\frac{d}{12} + \frac{e}{6} + \frac{f}{3}\right) \ln(x-2)$
norman	$\left(-\frac{d}{12} + \frac{e}{6} - \frac{f}{3}\right) \ln(x+2) + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6}\right) \ln(x+1) + \left(-\frac{d}{6} - \frac{e}{6} - \frac{f}{6}\right) \ln(x-1) + \left(\frac{d}{12} + \frac{e}{6} + \frac{f}{3}\right) \ln(x-2)$
parallelrisch	$\frac{\ln(x-2)d}{12} + \frac{\ln(x-2)e}{6} + \frac{\ln(x-2)f}{3} - \frac{\ln(x-1)d}{6} - \frac{\ln(x-1)e}{6} - \frac{\ln(x-1)f}{6} + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} + \frac{\ln(x+1)f}{6} - \frac{\ln(x-2)d}{12} - \frac{\ln(x-2)e}{6} - \frac{\ln(x-2)f}{3}$
risch	$-\frac{\ln(1-x)d}{6} - \frac{\ln(1-x)e}{6} - \frac{\ln(1-x)f}{6} + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} + \frac{\ln(x+1)f}{6} + \frac{\ln(2-x)d}{12} + \frac{\ln(2-x)e}{6} + \frac{\ln(2-x)f}{3}$

[In] int((f\*x^2+e\*x+d)/(x^4-5\*x^2+4), x, method=\_RETURNVERBOSE)

[Out] (-1/12\*d+1/6\*e-1/3\*f)\*ln(x+2)+(1/6\*d-1/6\*e+1/6\*f)\*ln(x+1)+(-1/6\*d-1/6\*e-1/6\*f)\*ln(x-1)+(1/12\*d+1/6\*e+1/3\*f)\*ln(x-2)

**Fricas [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 51, normalized size of antiderivative = 1.00

$$\int \frac{d + ex + fx^2}{4 - 5x^2 + x^4} dx = -\frac{1}{12} (d - 2e + 4f) \log(x + 2) + \frac{1}{6} (d - e + f) \log(x + 1) - \frac{1}{6} (d + e + f) \log(x - 1) + \frac{1}{12} (d + 2e + 4f) \log(x - 2)$$

`[In] integrate((f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="fricas")``[Out] -1/12*(d - 2*e + 4*f)*log(x + 2) + 1/6*(d - e + f)*log(x + 1) - 1/6*(d + e + f)*log(x - 1) + 1/12*(d + 2*e + 4*f)*log(x - 2)`**Sympy [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 2195 vs. 2(44) = 88.

Time = 95.81 (sec) , antiderivative size = 2195, normalized size of antiderivative = 43.04

$$\int \frac{d + ex + fx^2}{4 - 5x^2 + x^4} dx = \text{Too large to display}$$

`[In] integrate((f*x**2+e*x+d)/(x**4-5*x**2+4),x)`

```
[Out] -(d - 2*e + 4*f)*log(x + (-35*d**5*e + 51*d**5*(d - 2*e + 4*f)/2 - 820*d**4
*e*f + 90*d**4*f*(d - 2*e + 4*f) - 180*d**3*e**3 - 90*d**3*e**2*(d - 2*e +
4*f) - 4100*d**3*e*f**2 + 41*d**3*e*(d - 2*e + 4*f)**2 + 42*d**3*f**2*(d -
2*e + 4*f) - 15*d**3*(d - 2*e + 4*f)**3/2 - 432*d**2*e**2*f*(d - 2*e + 4*f)
- 8000*d**2*e*f**3 + 240*d**2*e*f*(d - 2*e + 4*f)**2 - 240*d**2*f**3*(d -
2*e + 4*f) - 12*d**2*f*(d - 2*e + 4*f)**3 + 320*d*e**5 - 96*d*e**4*(d - 2*e
+ 4*f) + 720*d*e**3*f**2 - 80*d*e**3*(d - 2*e + 4*f)**2 - 1080*d*e**2*f**2
*(d - 2*e + 4*f) + 24*d*e**2*(d - 2*e + 4*f)**3 - 6400*d*e*f**4 + 492*d*e*f
**2*(d - 2*e + 4*f)**2 - 576*d*f**4*(d - 2*e + 4*f) + 30*d*f**2*(d - 2*e +
4*f)**3 + 512*e**5*f - 128*e**3*f*(d - 2*e + 4*f)**2 - 576*e**2*f**3*(d - 2
e + 4*f) - 1472*e*f**5 + 320*e*f**3*(d - 2*e + 4*f)**2 - 480*f**5*(d - 2*e
+ 4*f) + 48*f**3*(d - 2*e + 4*f)**3)/(9*d**6 + 45*d**5*f - 160*d**4*e**2 -
36*d**4*f**2 - 1312*d**3*e**2*f - 360*d**3*f**3 + 256*d**2*e**4 - 3840*d**
2*e**2*f**2 - 144*d**2*f**4 + 1280*d*e**4*f - 5248*d*e**2*f**3 + 720*d*f**5
+ 1024*e**4*f**2 - 2560*e**2*f**4 + 576*f**6))/12 + (d - e + f)*log(x + (-
35*d**5*e - 51*d**5*(d - e + f) - 820*d**4*e*f - 180*d**4*f*(d - e + f) - 1
80*d**3*e**3 + 180*d**3*e**2*(d - e + f) - 4100*d**3*e*f**2 + 164*d**3*e*(d
- e + f)**2 - 84*d**3*f**2*(d - e + f) + 60*d**3*(d - e + f)**3 + 864*d**2
*e**2*f*(d - e + f) - 8000*d**2*e*f**3 + 960*d**2*e*f*(d - e + f)**2 + 480*
d**2*f**3*(d - e + f) + 96*d**2*f*(d - e + f)**3 + 320*d*e**5 + 192*d*e**4
```

$$\begin{aligned}
& (d - e + f) + 720*d*e**3*f**2 - 320*d*e**3*(d - e + f)**2 + 2160*d*e**2*f** \\
& 2*(d - e + f) - 192*d*e**2*(d - e + f)**3 - 6400*d*e*f**4 + 1968*d*e*f**2*( \\
& d - e + f)**2 + 1152*d*f**4*(d - e + f) - 240*d*f**2*(d - e + f)**3 + 512*e \\
& **5*f - 512*e**3*f*(d - e + f)**2 + 1152*e**2*f**3*(d - e + f) - 1472*e*f** \\
& 5 + 1280*e*f**3*(d - e + f)**2 + 960*f**5*(d - e + f) - 384*f**3*(d - e + f \\
& )**3)/(9*d**6 + 45*d**5*f - 160*d**4*e**2 - 36*d**4*f**2 - 1312*d**3*e**2*f \\
& - 360*d**3*f**3 + 256*d**2*e**4 - 3840*d**2*e**2*f**2 - 144*d**2*f**4 + 12 \\
& 80*d*e**4*f - 5248*d*e**2*f**3 + 720*d*f**5 + 1024*e**4*f**2 - 2560*e**2*f** \\
& *4 + 576*f**6))/6 - (d + e + f)*\log(x + (-35*d**5*e + 51*d**5*(d + e + f) - \\
& 820*d**4*e*f + 180*d**4*f*(d + e + f) - 180*d**3*e**3 - 180*d**3*e**2*(d + \\
& e + f) - 4100*d**3*e*f**2 + 164*d**3*e*(d + e + f)**2 + 84*d**3*f**2*(d + \\
& e + f) - 60*d**3*(d + e + f)**3 - 864*d**2*e**2*f*(d + e + f) - 8000*d**2*e \\
& *f**3 + 960*d**2*e*f*(d + e + f)**2 - 480*d**2*f**3*(d + e + f) - 96*d**2*f \\
& *(d + e + f)**3 + 320*d*e**5 - 192*d*e**4*(d + e + f) + 720*d*e**3*f**2 - 3 \\
& 20*d*e**3*(d + e + f)**2 - 2160*d*e**2*f**2*(d + e + f) + 192*d*e**2*(d + e \\
& + f)**3 - 6400*d*e*f**4 + 1968*d*e*f**2*(d + e + f)**2 - 1152*d*f**4*(d + \\
& e + f) + 240*d*f**2*(d + e + f)**3 + 512*e**5*f - 512*e**3*f*(d + e + f)**2 \\
& - 1152*e**2*f**3*(d + e + f) - 1472*e*f**5 + 1280*e*f**3*(d + e + f)**2 - \\
& 960*f**5*(d + e + f) + 384*f**3*(d + e + f)**3)/(9*d**6 + 45*d**5*f - 160*d \\
& **4*e**2 - 36*d**4*f**2 - 1312*d**3*e**2*f - 360*d**3*f**3 + 256*d**2*e**4 \\
& - 3840*d**2*e**2*f**2 - 144*d**2*f**4 + 1280*d*e**4*f - 5248*d*e**2*f**3 + \\
& 720*d*f**5 + 1024*e**4*f**2 - 2560*e**2*f**4 + 576*f**6))/6 + (d + 2*e + 4* \\
& f)*\log(x + (-35*d**5*e - 51*d**5*(d + 2*e + 4*f)/2 - 820*d**4*e*f - 90*d**4 \\
& *f*(d + 2*e + 4*f) - 180*d**3*e**3 + 90*d**3*e**2*(d + 2*e + 4*f) - 4100*d* \\
& **3*e*f**2 + 41*d**3*e*(d + 2*e + 4*f)**2 - 42*d**3*f**2*(d + 2*e + 4*f) + 1 \\
& 5*d**3*(d + 2*e + 4*f)**3/2 + 432*d**2*e**2*f*(d + 2*e + 4*f) - 8000*d**2*e \\
& *f**3 + 240*d**2*e*f*(d + 2*e + 4*f)**2 + 240*d**2*f**3*(d + 2*e + 4*f) + 1 \\
& 2*d**2*f*(d + 2*e + 4*f)**3 + 320*d*e**5 + 96*d*e**4*(d + 2*e + 4*f) + 720* \\
& d*e**3*f**2 - 80*d*e**3*(d + 2*e + 4*f)**2 + 1080*d*e**2*f**2*(d + 2*e + 4* \\
& f) - 24*d*e**2*(d + 2*e + 4*f)**3 - 6400*d*e*f**4 + 492*d*e*f**2*(d + 2*e + \\
& 4*f)**2 + 576*d*f**4*(d + 2*e + 4*f) - 30*d*f**2*(d + 2*e + 4*f)**3 + 512* \\
& e**5*f - 128*e**3*f*(d + 2*e + 4*f)**2 + 576*e**2*f**3*(d + 2*e + 4*f) - 14 \\
& 72*e*f**5 + 320*e*f**3*(d + 2*e + 4*f)**2 + 480*f**5*(d + 2*e + 4*f) - 48*f \\
& **3*(d + 2*e + 4*f)**3)/(9*d**6 + 45*d**5*f - 160*d**4*e**2 - 36*d**4*f**2 \\
& - 1312*d**3*e**2*f - 360*d**3*f**3 + 256*d**2*e**4 - 3840*d**2*e**2*f**2 - \\
& 144*d**2*f**4 + 1280*d*e**4*f - 5248*d*e**2*f**3 + 720*d*f**5 + 1024*e**4*f \\
& **2 - 2560*e**2*f**4 + 576*f**6))/12
\end{aligned}$$

**Maxima [A] (verification not implemented)**

none

Time = 0.20 (sec) , antiderivative size = 51, normalized size of antiderivative = 1.00

$$\int \frac{d + ex + fx^2}{4 - 5x^2 + x^4} dx = -\frac{1}{12} (d - 2e + 4f) \log(x + 2) + \frac{1}{6} (d - e + f) \log(x + 1) \\ - \frac{1}{6} (d + e + f) \log(x - 1) + \frac{1}{12} (d + 2e + 4f) \log(x - 2)$$

[In] integrate((f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] -1/12\*(d - 2\*e + 4\*f)\*log(x + 2) + 1/6\*(d - e + f)\*log(x + 1) - 1/6\*(d + e + f)\*log(x - 1) + 1/12\*(d + 2\*e + 4\*f)\*log(x - 2)

**Giac [A] (verification not implemented)**

none

Time = 0.36 (sec) , antiderivative size = 55, normalized size of antiderivative = 1.08

$$\int \frac{d + ex + fx^2}{4 - 5x^2 + x^4} dx = -\frac{1}{12} (d - 2e + 4f) \log(|x + 2|) + \frac{1}{6} (d - e + f) \log(|x + 1|) \\ - \frac{1}{6} (d + e + f) \log(|x - 1|) + \frac{1}{12} (d + 2e + 4f) \log(|x - 2|)$$

[In] integrate((f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] -1/12\*(d - 2\*e + 4\*f)\*log(abs(x + 2)) + 1/6\*(d - e + f)\*log(abs(x + 1)) - 1/6\*(d + e + f)\*log(abs(x - 1)) + 1/12\*(d + 2\*e + 4\*f)\*log(abs(x - 2))

**Mupad [B] (verification not implemented)**

Time = 7.76 (sec) , antiderivative size = 63, normalized size of antiderivative = 1.24

$$\int \frac{d + ex + fx^2}{4 - 5x^2 + x^4} dx = \ln(x + 1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} \right) - \ln(x - 1) \left( \frac{d}{6} + \frac{e}{6} + \frac{f}{6} \right) \\ + \ln(x - 2) \left( \frac{d}{12} + \frac{e}{6} + \frac{f}{3} \right) - \ln(x + 2) \left( \frac{d}{12} - \frac{e}{6} + \frac{f}{3} \right)$$

[In] int((d + e\*x + f\*x^2)/(x^4 - 5\*x^2 + 4),x)

[Out] log(x + 1)\*(d/6 - e/6 + f/6) - log(x - 1)\*(d/6 + e/6 + f/6) + log(x - 2)\*(d/12 + e/6 + f/3) - log(x + 2)\*(d/12 - e/6 + f/3)

### 3.12 $\int \frac{d+ex+fx^2+gx^3}{4-5x^2+x^4} dx$

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#### Optimal result

Integrand size = 28, antiderivative size = 57

$$\int \frac{d+ex+fx^2+gx^3}{4-5x^2+x^4} dx = -\frac{1}{6}(d+4f)\operatorname{arctanh}\left(\frac{x}{2}\right) + \frac{1}{3}(d+f)\operatorname{arctanh}(x) \\ - \frac{1}{6}(e+g)\log(1-x^2) + \frac{1}{6}(e+4g)\log(4-x^2)$$

[Out]  $-1/6*(d+4*f)*\operatorname{arctanh}(1/2*x)+1/3*(d+f)*\operatorname{arctanh}(x)-1/6*(e+g)*\ln(-x^2+1)+1/6*(e+4*g)*\ln(-x^2+4)$

#### Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 57, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 6,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.214$ , Rules used = {1687, 1180, 213, 1261, 646, 31}

$$\int \frac{d+ex+fx^2+gx^3}{4-5x^2+x^4} dx = -\frac{1}{6}\operatorname{arctanh}\left(\frac{x}{2}\right)(d+4f) + \frac{1}{3}\operatorname{arctanh}(x)(d+f) \\ - \frac{1}{6}(e+g)\log(1-x^2) + \frac{1}{6}(e+4g)\log(4-x^2)$$

[In]  $\operatorname{Int}[(d+e*x+f*x^2+g*x^3)/(4-5*x^2+x^4),x]$

[Out]  $-1/6*((d+4*f)*\operatorname{ArcTanh}[x/2]) + ((d+f)*\operatorname{ArcTanh}[x])/3 - ((e+g)*\operatorname{Log}[1-x^2])/6 + ((e+4*g)*\operatorname{Log}[4-x^2])/6$

#### Rule 31

$\operatorname{Int}[(a_0 + (b_0*x_0)^{-1}), x\_Symbol] \rightarrow \operatorname{Simp}[\operatorname{Log}[\operatorname{RemoveContent}[a + b*x, x]]/b, x] /;$   $\operatorname{FreeQ}\{a, b\}, x]$

Rule 213

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[b, 2])^(-1))\*ArcTanh[Rt[b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a, 0] || GtQ[b, 0])

Rule 646

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[(c\*d - e\*(b/2 - q/2))/q, Int[1/(b/2 - q/2 + c\*x), x], x] - Dist[(c\*d - e\*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c\*x), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && NiceSqrtQ[b^2 - 4\*a\*c]

Rule 1180

Int[((d\_) + (e\_)\*(x\_)^2)/((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4), x\_Symbol] :> With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[e/2 + (2\*c\*d - b\*e)/(2\*q), Int[1/(b/2 - q/2 + c\*x^2), x], x] + Dist[e/2 - (2\*c\*d - b\*e)/(2\*q), Int[1/(b/2 + q/2 + c\*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - a\*e^2, 0] && PosQ[b^2 - 4\*a\*c]

Rule 1261

Int[(x\_)\*((d\_) + (e\_)\*(x\_)^2)^(q\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Dist[1/2, Subst[Int[(d + e\*x)^q\*(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]

Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + fx^2}{4 - 5x^2 + x^4} dx + \int \frac{x(e + gx^2)}{4 - 5x^2 + x^4} dx \\
 &= \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{4 - 5x + x^2} dx, x, x^2 \right) - \frac{1}{3} (d + f) \int \frac{1}{-1 + x^2} dx + \frac{1}{3} (d + 4f) \int \frac{1}{-4 + x^2} dx \\
 &= -\frac{1}{6} (d + 4f) \tanh^{-1} \left( \frac{x}{2} \right) + \frac{1}{3} (d + f) \tanh^{-1}(x) \\
 &\quad + \frac{1}{6} (-e - g) \text{Subst} \left( \int \frac{1}{-1 + x} dx, x, x^2 \right) + \frac{1}{6} (e + 4g) \text{Subst} \left( \int \frac{1}{-4 + x} dx, x, x^2 \right)
 \end{aligned}$$

$$= -\frac{1}{6}(d+4f) \tanh^{-1}\left(\frac{x}{2}\right) + \frac{1}{3}(d+f) \tanh^{-1}(x) - \frac{1}{6}(e+g) \log(1-x^2) + \frac{1}{6}(e+4g) \log(4-x^2)$$

### Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 68, normalized size of antiderivative = 1.19

$$\int \frac{d+ex+fx^2+gx^3}{4-5x^2+x^4} dx = \frac{1}{12}(-2(d+e+f+g) \log(1-x) + (d+2e+4f+8g) \log(2-x) + 2(d-e+f-g) \log(1+x) - (d-2e+4f-8g) \log(2+x))$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)/(4 - 5\*x^2 + x^4), x]

[Out] (-2\*(d + e + f + g)\*Log[1 - x] + (d + 2\*e + 4\*f + 8\*g)\*Log[2 - x] + 2\*(d - e + f - g)\*Log[1 + x] - (d - 2\*e + 4\*f - 8\*g)\*Log[2 + x])/12

### Maple [A] (verified)

Time = 0.07 (sec) , antiderivative size = 74, normalized size of antiderivative = 1.30

method	result
default	$\left(-\frac{d}{12} + \frac{e}{6} - \frac{f}{3} + \frac{2g}{3}\right) \ln(x+2) + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6}\right) \ln(x+1) + \left(-\frac{d}{6} - \frac{e}{6} - \frac{f}{6} - \frac{g}{6}\right) \ln(x-1) +$
norman	$\left(-\frac{d}{12} + \frac{e}{6} - \frac{f}{3} + \frac{2g}{3}\right) \ln(x+2) + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6}\right) \ln(x+1) + \left(-\frac{d}{6} - \frac{e}{6} - \frac{f}{6} - \frac{g}{6}\right) \ln(x-1) +$
parallelrisc	$\frac{\ln(x-2)d}{12} + \frac{\ln(x-2)e}{6} + \frac{\ln(x-2)f}{3} + \frac{2\ln(x-2)g}{3} - \frac{\ln(x-1)d}{6} - \frac{\ln(x-1)e}{6} - \frac{\ln(x-1)f}{6} - \frac{\ln(x-1)g}{6} + \frac{\ln(x+1)d}{6} -$
risc	$-\frac{\ln(x+2)d}{12} + \frac{\ln(x+2)e}{6} - \frac{\ln(x+2)f}{3} + \frac{2\ln(x+2)g}{3} + \frac{\ln(2-x)d}{12} + \frac{\ln(2-x)e}{6} + \frac{\ln(2-x)f}{3} + \frac{2\ln(2-x)g}{3} + \frac{\ln(x+1)d}{6}$

[In] int((g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4), x, method=\_RETURNVERBOSE)

[Out] (-1/12\*d+1/6\*e-1/3\*f+2/3\*g)\*ln(x+2)+(1/6\*d-1/6\*e+1/6\*f-1/6\*g)\*ln(x+1)+(-1/6\*d-1/6\*e-1/6\*f-1/6\*g)\*ln(x-1)+(1/12\*d+1/6\*e+1/3\*f+2/3\*g)\*ln(x-2)

### Fricas [A] (verification not implemented)

none

Time = 0.42 (sec) , antiderivative size = 61, normalized size of antiderivative = 1.07

$$\int \frac{d+ex+fx^2+gx^3}{4-5x^2+x^4} dx = -\frac{1}{12}(d-2e+4f-8g) \log(x+2) + \frac{1}{6}(d-e+f-g) \log(x+1) - \frac{1}{6}(d+e+f+g) \log(x-1) + \frac{1}{12}(d+2e+4f+8g) \log(x-2)$$



[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out]  $-1/12*(d - 2*e + 4*f - 8*g)*\log(x + 2) + 1/6*(d - e + f - g)*\log(x + 1) - 1/6*(d + e + f + g)*\log(x - 1) + 1/12*(d + 2*e + 4*f + 8*g)*\log(x - 2)$

## Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{4 - 5x^2 + x^4} dx = \text{Timed out}$$

[In] integrate((g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4),x)

[Out] Timed out

## Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 61, normalized size of antiderivative = 1.07

$$\begin{aligned} \int \frac{d + ex + fx^2 + gx^3}{4 - 5x^2 + x^4} dx = & -\frac{1}{12} (d - 2e + 4f - 8g) \log(x + 2) \\ & + \frac{1}{6} (d - e + f - g) \log(x + 1) - \frac{1}{6} (d + e + f + g) \log(x - 1) \\ & + \frac{1}{12} (d + 2e + 4f + 8g) \log(x - 2) \end{aligned}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out]  $-1/12*(d - 2*e + 4*f - 8*g)*\log(x + 2) + 1/6*(d - e + f - g)*\log(x + 1) - 1/6*(d + e + f + g)*\log(x - 1) + 1/12*(d + 2*e + 4*f + 8*g)*\log(x - 2)$

## Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 65, normalized size of antiderivative = 1.14

$$\begin{aligned} \int \frac{d + ex + fx^2 + gx^3}{4 - 5x^2 + x^4} dx = & -\frac{1}{12} (d - 2e + 4f - 8g) \log(|x + 2|) \\ & + \frac{1}{6} (d - e + f - g) \log(|x + 1|) \\ & - \frac{1}{6} (d + e + f + g) \log(|x - 1|) \\ & + \frac{1}{12} (d + 2e + 4f + 8g) \log(|x - 2|) \end{aligned}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] -1/12\*(d - 2\*e + 4\*f - 8\*g)\*log(abs(x + 2)) + 1/6\*(d - e + f - g)\*log(abs(x + 1)) - 1/6\*(d + e + f + g)\*log(abs(x - 1)) + 1/12\*(d + 2\*e + 4\*f + 8\*g)\*log(abs(x - 2))

### Mupad [B] (verification not implemented)

Time = 7.80 (sec) , antiderivative size = 75, normalized size of antiderivative = 1.32

$$\int \frac{d + ex + fx^2 + gx^3}{4 - 5x^2 + x^4} dx = \ln(x + 1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} \right) - \ln(x - 1) \left( \frac{d}{6} + \frac{e}{6} + \frac{f}{6} + \frac{g}{6} \right) + \ln(x - 2) \left( \frac{d}{12} + \frac{e}{6} + \frac{f}{3} + \frac{2g}{3} \right) - \ln(x + 2) \left( \frac{d}{12} - \frac{e}{6} + \frac{f}{3} - \frac{2g}{3} \right)$$

[In] int((d + e\*x + f\*x^2 + g\*x^3)/(x^4 - 5\*x^2 + 4),x)

[Out] log(x + 1)\*(d/6 - e/6 + f/6 - g/6) - log(x - 1)\*(d/6 + e/6 + f/6 + g/6) + log(x - 2)\*(d/12 + e/6 + f/3 + (2\*g)/3) - log(x + 2)\*(d/12 - e/6 + f/3 - (2\*g)/3)

### 3.13 $\int \frac{d+ex+fx^2+gx^3+hx^4}{4-5x^2+x^4} dx$

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Fricas [A] (verification not implemented)	118
Sympy [F(-1)]	118
Maxima [A] (verification not implemented)	118
Giac [A] (verification not implemented)	119
Mupad [B] (verification not implemented)	119

#### Optimal result

Integrand size = 33, antiderivative size = 64

$$\int \frac{d+ex+fx^2+gx^3+hx^4}{4-5x^2+x^4} dx = hx - \frac{1}{6}(d+4f+16h)\operatorname{arctanh}\left(\frac{x}{2}\right) + \frac{1}{3}(d+f+h)\operatorname{arctanh}(x) - \frac{1}{6}(e+g)\log(1-x^2) + \frac{1}{6}(e+4g)\log(4-x^2)$$

[Out]  $h*x - 1/6*(d+4*f+16*h)*\operatorname{arctanh}(1/2*x) + 1/3*(d+f+h)*\operatorname{arctanh}(x) - 1/6*(e+g)*\ln(-x^2+1) + 1/6*(e+4*g)*\ln(-x^2+4)$

#### Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 64, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 7,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.212$ , Rules used = {1687, 1690, 1180, 213, 1261, 646, 31}

$$\int \frac{d+ex+fx^2+gx^3+hx^4}{4-5x^2+x^4} dx = -\frac{1}{6}\operatorname{arctanh}\left(\frac{x}{2}\right)(d+4f+16h) + \frac{1}{3}\operatorname{arctanh}(x)(d+f+h) - \frac{1}{6}(e+g)\log(1-x^2) + \frac{1}{6}(e+4g)\log(4-x^2) + hx$$

[In]  $\operatorname{Int}[(d + e*x + f*x^2 + g*x^3 + h*x^4)/(4 - 5*x^2 + x^4), x]$

[Out]  $h*x - ((d + 4*f + 16*h)*\operatorname{ArcTanh}[x/2])/6 + ((d + f + h)*\operatorname{ArcTanh}[x])/3 - ((e + g)*\operatorname{Log}[1 - x^2])/6 + ((e + 4*g)*\operatorname{Log}[4 - x^2])/6$

#### Rule 31

$\operatorname{Int}[(a_ + (b_)*(x_))^{(-1)}, x\_Symbol] \rightarrow \operatorname{Simp}[\operatorname{Log}[\operatorname{RemoveContent}[a + b*x, x]]/b, x] /;$   $\operatorname{FreeQ}\{a, b\}, x]$

Rule 213

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] := Simp[(-(Rt[-a, 2]*Rt[b, 2])^(-1))*ArcTanh[Rt[b, 2]*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a, 0] || GtQ[b, 0])
```

Rule 646

```
Int[((d_) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] := With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[(c*d - e*(b/2 - q/2))/q, Int[1/(b/2 - q/2 + c*x), x], x] - Dist[(c*d - e*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c*x), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && NiceSqrtQ[b^2 - 4*a*c]
```

Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] := With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2 - q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2 + c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

Rule 1261

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol] := Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]
```

Rule 1690

```
Int[(Pq_)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] := Int[ExpandIntegrand[Pq/(a + b*x^2 + c*x^4), x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^2] && Expon[Pq, x^2] > 1
```

Rubi steps

$$\text{integral} = \int \frac{x(e + gx^2)}{4 - 5x^2 + x^4} dx + \int \frac{d + fx^2 + hx^4}{4 - 5x^2 + x^4} dx$$

$$\begin{aligned}
&= \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{4 - 5x + x^2} dx, x, x^2 \right) + \int \left( h + \frac{d - 4h + (f + 5h)x^2}{4 - 5x^2 + x^4} \right) dx \\
&= hx + \frac{1}{6}(-e - g) \text{Subst} \left( \int \frac{1}{-1 + x} dx, x, x^2 \right) \\
&\quad + \frac{1}{6}(e + 4g) \text{Subst} \left( \int \frac{1}{-4 + x} dx, x, x^2 \right) + \int \frac{d - 4h + (f + 5h)x^2}{4 - 5x^2 + x^4} dx \\
&= hx - \frac{1}{6}(e + g) \log(1 - x^2) + \frac{1}{6}(e + 4g) \log(4 - x^2) \\
&\quad - \frac{1}{3}(d + f + h) \int \frac{1}{-1 + x^2} dx + \frac{1}{3}(d + 4f + 16h) \int \frac{1}{-4 + x^2} dx \\
&= hx - \frac{1}{6}(d + 4f + 16h) \tanh^{-1} \left( \frac{x}{2} \right) + \frac{1}{3}(d + f + h) \tanh^{-1}(x) \\
&\quad - \frac{1}{6}(e + g) \log(1 - x^2) + \frac{1}{6}(e + 4g) \log(4 - x^2)
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 81, normalized size of antiderivative = 1.27

$$\begin{aligned}
\int \frac{d + ex + fx^2 + gx^3 + hx^4}{4 - 5x^2 + x^4} dx = & \frac{1}{12} (12hx - 2(d + e + f + g + h) \log(1 - x) \\
& + (d + 2(e + 2f + 4g + 8h)) \log(2 - x) \\
& + 2(d - e + f - g + h) \log(1 + x) \\
& - (d - 2e + 4f - 8g + 16h) \log(2 + x))
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(4 - 5\*x^2 + x^4),x]

[Out] (12\*h\*x - 2\*(d + e + f + g + h)\*Log[1 - x] + (d + 2\*(e + 2\*f + 4\*g + 8\*h))\*  
Log[2 - x] + 2\*(d - e + f - g + h)\*Log[1 + x] - (d - 2\*e + 4\*f - 8\*g + 16\*h)  
)\*Log[2 + x])/12

### Maple [A] (verified)

Time = 0.08 (sec) , antiderivative size = 89, normalized size of antiderivative = 1.39

method	result
default	$hx + \left(-\frac{d}{12} + \frac{e}{6} - \frac{f}{3} + \frac{2g}{3} - \frac{4h}{3}\right) \ln(x + 2) + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6}\right) \ln(x + 1) + \left(-\frac{d}{6} - \frac{e}{6} - \frac{f}{6}\right)$
norman	$hx + \left(-\frac{d}{12} + \frac{e}{6} - \frac{f}{3} + \frac{2g}{3} - \frac{4h}{3}\right) \ln(x + 2) + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6}\right) \ln(x + 1) + \left(-\frac{d}{6} - \frac{e}{6} - \frac{f}{6}\right)$
parallelrisch	$hx + \frac{\ln(x-2)d}{12} + \frac{\ln(x-2)e}{6} + \frac{\ln(x-2)f}{3} + \frac{2\ln(x-2)g}{3} + \frac{4\ln(x-2)h}{3} - \frac{\ln(x-1)d}{6} - \frac{\ln(x-1)e}{6} - \frac{\ln(x-1)f}{6} - \frac{\ln(x-1)g}{6} - \frac{\ln(x-1)h}{6}$
risch	$hx - \frac{\ln(1-x)d}{6} - \frac{\ln(1-x)e}{6} - \frac{\ln(1-x)f}{6} - \frac{\ln(1-x)g}{6} - \frac{\ln(1-x)h}{6} + \frac{\ln(2-x)d}{12} + \frac{\ln(2-x)e}{6} + \frac{\ln(2-x)f}{3} + \frac{2\ln(2-x)g}{3} + \frac{4\ln(2-x)h}{3}$

[In] `int((h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x,method=_RETURNVERBOSE)`

[Out]  $h*x + (-1/12*d + 1/6*e - 1/3*f + 2/3*g - 4/3*h) * \ln(x+2) + (1/6*d - 1/6*e + 1/6*f - 1/6*g + 1/6*h) * \ln(x+1) + (-1/6*d - 1/6*e - 1/6*f - 1/6*g - 1/6*h) * \ln(x-1) + (1/12*d + 1/6*e + 1/3*f + 2/3*g + 4/3*h) * \ln(x-2)$

## Fricas [A] (verification not implemented)

none

Time = 1.14 (sec) , antiderivative size = 72, normalized size of antiderivative = 1.12

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{4 - 5x^2 + x^4} dx = hx - \frac{1}{12} (d - 2e + 4f - 8g + 16h) \log(x + 2) + \frac{1}{6} (d - e + f - g + h) \log(x + 1) - \frac{1}{6} (d + e + f + g + h) \log(x - 1) + \frac{1}{12} (d + 2e + 4f + 8g + 16h) \log(x - 2)$$

[In] `integrate((h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="fricas")`

[Out]  $h*x - 1/12*(d - 2*e + 4*f - 8*g + 16*h)*\log(x + 2) + 1/6*(d - e + f - g + h)*\log(x + 1) - 1/6*(d + e + f + g + h)*\log(x - 1) + 1/12*(d + 2*e + 4*f + 8*g + 16*h)*\log(x - 2)$

## Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{4 - 5x^2 + x^4} dx = \text{Timed out}$$

[In] `integrate((h*x**4+g*x**3+f*x**2+e*x+d)/(x**4-5*x**2+4),x)`

[Out] Timed out

## Maxima [A] (verification not implemented)

none

Time = 0.20 (sec) , antiderivative size = 72, normalized size of antiderivative = 1.12

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{4 - 5x^2 + x^4} dx = hx - \frac{1}{12} (d - 2e + 4f - 8g + 16h) \log(x + 2) + \frac{1}{6} (d - e + f - g + h) \log(x + 1) - \frac{1}{6} (d + e + f + g + h) \log(x - 1) + \frac{1}{12} (d + 2e + 4f + 8g + 16h) \log(x - 2)$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] h\*x - 1/12\*(d - 2\*e + 4\*f - 8\*g + 16\*h)\*log(x + 2) + 1/6\*(d - e + f - g + h)\*log(x + 1) - 1/6\*(d + e + f + g + h)\*log(x - 1) + 1/12\*(d + 2\*e + 4\*f + 8\*g + 16\*h)\*log(x - 2)

### Giac [A] (verification not implemented)

none

Time = 0.31 (sec) , antiderivative size = 76, normalized size of antiderivative = 1.19

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{4 - 5x^2 + x^4} dx = hx - \frac{1}{12} (d - 2e + 4f - 8g + 16h) \log(|x + 2|) + \frac{1}{6} (d - e + f - g + h) \log(|x + 1|) - \frac{1}{6} (d + e + f + g + h) \log(|x - 1|) + \frac{1}{12} (d + 2e + 4f + 8g + 16h) \log(|x - 2|)$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] h\*x - 1/12\*(d - 2\*e + 4\*f - 8\*g + 16\*h)\*log(abs(x + 2)) + 1/6\*(d - e + f - g + h)\*log(abs(x + 1)) - 1/6\*(d + e + f + g + h)\*log(abs(x - 1)) + 1/12\*(d + 2\*e + 4\*f + 8\*g + 16\*h)\*log(abs(x - 2))

### Mupad [B] (verification not implemented)

Time = 7.90 (sec) , antiderivative size = 90, normalized size of antiderivative = 1.41

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{4 - 5x^2 + x^4} dx = hx - \ln(x - 1) \left( \frac{d}{6} + \frac{e}{6} + \frac{f}{6} + \frac{g}{6} + \frac{h}{6} \right) + \ln(x + 1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6} \right) + \ln(x - 2) \left( \frac{d}{12} + \frac{e}{6} + \frac{f}{3} + \frac{2g}{3} + \frac{4h}{3} \right) - \ln(x + 2) \left( \frac{d}{12} - \frac{e}{6} + \frac{f}{3} - \frac{2g}{3} + \frac{4h}{3} \right)$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(x^4 - 5\*x^2 + 4),x)

[Out] h\*x - log(x - 1)\*(d/6 + e/6 + f/6 + g/6 + h/6) + log(x + 1)\*(d/6 - e/6 + f/6 - g/6 + h/6) + log(x - 2)\*(d/12 + e/6 + f/3 + (2\*g)/3 + (4\*h)/3) - log(x + 2)\*(d/12 - e/6 + f/3 - (2\*g)/3 + (4\*h)/3)

$$3.14 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{4-5x^2+x^4} dx$$

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### Optimal result

Integrand size = 38, antiderivative size = 76

$$\int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{4-5x^2+x^4} dx = hx + \frac{ix^2}{2} - \frac{1}{6}(d+4f+16h)\operatorname{arctanh}\left(\frac{x}{2}\right) \\ + \frac{1}{3}(d+f+h)\operatorname{arctanh}(x) - \frac{1}{6}(e+g+i)\log(1-x^2) \\ + \frac{1}{6}(e+4g+16i)\log(4-x^2)$$

[Out] `h*x+1/2*i*x^2-1/6*(d+4*f+16*h)*arctanh(1/2*x)+1/3*(d+f+h)*arctanh(x)-1/6*(e+g+i)*ln(-x^2+1)+1/6*(e+4*g+16*i)*ln(-x^2+4)`

### Rubi [A] (verified)

Time = 0.12 (sec) , antiderivative size = 76, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.211$ , Rules used = {1687, 1690, 1180, 213, 1677, 1671, 646, 31}

$$\int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{4-5x^2+x^4} dx = -\frac{1}{6}\operatorname{arctanh}\left(\frac{x}{2}\right)(d+4f+16h) \\ + \frac{1}{3}\operatorname{arctanh}(x)(d+f+h) - \frac{1}{6}\log(1-x^2)(e+g+i) \\ + \frac{1}{6}\log(4-x^2)(e+4g+16i) + hx + \frac{ix^2}{2}$$

[In] `Int[(d + e*x + f*x^2 + g*x^3 + h*x^4 + i*x^5)/(4 - 5*x^2 + x^4),x]`

[Out] `h*x + (i*x^2)/2 - ((d + 4*f + 16*h)*ArcTanh[x/2])/6 + ((d + f + h)*ArcTanh[x])/3 - ((e + g + i)*Log[1 - x^2])/6 + ((e + 4*g + 16*i)*Log[4 - x^2])/6`



Rule 31

$\text{Int}[\frac{(a_ + (b_ \cdot x_))^{-1}}{x}, x\_Symbol] \rightarrow \text{Simp}[\frac{\text{Log}[\text{RemoveContent}[a + b \cdot x, x]]}{b}, x] \text{ ; FreeQ}[\{a, b\}, x]$

Rule 213

$\text{Int}[\frac{(a_ + (b_ \cdot x_)^2)^{-1}}{x}, x\_Symbol] \rightarrow \text{Simp}[\frac{(-\text{Rt}[-a, 2] \cdot \text{Rt}[b, 2])^{-1} \cdot \text{ArcTanh}[\frac{\text{Rt}[b, 2] \cdot (x/\text{Rt}[-a, 2])]}{1}]}{x}, x] \text{ ; FreeQ}[\{a, b\}, x] \ \&\& \ \text{NegQ}[a/b] \ \&\& \ (\text{LtQ}[a, 0] \ || \ \text{GtQ}[b, 0])$

Rule 646

$\text{Int}[\frac{(d_ + (e_ \cdot x_))}{(a_ + (b_ \cdot x_ + (c_ \cdot x_)^2)}, x\_Symbol] \rightarrow \text{With}[\{q = \text{Rt}[b^2 - 4 \cdot a \cdot c, 2]\}, \text{Dist}[\frac{(c \cdot d - e \cdot (b/2 - q/2))}{q}, \text{Int}[1/(b/2 - q/2 + c \cdot x), x], x] - \text{Dist}[\frac{(c \cdot d - e \cdot (b/2 + q/2))}{q}, \text{Int}[1/(b/2 + q/2 + c \cdot x), x], x]] \text{ ; FreeQ}[\{a, b, c, d, e\}, x] \ \&\& \ \text{NeQ}[2 \cdot c \cdot d - b \cdot e, 0] \ \&\& \ \text{NeQ}[b^2 - 4 \cdot a \cdot c, 0] \ \&\& \ \text{NiceSqrtQ}[b^2 - 4 \cdot a \cdot c]$

Rule 1180

$\text{Int}[\frac{(d_ + (e_ \cdot x_)^2)}{(a_ + (b_ \cdot x_)^2 + (c_ \cdot x_)^4)}, x\_Symbol] \rightarrow \text{With}[\{q = \text{Rt}[b^2 - 4 \cdot a \cdot c, 2]\}, \text{Dist}[\frac{e/2 + (2 \cdot c \cdot d - b \cdot e)/(2 \cdot q)}{2 \cdot q}, \text{Int}[1/(b/2 - q/2 + c \cdot x^2), x], x] + \text{Dist}[\frac{e/2 - (2 \cdot c \cdot d - b \cdot e)/(2 \cdot q)}{2 \cdot q}, \text{Int}[1/(b/2 + q/2 + c \cdot x^2), x], x]] \text{ ; FreeQ}[\{a, b, c, d, e\}, x] \ \&\& \ \text{NeQ}[b^2 - 4 \cdot a \cdot c, 0] \ \&\& \ \text{NeQ}[c \cdot d^2 - a \cdot e^2, 0] \ \&\& \ \text{PosQ}[b^2 - 4 \cdot a \cdot c]$

Rule 1671

$\text{Int}[(Pq_ \cdot ((a_ + (b_ \cdot x_ + (c_ \cdot x_)^2))^p), x\_Symbol] \rightarrow \text{Int}[\text{ExpandIntegrand}[Pq \cdot (a + b \cdot x + c \cdot x^2)^p, x], x] \text{ ; FreeQ}[\{a, b, c\}, x] \ \&\& \ \text{PolyQ}[Pq, x] \ \&\& \ \text{IGtQ}[p, -2]$

Rule 1677

$\text{Int}[(Pq_ \cdot (x_)^{m_} \cdot ((a_ + (b_ \cdot x_)^2 + (c_ \cdot x_)^4))^p), x\_Symbol] \rightarrow \text{Dist}[1/2, \text{Subst}[\text{Int}[x^{(m-1)/2} \cdot \text{SubstFor}[x^2, Pq, x] \cdot (a + b \cdot x + c \cdot x^2)^p, x], x, x^2], x] \text{ ; FreeQ}[\{a, b, c, p\}, x] \ \&\& \ \text{PolyQ}[Pq, x^2] \ \&\& \ \text{IntegerQ}[(m-1)/2]$

Rule 1687

$\text{Int}[(Pq_ \cdot ((a_ + (b_ \cdot x_)^2 + (c_ \cdot x_)^4))^p), x\_Symbol] \rightarrow \text{Module}[\{q = \text{Expon}[Pq, x], k\}, \text{Int}[\text{Sum}[\text{Coeff}[Pq, x, 2 \cdot k] \cdot x^{(2 \cdot k)}, \{k, 0, q/2\}] \cdot (a + b \cdot x^2 + c \cdot x^4)^p, x] + \text{Int}[x \cdot \text{Sum}[\text{Coeff}[Pq, x, 2 \cdot k + 1] \cdot x^{(2 \cdot k)}, \{k, 0, (q-1)/2\}] \cdot (a + b \cdot x^2 + c \cdot x^4)^p, x]] \text{ ; FreeQ}[\{a, b, c, p\}, x] \ \&\& \ \text{PolyQ}[Pq, x]$

&& !PolyQ[Pq, x^2]

Rule 1690

Int[(Pq\_)/((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4), x\_Symbol] := Int[ExpandIntegrand[Pq/(a + b\*x^2 + c\*x^4), x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^2] && Expon[Pq, x^2] > 1

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + fx^2 + hx^4}{4 - 5x^2 + x^4} dx + \int \frac{x(e + gx^2 + ix^4)}{4 - 5x^2 + x^4} dx \\
 &= \frac{1}{2} \text{Subst} \left( \int \frac{e + gx + ix^2}{4 - 5x + x^2} dx, x, x^2 \right) + \int \left( h + \frac{d - 4h + (f + 5h)x^2}{4 - 5x^2 + x^4} \right) dx \\
 &= hx + \frac{1}{2} \text{Subst} \left( \int \left( i + \frac{e - 4i + (g + 5i)x}{4 - 5x + x^2} \right) dx, x, x^2 \right) + \int \frac{d - 4h + (f + 5h)x^2}{4 - 5x^2 + x^4} dx \\
 &= hx + \frac{ix^2}{2} + \frac{1}{2} \text{Subst} \left( \int \frac{e - 4i + (g + 5i)x}{4 - 5x + x^2} dx, x, x^2 \right) \\
 &\quad - \frac{1}{3}(d + f + h) \int \frac{1}{-1 + x^2} dx + \frac{1}{3}(d + 4f + 16h) \int \frac{1}{-4 + x^2} dx \\
 &= hx + \frac{ix^2}{2} - \frac{1}{6}(d + 4f + 16h) \tanh^{-1} \left( \frac{x}{2} \right) + \frac{1}{3}(d + f + h) \tanh^{-1}(x) \\
 &\quad + \frac{1}{6}(-e - g - i) \text{Subst} \left( \int \frac{1}{-1 + x} dx, x, x^2 \right) \\
 &\quad + \frac{1}{6}(e + 4g + 16i) \text{Subst} \left( \int \frac{1}{-4 + x} dx, x, x^2 \right) \\
 &= hx + \frac{ix^2}{2} - \frac{1}{6}(d + 4f + 16h) \tanh^{-1} \left( \frac{x}{2} \right) + \frac{1}{3}(d + f + h) \tanh^{-1}(x) \\
 &\quad - \frac{1}{6}(e + g + i) \log(1 - x^2) + \frac{1}{6}(e + 4g + 16i) \log(4 - x^2)
 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 98, normalized size of antiderivative = 1.29

$$\begin{aligned}
 \int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{4 - 5x^2 + x^4} dx &= \frac{1}{12} (12hx + 6ix^2 - 2(d + e + f + g + h + i) \log(1 - x) \\
 &\quad + (d + 2e + 4(f + 2g + 4h + 8i)) \log(2 - x) \\
 &\quad + 2(d - e + f - g + h - i) \log(1 + x) \\
 &\quad - (d - 2(e - 2f + 4g - 8h + 16i)) \log(2 + x))
 \end{aligned}$$

```
[In] Integrate[(d + e*x + f*x^2 + g*x^3 + h*x^4 + i*x^5)/(4 - 5*x^2 + x^4),x]
[Out] (12*h*x + 6*i*x^2 - 2*(d + e + f + g + h + i)*Log[1 - x] + (d + 2*e + 4*(f
+ 2*g + 4*h + 8*i))*Log[2 - x] + 2*(d - e + f - g + h - i)*Log[1 + x] - (d
- 2*(e - 2*f + 4*g - 8*h + 16*i))*Log[2 + x])/12
```

### Maple [A] (verified)

Time = 0.09 (sec) , antiderivative size = 107, normalized size of antiderivative = 1.41

method	result
default	$\frac{ix^2}{2} + hx + \left(-\frac{d}{12} + \frac{e}{6} - \frac{f}{3} + \frac{2g}{3} - \frac{4h}{3} + \frac{8i}{3}\right) \ln(x+2) + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6} - \frac{i}{6}\right) \ln(x+1) -$
norman	$\frac{ix^2}{2} + hx + \left(-\frac{d}{12} + \frac{e}{6} - \frac{f}{3} + \frac{2g}{3} - \frac{4h}{3} + \frac{8i}{3}\right) \ln(x+2) + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6} - \frac{i}{6}\right) \ln(x+1) -$
parallelrisch	$\frac{ix^2}{2} + \frac{\ln(x-2)d}{12} + \frac{\ln(x-2)e}{6} - \frac{\ln(x-1)d}{6} - \frac{\ln(x-1)e}{6} - \frac{\ln(x+1)i}{6} - \frac{\ln(x+2)f}{3} + \frac{\ln(x+1)f}{6} - \frac{\ln(x+2)d}{12} + hx -$
risch	$\frac{ix^2}{2} - \frac{\ln(x+1)i}{6} - \frac{\ln(x+2)f}{3} - \frac{\ln(1-x)f}{6} + \frac{\ln(x+1)f}{6} + \frac{\ln(2-x)f}{3} + \frac{\ln(2-x)d}{12} + \frac{\ln(2-x)e}{6} - \frac{\ln(x+2)d}{12} + hx -$

```
[In] int((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x,method=_RETURNVERBOSE)
[Out] 1/2*i*x^2+h*x+(-1/12*d+1/6*e-1/3*f+2/3*g-4/3*h+8/3*i)*ln(x+2)+(1/6*d-1/6*e+
1/6*f-1/6*g+1/6*h-1/6*i)*ln(x+1)+(-1/6*d-1/6*e-1/6*f-1/6*g-1/6*h-1/6*i)*ln(
x-1)+(1/12*d+1/6*e+1/3*f+2/3*g+4/3*h+8/3*i)*ln(x-2)
```

### Fricas [A] (verification not implemented)

none

Time = 5.00 (sec) , antiderivative size = 88, normalized size of antiderivative = 1.16

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{4 - 5x^2 + x^4} dx = \frac{1}{2}ix^2 + hx - \frac{1}{12}(d - 2e + 4f - 8g + 16h - 32i) \log(x+2) + \frac{1}{6}(d - e + f - g + h - i) \log(x+1) - \frac{1}{6}(d + e + f + g + h + i) \log(x-1) + \frac{1}{12}(d + 2e + 4f + 8g + 16h + 32i) \log(x-2)$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="fricas")
[Out] 1/2*i*x^2 + h*x - 1/12*(d - 2*e + 4*f - 8*g + 16*h - 32*i)*log(x + 2) + 1/6
*(d - e + f - g + h - i)*log(x + 1) - 1/6*(d + e + f + g + h + i)*log(x - 1
) + 1/12*(d + 2*e + 4*f + 8*g + 16*h + 32*i)*log(x - 2)
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{4 - 5x^2 + x^4} dx = \text{Timed out}$$

```
[In] integrate((i*x**5+h*x**4+g*x**3+f*x**2+e*x+d)/(x**4-5*x**2+4),x)
```

```
[Out] Timed out
```

**Maxima [A] (verification not implemented)**

none

Time = 0.20 (sec) , antiderivative size = 88, normalized size of antiderivative = 1.16

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{4 - 5x^2 + x^4} dx = \frac{1}{2}ix^2 + hx$$

$$- \frac{1}{12}(d - 2e + 4f - 8g + 16h - 32i) \log(x + 2)$$

$$+ \frac{1}{6}(d - e + f - g + h - i) \log(x + 1)$$

$$- \frac{1}{6}(d + e + f + g + h + i) \log(x - 1)$$

$$+ \frac{1}{12}(d + 2e + 4f + 8g + 16h + 32i) \log(x - 2)$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="maxima")
```

```
[Out] 1/2*i*x^2 + h*x - 1/12*(d - 2*e + 4*f - 8*g + 16*h - 32*i)*log(x + 2) + 1/6*(d - e + f - g + h - i)*log(x + 1) - 1/6*(d + e + f + g + h + i)*log(x - 1) + 1/12*(d + 2*e + 4*f + 8*g + 16*h + 32*i)*log(x - 2)
```

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 92, normalized size of antiderivative = 1.21

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{4 - 5x^2 + x^4} dx = \frac{1}{2}ix^2 + hx$$

$$- \frac{1}{12}(d - 2e + 4f - 8g + 16h - 32i) \log(|x + 2|)$$

$$+ \frac{1}{6}(d - e + f - g + h - i) \log(|x + 1|)$$

$$- \frac{1}{6}(d + e + f + g + h + i) \log(|x - 1|)$$

$$+ \frac{1}{12}(d + 2e + 4f + 8g + 16h + 32i) \log(|x - 2|)$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] 1/2\*i\*x^2 + h\*x - 1/12\*(d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)\*log(abs(x + 2)) + 1/6\*(d - e + f - g + h - i)\*log(abs(x + 1)) - 1/6\*(d + e + f + g + h + i)\*log(abs(x - 1)) + 1/12\*(d + 2\*e + 4\*f + 8\*g + 16\*h + 32\*i)\*log(abs(x - 2))

### Mupad [B] (verification not implemented)

Time = 8.15 (sec) , antiderivative size = 108, normalized size of antiderivative = 1.42

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{4 - 5x^2 + x^4} dx = hx + \frac{ix^2}{2} - \ln(x - 1) \left( \frac{d}{6} + \frac{e}{6} + \frac{f}{6} + \frac{g}{6} + \frac{h}{6} + \frac{i}{6} \right) + \ln(x + 1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6} - \frac{i}{6} \right) + \ln(x - 2) \left( \frac{d}{12} + \frac{e}{6} + \frac{f}{3} + \frac{2g}{3} + \frac{4h}{3} + \frac{8i}{3} \right) - \ln(x + 2) \left( \frac{d}{12} - \frac{e}{6} + \frac{f}{3} - \frac{2g}{3} + \frac{4h}{3} - \frac{8i}{3} \right)$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(x^4 - 5\*x^2 + 4),x)

[Out] h\*x + (i\*x^2)/2 - log(x - 1)\*(d/6 + e/6 + f/6 + g/6 + h/6 + i/6) + log(x + 1)\*(d/6 - e/6 + f/6 - g/6 + h/6 - i/6) + log(x - 2)\*(d/12 + e/6 + f/3 + (2\*g)/3 + (4\*h)/3 + (8\*i)/3) - log(x + 2)\*(d/12 - e/6 + f/3 - (2\*g)/3 + (4\*h)/3 - (8\*i)/3)

### 3.15 $\int \frac{d+ex}{1+x^2+x^4} dx$

Optimal result	126
Rubi [A] (verified)	126
Mathematica [C] (verified)	128
Maple [A] (verified)	129
Fricas [A] (verification not implemented)	129
Sympy [C] (verification not implemented)	129
Maxima [A] (verification not implemented)	130
Giac [A] (verification not implemented)	131
Mupad [B] (verification not implemented)	131

#### Optimal result

Integrand size = 16, antiderivative size = 92

$$\int \frac{d+ex}{1+x^2+x^4} dx = -\frac{d \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{2\sqrt{3}} + \frac{d \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{2\sqrt{3}} + \frac{e \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{\sqrt{3}} - \frac{1}{4}d \log(1-x+x^2) + \frac{1}{4}d \log(1+x+x^2)$$

[Out]  $-1/4*d*\ln(x^2-x+1)+1/4*d*\ln(x^2+x+1)-1/6*d*\arctan(1/3*(1-2*x)*3^{(1/2)})*3^{(1/2)}+1/6*d*\arctan(1/3*(1+2*x)*3^{(1/2)})*3^{(1/2)}+1/3*e*\arctan(1/3*(2*x^2+1)*3^{(1/2)})*3^{(1/2)}$

#### Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 92, normalized size of antiderivative = 1.00, number of steps used = 15, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.500$ , Rules used = {1687, 12, 1108, 648, 632, 210, 642, 1121}

$$\int \frac{d+ex}{1+x^2+x^4} dx = -\frac{d \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{2\sqrt{3}} + \frac{d \arctan\left(\frac{2x+1}{\sqrt{3}}\right)}{2\sqrt{3}} + \frac{e \arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)}{\sqrt{3}} - \frac{1}{4}d \log(x^2-x+1) + \frac{1}{4}d \log(x^2+x+1)$$

[In] Int[(d + e\*x)/(1 + x^2 + x^4), x]

[Out]  $-1/2*(d*\text{ArcTan}[(1 - 2*x)/\text{Sqrt}[3]])/\text{Sqrt}[3] + (d*\text{ArcTan}[(1 + 2*x)/\text{Sqrt}[3]])/(2*\text{Sqrt}[3]) + (e*\text{ArcTan}[(1 + 2*x^2)/\text{Sqrt}[3]])/\text{Sqrt}[3] - (d*\text{Log}[1 - x + x^2])/4 + (d*\text{Log}[1 + x + x^2])/4$

Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

### Rule 210

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[-b, 2])^(-1)\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

### Rule 632

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

### Rule 642

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := Simp[d\*(Log[RemoveContent[a + b\*x + c\*x^2, x]]/b), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[2\*c\*d - b\*e, 0]

### Rule 648

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := Dist[(2\*c\*d - b\*e)/(2\*c), Int[1/(a + b\*x + c\*x^2), x], x] + Dist[e/(2\*c), Int[(b + 2\*c\*x)/(a + b\*x + c\*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && !NiceSqrtQ[b^2 - 4\*a\*c]

### Rule 1108

Int[((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(-1), x\_Symbol] := With[{q = Rt[a/c, 2]}, With[{r = Rt[2\*q - b/c, 2]}, Dist[1/(2\*c\*q\*r), Int[(r - x)/(q - r\*x + x^2), x], x] + Dist[1/(2\*c\*q\*r), Int[(r + x)/(q + r\*x + x^2), x], x]]] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && NegQ[b^2 - 4\*a\*c]

### Rule 1121

Int[(x\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Dist[1/2, Subst[Int[(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]

### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]

&& !PolyQ[Pq, x^2]

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d}{1+x^2+x^4} dx + \int \frac{ex}{1+x^2+x^4} dx \\
&= d \int \frac{1}{1+x^2+x^4} dx + e \int \frac{x}{1+x^2+x^4} dx \\
&= \frac{1}{2}d \int \frac{1-x}{1-x+x^2} dx + \frac{1}{2}d \int \frac{1+x}{1+x+x^2} dx + \frac{1}{2}e \text{Subst} \left( \int \frac{1}{1+x+x^2} dx, x, x^2 \right) \\
&= \frac{1}{4}d \int \frac{1}{1-x+x^2} dx - \frac{1}{4}d \int \frac{-1+2x}{1-x+x^2} dx + \frac{1}{4}d \int \frac{1}{1+x+x^2} dx \\
&\quad + \frac{1}{4}d \int \frac{1+2x}{1+x+x^2} dx - e \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x^2 \right) \\
&= \frac{e \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{\sqrt{3}} - \frac{1}{4}d \log(1-x+x^2) + \frac{1}{4}d \log(1+x+x^2) \\
&\quad - \frac{1}{2}d \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, -1+2x \right) - \frac{1}{2}d \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x \right) \\
&= -\frac{d \tan^{-1} \left( \frac{1-2x}{\sqrt{3}} \right)}{2\sqrt{3}} + \frac{d \tan^{-1} \left( \frac{1+2x}{\sqrt{3}} \right)}{2\sqrt{3}} + \frac{e \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{\sqrt{3}} \\
&\quad - \frac{1}{4}d \log(1-x+x^2) + \frac{1}{4}d \log(1+x+x^2)
\end{aligned}$$

**Mathematica [C] (verified)**

Result contains complex when optimal does not.

Time = 0.17 (sec) , antiderivative size = 98, normalized size of antiderivative = 1.07

$$\begin{aligned}
\int \frac{d+ex}{1+x^2+x^4} dx &= \frac{1}{6}i \left( \sqrt{6-6i\sqrt{3}}d \arctan \left( \frac{1}{2}(-i+\sqrt{3})x \right) \right. \\
&\quad \left. - \sqrt{6+6i\sqrt{3}}d \arctan \left( \frac{1}{2}(i+\sqrt{3})x \right) + 2i\sqrt{3}e \arctan \left( \frac{\sqrt{3}}{1+2x^2} \right) \right)
\end{aligned}$$

[In] Integrate[(d + e\*x)/(1 + x^2 + x^4),x]

[Out] (I/6)\*(Sqrt[6 - (6\*I)\*Sqrt[3]]\*d\*ArcTan[((-I + Sqrt[3])\*x)/2] - Sqrt[6 + (6\*I)\*Sqrt[3]]\*d\*ArcTan[((I + Sqrt[3])\*x)/2] + (2\*I)\*Sqrt[3]\*e\*ArcTan[Sqrt[3]/(1 + 2\*x^2)])



**Maple [A] (verified)**

Time = 0.12 (sec) , antiderivative size = 68, normalized size of antiderivative = 0.74

method	result
default	$-\frac{d \ln(x^2-x+1)}{4} + \frac{\left(\frac{d}{2}+e\right)\sqrt{3} \arctan\left(\frac{(2x-1)\sqrt{3}}{3}\right)}{3} + \frac{d \ln(x^2+x+1)}{4} + \frac{\left(\frac{d}{2}-e\right) \arctan\left(\frac{(1+2x)\sqrt{3}}{3}\right)\sqrt{3}}{3}$
risch	$\frac{d \ln(36d^2x^2+48e^2x^2+36d^2x+48e^2x+36d^2+48e^2)}{4} + \frac{\sqrt{3} d \arctan\left(\frac{8e^2\sqrt{3}x}{3(3d^2+4e^2)} - \frac{4e^2\sqrt{3}}{3(3d^2+4e^2)} + \frac{2d^2\sqrt{3}x}{3d^2+4e^2} - \frac{d^2\sqrt{3}}{3d^2+4e^2}\right)}{6} - \frac{\sqrt{3} d \arctan\left(\frac{8e^2\sqrt{3}x}{3(3d^2+4e^2)} - \frac{4e^2\sqrt{3}}{3(3d^2+4e^2)} + \frac{2d^2\sqrt{3}x}{3d^2+4e^2} - \frac{d^2\sqrt{3}}{3d^2+4e^2}\right)}{3}$

[In] int((e\*x+d)/(x^4+x^2+1),x,method=\_RETURNVERBOSE)

[Out] -1/4\*d\*ln(x^2-x+1)+1/3\*(1/2\*d+e)\*3^(1/2)\*arctan(1/3\*(2\*x-1)\*3^(1/2))+1/4\*d\*ln(x^2+x+1)+1/3\*(1/2\*d-e)\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)

**Fricas [A] (verification not implemented)**

none

Time = 0.27 (sec) , antiderivative size = 65, normalized size of antiderivative = 0.71

$$\int \frac{d+ex}{1+x^2+x^4} dx = \frac{1}{6} \sqrt{3}(d-2e) \arctan\left(\frac{1}{3} \sqrt{3}(2x+1)\right) + \frac{1}{6} \sqrt{3}(d+2e) \arctan\left(\frac{1}{3} \sqrt{3}(2x-1)\right) + \frac{1}{4} d \log(x^2+x+1) - \frac{1}{4} d \log(x^2-x+1)$$

[In] integrate((e\*x+d)/(x^4+x^2+1),x, algorithm="fricas")

[Out] 1/6\*sqrt(3)\*(d-2\*e)\*arctan(1/3\*sqrt(3)\*(2\*x+1))+1/6\*sqrt(3)\*(d+2\*e)\*arctan(1/3\*sqrt(3)\*(2\*x-1))+1/4\*d\*log(x^2+x+1)-1/4\*d\*log(x^2-x+1)

**Sympy [C] (verification not implemented)**

Result contains complex when optimal does not.

Time = 1.66 (sec) , antiderivative size = 923, normalized size of antiderivative = 10.03

$$\int \frac{d+ex}{1+x^2+x^4} dx = \text{Too large to display}$$

[In] integrate((e\*x+d)/(x\*\*4+x\*\*2+1),x)

[Out] (-d/4 - sqrt(3)\*I\*(d+2\*e)/12)\*log(x + (-7\*d\*\*4\*e + 6\*d\*\*4\*(-d/4 - sqrt(3))\*I\*(d+2\*e)/12) - 15\*d\*\*2\*e\*\*3 - 18\*d\*\*2\*e\*\*2\*(-d/4 - sqrt(3)\*I\*(d+2\*e)/

```

12) + 60*d**2*e*(-d/4 - sqrt(3)*I*(d + 2*e)/12)**2 + 72*d**2*(-d/4 - sqrt(3)
)*I*(d + 2*e)/12)**3 + 4*e**5 + 24*e**4*(-d/4 - sqrt(3)*I*(d + 2*e)/12) + 4
8*e**3*(-d/4 - sqrt(3)*I*(d + 2*e)/12)**2 + 288*e**2*(-d/4 - sqrt(3)*I*(d +
2*e)/12)**3)/(3*d**5 - 8*d**3*e**2 - 16*d*e**4)) + (-d/4 + sqrt(3)*I*(d +
2*e)/12)*log(x + (-7*d**4*e + 6*d**4*(-d/4 + sqrt(3)*I*(d + 2*e)/12) - 15*d
**2*e**3 - 18*d**2*e**2*(-d/4 + sqrt(3)*I*(d + 2*e)/12) + 60*d**2*e*(-d/4 +
sqrt(3)*I*(d + 2*e)/12)**2 + 72*d**2*(-d/4 + sqrt(3)*I*(d + 2*e)/12)**3 +
4*e**5 + 24*e**4*(-d/4 + sqrt(3)*I*(d + 2*e)/12) + 48*e**3*(-d/4 + sqrt(3)*
I*(d + 2*e)/12)**2 + 288*e**2*(-d/4 + sqrt(3)*I*(d + 2*e)/12)**3)/(3*d**5 -
8*d**3*e**2 - 16*d*e**4)) + (d/4 - sqrt(3)*I*(d - 2*e)/12)*log(x + (-7*d**
4*e + 6*d**4*(d/4 - sqrt(3)*I*(d - 2*e)/12) - 15*d**2*e**3 - 18*d**2*e**2*(
d/4 - sqrt(3)*I*(d - 2*e)/12) + 60*d**2*e*(d/4 - sqrt(3)*I*(d - 2*e)/12)**2
+ 72*d**2*(d/4 - sqrt(3)*I*(d - 2*e)/12)**3 + 4*e**5 + 24*e**4*(d/4 - sqrt
(3)*I*(d - 2*e)/12) + 48*e**3*(d/4 - sqrt(3)*I*(d - 2*e)/12)**2 + 288*e**2*
(d/4 - sqrt(3)*I*(d - 2*e)/12)**3)/(3*d**5 - 8*d**3*e**2 - 16*d*e**4)) + (d
/4 + sqrt(3)*I*(d - 2*e)/12)*log(x + (-7*d**4*e + 6*d**4*(d/4 + sqrt(3)*I*(
d - 2*e)/12) - 15*d**2*e**3 - 18*d**2*e**2*(d/4 + sqrt(3)*I*(d - 2*e)/12) +
60*d**2*e*(d/4 + sqrt(3)*I*(d - 2*e)/12)**2 + 72*d**2*(d/4 + sqrt(3)*I*(d
- 2*e)/12)**3 + 4*e**5 + 24*e**4*(d/4 + sqrt(3)*I*(d - 2*e)/12) + 48*e**3*(
d/4 + sqrt(3)*I*(d - 2*e)/12)**2 + 288*e**2*(d/4 + sqrt(3)*I*(d - 2*e)/12)**
3)/(3*d**5 - 8*d**3*e**2 - 16*d*e**4))

```

## Maxima [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 65, normalized size of antiderivative = 0.71

$$\begin{aligned}
\int \frac{d+ex}{1+x^2+x^4} dx &= \frac{1}{6} \sqrt{3}(d-2e) \arctan\left(\frac{1}{3} \sqrt{3}(2x+1)\right) \\
&+ \frac{1}{6} \sqrt{3}(d+2e) \arctan\left(\frac{1}{3} \sqrt{3}(2x-1)\right) \\
&+ \frac{1}{4} d \log(x^2+x+1) - \frac{1}{4} d \log(x^2-x+1)
\end{aligned}$$

```
[In] integrate((e*x+d)/(x^4+x^2+1),x, algorithm="maxima")
```

```
[Out] 1/6*sqrt(3)*(d - 2*e)*arctan(1/3*sqrt(3)*(2*x + 1)) + 1/6*sqrt(3)*(d + 2*e)
*arctan(1/3*sqrt(3)*(2*x - 1)) + 1/4*d*log(x^2 + x + 1) - 1/4*d*log(x^2 - x
+ 1)
```

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 65, normalized size of antiderivative = 0.71

$$\int \frac{d+ex}{1+x^2+x^4} dx = \frac{1}{6} \sqrt{3}(d-2e) \arctan\left(\frac{1}{3} \sqrt{3}(2x+1)\right) + \frac{1}{6} \sqrt{3}(d+2e) \arctan\left(\frac{1}{3} \sqrt{3}(2x-1)\right) + \frac{1}{4} d \log(x^2+x+1) - \frac{1}{4} d \log(x^2-x+1)$$

[In] integrate((e\*x+d)/(x^4+x^2+1),x, algorithm="giac")

```
[Out] 1/6*sqrt(3)*(d - 2*e)*arctan(1/3*sqrt(3)*(2*x + 1)) + 1/6*sqrt(3)*(d + 2*e)*arctan(1/3*sqrt(3)*(2*x - 1)) + 1/4*d*log(x^2 + x + 1) - 1/4*d*log(x^2 - x + 1)
```

**Mupad [B] (verification not implemented)**

Time = 0.13 (sec) , antiderivative size = 118, normalized size of antiderivative = 1.28

$$\int \frac{d+ex}{1+x^2+x^4} dx = -\ln\left(x - \frac{1}{2} - \frac{\sqrt{3} \text{li}}{2}\right) \left(\frac{d}{4} + \frac{\sqrt{3} d \text{li}}{12} + \frac{\sqrt{3} e \text{li}}{6}\right) + \ln\left(x + \frac{1}{2} - \frac{\sqrt{3} \text{li}}{2}\right) \left(\frac{d}{4} - \frac{\sqrt{3} d \text{li}}{12} + \frac{\sqrt{3} e \text{li}}{6}\right) + \ln\left(x - \frac{1}{2} + \frac{\sqrt{3} \text{li}}{2}\right) \left(-\frac{d}{4} + \frac{\sqrt{3} d \text{li}}{12} + \frac{\sqrt{3} e \text{li}}{6}\right) + \ln\left(x + \frac{1}{2} + \frac{\sqrt{3} \text{li}}{2}\right) \left(\frac{d}{4} + \frac{\sqrt{3} d \text{li}}{12} - \frac{\sqrt{3} e \text{li}}{6}\right)$$

[In] int((d + e\*x)/(x^2 + x^4 + 1),x)

```
[Out] log(x - (3^(1/2)*1i)/2 + 1/2)*(d/4 - (3^(1/2)*d*1i)/12 + (3^(1/2)*e*1i)/6) - log(x - (3^(1/2)*1i)/2 - 1/2)*(d/4 + (3^(1/2)*d*1i)/12 + (3^(1/2)*e*1i)/6) + log(x + (3^(1/2)*1i)/2 - 1/2)*((3^(1/2)*d*1i)/12 - d/4 + (3^(1/2)*e*1i)/6) + log(x + (3^(1/2)*1i)/2 + 1/2)*(d/4 + (3^(1/2)*d*1i)/12 - (3^(1/2)*e*1i)/6)
```

### 3.16 $\int \frac{d+ex+fx^2}{1+x^2+x^4} dx$

Optimal result	132
Rubi [A] (verified)	132
Mathematica [C] (verified)	134
Maple [A] (verified)	135
Fricas [A] (verification not implemented)	135
Sympy [C] (verification not implemented)	136
Maxima [A] (verification not implemented)	138
Giac [A] (verification not implemented)	138
Mupad [B] (verification not implemented)	139

#### Optimal result

Integrand size = 21, antiderivative size = 104

$$\int \frac{d+ex+fx^2}{1+x^2+x^4} dx = -\frac{(d+f) \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{2\sqrt{3}} + \frac{(d+f) \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{2\sqrt{3}} + \frac{e \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{\sqrt{3}} - \frac{1}{4}(d-f) \log(1-x+x^2) + \frac{1}{4}(d-f) \log(1+x+x^2)$$

[Out]  $-1/4*(d-f)*\ln(x^2-x+1)+1/4*(d-f)*\ln(x^2+x+1)-1/6*(d+f)*\arctan(1/3*(1-2*x)*3^{(1/2)})*3^{(1/2)}+1/6*(d+f)*\arctan(1/3*(1+2*x)*3^{(1/2)})*3^{(1/2)}+1/3*e*\arctan(1/3*(2*x^2+1)*3^{(1/2)})*3^{(1/2)}$

#### Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 104, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.381$ , Rules used = {1687, 1183, 648, 632, 210, 642, 12, 1121}

$$\int \frac{d+ex+fx^2}{1+x^2+x^4} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(d+f)}{2\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(d+f)}{2\sqrt{3}} + \frac{e \arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)}{\sqrt{3}} - \frac{1}{4}(d-f) \log(x^2-x+1) + \frac{1}{4}(d-f) \log(x^2+x+1)$$

[In] Int[(d + e\*x + f\*x^2)/(1 + x^2 + x^4),x]

[Out]  $-1/2*((d+f)*\text{ArcTan}[(1-2*x)/\text{Sqrt}[3]])/\text{Sqrt}[3] + ((d+f)*\text{ArcTan}[(1+2*x)/\text{Sqrt}[3]])/(2*\text{Sqrt}[3]) + (e*\text{ArcTan}[(1+2*x^2)/\text{Sqrt}[3]])/\text{Sqrt}[3] - ((d-f)*\text{Log}[1-x+x^2])/4 + ((d-f)*\text{Log}[1+x+x^2])/4$

Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_) /; FreeQ[b, x]]

### Rule 210

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-(Rt[-a, 2]\*Rt[-b, 2])^(-1))\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

### Rule 632

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

### Rule 642

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := Simp[d\*(Log[RemoveContent[a + b\*x + c\*x^2, x]]/b), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[2\*c\*d - b\*e, 0]

### Rule 648

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := Dist[(2\*c\*d - b\*e)/(2\*c), Int[1/(a + b\*x + c\*x^2), x], x] + Dist[e/(2\*c), Int[(b + 2\*c\*x)/(a + b\*x + c\*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && !NiceSqrtQ[b^2 - 4\*a\*c]

### Rule 1121

Int[(x\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Dist[1/2, Subst[Int[(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]

### Rule 1183

Int[((d\_) + (e\_)\*(x\_)^2)/((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4), x\_Symbol] := With[{q = Rt[a/c, 2]}, With[{r = Rt[2\*q - b/c, 2]}, Dist[1/(2\*c\*q\*r), Int[(d\*r - (d - e\*q)\*x)/(q - r\*x + x^2), x], x] + Dist[1/(2\*c\*q\*r), Int[(d\*r + (d - e\*q)\*x)/(q + r\*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && NegQ[b^2 - 4\*a\*c]

### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q -

1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]  
 && !PolyQ[Pq, x^2]

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{ex}{1+x^2+x^4} dx + \int \frac{d+fx^2}{1+x^2+x^4} dx \\
 &= \frac{1}{2} \int \frac{d-(d-f)x}{1-x+x^2} dx + \frac{1}{2} \int \frac{d+(d-f)x}{1+x+x^2} dx + e \int \frac{x}{1+x^2+x^4} dx \\
 &= \frac{1}{2} e \text{Subst} \left( \int \frac{1}{1+x+x^2} dx, x, x^2 \right) \\
 &\quad + \frac{1}{4} (d-f) \int \frac{1+2x}{1+x+x^2} dx + \frac{1}{4} (-d+f) \int \frac{-1+2x}{1-x+x^2} dx \\
 &\quad + \frac{1}{4} (d+f) \int \frac{1}{1-x+x^2} dx + \frac{1}{4} (d+f) \int \frac{1}{1+x+x^2} dx \\
 &= -\frac{1}{4} (d-f) \log(1-x+x^2) + \frac{1}{4} (d-f) \log(1+x+x^2) \\
 &\quad - e \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x^2 \right) \\
 &\quad + \frac{1}{2} (-d-f) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, -1+2x \right) \\
 &\quad + \frac{1}{2} (-d-f) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x \right) \\
 &= -\frac{(d+f) \tan^{-1} \left( \frac{1-2x}{\sqrt{3}} \right)}{2\sqrt{3}} + \frac{(d+f) \tan^{-1} \left( \frac{1+2x}{\sqrt{3}} \right)}{2\sqrt{3}} + \frac{e \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{\sqrt{3}} \\
 &\quad - \frac{1}{4} (d-f) \log(1-x+x^2) + \frac{1}{4} (d-f) \log(1+x+x^2)
 \end{aligned}$$

**Mathematica [C] (verified)**

Result contains complex when optimal does not.

Time = 0.11 (sec) , antiderivative size = 121, normalized size of antiderivative = 1.16

$$\begin{aligned}
 \int \frac{d+ex+fx^2}{1+x^2+x^4} dx &= \frac{(2id + (-i + \sqrt{3})f) \arctan \left( \frac{1}{2}(-i + \sqrt{3})x \right)}{\sqrt{6+6i\sqrt{3}}} \\
 &\quad + \frac{(-2id + (i + \sqrt{3})f) \arctan \left( \frac{1}{2}(i + \sqrt{3})x \right)}{\sqrt{6-6i\sqrt{3}}} - \frac{e \arctan \left( \frac{\sqrt{3}}{1+2x^2} \right)}{\sqrt{3}}
 \end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2)/(1 + x^2 + x^4), x]

```
[Out] (((2*I)*d + (-I + Sqrt[3])*f)*ArcTan[((-I + Sqrt[3])*x)/2])/Sqrt[6 + (6*I)*
Sqrt[3]] + (((-2*I)*d + (I + Sqrt[3])*f)*ArcTan[((I + Sqrt[3])*x)/2])/Sqrt[
6 - (6*I)*Sqrt[3]] - (e*ArcTan[Sqrt[3]/(1 + 2*x^2)])/Sqrt[3]
```

### Maple [A] (verified)

Time = 0.23 (sec) , antiderivative size = 82, normalized size of antiderivative = 0.79

method	result	size
default	$\frac{(f-d)\ln(x^2-x+1)}{4} + \frac{\left(\frac{d}{2}+e+\frac{f}{2}\right)\sqrt{3}\arctan\left(\frac{(2x-1)\sqrt{3}}{3}\right)}{3} + \frac{(d-f)\ln(x^2+x+1)}{4} + \frac{\left(\frac{d}{2}-e+\frac{f}{2}\right)\arctan\left(\frac{(1+2x)\sqrt{3}}{3}\right)\sqrt{3}}{3}$	82
risch	Expression too large to display	7878

```
[In] int((f*x^2+e*x+d)/(x^4+x^2+1),x,method=_RETURNVERBOSE)
```

```
[Out] 1/4*(f-d)*ln(x^2-x+1)+1/3*(1/2*d+e+1/2*f)*3^(1/2)*arctan(1/3*(2*x-1)*3^(1/2))
)+1/4*(d-f)*ln(x^2+x+1)+1/3*(1/2*d-e+1/2*f)*arctan(1/3*(1+2*x)*3^(1/2))*3^(1/2)
```

### Fricas [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 75, normalized size of antiderivative = 0.72

$$\int \frac{d + ex + fx^2}{1 + x^2 + x^4} dx = \frac{1}{6} \sqrt{3}(d - 2e + f) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) + \frac{1}{6} \sqrt{3}(d + 2e + f) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) + \frac{1}{4}(d - f) \log(x^2 + x + 1) - \frac{1}{4}(d - f) \log(x^2 - x + 1)$$

```
[In] integrate((f*x^2+e*x+d)/(x^4+x^2+1),x, algorithm="fricas")
```

```
[Out] 1/6*sqrt(3)*(d - 2*e + f)*arctan(1/3*sqrt(3)*(2*x + 1)) + 1/6*sqrt(3)*(d +
2*e + f)*arctan(1/3*sqrt(3)*(2*x - 1)) + 1/4*(d - f)*log(x^2 + x + 1) - 1/4
*(d - f)*log(x^2 - x + 1)
```

## Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 65.87 (sec) , antiderivative size = 3589, normalized size of antiderivative = 34.51

$$\int \frac{d + ex + fx^2}{1 + x^2 + x^4} dx = \text{Too large to display}$$

[In] integrate((f\*x\*\*2+e\*x+d)/(x\*\*4+x\*\*2+1),x)

[Out]  $(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)*\log(x + (-7*d**5*e + 6*d**5*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12) + 25*d**4*e*f + 18*d**4*f*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12) - 15*d**3*e**3 - 18*d**3*e**2*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12) - 25*d**3*e*f**2 + 60*d**3*e*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)**2 - 42*d**3*f**2*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12) + 72*d**3*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)**3 + 108*d**2*e**2*f*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12) + 20*d**2*e*f**3 - 144*d**2*e*f*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)**2 - 12*d**2*f**3*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12) - 144*d**2*f*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)**3 + 4*d*e**5 + 24*d*e**4*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12) + 15*d*e**3*f**2 + 48*d*e**3*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)**2 - 54*d*e**2*f**2*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12) + 288*d*e**2*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)**3 - 20*d*e*f**4 + 180*d*e*f**2*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)**2 + 36*d*f**4*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12) - 72*d*f**2*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)**3 - 8*e**5*f - 96*e**3*f*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)**2 + 36*e**2*f**3*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12) + 11*e*f**5 - 48*e*f**3*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)**2 - 6*f**5*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12) + 144*f**3*(-d/4 + f/4 - \sqrt{3}*I*(d + 2*e + f)/12)**3)/(3*d**6 - 3*d**5*f - 8*d**4*e**2 - 3*d**4*f**2 + 40*d**3*e**2*f + 6*d**3*f**3 - 16*d**2*e**4 - 48*d**2*e**2*f**2 - 3*d**2*f**4 + 16*d*e**4*f + 40*d*e**2*f**3 - 3*d*f**5 - 16*e**4*f**2 - 8*e**2*f**4 + 3*f**6)) + (-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)*\log(x + (-7*d**5*e + 6*d**5*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12) + 25*d**4*e*f + 18*d**4*f*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12) - 15*d**3*e**3 - 18*d**3*e**2*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12) - 25*d**3*e*f**2 + 60*d**3*e*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)**2 - 42*d**3*f**2*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12) + 72*d**3*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)**3 + 108*d**2*e**2*f*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12) + 20*d**2*e*f**3 - 144*d**2*e*f*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)**2 - 12*d**2*f**3*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12) - 144*d**2*f*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)**3 + 4*d*e**5 + 24*d*e**4*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12) + 15*d*e**3*f**2 + 48*d*e**3*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)**2 - 54*d*e**2*f**2*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12) + 288*d*e**2*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)**3 - 20*d*e*f**4 + 180*d*e*f**2*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)**2 + 36*d*f**4*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12) - 72*d*f**2*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)**3 - 8*e**5*f - 96*e**3*f*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)**2 + 36*e**2*f**3*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12) + 11*e*f**5 - 48*e*f**3*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)**2 - 6*f**5*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12) + 144*f**3*(-d/4 + f/4 + \sqrt{3}*I*(d + 2*e + f)/12)**3)/(3*d**6 - 3*d**5*f - 8*d**4*e**2 - 3*d**4*f**2 + 40*d**3*e**2*f + 6*d**3*f**3 - 16*d**2*e**4 - 48*d**2*e**2*f**2 - 3*d**2*f**4 + 16*d*e**4*f + 40*d*e**2*f**3 - 3*d*f**5 - 16*e**4*f**2 - 8*e**2*f**4 + 3*f**6))$



$$\begin{aligned}
& + f/4 + \sqrt{3} * I * (d + 2 * e + f) / 12) ** 2 + 36 * d * f ** 4 * (-d/4 + f/4 + \sqrt{3} * I * \\
& (d + 2 * e + f) / 12) - 72 * d * f ** 2 * (-d/4 + f/4 + \sqrt{3} * I * (d + 2 * e + f) / 12) ** 3 \\
& - 8 * e ** 5 * f - 96 * e ** 3 * f * (-d/4 + f/4 + \sqrt{3} * I * (d + 2 * e + f) / 12) ** 2 + 36 * e * \\
& * 2 * f ** 3 * (-d/4 + f/4 + \sqrt{3} * I * (d + 2 * e + f) / 12) + 11 * e * f ** 5 - 48 * e * f ** 3 * ( \\
& -d/4 + f/4 + \sqrt{3} * I * (d + 2 * e + f) / 12) ** 2 - 6 * f ** 5 * (-d/4 + f/4 + \sqrt{3} * I * \\
& I * (d + 2 * e + f) / 12) + 144 * f ** 3 * (-d/4 + f/4 + \sqrt{3} * I * (d + 2 * e + f) / 12) ** 3 \\
& ) / (3 * d ** 6 - 3 * d ** 5 * f - 8 * d ** 4 * e ** 2 - 3 * d ** 4 * f ** 2 + 40 * d ** 3 * e ** 2 * f + 6 * d ** 3 * \\
& f ** 3 - 16 * d ** 2 * e ** 4 - 48 * d ** 2 * e ** 2 * f ** 2 - 3 * d ** 2 * f ** 4 + 16 * d * e ** 4 * f + 40 * d * \\
& e ** 2 * f ** 3 - 3 * d * f ** 5 - 16 * e ** 4 * f ** 2 - 8 * e ** 2 * f ** 4 + 3 * f ** 6) + (d/4 - f/4 - \\
& \sqrt{3} * I * (d - 2 * e + f) / 12) * \log(x + (-7 * d ** 5 * e + 6 * d ** 5 * (d/4 - f/4 - \sqrt{3} * \\
& 3) * I * (d - 2 * e + f) / 12) + 25 * d ** 4 * e * f + 18 * d ** 4 * f * (d/4 - f/4 - \sqrt{3} * I * (d \\
& - 2 * e + f) / 12) - 15 * d ** 3 * e ** 3 - 18 * d ** 3 * e ** 2 * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * \\
& e + f) / 12) - 25 * d ** 3 * e * f ** 2 + 60 * d ** 3 * e * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e + f \\
& ) / 12) ** 2 - 42 * d ** 3 * f ** 2 * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e + f) / 12) + 72 * d ** 3 * \\
& (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e + f) / 12) ** 3 + 108 * d ** 2 * e ** 2 * f * (d/4 - f/4 - \\
& \sqrt{3} * I * (d - 2 * e + f) / 12) + 20 * d ** 2 * e * f ** 3 - 144 * d ** 2 * e * f * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e \\
& + f) / 12) - 12 * d ** 2 * f ** 3 * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e \\
& + f) / 12) - 144 * d ** 2 * f * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e + f) / 12) ** 3 + 4 * d * e * \\
& * 5 + 24 * d * e ** 4 * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e + f) / 12) + 15 * d * e ** 3 * f ** 2 + \\
& 48 * d * e ** 3 * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e + f) / 12) ** 2 - 54 * d * e ** 2 * f ** 2 * (d/4 \\
& - f/4 - \sqrt{3} * I * (d - 2 * e + f) / 12) + 288 * d * e ** 2 * (d/4 - f/4 - \sqrt{3} * I * (d \\
& - 2 * e + f) / 12) ** 3 - 20 * d * e * f ** 4 + 180 * d * e * f ** 2 * (d/4 - f/4 - \sqrt{3} * I * (d - \\
& 2 * e + f) / 12) ** 2 + 36 * d * f ** 4 * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e + f) / 12) - 72 * \\
& d * f ** 2 * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e + f) / 12) ** 3 - 8 * e ** 5 * f - 96 * e ** 3 * f * ( \\
& d/4 - f/4 - \sqrt{3} * I * (d - 2 * e + f) / 12) ** 2 + 36 * e ** 2 * f ** 3 * (d/4 - f/4 - \sqrt{3} * I * (d - \\
& 2 * e + f) / 12) + 11 * e * f ** 5 - 48 * e * f ** 3 * (d/4 - f/4 - \sqrt{3} * I * (d - \\
& 2 * e + f) / 12) ** 2 - 6 * f ** 5 * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e + f) / 12) + 144 * f * \\
& * 3 * (d/4 - f/4 - \sqrt{3} * I * (d - 2 * e + f) / 12) ** 3) / (3 * d ** 6 - 3 * d ** 5 * f - 8 * d ** 4 \\
& * e ** 2 - 3 * d ** 4 * f ** 2 + 40 * d ** 3 * e ** 2 * f + 6 * d ** 3 * f ** 3 - 16 * d ** 2 * e ** 4 - 48 * d ** 2 \\
& * e ** 2 * f ** 2 - 3 * d ** 2 * f ** 4 + 16 * d * e ** 4 * f + 40 * d * e ** 2 * f ** 3 - 3 * d * f ** 5 - 16 * e ** \\
& 4 * f ** 2 - 8 * e ** 2 * f ** 4 + 3 * f ** 6) + (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) * \\
& \log(x + (-7 * d ** 5 * e + 6 * d ** 5 * (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) + 25 * d \\
& ** 4 * e * f + 18 * d ** 4 * f * (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) - 15 * d ** 3 * e ** 3 \\
& - 18 * d ** 3 * e ** 2 * (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) - 25 * d ** 3 * e * f ** 2 + \\
& 60 * d ** 3 * e * (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) ** 2 - 42 * d ** 3 * f ** 2 * (d/4 \\
& - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) + 72 * d ** 3 * (d/4 - f/4 + \sqrt{3} * I * (d - 2 \\
& * e + f) / 12) ** 3 + 108 * d ** 2 * e ** 2 * f * (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) + \\
& 20 * d ** 2 * e * f ** 3 - 144 * d ** 2 * e * f * (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) ** 2 \\
& - 12 * d ** 2 * f ** 3 * (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) - 144 * d ** 2 * f * (d/4 - \\
& f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) ** 3 + 4 * d * e ** 5 + 24 * d * e ** 4 * (d/4 - f/4 + \sqrt{3} * \\
& \sqrt{3} * I * (d - 2 * e + f) / 12) + 15 * d * e ** 3 * f ** 2 + 48 * d * e ** 3 * (d/4 - f/4 + \sqrt{3} * \\
& ) * I * (d - 2 * e + f) / 12) ** 2 - 54 * d * e ** 2 * f ** 2 * (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + \\
& f) / 12) + 288 * d * e ** 2 * (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) ** 3 - 20 * d * e * f \\
& ** 4 + 180 * d * e * f ** 2 * (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) ** 2 + 36 * d * f ** 4 * \\
& (d/4 - f/4 + \sqrt{3} * I * (d - 2 * e + f) / 12) - 72 * d * f ** 2 * (d/4 - f/4 + \sqrt{3} * I
\end{aligned}$$

```

*(d - 2*e + f)/12)**3 - 8*e**5*f - 96*e**3*f*(d/4 - f/4 + sqrt(3)*I*(d - 2*
e + f)/12)**2 + 36*e**2*f**3*(d/4 - f/4 + sqrt(3)*I*(d - 2*e + f)/12) + 11*
e*f**5 - 48*e*f**3*(d/4 - f/4 + sqrt(3)*I*(d - 2*e + f)/12)**2 - 6*f**5*(d/
4 - f/4 + sqrt(3)*I*(d - 2*e + f)/12) + 144*f**3*(d/4 - f/4 + sqrt(3)*I*(d
- 2*e + f)/12)**3)/(3*d**6 - 3*d**5*f - 8*d**4*e**2 - 3*d**4*f**2 + 40*d**3
*e**2*f + 6*d**3*f**3 - 16*d**2*e**4 - 48*d**2*e**2*f**2 - 3*d**2*f**4 + 16
*d*e**4*f + 40*d*e**2*f**3 - 3*d*f**5 - 16*e**4*f**2 - 8*e**2*f**4 + 3*f**6
))

```

## Maxima [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 75, normalized size of antiderivative = 0.72

$$\begin{aligned}
\int \frac{d + ex + fx^2}{1 + x^2 + x^4} dx &= \frac{1}{6} \sqrt{3}(d - 2e + f) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) \\
&+ \frac{1}{6} \sqrt{3}(d + 2e + f) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) \\
&+ \frac{1}{4} (d - f) \log(x^2 + x + 1) - \frac{1}{4} (d - f) \log(x^2 - x + 1)
\end{aligned}$$

```
[In] integrate((f*x^2+e*x+d)/(x^4+x^2+1),x, algorithm="maxima")
```

```
[Out] 1/6*sqrt(3)*(d - 2*e + f)*arctan(1/3*sqrt(3)*(2*x + 1)) + 1/6*sqrt(3)*(d +
2*e + f)*arctan(1/3*sqrt(3)*(2*x - 1)) + 1/4*(d - f)*log(x^2 + x + 1) - 1/4
*(d - f)*log(x^2 - x + 1)
```

## Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 75, normalized size of antiderivative = 0.72

$$\begin{aligned}
\int \frac{d + ex + fx^2}{1 + x^2 + x^4} dx &= \frac{1}{6} \sqrt{3}(d - 2e + f) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) \\
&+ \frac{1}{6} \sqrt{3}(d + 2e + f) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) \\
&+ \frac{1}{4} (d - f) \log(x^2 + x + 1) - \frac{1}{4} (d - f) \log(x^2 - x + 1)
\end{aligned}$$

```
[In] integrate((f*x^2+e*x+d)/(x^4+x^2+1),x, algorithm="giac")
```

```
[Out] 1/6*sqrt(3)*(d - 2*e + f)*arctan(1/3*sqrt(3)*(2*x + 1)) + 1/6*sqrt(3)*(d +
2*e + f)*arctan(1/3*sqrt(3)*(2*x - 1)) + 1/4*(d - f)*log(x^2 + x + 1) - 1/4
*(d - f)*log(x^2 - x + 1)
```

**Mupad [B] (verification not implemented)**

Time = 7.98 (sec) , antiderivative size = 159, normalized size of antiderivative = 1.53

$$\int \frac{d + ex + fx^2}{1 + x^2 + x^4} dx = -\ln\left(x - \frac{1}{2} - \frac{\sqrt{3}i}{2}\right) \left(\frac{d}{4} - \frac{f}{4} + \frac{\sqrt{3}d i}{12} + \frac{\sqrt{3}e i}{6} + \frac{\sqrt{3}f i}{12}\right) \\ - \ln\left(x + \frac{1}{2} - \frac{\sqrt{3}i}{2}\right) \left(\frac{f}{4} - \frac{d}{4} + \frac{\sqrt{3}d i}{12} - \frac{\sqrt{3}e i}{6} + \frac{\sqrt{3}f i}{12}\right) \\ + \ln\left(x - \frac{1}{2} + \frac{\sqrt{3}i}{2}\right) \left(\frac{f}{4} - \frac{d}{4} + \frac{\sqrt{3}d i}{12} + \frac{\sqrt{3}e i}{6} + \frac{\sqrt{3}f i}{12}\right) \\ + \ln\left(x + \frac{1}{2} + \frac{\sqrt{3}i}{2}\right) \left(\frac{d}{4} - \frac{f}{4} + \frac{\sqrt{3}d i}{12} - \frac{\sqrt{3}e i}{6} + \frac{\sqrt{3}f i}{12}\right)$$

`[In] int((d + e*x + f*x^2)/(x^2 + x^4 + 1),x)`

```
[Out] log(x + (3^(1/2)*1i)/2 - 1/2)*(f/4 - d/4 + (3^(1/2)*d*1i)/12 + (3^(1/2)*e*1i)/6 + (3^(1/2)*f*1i)/12) - log(x - (3^(1/2)*1i)/2 + 1/2)*(f/4 - d/4 + (3^(1/2)*d*1i)/12 - (3^(1/2)*e*1i)/6 + (3^(1/2)*f*1i)/12) - log(x - (3^(1/2)*1i)/2 - 1/2)*(d/4 - f/4 + (3^(1/2)*d*1i)/12 + (3^(1/2)*e*1i)/6 + (3^(1/2)*f*1i)/12) + log(x + (3^(1/2)*1i)/2 + 1/2)*(d/4 - f/4 + (3^(1/2)*d*1i)/12 - (3^(1/2)*e*1i)/6 + (3^(1/2)*f*1i)/12)
```

### 3.17 $\int \frac{d+ex+fx^2+gx^3}{1+x^2+x^4} dx$

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#### Optimal result

Integrand size = 26, antiderivative size = 127

$$\int \frac{d+ex+fx^2+gx^3}{1+x^2+x^4} dx = -\frac{(d+f) \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{2\sqrt{3}} + \frac{(d+f) \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{2\sqrt{3}}$$

$$+ \frac{(2e-g) \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{2\sqrt{3}} - \frac{1}{4}(d-f) \log(1-x+x^2)$$

$$+ \frac{1}{4}(d-f) \log(1+x+x^2) + \frac{1}{4}g \log(1+x^2+x^4)$$

[Out]  $-1/4*(d-f)*\ln(x^2-x+1)+1/4*(d-f)*\ln(x^2+x+1)+1/4*g*\ln(x^4+x^2+1)-1/6*(d+f)*\arctan(1/3*(1-2*x)*3^{(1/2)})*3^{(1/2)}+1/6*(d+f)*\arctan(1/3*(1+2*x)*3^{(1/2)})*3^{(1/2)}+1/6*(2*e-g)*\arctan(1/3*(2*x^2+1)*3^{(1/2)})*3^{(1/2)}$

#### Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 127, normalized size of antiderivative = 1.00, number of steps used = 15, number of rules used = 7,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.269$ , Rules used = {1687, 1183, 648, 632, 210, 642, 1261}

$$\int \frac{d+ex+fx^2+gx^3}{1+x^2+x^4} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(d+f)}{2\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(d+f)}{2\sqrt{3}}$$

$$+ \frac{\arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)(2e-g)}{2\sqrt{3}} - \frac{1}{4}(d-f) \log(x^2-x+1)$$

$$+ \frac{1}{4}(d-f) \log(x^2+x+1) + \frac{1}{4}g \log(x^4+x^2+1)$$

[In]  $\text{Int}[(d + e*x + f*x^2 + g*x^3)/(1 + x^2 + x^4), x]$

```
[Out] -1/2*((d + f)*ArcTan[(1 - 2*x)/Sqrt[3]]/Sqrt[3] + ((d + f)*ArcTan[(1 + 2*x)
)/Sqrt[3]]/(2*Sqrt[3]) + ((2*e - g)*ArcTan[(1 + 2*x^2)/Sqrt[3]]/(2*Sqrt[3
]) - ((d - f)*Log[1 - x + x^2])/4 + ((d - f)*Log[1 + x + x^2])/4 + (g*Log[1
+ x^2 + x^4])/4
```

#### Rule 210

```
Int[((a_) + (b_)*(x_)^2)^(-1), x_Symbol] := Simp[(-Rt[-a, 2]*Rt[-b, 2])^(
-1)*ArcTan[Rt[-b, 2]*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] &
& (LtQ[a, 0] || LtQ[b, 0])
```

#### Rule 632

```
Int[((a_) + (b_)*(x_) + (c_)*(x_)^2)^(-1), x_Symbol] := Dist[-2, Subst[In
t[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]
```

#### Rule 642

```
Int[((d_) + (e_)*(x_))/((a_) + (b_)*(x_) + (c_)*(x_)^2), x_Symbol] := S
imp[d*(Log[RemoveContent[a + b*x + c*x^2, x]]/b), x] /; FreeQ[{a, b, c, d,
e}, x] && EqQ[2*c*d - b*e, 0]
```

#### Rule 648

```
Int[((d_) + (e_)*(x_))/((a_) + (b_)*(x_) + (c_)*(x_)^2), x_Symbol] := D
ist[(2*c*d - b*e)/(2*c), Int[1/(a + b*x + c*x^2), x], x] + Dist[e/(2*c), In
t[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && !NiceSqrtQ[b^2 - 4*a*c]
```

#### Rule 1183

```
Int[((d_) + (e_)*(x_)^2)/((a_) + (b_)*(x_)^2 + (c_)*(x_)^4), x_Symbol] :
> With[{q = Rt[a/c, 2]}, With[{r = Rt[2*q - b/c, 2]}, Dist[1/(2*c*q*r), Int
[(d*r - (d - e*q)*x)/(q - r*x + x^2), x], x] + Dist[1/(2*c*q*r), Int[(d*r +
(d - e*q)*x)/(q + r*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && NegQ[b^2 - 4*a*c]
```

#### Rule 1261

```
Int[(x_)*((d_) + (e_)*(x_)^2)^(q_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(
p_), x_Symbol] := Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

#### Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]]*(a + b
```

$*x^2 + c*x^4)^p, x] + \text{Int}[x*\text{Sum}[\text{Coeff}[\text{Pq}, x, 2*k + 1]*x^{(2*k)}, \{k, 0, (q - 1)/2\}](a + b*x^2 + c*x^4)^p, x]] /; \text{FreeQ}[\{a, b, c, p\}, x] \&\& \text{PolyQ}[\text{Pq}, x] \&\& !\text{PolyQ}[\text{Pq}, x^2]$

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d + fx^2}{1 + x^2 + x^4} dx + \int \frac{x(e + gx^2)}{1 + x^2 + x^4} dx \\
&= \frac{1}{2} \int \frac{d - (d - f)x}{1 - x + x^2} dx + \frac{1}{2} \int \frac{d + (d - f)x}{1 + x + x^2} dx + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{1 + x + x^2} dx, x, x^2 \right) \\
&= \frac{1}{4}(d - f) \int \frac{1 + 2x}{1 + x + x^2} dx + \frac{1}{4}(-d + f) \int \frac{-1 + 2x}{1 - x + x^2} dx \\
&\quad + \frac{1}{4}(d + f) \int \frac{1}{1 - x + x^2} dx + \frac{1}{4}(d + f) \int \frac{1}{1 + x + x^2} dx \\
&\quad + \frac{1}{4}(2e - g) \text{Subst} \left( \int \frac{1}{1 + x + x^2} dx, x, x^2 \right) + \frac{1}{4}g \text{Subst} \left( \int \frac{1 + 2x}{1 + x + x^2} dx, x, x^2 \right) \\
&= -\frac{1}{4}(d - f) \log(1 - x + x^2) + \frac{1}{4}(d - f) \log(1 + x + x^2) \\
&\quad + \frac{1}{4}g \log(1 + x^2 + x^4) + \frac{1}{2}(-d - f) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, -1 + 2x \right) \\
&\quad + \frac{1}{2}(-d - f) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, 1 + 2x \right) \\
&\quad + \frac{1}{2}(-2e + g) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, 1 + 2x^2 \right) \\
&= -\frac{(d + f) \tan^{-1} \left( \frac{1 - 2x}{\sqrt{3}} \right)}{2\sqrt{3}} + \frac{(d + f) \tan^{-1} \left( \frac{1 + 2x}{\sqrt{3}} \right)}{2\sqrt{3}} + \frac{(2e - g) \tan^{-1} \left( \frac{1 + 2x^2}{\sqrt{3}} \right)}{2\sqrt{3}} \\
&\quad - \frac{1}{4}(d - f) \log(1 - x + x^2) + \frac{1}{4}(d - f) \log(1 + x + x^2) + \frac{1}{4}g \log(1 + x^2 + x^4)
\end{aligned}$$

**Mathematica [C] (verified)**

Result contains complex when optimal does not.

Time = 0.36 (sec) , antiderivative size = 150, normalized size of antiderivative = 1.18

$$\begin{aligned}
&\int \frac{d + ex + fx^2 + gx^3}{1 + x^2 + x^4} dx \\
&= \frac{2\sqrt{2 - 2i\sqrt{3}}(2id + (-i + \sqrt{3})f) \arctan \left( \frac{1}{2}(-i + \sqrt{3})x \right) + 2 \left( \sqrt{2 + 2i\sqrt{3}}(-2id + (i + \sqrt{3})f) \arctan \left( \frac{1}{2} \right) \right)}{8\sqrt{3}}
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)/(1 + x^2 + x^4), x]

```
[Out] (2*Sqrt[2 - (2*I)*Sqrt[3]]*((2*I)*d + (-I + Sqrt[3])*f)*ArcTan[(-I + Sqrt[3])*x)/2] + 2*(Sqrt[2 + (2*I)*Sqrt[3]]*((-2*I)*d + (I + Sqrt[3])*f)*ArcTan[(I + Sqrt[3])*x]/2) + (-4*e + 2*g)*ArcTan[Sqrt[3]/(1 + 2*x^2)] + Sqrt[3]*g*Log[1 + x^2 + x^4])/(8*Sqrt[3])
```

### Maple [A] (verified)

Time = 0.27 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.71

method	result
default	$\frac{(f-d+g)\ln(x^2-x+1)}{4} + \frac{\left(\frac{d}{2}+e+\frac{f}{2}-\frac{g}{2}\right)\sqrt{3}\arctan\left(\frac{(2x-1)\sqrt{3}}{3}\right)}{3} + \frac{(d-f+g)\ln(x^2+x+1)}{4} + \frac{\left(\frac{d}{2}-e+\frac{f}{2}+\frac{g}{2}\right)\arctan\left(\frac{(1+2x)\sqrt{3}}{3}\right)}{3}$
risch	Expression too large to display

```
[In] int((g*x^3+f*x^2+e*x+d)/(x^4+x^2+1),x,method=_RETURNVERBOSE)
```

```
[Out] 1/4*(f-d+g)*ln(x^2-x+1)+1/3*(1/2*d+e+1/2*f-1/2*g)*3^(1/2)*arctan(1/3*(2*x-1)*3^(1/2))+1/4*(d-f+g)*ln(x^2+x+1)+1/3*(1/2*d-e+1/2*f+1/2*g)*arctan(1/3*(1+2*x)*3^(1/2))*3^(1/2)
```

### Fricas [A] (verification not implemented)

none

Time = 0.41 (sec) , antiderivative size = 83, normalized size of antiderivative = 0.65

$$\int \frac{d + ex + fx^2 + gx^3}{1 + x^2 + x^4} dx = \frac{1}{6} \sqrt{3}(d - 2e + f + g) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) + \frac{1}{6} \sqrt{3}(d + 2e + f - g) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) + \frac{1}{4}(d - f + g) \log(x^2 + x + 1) - \frac{1}{4}(d - f - g) \log(x^2 - x + 1)$$

```
[In] integrate((g*x^3+f*x^2+e*x+d)/(x^4+x^2+1),x, algorithm="fricas")
```

```
[Out] 1/6*sqrt(3)*(d - 2*e + f + g)*arctan(1/3*sqrt(3)*(2*x + 1)) + 1/6*sqrt(3)*(d + 2*e + f - g)*arctan(1/3*sqrt(3)*(2*x - 1)) + 1/4*(d - f + g)*log(x^2 + x + 1) - 1/4*(d - f - g)*log(x^2 - x + 1)
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{1 + x^2 + x^4} dx = \text{Timed out}$$

[In] integrate((g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4+x\*\*2+1),x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.26 (sec) , antiderivative size = 83, normalized size of antiderivative = 0.65

$$\begin{aligned} \int \frac{d + ex + fx^2 + gx^3}{1 + x^2 + x^4} dx &= \frac{1}{6} \sqrt{3}(d - 2e + f + g) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) \\ &+ \frac{1}{6} \sqrt{3}(d + 2e + f - g) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) \\ &+ \frac{1}{4}(d - f + g) \log(x^2 + x + 1) - \frac{1}{4}(d - f - g) \log(x^2 - x + 1) \end{aligned}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1),x, algorithm="maxima")

[Out] 1/6\*sqrt(3)\*(d - 2\*e + f + g)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/6\*sqrt(3)\*(d + 2\*e + f - g)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/4\*(d - f + g)\*log(x^2 + x + 1) - 1/4\*(d - f - g)\*log(x^2 - x + 1)

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 83, normalized size of antiderivative = 0.65

$$\begin{aligned} \int \frac{d + ex + fx^2 + gx^3}{1 + x^2 + x^4} dx &= \frac{1}{6} \sqrt{3}(d - 2e + f + g) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) \\ &+ \frac{1}{6} \sqrt{3}(d + 2e + f - g) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) \\ &+ \frac{1}{4}(d - f + g) \log(x^2 + x + 1) - \frac{1}{4}(d - f - g) \log(x^2 - x + 1) \end{aligned}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1),x, algorithm="giac")

[Out] 1/6\*sqrt(3)\*(d - 2\*e + f + g)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/6\*sqrt(3)\*(d + 2\*e + f - g)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/4\*(d - f + g)\*log(x^2 + x + 1) - 1/4\*(d - f - g)\*log(x^2 - x + 1)



**Mupad [B] (verification not implemented)**

Time = 8.11 (sec) , antiderivative size = 199, normalized size of antiderivative = 1.57

$$\int \frac{d + ex + fx^2 + gx^3}{1 + x^2 + x^4} dx = -\ln\left(x - \frac{1}{2} - \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{d}{4} - \frac{f}{4} - \frac{g}{4} + \frac{\sqrt{3} d \operatorname{li}}{12} + \frac{\sqrt{3} e \operatorname{li}}{6} + \frac{\sqrt{3} f \operatorname{li}}{12} - \frac{\sqrt{3} g \operatorname{li}}{12}\right) - \ln\left(x + \frac{1}{2} - \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{f}{4} - \frac{d}{4} - \frac{g}{4} + \frac{\sqrt{3} d \operatorname{li}}{12} - \frac{\sqrt{3} e \operatorname{li}}{6} + \frac{\sqrt{3} f \operatorname{li}}{12} + \frac{\sqrt{3} g \operatorname{li}}{12}\right) + \ln\left(x - \frac{1}{2} + \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{f}{4} - \frac{d}{4} + \frac{g}{4} + \frac{\sqrt{3} d \operatorname{li}}{12} + \frac{\sqrt{3} e \operatorname{li}}{6} + \frac{\sqrt{3} f \operatorname{li}}{12} - \frac{\sqrt{3} g \operatorname{li}}{12}\right) + \ln\left(x + \frac{1}{2} + \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{d}{4} - \frac{f}{4} + \frac{g}{4} + \frac{\sqrt{3} d \operatorname{li}}{12} - \frac{\sqrt{3} e \operatorname{li}}{6} + \frac{\sqrt{3} f \operatorname{li}}{12} + \frac{\sqrt{3} g \operatorname{li}}{12}\right)$$

[In] int((d + e\*x + f\*x^2 + g\*x^3)/(x^2 + x^4 + 1),x)

```
[Out] log(x + (3^(1/2)*1i)/2 - 1/2)*(f/4 - d/4 + g/4 + (3^(1/2)*d*1i)/12 + (3^(1/2)*e*1i)/6 + (3^(1/2)*f*1i)/12 - (3^(1/2)*g*1i)/12) - log(x - (3^(1/2)*1i)/2 + 1/2)*(f/4 - d/4 - g/4 + (3^(1/2)*d*1i)/12 - (3^(1/2)*e*1i)/6 + (3^(1/2)*f*1i)/12 + (3^(1/2)*g*1i)/12) - log(x - (3^(1/2)*1i)/2 - 1/2)*(d/4 - f/4 - g/4 + (3^(1/2)*d*1i)/12 + (3^(1/2)*e*1i)/6 + (3^(1/2)*f*1i)/12 - (3^(1/2)*g*1i)/12) + log(x + (3^(1/2)*1i)/2 + 1/2)*(d/4 - f/4 + g/4 + (3^(1/2)*d*1i)/12 - (3^(1/2)*e*1i)/6 + (3^(1/2)*f*1i)/12 + (3^(1/2)*g*1i)/12)
```

$$3.18 \quad \int \frac{d+ex+fx^2+gx^3+hx^4}{1+x^2+x^4} dx$$

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### Optimal result

Integrand size = 31, antiderivative size = 136

$$\int \frac{d+ex+fx^2+gx^3+hx^4}{1+x^2+x^4} dx = hx - \frac{(d+f-2h) \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{2\sqrt{3}} + \frac{(d+f-2h) \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{2\sqrt{3}} + \frac{(2e-g) \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{2\sqrt{3}} - \frac{1}{4}(d-f) \log(1-x+x^2) + \frac{1}{4}(d-f) \log(1+x+x^2) + \frac{1}{4}g \log(1+x^2+x^4)$$

[Out] h\*x-1/4\*(d-f)\*ln(x^2-x+1)+1/4\*(d-f)\*ln(x^2+x+1)+1/4\*g\*ln(x^4+x^2+1)-1/6\*(d+f-2\*h)\*arctan(1/3\*(1-2\*x)\*3^(1/2))\*3^(1/2)+1/6\*(d+f-2\*h)\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)+1/6\*(2\*e-g)\*arctan(1/3\*(2\*x^2+1)\*3^(1/2))\*3^(1/2)

### Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 136, normalized size of antiderivative = 1.00, number of steps used = 17, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.258$ , Rules used

= {1687, 1690, 1183, 648, 632, 210, 642, 1261}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{1 + x^2 + x^4} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(d+f-2h)}{2\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(d+f-2h)}{2\sqrt{3}} + \frac{\arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)(2e-g)}{2\sqrt{3}} - \frac{1}{4}(d-f)\log(x^2-x+1) + \frac{1}{4}(d-f)\log(x^2+x+1) + \frac{1}{4}g\log(x^4+x^2+1) + hx$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(1 + x^2 + x^4),x]

[Out] h\*x - ((d + f - 2\*h)\*ArcTan[(1 - 2\*x)/Sqrt[3]])/(2\*Sqrt[3]) + ((d + f - 2\*h)\*ArcTan[(1 + 2\*x)/Sqrt[3]])/(2\*Sqrt[3]) + ((2\*e - g)\*ArcTan[(1 + 2\*x^2)/Sqrt[3]])/(2\*Sqrt[3]) - ((d - f)\*Log[1 - x + x^2])/4 + ((d - f)\*Log[1 + x + x^2])/4 + (g\*Log[1 + x^2 + x^4])/4

#### Rule 210

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-(Rt[-a, 2]\*Rt[-b, 2])^(-1))\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

#### Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

#### Rule 642

Int[((d\_) + (e\_.)\*(x\_))/((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] := Simp[d\*(Log[RemoveContent[a + b\*x + c\*x^2, x]]/b), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[2\*c\*d - b\*e, 0]

#### Rule 648

Int[((d\_.) + (e\_.)\*(x\_))/((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] := Dist[(2\*c\*d - b\*e)/(2\*c), Int[1/(a + b\*x + c\*x^2), x], x] + Dist[e/(2\*c), Int[(b + 2\*c\*x)/(a + b\*x + c\*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && !NiceSqrtQ[b^2 - 4\*a\*c]

#### Rule 1183

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[a/c, 2]}, With[{r = Rt[2*q - b/c, 2]}, Dist[1/(2*c*q*r), Int
[(d*r - (d - e*q)*x)/(q - r*x + x^2), x], x] + Dist[1/(2*c*q*r), Int[(d*r +
(d - e*q)*x)/(q + r*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && NegQ[b^2 - 4*a*c]
```

### Rule 1261

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(
p_.), x_Symbol] :=> Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] :=> Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

### Rule 1690

```
Int[(Pq_)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :=> Int[ExpandInte
grand[Pq/(a + b*x^2 + c*x^4), x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^
2] && Expon[Pq, x^2] > 1
```

### Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{x(e + gx^2)}{1 + x^2 + x^4} dx + \int \frac{d + fx^2 + hx^4}{1 + x^2 + x^4} dx \\
&= \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{1 + x + x^2} dx, x, x^2 \right) + \int \left( h + \frac{d - h + (f - h)x^2}{1 + x^2 + x^4} \right) dx \\
&= hx + \frac{1}{4}(2e - g) \text{Subst} \left( \int \frac{1}{1 + x + x^2} dx, x, x^2 \right) \\
&\quad + \frac{1}{4}g \text{Subst} \left( \int \frac{1 + 2x}{1 + x + x^2} dx, x, x^2 \right) + \int \frac{d - h + (f - h)x^2}{1 + x^2 + x^4} dx \\
&= hx + \frac{1}{4}g \log(1 + x^2 + x^4) + \frac{1}{2} \int \frac{d - h - (d - f)x}{1 - x + x^2} dx \\
&\quad + \frac{1}{2} \int \frac{d - h + (d - f)x}{1 + x + x^2} dx + \frac{1}{2}(-2e + g) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, 1 + 2x^2 \right)
\end{aligned}$$

$$\begin{aligned}
&= hx + \frac{(2e - g) \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{2\sqrt{3}} + \frac{1}{4}g \log(1 + x^2 + x^4) \\
&\quad + \frac{1}{4}(d - f) \int \frac{1 + 2x}{1 + x + x^2} dx + \frac{1}{4}(-d + f) \int \frac{-1 + 2x}{1 - x + x^2} dx \\
&\quad + \frac{1}{4}(d + f - 2h) \int \frac{1}{1 - x + x^2} dx + \frac{1}{4}(d + f - 2h) \int \frac{1}{1 + x + x^2} dx \\
&= hx + \frac{(2e - g) \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{2\sqrt{3}} - \frac{1}{4}(d - f) \log(1 - x + x^2) + \frac{1}{4}(d - f) \log(1 + x + x^2) \\
&\quad + \frac{1}{4}g \log(1 + x^2 + x^4) + \frac{1}{2}(-d - f + 2h) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, -1 + 2x \right) \\
&\quad + \frac{1}{2}(-d - f + 2h) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, 1 + 2x \right) \\
&= hx - \frac{(d + f - 2h) \tan^{-1} \left( \frac{1-2x}{\sqrt{3}} \right)}{2\sqrt{3}} + \frac{(d + f - 2h) \tan^{-1} \left( \frac{1+2x}{\sqrt{3}} \right)}{2\sqrt{3}} + \frac{(2e - g) \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{2\sqrt{3}} \\
&\quad - \frac{1}{4}(d - f) \log(1 - x + x^2) + \frac{1}{4}(d - f) \log(1 + x + x^2) + \frac{1}{4}g \log(1 + x^2 + x^4)
\end{aligned}$$

### Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.47 (sec) , antiderivative size = 165, normalized size of antiderivative = 1.21

$$\begin{aligned}
\int \frac{d + ex + fx^2 + gx^3 + hx^4}{1 + x^2 + x^4} dx &= \frac{1}{24} \left( 24hx + 4 \left( (3i + \sqrt{3})d + (-3i + \sqrt{3})f \right. \right. \\
&\quad - 2\sqrt{3}h) \arctan \left( \frac{1}{2}(-i + \sqrt{3})x \right) + 4 \left( (-3i + \sqrt{3})d \right. \\
&\quad \left. \left. + (3i + \sqrt{3})f - 2\sqrt{3}h \right) \arctan \left( \frac{1}{2}(i + \sqrt{3})x \right) \right. \\
&\quad - 8\sqrt{3}e \arctan \left( \frac{\sqrt{3}}{1 + 2x^2} \right) + 4\sqrt{3}g \arctan \left( \frac{\sqrt{3}}{1 + 2x^2} \right) \\
&\quad \left. \left. + 6g \log(1 + x^2 + x^4) \right)
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(1 + x^2 + x^4),x]

[Out] (24\*h\*x + 4\*((3\*I + Sqrt[3])\*d + (-3\*I + Sqrt[3])\*f - 2\*Sqrt[3]\*h)\*ArcTan[(-I + Sqrt[3])\*x]/2] + 4\*((-3\*I + Sqrt[3])\*d + (3\*I + Sqrt[3])\*f - 2\*Sqrt[3]\*h)\*ArcTan[(I + Sqrt[3])\*x]/2 - 8\*Sqrt[3]\*e\*ArcTan[Sqrt[3]/(1 + 2\*x^2)] + 4\*Sqrt[3]\*g\*ArcTan[Sqrt[3]/(1 + 2\*x^2)] + 6\*g\*Log[1 + x^2 + x^4])/24

**Maple [A] (verified)**

Time = 0.39 (sec) , antiderivative size = 99, normalized size of antiderivative = 0.73

method	result
default	$hx + \frac{(f-d+g)\ln(x^2-x+1)}{4} + \frac{\left(\frac{d}{2}+e+\frac{f}{2}-\frac{g}{2}-h\right)\sqrt{3}\arctan\left(\frac{(2x-1)\sqrt{3}}{3}\right)}{3} + \frac{(d-f+g)\ln(x^2+x+1)}{4} + \frac{\left(\frac{d}{2}-e+\frac{f}{2}+\frac{g}{2}-h\right)\arctan\left(\frac{(2x+1)\sqrt{3}}{3}\right)}{3}$
risch	Expression too large to display

[In] int((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1),x,method=\_RETURNVERBOSE)

[Out] h\*x+1/4\*(f-d+g)\*ln(x^2-x+1)+1/3\*(1/2\*d+e+1/2\*f-1/2\*g-h)\*3^(1/2)\*arctan(1/3\*(2\*x-1)\*3^(1/2))+1/4\*(d-f+g)\*ln(x^2+x+1)+1/3\*(1/2\*d-e+1/2\*f+1/2\*g-h)\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)

**Fricas [A] (verification not implemented)**

none

Time = 1.12 (sec) , antiderivative size = 92, normalized size of antiderivative = 0.68

$$\int \frac{d+ex+fx^2+gx^3+hx^4}{1+x^2+x^4} dx = \frac{1}{6}\sqrt{3}(d-2e+f+g-2h)\arctan\left(\frac{1}{3}\sqrt{3}(2x+1)\right) + \frac{1}{6}\sqrt{3}(d+2e+f-g-2h)\arctan\left(\frac{1}{3}\sqrt{3}(2x-1)\right) + hx + \frac{1}{4}(d-f+g)\log(x^2+x+1) - \frac{1}{4}(d-f-g)\log(x^2-x+1)$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1),x, algorithm="fricas")

[Out] 1/6\*sqrt(3)\*(d - 2\*e + f + g - 2\*h)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/6\*sqrt(3)\*(d + 2\*e + f - g - 2\*h)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + h\*x + 1/4\*(d - f + g)\*log(x^2 + x + 1) - 1/4\*(d - f - g)\*log(x^2 - x + 1)

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d+ex+fx^2+gx^3+hx^4}{1+x^2+x^4} dx = \text{Timed out}$$

[In] integrate((h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4+x\*\*2+1),x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.28 (sec) , antiderivative size = 92, normalized size of antiderivative = 0.68

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{1 + x^2 + x^4} dx = \frac{1}{6} \sqrt{3}(d - 2e + f + g - 2h) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) + \frac{1}{6} \sqrt{3}(d + 2e + f - g - 2h) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) + hx + \frac{1}{4}(d - f + g) \log(x^2 + x + 1) - \frac{1}{4}(d - f - g) \log(x^2 - x + 1)$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1),x, algorithm="maxima")

[Out] 1/6\*sqrt(3)\*(d - 2\*e + f + g - 2\*h)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/6\*sqrt(3)\*(d + 2\*e + f - g - 2\*h)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + h\*x + 1/4\*(d - f + g)\*log(x^2 + x + 1) - 1/4\*(d - f - g)\*log(x^2 - x + 1)

**Giac [A] (verification not implemented)**

none

Time = 0.32 (sec) , antiderivative size = 92, normalized size of antiderivative = 0.68

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{1 + x^2 + x^4} dx = \frac{1}{6} \sqrt{3}(d - 2e + f + g - 2h) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) + \frac{1}{6} \sqrt{3}(d + 2e + f - g - 2h) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) + hx + \frac{1}{4}(d - f + g) \log(x^2 + x + 1) - \frac{1}{4}(d - f - g) \log(x^2 - x + 1)$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1),x, algorithm="giac")

[Out] 1/6\*sqrt(3)\*(d - 2\*e + f + g - 2\*h)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/6\*sqrt(3)\*(d + 2\*e + f - g - 2\*h)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + h\*x + 1/4\*(d - f + g)\*log(x^2 + x + 1) - 1/4\*(d - f - g)\*log(x^2 - x + 1)

## Mupad [B] (verification not implemented)

Time = 11.14 (sec) , antiderivative size = 1209, normalized size of antiderivative = 8.89

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{1 + x^2 + x^4} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(x^2 + x^4 + 1),x)

[Out]  $\log(d*f*9i - d*e*6i + d*g*3i - d*h*3i + e*h*6i + f*h*3i - g*h*3i - 3*3^{(1/2)}*d^2 - d^2*x*6i - f^2*x*3i - d^2*3i - f^2*6i + 2*3^{(1/2)}*d*e + 3*3^{(1/2)}*d*f - 3^{(1/2)}*d*g - 4*3^{(1/2)}*e*f + 3*3^{(1/2)}*d*h + 2*3^{(1/2)}*e*h + 2*3^{(1/2)}*f*g - 3*3^{(1/2)}*f*h - 3^{(1/2)}*g*h + d*f*x*9i - e*f*x*6i + d*h*x*3i + e*h*x*6i + f*g*x*3i - f*h*x*3i - g*h*x*3i + 3*3^{(1/2)}*f^2*x - 3*3^{(1/2)}*d*f*x - 2*3^{(1/2)}*d*g*x - 2*3^{(1/2)}*e*f*x + 3*3^{(1/2)}*d*h*x - 2*3^{(1/2)}*e*h*x + 3^{(1/2)}*f*g*x - 3*3^{(1/2)}*f*h*x + 3^{(1/2)}*g*h*x + 4*3^{(1/2)}*d*e*x)*(d/4 - f/4 + g/4 - (3^{(1/2)}*d*1i)/12 + (3^{(1/2)}*e*1i)/6 - (3^{(1/2)}*f*1i)/12 - (3^{(1/2)}*g*1i)/12 + (3^{(1/2)}*h*1i)/6) - \log(d*g*3i - d*f*9i - d*e*6i + d*h*3i + e*h*6i - f*h*3i - g*h*3i - 3*3^{(1/2)}*d^2 - d^2*x*6i - f^2*x*3i + d^2*3i + f^2*6i - 2*3^{(1/2)}*d*e + 3*3^{(1/2)}*d*f + 3^{(1/2)}*d*g + 4*3^{(1/2)}*e*f + 3*3^{(1/2)}*d*h - 2*3^{(1/2)}*e*h - 2*3^{(1/2)}*f*g - 3*3^{(1/2)}*f*h + 3^{(1/2)}*g*h + d*f*x*9i + e*f*x*6i + d*h*x*3i - e*h*x*6i - f*g*x*3i - f*h*x*3i + g*h*x*3i - 3*3^{(1/2)}*f^2*x + 3*3^{(1/2)}*d*f*x - 2*3^{(1/2)}*d*g*x - 2*3^{(1/2)}*e*f*x - 3*3^{(1/2)}*d*h*x - 2*3^{(1/2)}*e*h*x + 3^{(1/2)}*f*g*x + 3*3^{(1/2)}*f*h*x + 3^{(1/2)}*g*h*x + 4*3^{(1/2)}*d*e*x)*(d/4 - f/4 - g/4 + (3^{(1/2)}*d*1i)/12 + (3^{(1/2)}*e*1i)/6 + (3^{(1/2)}*f*1i)/12 - (3^{(1/2)}*g*1i)/12 - (3^{(1/2)}*h*1i)/6) + \log(d*f*9i - d*e*6i + d*g*3i - d*h*3i + e*h*6i + f*h*3i - g*h*3i + 3*3^{(1/2)}*d^2 - d^2*x*6i - f^2*x*3i - d^2*3i - f^2*6i - 2*3^{(1/2)}*d*e - 3*3^{(1/2)}*d*f + 3^{(1/2)}*d*g + 4*3^{(1/2)}*e*f - 3*3^{(1/2)}*d*h - 2*3^{(1/2)}*e*h - 2*3^{(1/2)}*f*g + 3*3^{(1/2)}*f*h + 3^{(1/2)}*g*h + d*f*x*9i - e*f*x*6i + d*h*x*3i + e*h*x*6i + f*g*x*3i - f*h*x*3i - g*h*x*3i - 3*3^{(1/2)}*f^2*x + 3*3^{(1/2)}*d*f*x + 2*3^{(1/2)}*d*g*x + 2*3^{(1/2)}*e*f*x - 3*3^{(1/2)}*d*h*x + 2*3^{(1/2)}*e*h*x - 3^{(1/2)}*f*g*x + 3*3^{(1/2)}*f*h*x - 3^{(1/2)}*g*h*x - 4*3^{(1/2)}*d*e*x)*(d/4 - f/4 + g/4 + (3^{(1/2)}*d*1i)/12 - (3^{(1/2)}*e*1i)/6 + (3^{(1/2)}*f*1i)/12 + (3^{(1/2)}*g*1i)/12 - (3^{(1/2)}*h*1i)/6) + \log(d*g*3i - d*f*9i - d*e*6i + d*h*3i + e*h*6i - f*h*3i - g*h*3i + 3*3^{(1/2)}*d^2 - d^2*x*6i - f^2*x*3i + d^2*3i + f^2*6i + 2*3^{(1/2)}*d*e - 3*3^{(1/2)}*d*f - 3^{(1/2)}*d*g - 4*3^{(1/2)}*e*f - 3*3^{(1/2)}*d*h + 2*3^{(1/2)}*e*h + 2*3^{(1/2)}*f*g + 3*3^{(1/2)}*f*h - 3^{(1/2)}*g*h + d*f*x*9i + e*f*x*6i + d*h*x*3i - e*h*x*6i - f*g*x*3i - f*h*x*3i + g*h*x*3i + 3*3^{(1/2)}*f^2*x - 3*3^{(1/2)}*d*f*x + 2*3^{(1/2)}*d*g*x + 2*3^{(1/2)}*e*f*x + 3*3^{(1/2)}*d*h*x + 2*3^{(1/2)}*e*h*x - 3^{(1/2)}*f*g*x - 3*3^{(1/2)}*f*h*x - 3^{(1/2)}*g*h*x - 4*3^{(1/2)}*d*e*x)*(f/4 - d/4 + g/4 + (3^{(1/2)}*d*1i)/12 + (3^{(1/2)}*e*1i)/6 + (3^{(1/2)}*f*1i)/12 - (3^{(1/2)}*g*1i)/12 - (3^{(1/2)}*h*1i)/6) + h*x$



$$3.19 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{1+x^2+x^4} dx$$

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### Optimal result

Integrand size = 36, antiderivative size = 151

$$\begin{aligned} \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{1+x^2+x^4} dx = & hx + \frac{ix^2}{2} - \frac{(d+f-2h) \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{2\sqrt{3}} \\ & + \frac{(d+f-2h) \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{2\sqrt{3}} \\ & + \frac{(2e-g-i) \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{2\sqrt{3}} \\ & - \frac{1}{4}(d-f) \log(1-x+x^2) \\ & + \frac{1}{4}(d-f) \log(1+x+x^2) + \frac{1}{4}(g-i) \log(1+x^2+x^4) \end{aligned}$$

```
[Out] h*x+1/2*i*x^2-1/4*(d-f)*ln(x^2-x+1)+1/4*(d-f)*ln(x^2+x+1)+1/4*(g-i)*ln(x^4+
x^2+1)-1/6*(d+f-2*h)*arctan(1/3*(1-2*x)*3^(1/2))*3^(1/2)+1/6*(d+f-2*h)*arct
an(1/3*(1+2*x)*3^(1/2))*3^(1/2)+1/6*(2*e-g-i)*arctan(1/3*(2*x^2+1)*3^(1/2))
*3^(1/2)
```

**Rubi [A] (verified)**

Time = 0.12 (sec) , antiderivative size = 151, normalized size of antiderivative = 1.00, number of steps used = 19, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.250$ , Rules used = {1687, 1690, 1183, 648, 632, 210, 642, 1677, 1671}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{1 + x^2 + x^4} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(d+f-2h)}{2\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(d+f-2h)}{2\sqrt{3}} + \frac{\arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)(2e-g-i)}{2\sqrt{3}} - \frac{1}{4}(d-f)\log(x^2-x+1) + \frac{1}{4}(d-f)\log(x^2+x+1) + \frac{1}{4}(g-i)\log(x^4+x^2+1) + hx + \frac{ix^2}{2}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(1 + x^2 + x^4),x]

[Out] h\*x + (i\*x^2)/2 - ((d + f - 2\*h)\*ArcTan[(1 - 2\*x)/Sqrt[3]])/(2\*Sqrt[3]) + ((d + f - 2\*h)\*ArcTan[(1 + 2\*x)/Sqrt[3]])/(2\*Sqrt[3]) + ((2\*e - g - i)\*ArcTan[(1 + 2\*x^2)/Sqrt[3]])/(2\*Sqrt[3]) - ((d - f)\*Log[1 - x + x^2])/4 + ((d - f)\*Log[1 + x + x^2])/4 + ((g - i)\*Log[1 + x^2 + x^4])/4

Rule 210

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[-b, 2])^(-1))\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

Rule 642

Int[((d\_) + (e\_.)\*(x\_))/((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] := Simp[d\*(Log[RemoveContent[a + b\*x + c\*x^2, x]]/b), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[2\*c\*d - b\*e, 0]

Rule 648

Int[((d\_.) + (e\_.)\*(x\_))/((a\_) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] := Dist[(2\*c\*d - b\*e)/(2\*c), Int[1/(a + b\*x + c\*x^2), x], x] + Dist[e/(2\*c), In

$\int \frac{(b + 2cx)/(a + bx + cx^2)}{x} dx$  ; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && !NiceSqrtQ[b^2 - 4\*a\*c]

### Rule 1183

$\int \frac{(d_1 + (e_1)x^2)/(a_1 + (b_1)x + (c_1)x^4)}{x} dx$  :> With[{q = Rt[a/c, 2]}, With[{r = Rt[2\*q - b/c, 2]}, Dist[1/(2\*c\*q\*r), Int[(d\*r - (d - e\*q)\*x)/(q - r\*x + x^2), x], x] + Dist[1/(2\*c\*q\*r), Int[(d\*r + (d - e\*q)\*x)/(q + r\*x + x^2), x], x]]] ; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && NegQ[b^2 - 4\*a\*c]

### Rule 1671

$\int (Pq_1)((a_1) + (b_1)x + (c_1)x^2)^{(p_1)} dx$  :> Int[ExpandIntegrand[Pq\*(a + b\*x + c\*x^2)^p, x], x] ; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, -2]

### Rule 1677

$\int (Pq_1)(x_1)^{(m_1)}((a_1) + (b_1)x^2 + (c_1)x^4)^{(p_1)} dx$  :> Dist[1/2, Subst[Int[x^((m - 1)/2)\*SubstFor[x^2, Pq, x]\*(a + b\*x + c\*x^2)^p, x], x, x^2], x] ; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x^2] && IntegerQ[(m - 1)/2]

### Rule 1687

$\int (Pq_1)((a_1) + (b_1)x^2 + (c_1)x^4)^{(p_1)} dx$  :> Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] ; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

### Rule 1690

$\int \frac{Pq_1}{(a_1) + (b_1)x^2 + (c_1)x^4} dx$  :> Int[ExpandIntegrand[Pq/(a + b\*x^2 + c\*x^4), x], x] ; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^2] && Expon[Pq, x^2] > 1

### Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + fx^2 + hx^4}{1 + x^2 + x^4} dx + \int \frac{x(e + gx^2 + ix^4)}{1 + x^2 + x^4} dx \\ &= \frac{1}{2} \text{Subst} \left( \int \frac{e + gx + ix^2}{1 + x + x^2} dx, x, x^2 \right) + \int \left( h + \frac{d - h + (f - h)x^2}{1 + x^2 + x^4} \right) dx \end{aligned}$$

$$\begin{aligned}
&= hx + \frac{1}{2} \text{Subst} \left( \int \left( i + \frac{e - i + (g - i)x}{1 + x + x^2} \right) dx, x, x^2 \right) + \int \frac{d - h + (f - h)x^2}{1 + x^2 + x^4} dx \\
&= hx + \frac{ix^2}{2} + \frac{1}{2} \int \frac{d - h - (d - f)x}{1 - x + x^2} dx + \frac{1}{2} \int \frac{d - h + (d - f)x}{1 + x + x^2} dx \\
&\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e - i + (g - i)x}{1 + x + x^2} dx, x, x^2 \right) \\
&= hx + \frac{ix^2}{2} + \frac{1}{4}(d - f) \int \frac{1 + 2x}{1 + x + x^2} dx + \frac{1}{4}(-d + f) \int \frac{-1 + 2x}{1 - x + x^2} dx \\
&\quad + \frac{1}{4}(d + f - 2h) \int \frac{1}{1 - x + x^2} dx + \frac{1}{4}(d + f - 2h) \int \frac{1}{1 + x + x^2} dx \\
&\quad + \frac{1}{4}(2e - g - i) \text{Subst} \left( \int \frac{1}{1 + x + x^2} dx, x, x^2 \right) \\
&\quad + \frac{1}{4}(g - i) \text{Subst} \left( \int \frac{1 + 2x}{1 + x + x^2} dx, x, x^2 \right) \\
&= hx + \frac{ix^2}{2} - \frac{1}{4}(d - f) \log(1 - x + x^2) + \frac{1}{4}(d - f) \log(1 + x + x^2) \\
&\quad + \frac{1}{4}(g - i) \log(1 + x^2 + x^4) + \frac{1}{2}(-d - f + 2h) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, -1 + 2x \right) \\
&\quad + \frac{1}{2}(-d - f + 2h) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, 1 + 2x \right) \\
&\quad + \frac{1}{2}(-2e + g + i) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, 1 + 2x^2 \right) \\
&= hx + \frac{ix^2}{2} - \frac{(d + f - 2h) \tan^{-1} \left( \frac{1-2x}{\sqrt{3}} \right)}{2\sqrt{3}} + \frac{(d + f - 2h) \tan^{-1} \left( \frac{1+2x}{\sqrt{3}} \right)}{2\sqrt{3}} \\
&\quad + \frac{(2e - g - i) \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{2\sqrt{3}} - \frac{1}{4}(d - f) \log(1 - x + x^2) \\
&\quad + \frac{1}{4}(d - f) \log(1 + x + x^2) + \frac{1}{4}(g - i) \log(1 + x^2 + x^4)
\end{aligned}$$

### Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.47 (sec) , antiderivative size = 187, normalized size of antiderivative = 1.24

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{1 + x^2 + x^4} dx = \frac{1}{12} \left( 6x(2h + ix) + (1 + i\sqrt{3}) (2\sqrt{3}d - (3i + \sqrt{3}) f - (-3i + \sqrt{3}) h) \arctan \left( \frac{1}{2} (-i + \sqrt{3}) x \right) + (i + \sqrt{3}) (-2i\sqrt{3}d + (3 + i\sqrt{3}) f + i(3i + \sqrt{3}) h) \arctan \left( \frac{1}{2} (i + \sqrt{3}) x \right) - 2\sqrt{3}(2e - g - i) \arctan \left( \frac{\sqrt{3}}{1 + 2x^2} \right) + 3(g - i) \log(1 + x^2 + x^4) \right)$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(1 + x^2 + x^4),x]

[Out] (6\*x\*(2\*h + i\*x) + (1 + I\*Sqrt[3])\*(2\*Sqrt[3]\*d - (3\*I + Sqrt[3])\*f - (-3\*I + Sqrt[3])\*h)\*ArcTan[(-I + Sqrt[3])\*x]/2] + (I + Sqrt[3])\*((-2\*I)\*Sqrt[3]\*d + (3 + I\*Sqrt[3])\*f + I\*(3\*I + Sqrt[3])\*h)\*ArcTan[(I + Sqrt[3])\*x]/2] - 2\*Sqrt[3]\*(2\*e - g - i)\*ArcTan[Sqrt[3]/(1 + 2\*x^2)] + 3\*(g - i)\*Log[1 + x^2 + x^4])/12

## Maple [A] (verified)

Time = 0.46 (sec) , antiderivative size = 117, normalized size of antiderivative = 0.77

method	result
default	$\frac{ix^2}{2} + hx + \frac{(g-i+f-d)\ln(x^2-x+1)}{4} + \frac{(\frac{d}{2}+e+\frac{f}{2}-\frac{g}{2}-h-\frac{i}{2})\sqrt{3} \arctan(\frac{(2x-1)\sqrt{3}}{3})}{3} + \frac{(d-f+g-i)\ln(x^2+x+1)}{4} + \frac{(\frac{d}{2}-e-i)}{3}$
risch	Expression too large to display

[In] int((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1),x,method=\_RETURNVERBOSE)

[Out] 1/2\*i\*x^2+h\*x+1/4\*(g-i+f-d)\*ln(x^2-x+1)+1/3\*(1/2\*d+e+1/2\*f-1/2\*g-h-1/2\*i)\*3^(1/2)\*arctan(1/3\*(2\*x-1)\*3^(1/2))+1/4\*(d-f+g-i)\*ln(x^2+x+1)+1/3\*(1/2\*d-e+1/2\*f+1/2\*g-h+1/2\*i)\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)

**Fricas [A] (verification not implemented)**

none

Time = 4.39 (sec) , antiderivative size = 106, normalized size of antiderivative = 0.70

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{1 + x^2 + x^4} dx$$

$$= \frac{1}{2}ix^2 + \frac{1}{6}\sqrt{3}(d - 2e + f + g - 2h + i) \arctan\left(\frac{1}{3}\sqrt{3}(2x + 1)\right)$$

$$+ \frac{1}{6}\sqrt{3}(d + 2e + f - g - 2h - i) \arctan\left(\frac{1}{3}\sqrt{3}(2x - 1)\right) + hx$$

$$+ \frac{1}{4}(d - f + g - i) \log(x^2 + x + 1) - \frac{1}{4}(d - f - g + i) \log(x^2 - x + 1)$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4+x^2+1),x, algorithm="fricas")
```

```
[Out] 1/2*i*x^2 + 1/6*sqrt(3)*(d - 2*e + f + g - 2*h + i)*arctan(1/3*sqrt(3)*(2*x + 1)) + 1/6*sqrt(3)*(d + 2*e + f - g - 2*h - i)*arctan(1/3*sqrt(3)*(2*x - 1)) + h*x + 1/4*(d - f + g - i)*log(x^2 + x + 1) - 1/4*(d - f - g + i)*log(x^2 - x + 1)
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{1 + x^2 + x^4} dx = \text{Timed out}$$

```
[In] integrate((i*x**5+h*x**4+g*x**3+f*x**2+e*x+d)/(x**4+x**2+1),x)
```

```
[Out] Timed out
```

**Maxima [A] (verification not implemented)**

none

Time = 0.27 (sec) , antiderivative size = 106, normalized size of antiderivative = 0.70

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{1 + x^2 + x^4} dx$$

$$= \frac{1}{2}ix^2 + \frac{1}{6}\sqrt{3}(d - 2e + f + g - 2h + i) \arctan\left(\frac{1}{3}\sqrt{3}(2x + 1)\right)$$

$$+ \frac{1}{6}\sqrt{3}(d + 2e + f - g - 2h - i) \arctan\left(\frac{1}{3}\sqrt{3}(2x - 1)\right) + hx$$

$$+ \frac{1}{4}(d - f + g - i) \log(x^2 + x + 1) - \frac{1}{4}(d - f - g + i) \log(x^2 - x + 1)$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1),x, algorithm="maxima")

[Out]  $\frac{1}{2}ix^2 + \frac{1}{6}\sqrt{3}(d - 2e + f + g - 2h + i)\arctan\left(\frac{1}{3}\sqrt{3}(2x + 1)\right) + \frac{1}{6}\sqrt{3}(d + 2e + f - g - 2h - i)\arctan\left(\frac{1}{3}\sqrt{3}(2x - 1)\right) + hx + \frac{1}{4}(d - f + g - i)\log(x^2 + x + 1) - \frac{1}{4}(d - f - g + i)\log(x^2 - x + 1)$

## Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 106, normalized size of antiderivative = 0.70

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{1 + x^2 + x^4} dx$$

$$= \frac{1}{2}ix^2 + \frac{1}{6}\sqrt{3}(d - 2e + f + g - 2h + i)\arctan\left(\frac{1}{3}\sqrt{3}(2x + 1)\right) + \frac{1}{6}\sqrt{3}(d + 2e + f - g - 2h - i)\arctan\left(\frac{1}{3}\sqrt{3}(2x - 1)\right) + hx + \frac{1}{4}(d - f + g - i)\log(x^2 + x + 1) - \frac{1}{4}(d - f - g + i)\log(x^2 - x + 1)$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1),x, algorithm="giac")

[Out]  $\frac{1}{2}ix^2 + \frac{1}{6}\sqrt{3}(d - 2e + f + g - 2h + i)\arctan\left(\frac{1}{3}\sqrt{3}(2x + 1)\right) + \frac{1}{6}\sqrt{3}(d + 2e + f - g - 2h - i)\arctan\left(\frac{1}{3}\sqrt{3}(2x - 1)\right) + hx + \frac{1}{4}(d - f + g - i)\log(x^2 + x + 1) - \frac{1}{4}(d - f - g + i)\log(x^2 - x + 1)$

## Mupad [B] (verification not implemented)

Time = 12.66 (sec) , antiderivative size = 1509, normalized size of antiderivative = 9.99

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{1 + x^2 + x^4} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(x^2 + x^4 + 1),x)

[Out]  $hx - \log(d*g*3i - d*f*9i - d*e*6i + d*h*3i + d*i*3i + e*h*6i - f*h*3i - g*h*3i - h*i*3i - 3*3^{(1/2)}*d^2 - d^2*x*6i - f^2*x*3i + d^2*3i + f^2*6i - 2*3^{(1/2)}*d*e + 3*3^{(1/2)}*d*f + 3^{(1/2)}*d*g + 4*3^{(1/2)}*e*f + 3*3^{(1/2)}*d*h + 3^{(1/2)}*d*i - 2*3^{(1/2)}*e*h - 2*3^{(1/2)}*f*g - 3*3^{(1/2)}*f*h - 2*3^{(1/2)}*f*i + 3^{(1/2)}*g*h + 3^{(1/2)}*h*i + d*f*x*9i + e*f*x*6i + d*h*x*3i - e*h*x*6i - f*g*x*3i - f*h*x*3i - f*i*x*3i + g*h*x*3i + h*i*x*3i - 3*3^{(1/2)}*f^2*x + 3*3^{(1/2)}*d*f*x - 2*3^{(1/2)}*d*g*x - 2*3^{(1/2)}*e*f*x - 3*3^{(1/2)}*d*h*x - 2*3^{(1/2)}$

$$\begin{aligned}
& 1/2)*d*i*x - 2*3^{(1/2)}*e*h*x + 3^{(1/2)}*f*g*x + 3*3^{(1/2)}*f*h*x + 3^{(1/2)}*f* \\
& i*x + 3^{(1/2)}*g*h*x + 3^{(1/2)}*h*i*x + 4*3^{(1/2)}*d*e*x)*(d/4 - f/4 - g/4 + i \\
& /4 + (3^{(1/2)}*d*1i)/12 + (3^{(1/2)}*e*1i)/6 + (3^{(1/2)}*f*1i)/12 - (3^{(1/2)}*g* \\
& 1i)/12 - (3^{(1/2)}*h*1i)/6 - (3^{(1/2)}*i*1i)/12) - \log(d*e*6i + d*f*9i - d*g* \\
& 3i - d*h*3i - d*i*3i - e*h*6i + f*h*3i + g*h*3i + h*i*3i - 3*3^{(1/2)}*d^2 + \\
& d^2*x*6i + f^2*x*3i - d^2*3i - f^2*6i - 2*3^{(1/2)}*d*e + 3*3^{(1/2)}*d*f + 3^{( \\
& 1/2)}*d*g + 4*3^{(1/2)}*e*f + 3*3^{(1/2)}*d*h + 3^{(1/2)}*d*i - 2*3^{(1/2)}*e*h - 2* \\
& 3^{(1/2)}*f*g - 3*3^{(1/2)}*f*h - 2*3^{(1/2)}*f*i + 3^{(1/2)}*g*h + 3^{(1/2)}*h*i - d \\
& *f*x*9i - e*f*x*6i - d*h*x*3i + e*h*x*6i + f*g*x*3i + f*h*x*3i + f*i*x*3i - \\
& g*h*x*3i - h*i*x*3i - 3*3^{(1/2)}*f^2*x + 3*3^{(1/2)}*d*f*x - 2*3^{(1/2)}*d*g*x \\
& - 2*3^{(1/2)}*e*f*x - 3*3^{(1/2)}*d*h*x - 2*3^{(1/2)}*d*i*x - 2*3^{(1/2)}*e*h*x + 3 \\
& ^{(1/2)}*f*g*x + 3*3^{(1/2)}*f*h*x + 3^{(1/2)}*f*i*x + 3^{(1/2)}*g*h*x + 3^{(1/2)}*h* \\
& i*x + 4*3^{(1/2)}*d*e*x)*(d/4 - f/4 - g/4 + i/4 - (3^{(1/2)}*d*1i)/12 - (3^{(1/2)} \\
& )*e*1i)/6 - (3^{(1/2)}*f*1i)/12 + (3^{(1/2)}*g*1i)/12 + (3^{(1/2)}*h*1i)/6 + (3^{( \\
& 1/2)}*i*1i)/12) - \log(d*f*9i - d*e*6i + d*g*3i - d*h*3i + d*i*3i + e*h*6i + \\
& f*h*3i - g*h*3i - h*i*3i - 3*3^{(1/2)}*d^2 - d^2*x*6i - f^2*x*3i - d^2*3i - f \\
& ^2*6i + 2*3^{(1/2)}*d*e + 3*3^{(1/2)}*d*f - 3^{(1/2)}*d*g - 4*3^{(1/2)}*e*f + 3*3^{( \\
& 1/2)}*d*h - 3^{(1/2)}*d*i + 2*3^{(1/2)}*e*h + 2*3^{(1/2)}*f*g - 3*3^{(1/2)}*f*h + 2* \\
& 3^{(1/2)}*f*i - 3^{(1/2)}*g*h - 3^{(1/2)}*h*i + d*f*x*9i - e*f*x*6i + d*h*x*3i + \\
& e*h*x*6i + f*g*x*3i - f*h*x*3i + f*i*x*3i - g*h*x*3i - h*i*x*3i + 3*3^{(1/2)} \\
& *f^2*x - 3*3^{(1/2)}*d*f*x - 2*3^{(1/2)}*d*g*x - 2*3^{(1/2)}*e*f*x + 3*3^{(1/2)}*d* \\
& h*x - 2*3^{(1/2)}*d*i*x - 2*3^{(1/2)}*e*h*x + 3^{(1/2)}*f*g*x - 3*3^{(1/2)}*f*h*x + \\
& 3^{(1/2)}*f*i*x + 3^{(1/2)}*g*h*x + 3^{(1/2)}*h*i*x + 4*3^{(1/2)}*d*e*x)*(f/4 - d/ \\
& 4 - g/4 + i/4 + (3^{(1/2)}*d*1i)/12 - (3^{(1/2)}*e*1i)/6 + (3^{(1/2)}*f*1i)/12 + \\
& (3^{(1/2)}*g*1i)/12 - (3^{(1/2)}*h*1i)/6 + (3^{(1/2)}*i*1i)/12) + \log(d*f*9i - d* \\
& e*6i + d*g*3i - d*h*3i + d*i*3i + e*h*6i + f*h*3i - g*h*3i - h*i*3i + 3*3^{( \\
& 1/2)}*d^2 - d^2*x*6i - f^2*x*3i - d^2*3i - f^2*6i - 2*3^{(1/2)}*d*e - 3*3^{(1/2)} \\
& )*d*f + 3^{(1/2)}*d*g + 4*3^{(1/2)}*e*f - 3*3^{(1/2)}*d*h + 3^{(1/2)}*d*i - 2*3^{(1/ \\
& 2)}*e*h - 2*3^{(1/2)}*f*g + 3*3^{(1/2)}*f*h - 2*3^{(1/2)}*f*i + 3^{(1/2)}*g*h + 3^{(1 \\
& /2)}*h*i + d*f*x*9i - e*f*x*6i + d*h*x*3i + e*h*x*6i + f*g*x*3i - f*h*x*3i + \\
& f*i*x*3i - g*h*x*3i - h*i*x*3i - 3*3^{(1/2)}*f^2*x + 3*3^{(1/2)}*d*f*x + 2*3^{( \\
& 1/2)}*d*g*x + 2*3^{(1/2)}*e*f*x - 3*3^{(1/2)}*d*h*x + 2*3^{(1/2)}*d*i*x + 2*3^{(1/2)} \\
& )*e*h*x - 3^{(1/2)}*f*g*x + 3*3^{(1/2)}*f*h*x - 3^{(1/2)}*f*i*x - 3^{(1/2)}*g*h*x - \\
& 3^{(1/2)}*h*i*x - 4*3^{(1/2)}*d*e*x)*(d/4 - f/4 + g/4 - i/4 + (3^{(1/2)}*d*1i)/1 \\
& 2 - (3^{(1/2)}*e*1i)/6 + (3^{(1/2)}*f*1i)/12 + (3^{(1/2)}*g*1i)/12 - (3^{(1/2)}*h*1 \\
& i)/6 + (3^{(1/2)}*i*1i)/12) + (i*x^2)/2
\end{aligned}$$



### 3.20 $\int \frac{d+ex}{a+bx^2+cx^4} dx$

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#### Optimal result

Integrand size = 20, antiderivative size = 189

$$\int \frac{d+ex}{a+bx^2+cx^4} dx = \frac{\sqrt{2}\sqrt{cd} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{\sqrt{b^2-4ac}\sqrt{b-\sqrt{b^2-4ac}}} - \frac{\sqrt{2}\sqrt{cd} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{\sqrt{b^2-4ac}\sqrt{b+\sqrt{b^2-4ac}}} - \frac{e \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}}$$

[Out]  $-e \operatorname{arctanh}\left(\frac{2cx^2+b}{(-4ac+b^2)^{1/2}}\right) / (-4ac+b^2)^{1/2} + d \arctan\left(\frac{x^{1/2} c^{1/2}}{(b-(-4ac+b^2)^{1/2})^{1/2}}\right) * 2^{1/2} c^{1/2} / (-4ac+b^2)^{1/2} / (b-(-4ac+b^2)^{1/2})^{1/2} - d \arctan\left(\frac{x^{1/2} c^{1/2}}{(b+(-4ac+b^2)^{1/2})^{1/2}}\right) * 2^{1/2} c^{1/2} / (-4ac+b^2)^{1/2} / (b+(-4ac+b^2)^{1/2})^{1/2}$

#### Rubi [A] (verified)

Time = 0.13 (sec) , antiderivative size = 189, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 7,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.350$ , Rules used = {1687, 12, 1107, 211, 1121, 632, 212}

$$\int \frac{d+ex}{a+bx^2+cx^4} dx = \frac{\sqrt{2}\sqrt{cd} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{\sqrt{b^2-4ac}\sqrt{b-\sqrt{b^2-4ac}}} - \frac{\sqrt{2}\sqrt{cd} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b^2-4ac+b}}\right)}{\sqrt{b^2-4ac}\sqrt{b^2-4ac+b}} - \frac{e \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}}$$

[In] Int[(d + e\*x)/(a + b\*x^2 + c\*x^4), x]

```
[Out] (Sqrt[2]*Sqrt[c]*d*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b - Sqrt[b^2 - 4*a*c]]])
/(Sqrt[b^2 - 4*a*c]*Sqrt[b - Sqrt[b^2 - 4*a*c]]) - (Sqrt[2]*Sqrt[c]*d*ArcTan
[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b + Sqrt[b^2 - 4*a*c]]])/(Sqrt[b^2 - 4*a*c]*Sqrt
[b + Sqrt[b^2 - 4*a*c]]) - (e*ArcTanh[(b + 2*c*x^2)/Sqrt[b^2 - 4*a*c]])/Sqr
t[b^2 - 4*a*c]
```

#### Rule 12

```
Int[(a_)*(u_), x_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !Match
Q[u, (b_)*(v_)] /; FreeQ[b, x]
```

#### Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] := Simp[(Rt[a/b, 2]/a)*ArcTan[x/Rt
[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

#### Rule 212

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] := Simp[(1/(Rt[a, 2]*Rt[-b, 2]))*
ArcTanh[Rt[-b, 2]*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

#### Rule 632

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] := Dist[-2, Subst[Int
[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]
```

#### Rule 1107

```
Int[((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(-1), x_Symbol] := With[{q = Rt[b^
2 - 4*a*c, 2]}, Dist[c/q, Int[1/(b/2 - q/2 + c*x^2), x], x] - Dist[c/q, Int
[1/(b/2 + q/2 + c*x^2), x], x]] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4*a*c,
0] && PosQ[b^2 - 4*a*c]
```

#### Rule 1121

```
Int[(x_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol] := Dist[1/2,
Subst[Int[(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]
```

#### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d}{a + bx^2 + cx^4} dx + \int \frac{ex}{a + bx^2 + cx^4} dx \\
 &= d \int \frac{1}{a + bx^2 + cx^4} dx + e \int \frac{x}{a + bx^2 + cx^4} dx \\
 &= \frac{(cd) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{\sqrt{b^2 - 4ac}} - \frac{(cd) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{\sqrt{b^2 - 4ac}} + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{a + bx + cx^2} dx, x, x^2 \right) \\
 &= \frac{\sqrt{2}\sqrt{cd} \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{\sqrt{b^2 - 4ac} \sqrt{b - \sqrt{b^2 - 4ac}}} - \frac{\sqrt{2}\sqrt{cd} \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{\sqrt{b^2 - 4ac} \sqrt{b + \sqrt{b^2 - 4ac}}} \\
 &\quad - e \text{Subst} \left( \int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2 \right) \\
 &= \frac{\sqrt{2}\sqrt{cd} \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{\sqrt{b^2 - 4ac} \sqrt{b - \sqrt{b^2 - 4ac}}} - \frac{\sqrt{2}\sqrt{cd} \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{\sqrt{b^2 - 4ac} \sqrt{b + \sqrt{b^2 - 4ac}}} - \frac{e \tanh^{-1} \left( \frac{b + 2cx^2}{\sqrt{b^2 - 4ac}} \right)}{\sqrt{b^2 - 4ac}}
 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.17 (sec) , antiderivative size = 194, normalized size of antiderivative = 1.03

$$\begin{aligned}
 &\int \frac{d + ex}{a + bx^2 + cx^4} dx \\
 &= \frac{2\sqrt{2}\sqrt{cd} \arctan \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{\sqrt{b - \sqrt{b^2 - 4ac}}} - \frac{2\sqrt{2}\sqrt{cd} \arctan \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{\sqrt{b + \sqrt{b^2 - 4ac}}} + \frac{e (\log(-b + \sqrt{b^2 - 4ac} - 2cx^2) - \log(b + \sqrt{b^2 - 4ac} + 2cx^2))}{2\sqrt{b^2 - 4ac}}
 \end{aligned}$$

[In] Integrate[(d + e\*x)/(a + b\*x^2 + c\*x^4), x]

[Out] ((2\*sqrt[2]\*sqrt[c]\*d\*ArcTan[(sqrt[2]\*sqrt[c]\*x)/sqrt[b - sqrt[b^2 - 4\*a\*c]]])/sqrt[b - sqrt[b^2 - 4\*a\*c]] - (2\*sqrt[2]\*sqrt[c]\*d\*ArcTan[(sqrt[2]\*sqrt[c]\*x)/sqrt[b + sqrt[b^2 - 4\*a\*c]]])/sqrt[b + sqrt[b^2 - 4\*a\*c]] + e\*(Log[-b + sqrt[b^2 - 4\*a\*c] - 2\*c\*x^2] - Log[b + sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2]))/(2\*sqrt[b^2 - 4\*a\*c])

**Maple [C] (verified)**

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.08 (sec) , antiderivative size = 43, normalized size of antiderivative = 0.23

method	result
risch	$\frac{\sum_{_R=\text{RootOf}(cZ^4+_Z^2b+a)} \frac{(-R_{e+d}) \ln(x-_R)}{2c\_R^3+_Rb}}{2}$
default	$4c \frac{\sqrt{-4ac+b^2} \left( \frac{e \ln(2cx^2+\sqrt{-4ac+b^2}+b)}{4c} + \frac{d\sqrt{2} \arctan\left(\frac{cx\sqrt{2}}{\sqrt{(b+\sqrt{-4ac+b^2})c}}\right)}{2\sqrt{(b+\sqrt{-4ac+b^2})c}} \right)}{8ac-2b^2} - \frac{\sqrt{-4ac+b^2} \left( \frac{e \ln(-2cx^2+\sqrt{-4ac+b^2}-b)}{4c} - \frac{d\sqrt{2} \arctan\left(\frac{cx\sqrt{2}}{\sqrt{(b-\sqrt{-4ac+b^2})c}}\right)}{2\sqrt{(b-\sqrt{-4ac+b^2})c}} \right)}{8ac-2b^2}$

[In] int((e\*x+d)/(c\*x^4+b\*x^2+a),x,method=\_RETURNVERBOSE)

[Out] 1/2\*sum((\_R\*e+d)/(2\*\_R^3\*c+\_R\*b)\*ln(x-\_R),\_R=RootOf(\_Z^4\*c+\_Z^2\*b+a))

**Fricas [C] (verification not implemented)**

Result contains complex when optimal does not.

Time = 3.16 (sec) , antiderivative size = 398481, normalized size of antiderivative = 2108.37

$$\int \frac{d+ex}{a+bx^2+cx^4} dx = \text{Too large to display}$$

[In] integrate((e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="fricas")

[Out] Too large to include

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d+ex}{a+bx^2+cx^4} dx = \text{Timed out}$$

[In] integrate((e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a),x)

[Out] Timed out

**Maxima [F]**

$$\int \frac{d + ex}{a + bx^2 + cx^4} dx = \int \frac{ex + d}{cx^4 + bx^2 + a} dx$$

[In] integrate((e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="maxima")

[Out] integrate((e\*x + d)/(c\*x^4 + b\*x^2 + a), x)

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 1342 vs. 2(149) = 298.

Time = 1.40 (sec) , antiderivative size = 1342, normalized size of antiderivative = 7.10

$$\int \frac{d + ex}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

[In] integrate((e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="giac")

[Out] 1/4\*(sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^4 - 8\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^2\*c - 2\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^3\*c - 2\*b^4\*c + 16\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*c^2 + 8\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b\*c^2 + sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^2\*c^2 + 16\*a\*b^2\*c^2 + 2\*b^3\*c^2 - 4\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*c^3 - 32\*a^2\*c^3 - 8\*a\*b\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^3 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b\*c + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^2\*c - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b\*c^2 + 2\*(b^2 - 4\*a\*c)\*b^2\*c - 8\*(b^2 - 4\*a\*c)\*a\*c^2 - 2\*(b^2 - 4\*a\*c)\*b\*c^2)\*d\*arctan(2\*sqrt(1/2)\*x/sqrt((b + sqrt(b^2 - 4\*a\*c))/c))/((a\*b^4 - 8\*a^2\*b^2\*c - 2\*a\*b^3\*c + 16\*a^3\*c^2 + 8\*a^2\*b\*c^2 + a\*b^2\*c^2 - 4\*a^2\*c^3)\*abs(c)) + 1/4\*(sqrt(2)\*sqrt(b\*c - sqrt(b^2 - 4\*a\*c)\*c)\*b^4 - 8\*sqrt(2)\*sqrt(b\*c - sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^2\*c - 2\*sqrt(2)\*sqrt(b\*c - sqrt(b^2 - 4\*a\*c)\*c)\*b^3\*c + 2\*b^4\*c + 16\*sqrt(2)\*sqrt(b\*c - sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*c^2 + 8\*sqrt(2)\*sqrt(b\*c - sqrt(b^2 - 4\*a\*c)\*c)\*a\*b\*c^2 + sqrt(2)\*sqrt(b\*c - sqrt(b^2 - 4\*a\*c)\*c)\*b^2\*c^2 - 16\*a\*b^2\*c^2 + 2\*b^3\*c^2 - 4\*sqrt(2)\*sqrt(b\*c - sqrt(b^2 - 4\*a\*c)\*c)\*a\*c^3 + 32\*a^2\*c^3 - 8\*a\*b\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c - sqrt(b^2 - 4\*a\*c)\*c)\*b^3 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c - sqrt(b^2 - 4\*a\*c)\*c)\*a\*b\*c + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c - sqrt(b^2 - 4\*a\*c)\*c)\*b^2\*c - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c - sqrt(b^2 - 4\*a\*c)\*c)\*b\*c^2 - 2\*(b^2 - 4\*a\*c)\*b^2\*c + 8\*(b^2 - 4\*a\*c)\*a\*c^2 - 2\*(b^2 - 4\*a\*c)\*b\*c^2)\*d\*arctan(2\*sqrt(1/2)\*x/sqrt((b - sqrt(b^2 - 4\*a\*c))/c))/((a\*b^4 - 8\*a^2\*b^2\*c - 2\*a\*b^3\*c + 16\*a^3\*c^2 + 8\*a^2\*b\*c^2 + a\*b^2\*c^2 - 4\*a^2\*c^3)\*abs(c)) - 1/2\*(b^2\*c^2 - 4\*a\*c^3 - 2\*b\*c^3 + c^4)\*sqrt(b^2 - 4\*a\*c)



$$\begin{aligned}
& a^4 e^4, z, k) * c^2 d^2 x - 4 * \text{root}(128 a^2 b^2 c^2 z^4 - 256 a^3 c^2 z^4 - 16 a^2 b^4 z^4 + 16 a^2 b^2 c^2 z^2 - 32 a^2 c^2 e^2 z^2 + 8 a^2 b^2 e^2 z^2 - 4 b^3 d^2 z^2 + 16 a^2 c^2 d^2 e z - 4 b^2 d^2 e z - b^2 d^2 e^2 - c^2 d^4 - a^4 e^4, z, k)^2 b^2 e^2 x + 4 * \text{root}(128 a^2 b^2 c^2 z^4 - 256 a^3 c^2 z^4 - 16 a^2 b^4 z^4 + 16 a^2 b^2 c^2 z^2 - 32 a^2 c^2 e^2 z^2 + 8 a^2 b^2 e^2 z^2 - 4 b^3 d^2 z^2 + 16 a^2 c^2 d^2 e z - 4 b^2 d^2 e z - b^2 d^2 e^2 - c^2 d^4 - a^4 e^4, z, k) * b^2 d^2 e + 32 * \text{root}(128 a^2 b^2 c^2 z^4 - 256 a^3 c^2 z^4 - 16 a^2 b^4 z^4 + 16 a^2 b^2 c^2 z^2 - 32 a^2 c^2 e^2 z^2 + 8 a^2 b^2 e^2 z^2 - 4 b^3 d^2 z^2 + 16 a^2 c^2 d^2 e z - 4 b^2 d^2 e z - b^2 d^2 e^2 - c^2 d^4 - a^4 e^4, z, k)^3 a^2 b^2 c^2 x + 16 * \text{root}(128 a^2 b^2 c^2 z^4 - 256 a^3 c^2 z^4 - 16 a^2 b^4 z^4 + 16 a^2 b^2 c^2 z^2 - 32 a^2 c^2 e^2 z^2 + 8 a^2 b^2 e^2 z^2 - 4 b^3 d^2 z^2 + 16 a^2 c^2 d^2 e z - 4 b^2 d^2 e z - b^2 d^2 e^2 - c^2 d^4 - a^4 e^4, z, k)^2 a^2 c^2 e^2 x) * \text{root}(128 a^2 b^2 c^2 z^4 - 256 a^3 c^2 z^4 - 16 a^2 b^4 z^4 + 16 a^2 b^2 c^2 z^2 - 32 a^2 c^2 e^2 z^2 + 8 a^2 b^2 e^2 z^2 - 4 b^3 d^2 z^2 + 16 a^2 c^2 d^2 e z - 4 b^2 d^2 e z - b^2 d^2 e^2 - c^2 d^4 - a^4 e^4, z, k), k, 1, 4)
\end{aligned}$$

### 3.21 $\int \frac{d+ex+fx^2}{a+bx^2+cx^4} dx$

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#### Optimal result

Integrand size = 25, antiderivative size = 211

$$\int \frac{d+ex+fx^2}{a+bx^2+cx^4} dx = \frac{\left(f + \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\left(f - \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b+\sqrt{b^2-4ac}}} - \frac{e \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}}$$

[Out]  $-e \operatorname{arctanh}\left(\frac{2cx^2+b}{(-4ac+b^2)^{1/2}}\right) / (-4ac+b^2)^{1/2} + 1/2 \arctan\left(x \sqrt{2} \sqrt{c} / (b - (-4ac+b^2)^{1/2})\right) / (b - (-4ac+b^2)^{1/2}) + (f + (-bf+2cd)/(-4ac+b^2)^{1/2}) \sqrt{2} \sqrt{c} / (b - (-4ac+b^2)^{1/2}) + 1/2 \arctan\left(x \sqrt{2} \sqrt{c} / (b + (-4ac+b^2)^{1/2})\right) / (b + (-4ac+b^2)^{1/2}) + (f + (bf-2cd)/(-4ac+b^2)^{1/2}) \sqrt{2} \sqrt{c} / (b + (-4ac+b^2)^{1/2})$

#### Rubi [A] (verified)

Time = 0.16 (sec) , antiderivative size = 211, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 7,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.280$ , Rules used = {1687, 1180, 211, 12, 1121, 632, 212}

$$\int \frac{d+ex+fx^2}{a+bx^2+cx^4} dx = \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{2cd-bf}{\sqrt{b^2-4ac}} + f\right)}{\sqrt{2}\sqrt{c}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left(f - \frac{2cd-bf}{\sqrt{b^2-4ac}}\right)}{\sqrt{2}\sqrt{c}\sqrt{\sqrt{b^2-4ac}+b}} - \frac{e \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}}$$

[In] Int[(d + e\*x + f\*x^2)/(a + b\*x^2 + c\*x^4), x]



```
[Out] ((f + (2*c*d - b*f)/Sqrt[b^2 - 4*a*c])*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b - Sqrt[b^2 - 4*a*c]])/(Sqrt[2]*Sqrt[c]*Sqrt[b - Sqrt[b^2 - 4*a*c]]) + ((f - (2*c*d - b*f)/Sqrt[b^2 - 4*a*c])*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b + Sqrt[b^2 - 4*a*c]])/(Sqrt[2]*Sqrt[c]*Sqrt[b + Sqrt[b^2 - 4*a*c]]) - (e*ArcTanh[(b + 2*c*x^2)/Sqrt[b^2 - 4*a*c]])/Sqrt[b^2 - 4*a*c]
```

### Rule 12

```
Int[(a_)*(u_), x_Symbol] :=> Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b_)*(v_)] /; FreeQ[b, x]
```

### Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :=> Simp[(Rt[a/b, 2]/a)*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

### Rule 212

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] :=> Simp[(1/(Rt[a, 2]*Rt[-b, 2]))*ArcTanh[Rt[-b, 2]*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])
```

### Rule 632

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] :=> Dist[-2, Subst[Int[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0]
```

### Rule 1121

```
Int[(x_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] :=> Dist[1/2, Subst[Int[(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]
```

### Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :=> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2 - q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2 + c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] :=> Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
```



2]\*(-2\*c\*d + (b + Sqrt[b^2 - 4\*a\*c])\*f)\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]]]/(Sqrt[c]\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) + e\*Log[-b + Sqrt[b^2 - 4\*a\*c] - 2\*c\*x^2] - e\*Log[b + Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2]/(2\*Sqrt[b^2 - 4\*a\*c])

### Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.07 (sec) , antiderivative size = 48, normalized size of antiderivative = 0.23

method	result
risch	$\left( \frac{\sum_{R=\text{RootOf}(cZ^4+Z^2b+a)} \left( \frac{(-R^2 f + R e + d) \ln(x - R)}{2cR^3 + Rb} \right)}{2} \right)$
default	$4c \left( \frac{\sqrt{-4ac+b^2} \left( -\frac{e \ln(2cx^2 + \sqrt{-4ac+b^2} + b)}{2} + \frac{(f\sqrt{-4ac+b^2} + bf - 2cd)\sqrt{2} \arctan\left(\frac{cx\sqrt{2}}{\sqrt{(b+\sqrt{-4ac+b^2})c}}\right)}{2\sqrt{(b+\sqrt{-4ac+b^2})c}} \right)}{4c(4ac-b^2)} - \frac{\sqrt{-4ac+b^2} \left( \frac{e \ln(-2}{\dots} \right)}{\dots} \right)$

[In] int((f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x,method=\_RETURNVERBOSE)

[Out] 1/2\*sum((R^2\*f+R\*e+d)/(2\*R^3\*c+R\*b)\*ln(x-R),R=RootOf(Z^4\*c+Z^2\*b+a))

### Fricas [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 18.02 (sec) , antiderivative size = 723401, normalized size of antiderivative = 3428.44

$$\int \frac{d + ex + fx^2}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

[In] integrate((f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="fricas")

[Out] Too large to include



```

2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a*b*c - sqrt(2)*sqrt(b^2 - 4*a*c
)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a*c^2 - 2*(b^2 - 4*a*c)*a*c^2)*f)*arctan(
2*sqrt(1/2)*x/sqrt((b + sqrt(b^2 - 4*a*c))/c))/((a*b^4 - 8*a^2*b^2*c - 2*a*
b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*abs(c)) + 1/4*((s
qrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b^4 - 8*sqrt(2)*sqrt(b*c - sqrt(b^2
- 4*a*c)*c)*a*b^2*c - 2*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b^3*c + 2*b
^4*c + 16*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a^2*c^2 + 8*sqrt(2)*sqrt(
b*c - sqrt(b^2 - 4*a*c)*c)*a*b*c^2 + sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c
)*b^2*c^2 - 16*a*b^2*c^2 + 2*b^3*c^2 - 4*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*
c)*c)*a*c^3 + 32*a^2*c^3 - 8*a*b*c^3 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c -
sqrt(b^2 - 4*a*c)*c)*b^3 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2
- 4*a*c)*c)*a*b*c + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*
c)*c)*b^2*c - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b*c
^2 - 2*(b^2 - 4*a*c)*b^2*c + 8*(b^2 - 4*a*c)*a*c^2 - 2*(b^2 - 4*a*c)*b*c^2)
*d - 2*(2*a*b^2*c^2 - 8*a^2*c^3 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt
(b^2 - 4*a*c)*c)*a*b^2 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 -
4*a*c)*c)*a^2*c + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*
c)*a*b*c - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a*c^2
- 2*(b^2 - 4*a*c)*a*c^2)*f)*arctan(2*sqrt(1/2)*x/sqrt((b - sqrt(b^2 - 4*a*c
))/c))/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2
*c^2 - 4*a^2*c^3)*abs(c)) + 1/4*(b^5*c - 8*a*b^3*c^2 - 2*b^4*c^2 + 16*a^2*b
*c^3 + 8*a*b^2*c^3 + b^3*c^3 - 4*a*b*c^4 + (b^4*c - 6*a*b^2*c^2 - 2*b^3*c^2
+ 8*a^2*c^3 + 4*a*b*c^3 + b^2*c^3 - 2*a*c^4)*sqrt(b^2 - 4*a*c))*e*log(x^2
+ 1/2*(b + sqrt(b^2 - 4*a*c))/c))/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3
*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2)

```

## Mupad [B] (verification not implemented)

Time = 8.64 (sec) , antiderivative size = 3942, normalized size of antiderivative = 18.68

$$\int \frac{d + ex + fx^2}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2)/(a + b\*x^2 + c\*x^4), x)

```

[Out] symsum(log(c^2*d*e^2 - c^2*d^2*f + c^2*e^3*x - a*c*f^3 - 8*root(16*a*b^4*c*
z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 + 64*a^2*c
^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2*d^2*z^2 +
32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2*c*e*f^2*z +
4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d*e^2*f + 2*a
*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f^2 + a*c*e^
4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)^3*b^3*c^2*x + b*c*d*f^2 - 16*roo
t(16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z
^2 + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c
^2*d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^

```

$$\begin{aligned}
& 2*c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c* \\
& d*e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2* \\
& f^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)^2*a*c^3*d - 4*root( \\
& 16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 \\
& + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2 \\
& *d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2*c \\
& *e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
& e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f \\
& ^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)*c^3*d^2*x + 4*root(16 \\
& *a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 + \\
& 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2*d \\
& ^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2*c* \\
& e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d*e \\
& ^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f^2 \\
& + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)^2*b^2*c^2*d + 32*root(1 \\
& 6*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 \\
& + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2* \\
& d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2*c \\
& *e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d*e \\
& ^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f^2 \\
& + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)^3*a*b*c^3*x + 16*root( \\
& 16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 \\
& + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2 \\
& *d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2*c \\
& *e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
& e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f \\
& ^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)^2*a*c^3*e*x + 4*root( \\
& 16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 \\
& + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2 \\
& *d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2*c \\
& *e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
& e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f \\
& ^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)*a*c^2*f^2*x + 2*root( \\
& 16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 \\
& + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2 \\
& *d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2*c \\
& *e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
& e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f \\
& ^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)*b^2*c^2*e^2*x - 2*root( \\
& 16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 \\
& + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2 \\
& *d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2*c \\
& *e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
& e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f \\
& ^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)*b^2*c*f^2*x - 4*root(
\end{aligned}$$

$$\begin{aligned}
& 16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 \\
& + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2 \\
& *d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2* \\
& c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
& e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f \\
& ^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)^2*b^2*c^2*e*x + 4*roo \\
& t(16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z \\
& ^2 + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c \\
& ^2*d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^ \\
& 2*c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
& e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2 \\
& *f^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)*b*c^2*d*e - 8*root( \\
& 16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 \\
& + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2 \\
& *d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2* \\
& c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
& e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f \\
& ^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)*a*c^2*e*f + b*c*e*f^2 \\
& *x - 2*c^2*d*e*f*x + 4*root(16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3* \\
& c^3*z^4 - 16*a*b^2*c*d*f*z^2 + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8* \\
& a*b^2*c*e^2*z^2 - 16*a*b*c^2*d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 \\
& + 4*a*b^3*f^2*z^2 + 16*a^2*c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - \\
& 16*a*c^2*d^2*e*z - 4*a*c*d*e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f \\
& ^3 + b*c*d^2*e^2 + a*b*e^2*f^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, \\
& z, k)*b*c^2*d*f*x)*root(16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3 \\
& *z^4 - 16*a*b^2*c*d*f*z^2 + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b \\
& ^2*c*e^2*z^2 - 16*a*b*c^2*d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + \\
& 4*a*b^3*f^2*z^2 + 16*a^2*c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16 \\
& *a*c^2*d^2*e*z - 4*a*c*d*e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 \\
& + b*c*d^2*e^2 + a*b*e^2*f^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, \\
& k), k, 1, 4)
\end{aligned}$$

### 3.22 $\int \frac{d+ex+fx^2+gx^3}{a+bx^2+cx^4} dx$

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#### Optimal result

Integrand size = 30, antiderivative size = 245

$$\int \frac{d+ex+fx^2+gx^3}{a+bx^2+cx^4} dx = \frac{\left(f + \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\left(f - \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b+\sqrt{b^2-4ac}}} - \frac{(2ce-bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{2c\sqrt{b^2-4ac}} + \frac{g \log(a+bx^2+cx^4)}{4c}$$

```
[Out] 1/4*g*ln(c*x^4+b*x^2+a)/c-1/2*(-b*g+2*c*e)*arctanh((2*c*x^2+b)/(-4*a*c+b^2)^(1/2))/c/(-4*a*c+b^2)^(1/2)+1/2*arctan(x*2^(1/2)*c^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2))*(f+(-b*f+2*c*d)/(-4*a*c+b^2)^(1/2))*2^(1/2)/c^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2)+1/2*arctan(x*2^(1/2)*c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2))*(f+(b*f-2*c*d)/(-4*a*c+b^2)^(1/2))*2^(1/2)/c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2)
```

#### Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 245, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.267$ , Rules used



= {1687, 1180, 211, 1261, 648, 632, 212, 642}

$$\int \frac{d + ex + fx^2 + gx^3}{a + bx^2 + cx^4} dx = \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{2cd-bf}{\sqrt{b^2-4ac}} + f\right)}{\sqrt{2}\sqrt{c}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left(f - \frac{2cd-bf}{\sqrt{b^2-4ac}}\right)}{\sqrt{2}\sqrt{c}\sqrt{\sqrt{b^2-4ac}+b}} - \frac{(2ce - bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{2c\sqrt{b^2-4ac}} + \frac{g \log(a + bx^2 + cx^4)}{4c}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4), x]

[Out] ((f + (2\*c\*d - b\*f)/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]])/(Sqrt[2]\*Sqrt[c]\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + ((f - (2\*c\*d - b\*f)/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]])/(Sqrt[2]\*Sqrt[c]\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) - ((2\*c\*e - b\*g)\*ArcTanh[(b + 2\*c\*x^2)/Sqrt[b^2 - 4\*a\*c]])/(2\*c\*Sqrt[b^2 - 4\*a\*c]) + (g\*Log[a + b\*x^2 + c\*x^4])/(4\*c)

#### Rule 211

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

#### Rule 212

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

#### Rule 632

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

#### Rule 642

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := Simp[d\*(Log[RemoveContent[a + b\*x + c\*x^2, x]]/b), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[2\*c\*d - b\*e, 0]

#### Rule 648

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := Dist[(2\*c\*d - b\*e)/(2\*c), Int[1/(a + b\*x + c\*x^2), x], x] + Dist[e/(2\*c), In

`t[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && !NiceSqrtQ[b^2 - 4*a*c]`

### Rule 1180

`Int[((d_) + (e_)*(x_)^2)/((a_) + (b_)*(x_)^2 + (c_)*(x_)^4), x_Symbol] :> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2 - q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2 + c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]`

### Rule 1261

`Int[(x_)*((d_) + (e_)*(x_)^2)^(q_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] :=> Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]`

### Rule 1687

`Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] :=> Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]`

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + fx^2}{a + bx^2 + cx^4} dx + \int \frac{x(e + gx^2)}{a + bx^2 + cx^4} dx \\
 &= \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{a + bx + cx^2} dx, x, x^2 \right) \\
 &\quad + \frac{1}{2} \left( f - \frac{2cd - bf}{\sqrt{b^2 - 4ac}} \right) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx \\
 &\quad + \frac{1}{2} \left( f + \frac{2cd - bf}{\sqrt{b^2 - 4ac}} \right) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx \\
 &= \frac{\left( f + \frac{2cd - bf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{\sqrt{2}\sqrt{c}\sqrt{b - \sqrt{b^2 - 4ac}}} + \frac{\left( f - \frac{2cd - bf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{\sqrt{2}\sqrt{c}\sqrt{b + \sqrt{b^2 - 4ac}}} \\
 &\quad + \frac{g \text{Subst} \left( \int \frac{b + 2cx}{a + bx + cx^2} dx, x, x^2 \right)}{4c} + \frac{(2ce - bg) \text{Subst} \left( \int \frac{1}{a + bx + cx^2} dx, x, x^2 \right)}{4c}
 \end{aligned}$$

$$\begin{aligned}
&= \frac{\left(f + \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\left(f - \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b+\sqrt{b^2-4ac}}} \\
&\quad + \frac{g \log(a + bx^2 + cx^4)}{4c} - \frac{(2ce - bg) \text{Subst}\left(\int \frac{1}{b^2-4ac-x^2} dx, x, b + 2cx^2\right)}{2c} \\
&= \frac{\left(f + \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\left(f - \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b+\sqrt{b^2-4ac}}} \\
&\quad - \frac{(2ce - bg) \tanh^{-1}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{2c\sqrt{b^2-4ac}} + \frac{g \log(a + bx^2 + cx^4)}{4c}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.18 (sec) , antiderivative size = 280, normalized size of antiderivative = 1.14

$$\begin{aligned}
&\int \frac{d + ex + fx^2 + gx^3}{a + bx^2 + cx^4} dx \\
&= \frac{2\sqrt{2}\sqrt{c}(2cd + (-b + \sqrt{b^2-4ac})f) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{\sqrt{b-\sqrt{b^2-4ac}}} + \frac{2\sqrt{2}\sqrt{c}(-2cd + (b + \sqrt{b^2-4ac})f) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{\sqrt{b+\sqrt{b^2-4ac}}} + \frac{(2ce + (-b + \sqrt{b^2-4ac})g) \log(-b + \sqrt{b^2-4ac} - 2cx^2) + (-2ce + (b + \sqrt{b^2-4ac})g) \log(b + \sqrt{b^2-4ac} + 2cx^2)}{4c\sqrt{b^2-4ac}}
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4),x]

[Out] ((2\*sqrt(2)\*sqrt(c)\*(2\*c\*d + (-b + sqrt(b^2 - 4\*a\*c))\*f)\*ArcTan[(sqrt(2)\*sqrt(c)\*x)/sqrt(b - sqrt(b^2 - 4\*a\*c))])/sqrt(b - sqrt(b^2 - 4\*a\*c)) + (2\*sqrt(2)\*sqrt(c)\*(-2\*c\*d + (b + sqrt(b^2 - 4\*a\*c))\*f)\*ArcTan[(sqrt(2)\*sqrt(c)\*x)/sqrt(b + sqrt(b^2 - 4\*a\*c))])/sqrt(b + sqrt(b^2 - 4\*a\*c)) + (2\*c\*e + (-b + sqrt(b^2 - 4\*a\*c))\*g)\*Log[-b + sqrt(b^2 - 4\*a\*c) - 2\*c\*x^2] + (-2\*c\*e + (b + sqrt(b^2 - 4\*a\*c))\*g)\*Log[b + sqrt(b^2 - 4\*a\*c) + 2\*c\*x^2])/(4\*c\*sqrt(b^2 - 4\*a\*c))

### Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.07 (sec) , antiderivative size = 53, normalized size of antiderivative = 0.22

method	result
risch	$\frac{\sum_{R=\text{RootOf}(cZ^4+Z^2b+a)} \left( \frac{(-R^3g+R^2f+Re+d) \ln(x-R)}{2cR^3+Rb} \right)}{2}$
default	$4c \frac{\sqrt{-4ac+b^2} \left( \frac{(\sqrt{-4ac+b^2}g+bg-2ec) \ln(2cx^2+\sqrt{-4ac+b^2}+b)}{4c} + \frac{(f\sqrt{-4ac+b^2}+bf-2cd)\sqrt{2} \arctan\left(\frac{cx\sqrt{2}}{\sqrt{(b+\sqrt{-4ac+b^2})c}}\right)}{2\sqrt{(b+\sqrt{-4ac+b^2})c}} \right)}{4c(4ac-b^2)}$

```
[In] int((g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a),x,method=_RETURNVERBOSE)
```

```
[Out] 1/2*sum((R^3*g+R^2*f+R*e+d)/(2*R^3*c+R*b)*ln(x-R),R=RootOf(Z^4*c+Z^2*b+a))
```

## Fricas [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 249.08 (sec) , antiderivative size = 2136355, normalized size of antiderivative = 8719.82

$$\int \frac{d + ex + fx^2 + gx^3}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

```
[In] integrate((g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a),x, algorithm="fricas")
```

```
[Out] Too large to include
```

## Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{a + bx^2 + cx^4} dx = \text{Timed out}$$

```
[In] integrate((g*x**3+f*x**2+e*x+d)/(c*x**4+b*x**2+a),x)
```

```
[Out] Timed out
```

**Maxima [F]**

$$\int \frac{d + ex + fx^2 + gx^3}{a + bx^2 + cx^4} dx = \int \frac{gx^3 + fx^2 + ex + d}{cx^4 + bx^2 + a} dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="maxima")

[Out] integrate((g\*x^3 + f\*x^2 + e\*x + d)/(c\*x^4 + b\*x^2 + a), x)

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 3270 vs. 2(203) = 406.

Time = 1.33 (sec) , antiderivative size = 3270, normalized size of antiderivative = 13.35

$$\int \frac{d + ex + fx^2 + gx^3}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="giac")

[Out] 1/4\*g\*log(abs(c\*x^4 + b\*x^2 + a))/c + 1/8\*((2\*b^4\*c^2 - 16\*a\*b^2\*c^3 + 32\*a^2\*c^4 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^4 + 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^2\*c + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3\*c - 16\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*c^2 - 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c^2 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^2\*c^2 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*c^3 - 2\*(b^2 - 4\*a\*c)\*b^2\*c^2 + 8\*(b^2 - 4\*a\*c)\*a\*c^3)\*c^2\*f + 2\*(sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^4\*c^2 - 8\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^2\*c^3 - 2\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3\*c^3 - 2\*b^4\*c^3 + 16\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*c^4 + 8\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c^4 + sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^2\*c^4 + 16\*a\*b^2\*c^4 - 4\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*c^5 - 32\*a^2\*c^5 + 2\*(b^2 - 4\*a\*c)\*b^2\*c^3 - 8\*(b^2 - 4\*a\*c)\*a\*c^4)\*d\*abs(c) + 2\*(2\*b^3\*c^5 - 8\*a\*b\*c^6 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3\*c^3 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c^4 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^2\*c^4 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b\*c^5 - 2\*(b^2 - 4\*a\*c)\*b\*c^5)\*d - (2\*b^4\*c^4 - 8\*a\*b^2\*c^5 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^4\*c^2 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^2\*c^3 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^2\*c^4 - 2\*(b^2 - 4\*a\*c)\*b^2\*c^4)\*f)\*arctan(2\*sqrt(1/2)\*x/sqrt((b\*c + sqrt(b^2\*c^2 - 4\*a\*c^3))/c^2))/((a\*b^4\*c^2 - 8\*a^2\*b^2\*c^3 - 2\*a\*b^3\*c^3 + 16\*a^3\*c^4 + 8\*a^2\*b\*c

$$\begin{aligned}
&^4 + a*b^2*c^4 - 4*a^2*c^5)*c^2) + 1/8*((2*b^4*c^2 - 16*a*b^2*c^3 + 32*a^2*c^4 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b^4 + 8*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*a*b^2*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b^3*c - 16*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*a^2*c^2 - 8*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*a*b*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b^2*c^2 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*a*c^3 - 2*(b^2 - 4*a*c)*b^2*c^2 + 8*(b^2 - 4*a*c)*a*c^3)*c^2*f + 2*(\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b^4*c^2 - 8*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*a*b^2*c^3 - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b^3*c^3 + 2*b^4*c^3 + 16*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*a^2*c^4 + 8*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*a*b*c^4 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b^2*c^4 - 16*a*b^2*c^4 - 4*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*a*c^5 + 32*a^2*c^5 - 2*(b^2 - 4*a*c)*b^2*c^3 + 8*(b^2 - 4*a*c)*a*c^4)*d*abs(c) + 2*(2*b^3*c^5 - 8*a*b*c^6 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b^3*c^3 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*a*b*c^4 + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b^2*c^4 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b*c^5 - 2*(b^2 - 4*a*c)*b*c^5)*d - (2*b^4*c^4 - 8*a*b^2*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b^4*c^2 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*a*b^2*c^3 + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b^3*c^3 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*b^2*c^4 - 2*(b^2 - 4*a*c)*b^2*c^4)*f)*arctan(2*\sqrt{1/2}*x/\sqrt{(b*c - \sqrt{b^2*c^2 - 4*a*c^3})/c^2}))/((a*b^4*c^2 - 8*a^2*b^2*c^3 - 2*a*b^3*c^3 + 16*a^3*c^4 + 8*a^2*b*c^4 + a*b^2*c^4 - 4*a^2*c^5)*c^2) + 1/16*(2*(b^5*c - 8*a*b^3*c^2 - 2*b^4*c^2 + 16*a^2*b*c^3 + 8*a*b^2*c^3 + b^3*c^3 - 4*a*b*c^4 - (b^4*c - 8*a*b^2*c^2 - 2*b^3*c^2 + 16*a^2*c^3 + 8*a*b*c^3 + b^2*c^3 - 4*a*c^4))*\sqrt{b^2 - 4*a*c})*e*abs(c) - (b^6 - 8*a*b^4*c - 2*b^5*c + 16*a^2*b^2*c^2 + 8*a*b^3*c^2 + b^4*c^2 - 4*a*b^2*c^3 + (b^5 - 8*a*b^3*c - 2*b^4*c + 16*a^2*b*c^2 + 8*a*b^2*c^2 + b^3*c^2 - 4*a*b*c^3))*\sqrt{b^2 - 4*a*c})*g*abs(c) - 2*(b^5*c^2 - 8*a*b^3*c^3 - 2*b^4*c^3 + 16*a^2*b*c^4 + 8*a*b^2*c^4 + b^3*c^4 - 4*a*b*c^5 + (b^4*c^2 - 4*a*b^2*c^3 - 2*b^3*c^3 + b^2*c^4))*\sqrt{b^2 - 4*a*c})*e + (b^6*c - 8*a*b^4*c^2 - 2*b^5*c^2 + 16*a^2*b^2*c^3 + 8*a*b^3*c^3 + b^4*c^3 - 4*a*b^2*c^4 + (b^5*c - 4*a*b^3*c^2 - 2*b^4*c^2 + b^3*c^3))*\sqrt{b^2 - 4*a*c})*g)*log(x^2 + 1/2*(b*c + \sqrt{b^2*c^2 - 4*a*c^3})/c^2)/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2*abs(c)) + 1/16*(2*(b^5*c - 8*a*b^3*c^2 - 2*b^4*c^2 + 16*a^2*b*c^3 + 8*a*b^2*c^3 + b^3*c^3 - 4*a*b*c^4 + (b^4*c - 8*a*b^2*c^2 - 2*b^3*c^2 + 16*a^2*c^3 + 8*a*b*c^3 + b^2*c^3 - 4*a*c^4))*\sqrt{b^2 - 4*a*c})*e*abs(c) - (b^6 - 8*a*b^4*c - 2*b^5*c + 16*a^2*b^2*c^2 + 8*a*b^3*c^2 + b^4*c^2 - 4*a*b^2*c^3 - (b^5 - 8*a*b^3*c - 2*b^4*c + 16*a^2*b*c^2 + 8*a*b^2*c^2 + b^3*c^2 - 4*a*b*c^3))*\sqrt{b^2 - 4*a*c})*g*abs(c) - 2*(b^5*c^2 - 8*a*b^3*c^3 - 2*b^4*c^3 + 16*a^2*b*c^4 + 8*a*b^2*c^4 + b^3*c^4 - 4*a*b*c^5 + (b^4*c^2 - 4*a*b^2*c^3 - 2*b^3*c^3 + b^2*c^4))*\sqrt{b^2 - 4*a*c})*e + (b^6*c - 8*a*b^4*c^2 - 2*b^5*c^2 + 16*a^2*b^2*c^3 +
\end{aligned}$$

$$\frac{8ab^3c^3 + b^4c^3 - 4a^2b^2c^4 - (b^5c - 4ab^3c^2 - 2b^4c^2 + b^3c^3)\sqrt{b^2 - 4ac}}{c^2} \cdot \frac{g \log(x^2 + \frac{1}{2}(bc - \sqrt{b^2c^2 - 4ac^3}))}{((ab^4 - 8a^2b^2c - 2ab^3c + 16a^3c^2 + 8a^2bc^2 + ab^2c^2 - 4a^2c^3)c^2 \operatorname{abs}(c))}$$

## Mupad [B] (verification not implemented)

Time = 8.94 (sec) , antiderivative size = 15179, normalized size of antiderivative = 61.96

$$\int \frac{d + ex + fx^2 + gx^3}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

[In] `int((d + e*x + f*x^2 + g*x^3)/(a + b*x^2 + c*x^4),x)`

[Out] `symsum(log(c^2*d*e^2 + b^2*d*g^2 - c^2*d^2*f + c^2*e^3*x - a*c*f^3 - 8*root(128*a^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 + 16*a*b^2*c^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2*z - 4*a*b^2*c*e^2*g*z - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k)^3*b^3*c^2*x - a*c*d*g^2 + b*c*d*f^2 - a*b*f*g^2 - a*b*g^3*x - 16*root(128*a^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 + 16*a*b^2*c^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2*z - 4*a*b^2*c*e^2*g*z - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k)^2*a*c^3*d - 4*root(128*a^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 -`

$$\begin{aligned}
& 256a^3c^4z^4 - 128a^2b^2c^2gz^3 + 16ab^4c^3gz^3 + 256a^3c^3gz^3 + 32a^2b^2c^2egz^2 + 16ab^2c^2d^2fz^2 - 8ab^3c^2egz^2 + 40 \\
& a^2b^2c^2g^2z^2 + 16a^2b^2c^2f^2z^2 + 8ab^2c^2e^2z^2 - 64a^2c^3d^2fz^2 - 4ab^3c^2f^2z^2 + 16ab^2c^3d^2z^2 - 96a^3c^2g^2z^2 - 3 \\
& 2a^2c^3e^2z^2 - 4b^3c^2d^2z^2 - 4ab^4g^2z^2 - 8ab^2c^2d^2fgz + 32a^2c^2d^2fgz - 16a^2b^2c^2eg^2z - 4ab^2c^2e^2gz - 16ab^2c^2 \\
& d^2gz + 4ab^2c^2e^2fz + 16a^2c^2e^2gz - 16a^2c^2e^2fz - 4b^2c^2d^2ez + 4b^3c^2d^2gz + 4ab^3e^2gz + 16ac^3d^2ez + 16 \\
& a^3c^3g^3z - 4a^2b^2g^3z - 4ab^2c^2d^2efg + 2ab^2c^2e^3g + 2ab^2c^2d^2f^3 + 4a^2c^2e^2fg - 4a^2c^2d^2fg^2 + 2b^2c^2d^2ezg - 4ac^2d^2ez \\
& g + 2ab^2d^2fg^2 + 4ac^2d^2ef + 3ab^2c^2d^2g^2 + 2a^2b^2e^2g^3 + 2b^2c^2d^3f - ab^2c^2e^2f^2 - 2a^2c^2e^2g^2 - 2ac^2d^2f^2 - a^2b^2f^2 \\
& g^2 - b^2c^2d^2f^2 - ab^2e^2g^2 - b^2c^2d^2e^2 - b^3d^2g^2 - a^2c^2f^4 - ac^2e^4 - a^3g^4 - c^3d^4, z, k) * c^3d^2x - 2\text{root}(128a^2b^2 \\
& c^3z^4 - 16ab^4c^2z^4 - 256a^3c^4z^4 - 128a^2b^2c^2gz^3 + 16ab^4c^3gz^3 + 256a^3c^3gz^3 + 32a^2b^2c^2egz^2 + 16ab^2c^2d^2f \\
& z^2 - 8ab^3c^2egz^2 + 40a^2b^2c^2g^2z^2 + 16a^2b^2c^2f^2z^2 + 8ab^2c^2e^2z^2 - 64a^2c^3d^2fz^2 - 4ab^3c^2f^2z^2 + 16ab^2c^3d^2 \\
& z^2 - 96a^3c^2g^2z^2 - 32a^2c^3e^2z^2 - 4b^3c^2d^2z^2 - 4ab^4g^2z^2 - 8ab^2c^2d^2fgz + 32a^2c^2d^2fgz - 16a^2b^2c^2eg^2z - 4 \\
& ab^2c^2e^2gz - 16ab^2c^2d^2gz + 4ab^2c^2e^2fz + 16a^2c^2e^2gz - 16a^2c^2e^2fz - 4b^2c^2d^2ez + 4b^3c^2d^2gz + 4ab^3e^2 \\
& gz + 16ac^3d^2ez + 16a^3c^3g^3z - 4a^2b^2g^3z - 4ab^2c^2d^2efg + 2ab^2c^2e^3g + 2ab^2c^2d^2f^3 + 4a^2c^2e^2fg - 4a^2c^2d^2fg^2 + 2 \\
& b^2c^2d^2ezg - 4ac^2d^2ezg + 2ab^2d^2fg^2 + 4ac^2d^2ef + 3ab^2c^2d^2g^2 + 2a^2b^2e^2g^3 + 2b^2c^2d^3f - ab^2c^2e^2f^2 - 2a^2c^2e^2g^2 \\
& - 2ac^2d^2f^2 - a^2b^2f^2g^2 - b^2c^2d^2f^2 - ab^2e^2g^2 - b^2c^2d^2e^2 - b^3d^2g^2 - a^2c^2f^4 - ac^2e^4 - a^3g^4 - c^3d^4, z, k) * b \\
& ^3g^2x + b^2ezg^2x + c^2d^2g^2x + 4\text{root}(128a^2b^2c^3z^4 - 16ab^4c^2z^4 - 256a^3c^4z^4 - 128a^2b^2c^2gz^3 + 16ab^4c^3gz^3 + 25 \\
& 6a^3c^3gz^3 + 32a^2b^2c^2egz^2 + 16ab^2c^2d^2fz^2 - 8ab^3c^2egz^2 + 40a^2b^2c^2g^2z^2 + 16a^2b^2c^2f^2z^2 + 8ab^2c^2e^2z^2 \\
& - 64a^2c^3d^2fz^2 - 4ab^3c^2f^2z^2 + 16ab^2c^3d^2z^2 - 96a^3c^2g^2z^2 - 32a^2c^3e^2z^2 - 4b^3c^2d^2z^2 - 4ab^4g^2z^2 - 8ab^2c^2d^2fgz + 32a^2c^2d^2fgz - 16a^2b^2c^2eg^2z - 4ab^2c^2e^2gz - \\
& 16ab^2c^2d^2gz + 4ab^2c^2e^2fz + 16a^2c^2e^2gz - 16a^2c^2e^2fz - 4b^2c^2d^2ez + 4b^3c^2d^2gz + 4ab^3e^2gz - 16ac^3d^2ez + 16a^3c^3g^3z - 4a^2b^2g^3z - 4ab^2c^2d^2efg \\
& + 2ab^2c^2e^3g + 2ab^2c^2d^2f^3 + 4a^2c^2e^2fg - 4a^2c^2d^2fg^2 + 2b^2c^2d^2ezg - 4ac^2d^2ezg + 2ab^2d^2fg^2 + 4ac^2d^2ef + 3ab^2c^2d^2g^2 + 2a^2b^2e^2g^3 \\
& + 2b^2c^2d^3f - ab^2c^2e^2f^2 - 2a^2c^2e^2g^2 - 2ac^2d^2f^2 - a^2b^2f^2g^2 - b^2c^2d^2f^2 - ab^2e^2g^2 - b^2c^2d^2e^2 - b^3d^2g^2 - a^2c^2f^4 - ac^2e^4 - a^3g^4 - c^3d^4, z, k) ^2b^2c^2d + 32\text{ro} \\
& \text{ot}(128a^2b^2c^3z^4 - 16ab^4c^2z^4 - 256a^3c^4z^4 - 128a^2b^2c^2gz^3 + 16ab^4c^3gz^3 + 256a^3c^3gz^3 + 32a^2b^2c^2egz^2 + 16
\end{aligned}$$



$$\begin{aligned}
& *a*b^2*c^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + \\
& 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b \\
& *c*e*g^2*z - 4*a*b^2*c*e^2*g*z - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 1 \\
& 6*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z + 4*b^3*c*d^2*g*z \\
& z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g^3*z - \\
& 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2* \\
& c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d \\
& *e^2*f + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - \\
& 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e \\
& ^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k)^3*a*b*c^3*x + 16*root(128*a^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - \\
& 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g \\
& *z^3 + 32*a^2*b*c^2*e*g*z^2 + 16*a*b^2*c^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40 \\
& *a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^ \\
& 3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 3 \\
& 2*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z \\
& + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2*z - 4*a*b^2*c*e^2*g*z - 16*a*b*c^2 \\
& *d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4* \\
& b^2*c^2*d^2*e*z + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16 \\
& *a^3*c*g^3*z - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c* \\
& d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e \\
& *g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + \\
& 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f \\
& ^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2* \\
& c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k)^2*a*c^3*e*x + 4*root(128*a^2*b \\
& ^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 + 1 \\
& 6*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 + 16*a*b^2*c^2*d \\
& *f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + \\
& 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3*d \\
& ^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 - 4*a* \\
& b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2*z - \\
& 4*a*b^2*c*e^2*g*z - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^2*e^ \\
& 2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z + 4*b^3*c*d^2*g*z + 4*a*b^3* \\
& e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e \\
& *f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2*c*d*f*g^2 + \\
& 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f + 3*a \\
& *b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c*e^2* \\
& g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - b*c \\
& ^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k) \\
& *a*c^2*f^2*x + 2*root(128*a^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - 256*a^3*c^4* \\
& z^4 - 128*a^2*b^2*c^2*g*z^3 + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2 \\
& *b*c^2*e*g*z^2 + 16*a*b^2*c^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^ \\
& 2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4
\end{aligned}$$

$$\begin{aligned}
& *a*b^3*c*f^2*z^2 + 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2 \\
& *z^2 - 4*b^3*c^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2 \\
& *d*f*g*z - 16*a^2*b*c*e*g^2*z - 4*a*b^2*c*e^2*g*z - 16*a*b*c^2*d^2*g*z + 4* \\
& a*b^2*c*e*f^2*z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e \\
& *z + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z \\
& - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2 \\
& *c*e*f^2*g - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2* \\
& d*f*g^2 + 4*a*c^2*d*e^2*f + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f \\
& - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c \\
& *d^2*f^2 - a*b^2*e^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2 \\
& *e^4 - a^3*g^4 - c^3*d^4, z, k)*b*c^2*e^2*x - 2*root(128*a^2*b^2*c^3*z^4 - \\
& 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 + 16*a*b^4*c*g*z \\
& ^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 + 16*a*b^2*c^2*d*f*z^2 - 8*a* \\
& b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e \\
& ^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3*d^2*z^2 - 96*a \\
& ^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - \\
& 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2*z - 4*a*b^2*c*e^ \\
& 2*g*z - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^2*e^2*g*z - 16*a^ \\
& 2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16* \\
& a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e*f*g + 2*a*b* \\
& c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e \\
& *g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f + 3*a*b*c*d^2*g^2 \\
& + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2 \\
& *d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - b*c^2*d^2*e^2 - \\
& b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k)*b^2*c*f^2*x \\
& + 8*root(128*a^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 - 128*a^2 \\
& *b^2*c^2*g*z^3 + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^ \\
& 2 + 16*a*b^2*c^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^ \\
& 2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2* \\
& z^2 + 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c \\
& ^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16 \\
& *a^2*b*c*e*g^2*z - 4*a*b^2*c*e^2*g*z - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2 \\
& *z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z + 4*b^3*c* \\
& d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g \\
& ^3*z - 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - \\
& 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a \\
& *c^2*d*e^2*f + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2* \\
& f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a \\
& *b^2*e^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^ \\
& 4 - c^3*d^4, z, k)^2*b^3*c*g*x - 2*b*c*d*e*g + 2*a*c*e*f*g - 4*root(128*a^2 \\
& *b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 + \\
& 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 + 16*a*b^2*c^2 \\
& *d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 \\
& + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3 \\
& *d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 - 4*
\end{aligned}$$

$$\begin{aligned}
& a^4 b^2 g^2 z^2 - 8 a^3 b^2 c d f g z + 32 a^2 c^2 d f g z - 16 a^2 b^2 c e g^2 z \\
& - 4 a^2 b^2 c e^2 g z - 16 a^2 b^2 c^2 d^2 g z + 4 a^2 b^2 c e f^2 z + 16 a^2 c^2 e^2 g z - 16 a^2 c^2 e f^2 z - 4 b^2 c^2 d^2 e z + 4 b^3 c^2 d^2 g z + 4 a^2 b^3 e g^2 z \\
& + 16 a^2 c^3 d^2 e z + 16 a^3 c^2 g^3 z - 4 a^2 b^2 g^3 z - 4 a^2 b^2 c d e f g + 2 a^2 b^2 c e^3 g + 2 a^2 b^2 c d f^3 + 4 a^2 c^2 e f^2 g - 4 a^2 c^2 d f g^2 \\
& + 2 b^2 c^2 d^2 e g - 4 a^2 c^2 d^2 e g + 2 a^2 b^2 d f g^2 + 4 a^2 c^2 d e^2 f + 3 a^2 b^2 c d^2 g^2 + 2 a^2 b^2 e g^3 + 2 b^2 c^2 d^3 f - a^2 b^2 c e^2 f^2 - 2 a^2 c^2 e^2 g^2 - 2 a^2 c^2 d^2 f^2 - a^2 b^2 f^2 g^2 - b^2 c^2 d^2 e^2 \\
& - b^3 d^2 g^2 - a^2 c^2 f^4 - a^2 c^2 e^4 - a^3 g^4 - c^3 d^4, z, k)^2 b^2 c^2 e x + 4 \sqrt[4]{128 a^2 b^2 c^3 z^4 - 16 a^2 b^4 c^2 z^4 - 256 a^3 c^3 g z^3 + 32 a^2 b^2 c^2 e g z^2 + 16 a^2 b^2 c^2 d f z^2 - 8 a^2 b^3 c e g z^2 + 40 a^2 b^2 c^2 g^2 z^2 + 16 a^2 b^2 c^2 f^2 z^2 + 8 a^2 b^2 c^2 e^2 z^2 - 64 a^2 c^3 d f z^2 - 4 a^2 b^3 c f^2 z^2 + 16 a^2 b^2 c^3 d^2 z^2 - 96 a^3 c^2 g^2 z^2 - 32 a^2 c^3 e^2 z^2 - 4 b^3 c^2 d^2 z^2 - 4 a^2 b^4 g^2 z^2 - 8 a^2 b^2 c d f g z + 32 a^2 c^2 d f g z - 16 a^2 b^2 c e g^2 z - 4 a^2 b^2 c e^2 g z - 16 a^2 b^2 c^2 d^2 g z + 4 a^2 b^2 c e f^2 z + 16 a^2 c^2 e^2 g z - 16 a^2 c^2 e f^2 z - 4 b^2 c^2 d^2 e z + 4 b^3 c^2 d^2 g z + 4 a^2 b^3 e g^2 z + 16 a^2 c^3 d^2 e z + 16 a^3 c^2 g^3 z - 4 a^2 b^2 g^3 z - 4 a^2 b^2 c d e f g + 2 a^2 b^2 c e^3 g + 2 a^2 b^2 c d f^3 + 4 a^2 c^2 e f^2 g - 4 a^2 c^2 d f g^2 + 2 b^2 c^2 d^2 e g - 4 a^2 c^2 d^2 e g + 2 a^2 b^2 d f g^2 + 4 a^2 c^2 d e^2 f + 3 a^2 b^2 c d^2 g^2 + 2 a^2 b^2 e g^3 + 2 b^2 c^2 d^3 f - a^2 b^2 c e^2 f^2 - 2 a^2 c^2 e^2 g^2 - 2 a^2 c^2 d^2 f^2 - a^2 b^2 f^2 g^2 - b^2 c^2 d^2 e^2 - b^3 d^2 g^2 - a^2 c^2 f^4 - a^2 c^2 e^4 - a^3 g^4 - c^3 d^4, z, k) b^2 c^2 d e + 8 \sqrt[4]{128 a^2 b^2 c^3 z^4 - 16 a^2 b^4 c^2 z^4 - 256 a^3 c^3 g z^3 + 32 a^2 b^2 c^2 e g z^2 + 16 a^2 b^2 c^2 d f z^2 - 8 a^2 b^3 c e g z^2 + 40 a^2 b^2 c^2 g^2 z^2 + 16 a^2 b^2 c^2 f^2 z^2 + 8 a^2 b^2 c^2 e^2 z^2 - 64 a^2 c^3 d f z^2 - 4 a^2 b^3 c f^2 z^2 + 16 a^2 b^2 c^3 d^2 z^2 - 96 a^3 c^2 g^2 z^2 - 32 a^2 c^3 e^2 z^2 - 4 b^3 c^2 d^2 z^2 - 4 a^2 b^4 g^2 z^2 - 8 a^2 b^2 c d f g z + 32 a^2 c^2 d f g z - 16 a^2 b^2 c e g^2 z - 4 a^2 b^2 c e^2 g z - 16 a^2 b^2 c^2 d^2 g z + 4 a^2 b^2 c e f^2 z + 16 a^2 c^2 e^2 g z - 16 a^2 c^2 e f^2 z - 4 b^2 c^2 d^2 e z + 4 b^3 c^2 d^2 g z + 4 a^2 b^3 e g^2 z + 16 a^2 c^3 d^2 e z + 16 a^3 c^2 g^3 z - 4 a^2 b^2 g^3 z - 4 a^2 b^2 c d e f g + 2 a^2 b^2 c e^3 g + 2 a^2 b^2 c d f^3 + 4 a^2 c^2 e f^2 g - 4 a^2 c^2 d f g^2 + 2 b^2 c^2 d^2 e g - 4 a^2 c^2 d^2 e g + 2 a^2 b^2 d f g^2 + 4 a^2 c^2 d e^2 f + 3 a^2 b^2 c d^2 g^2 + 2 a^2 b^2 e g^3 + 2 b^2 c^2 d^3 f - a^2 b^2 c e^2 f^2 - 2 a^2 c^2 e^2 g^2 - 2 a^2 c^2 d^2 f^2 - a^2 b^2 f^2 g^2 - b^2 c^2 d^2 e^2 - b^3 d^2 g^2 - a^2 c^2 f^4 - a^2 c^2 e^4 - a^3 g^4 - c^3 d^4, z, k) a^2 c^2 d g - 8 \sqrt[4]{128 a^2 b^2 c^3 z^4 - 16 a^2 b^4 c^2 z^4 - 256 a^3 c^3 g z^3 + 32 a^2 b^2 c^2 e g z^2 + 16 a^2 b^2 c^2 d f z^2 - 8 a^2 b^3 c e g z^2 + 40 a^2 b^2 c^2 g^2 z^2 + 16 a^2 b^2 c^2 f^2 z^2 + 8 a^2 b^2 c^2 e^2 z^2 - 64 a^2 c^3 d f z^2 - 4 a^2 b^3 c f^2 z^2 + 16 a^2 b^2 c^3 d^2 z^2 - 96 a^3 c^2 g^2 z^2 - 32 a^2 c^3 e^2 z^2 - 4 b^3 c^2 d^2 z^2 - 4 a^2 b^4 g^2 z^2 - 8 a^2 b^2 c d f g z + 32 a^2 c^2 d f g z - 16 a^2 b^2 c e g^2 z - 4 a^2 b^2 c e^2 g z - 16 a^2 b^2 c^2 d^2 g z + 4 a^2 b^2 c e f^2 z
\end{aligned}$$

$$\begin{aligned}
& *z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k) * a*c^2*e*f - 4*root(128*a^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 + 16*a*b^2*c^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2*z - 4*a*b^2*c*e^2*g*z - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k) * b^2*c*d*g + a*c*e*g^2*x + b*c*e*f^2*x - a*c*f^2*g*x - 2*b*c*e^2*g*x - 2*c^2*d*e*f*x + 10*root(128*a^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 + 16*a*b^2*c^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2*z - 4*a*b^2*c*e^2*g*z - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k) * a*b*c*g^2*x + 4*root(128*a^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 + 16*a*b^2*c^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2*z - 4*a*b^2*c*e^2*g*z - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z
\end{aligned}$$

$$\begin{aligned}
& e*z + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z \\
& - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g \\
& - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f \\
& + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 \\
& - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g^2 \\
& - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k)*b*c^2*d*f*x - 8*root(128*a^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 \\
& - 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 \\
& + 16*a*b^2*c^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 \\
& - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 \\
& - 4*b^3*c^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2*z \\
& - 4*a*b^2*c*e^2*g*z - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z \\
& - 4*b^2*c^2*d^2*e*z + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z \\
& - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g \\
& - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f \\
& + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 \\
& - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 \\
& - a^3*g^4 - c^3*d^4, z, k)*a*c^2*e*g*x - 32*root(128*a^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 \\
& - 128*a^2*b^2*c^2*g*z^3 + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 + 16*a*b^2*c^2*d*f*z^2 \\
& - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 \\
& - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 \\
& - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2*z - 4*a*b^2*c*e^2*g*z \\
& - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z \\
& + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g^3*z \\
& - 4*a*b*c*d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g \\
& - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f + 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f \\
& - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 \\
& - b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k)^2*a*b*c^2*g*x + 4*root(128*a^2*b^2*c^3*z^4 \\
& - 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 \\
& + 16*a*b^2*c^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^2 + 8*a*b^2*c^2*e^2*z^2 \\
& - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 \\
& - 4*b^3*c^2*d^2*z^2 - 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2*z - 4*a*b^2*c*e^2*g*z \\
& - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z \\
& + 4*b^3*c*d^2*g*z + 4*a*b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g^3*z - 4*a*b*c*d*e*f*g \\
& + 2*a*b*c*e^3*g +
\end{aligned}$$

$$\begin{aligned}
& 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2*c*d*f*g^2 + 2*b^2*c*d^2*e*g - 4*a* \\
& c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f + 3*a*b*c*d^2*g^2 + 2*a^2*b \\
& *e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c*e^2*g^2 - 2*a*c^2*d^2*f^2 \\
& - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - b*c^2*d^2*e^2 - b^3*d^2*g \\
& ^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z, k)*a*b*c*f*g)*\text{root}(128*a \\
& ^2*b^2*c^3*z^4 - 16*a*b^4*c^2*z^4 - 256*a^3*c^4*z^4 - 128*a^2*b^2*c^2*g*z^3 \\
& + 16*a*b^4*c*g*z^3 + 256*a^3*c^3*g*z^3 + 32*a^2*b*c^2*e*g*z^2 + 16*a*b^2*c \\
& ^2*d*f*z^2 - 8*a*b^3*c*e*g*z^2 + 40*a^2*b^2*c*g^2*z^2 + 16*a^2*b*c^2*f^2*z^ \\
& 2 + 8*a*b^2*c^2*e^2*z^2 - 64*a^2*c^3*d*f*z^2 - 4*a*b^3*c*f^2*z^2 + 16*a*b*c \\
& ^3*d^2*z^2 - 96*a^3*c^2*g^2*z^2 - 32*a^2*c^3*e^2*z^2 - 4*b^3*c^2*d^2*z^2 - \\
& 4*a*b^4*g^2*z^2 - 8*a*b^2*c*d*f*g*z + 32*a^2*c^2*d*f*g*z - 16*a^2*b*c*e*g^2 \\
& *z - 4*a*b^2*c*e^2*g*z - 16*a*b*c^2*d^2*g*z + 4*a*b^2*c*e*f^2*z + 16*a^2*c^ \\
& 2*e^2*g*z - 16*a^2*c^2*e*f^2*z - 4*b^2*c^2*d^2*e*z + 4*b^3*c*d^2*g*z + 4*a* \\
& b^3*e*g^2*z + 16*a*c^3*d^2*e*z + 16*a^3*c*g^3*z - 4*a^2*b^2*g^3*z - 4*a*b*c \\
& *d*e*f*g + 2*a*b*c*e^3*g + 2*a*b*c*d*f^3 + 4*a^2*c*e*f^2*g - 4*a^2*c*d*f*g^ \\
& 2 + 2*b^2*c*d^2*e*g - 4*a*c^2*d^2*e*g + 2*a*b^2*d*f*g^2 + 4*a*c^2*d*e^2*f + \\
& 3*a*b*c*d^2*g^2 + 2*a^2*b*e*g^3 + 2*b*c^2*d^3*f - a*b*c*e^2*f^2 - 2*a^2*c* \\
& e^2*g^2 - 2*a*c^2*d^2*f^2 - a^2*b*f^2*g^2 - b^2*c*d^2*f^2 - a*b^2*e^2*g^2 - \\
& b*c^2*d^2*e^2 - b^3*d^2*g^2 - a^2*c*f^4 - a*c^2*e^4 - a^3*g^4 - c^3*d^4, z \\
& , k), k, 1, 4)
\end{aligned}$$

### 3.23 $\int \frac{d+ex+fx^2+gx^3+hx^4}{a+bx^2+cx^4} dx$

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#### Optimal result

Integrand size = 35, antiderivative size = 290

$$\int \frac{d+ex+fx^2+gx^3+hx^4}{a+bx^2+cx^4} dx = \frac{hx}{c} + \frac{\left(cf - bh + \frac{2c^2d+b^2h-c(bf+2ah)}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{\sqrt{2}c^{3/2}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\left(cf - bh - \frac{2c^2d-bcf+b^2h-2ach}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{\sqrt{2}c^{3/2}\sqrt{b+\sqrt{b^2-4ac}}} - \frac{(2ce - bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{2c\sqrt{b^2-4ac}} + \frac{g \log(a+bx^2+cx^4)}{4c}$$

```
[Out] h*x/c+1/4*g*ln(c*x^4+b*x^2+a)/c-1/2*(-b*g+2*c*e)*arctanh((2*c*x^2+b)/(-4*a*c+b^2)^(1/2))/c/(-4*a*c+b^2)^(1/2)+1/2*arctan(x*2^(1/2)*c^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2))*(c*f-b*h+(2*c^2*d+b^2*h-c*(2*a*h+b*f)))/(-4*a*c+b^2)^(1/2)/c^(3/2)*2^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2)+1/2*arctan(x*2^(1/2)*c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2))*(c*f-b*h+(2*a*c*h-b^2*h+b*c*f-2*c^2*d)/(-4*a*c+b^2)^(1/2))/c^(3/2)*2^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2)
```

#### Rubi [A] (verified)

Time = 0.45 (sec) , antiderivative size = 290, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.257$ , Rules used

= {1687, 1690, 1180, 211, 1261, 648, 632, 212, 642}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{a + bx^2 + cx^4} dx = \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{-c(2ah+bf)+b^2h+2c^2d}{\sqrt{b^2-4ac}} - bh + cf\right)}{\sqrt{2}c^{3/2}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left(\frac{-2ach+b^2h-bcf+2c^2d}{\sqrt{b^2-4ac}} - bh + cf\right)}{\sqrt{2}c^{3/2}\sqrt{\sqrt{b^2-4ac}+b}} - \frac{(2ce - bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{2c\sqrt{b^2-4ac}} + \frac{g \log(a + bx^2 + cx^4)}{4c} + \frac{hx}{c}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(a + b\*x^2 + c\*x^4), x]

[Out] (h\*x)/c + ((c\*f - b\*h + (2\*c^2\*d + b^2\*h - c\*(b\*f + 2\*a\*h))/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]])/(Sqrt[2]\*c^(3/2)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + ((c\*f - b\*h - (2\*c^2\*d - b\*c\*f + b^2\*h - 2\*a\*c\*h)/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]])/(Sqrt[2]\*c^(3/2)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) - ((2\*c\*e - b\*g)\*ArcTanh[(b + 2\*c\*x^2)/Sqrt[b^2 - 4\*a\*c]])/(2\*c\*Sqrt[b^2 - 4\*a\*c]) + (g\*Log[a + b\*x^2 + c\*x^4])/(4\*c)

#### Rule 211

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

#### Rule 212

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

#### Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

#### Rule 642

Int[((d\_) + (e\_.)\*(x\_))/((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] := Simp[d\*(Log[RemoveContent[a + b\*x + c\*x^2, x]]/b), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[2\*c\*d - b\*e, 0]



Rule 648

```
Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] := Dist[(2*c*d - b*e)/(2*c), Int[1/(a + b*x + c*x^2), x], x] + Dist[e/(2*c), Int[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && !NiceSqrtQ[b^2 - 4*a*c]
```

Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2 - q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2 + c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

Rule 1261

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol] := Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]
```

Rule 1690

```
Int[(Pq_)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] := Int[ExpandIntegrand[Pq/(a + b*x^2 + c*x^4), x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^2] && Expon[Pq, x^2] > 1
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{x(e + gx^2)}{a + bx^2 + cx^4} dx + \int \frac{d + fx^2 + hx^4}{a + bx^2 + cx^4} dx \\
&= \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{a + bx + cx^2} dx, x, x^2 \right) + \int \left( \frac{h}{c} + \frac{cd - ah + (cf - bh)x^2}{c(a + bx^2 + cx^4)} \right) dx \\
&= \frac{hx}{c} + \frac{\int \frac{cd - ah + (cf - bh)x^2}{a + bx^2 + cx^4} dx}{c} + \frac{g \text{Subst} \left( \int \frac{b + 2cx}{a + bx + cx^2} dx, x, x^2 \right)}{4c} \\
&\quad + \frac{(2ce - bg) \text{Subst} \left( \int \frac{1}{a + bx + cx^2} dx, x, x^2 \right)}{4c}
\end{aligned}$$

$$\begin{aligned}
&= \frac{hx}{c} + \frac{g \log(a + bx^2 + cx^4)}{4c} - \frac{(2ce - bg) \text{Subst}\left(\int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2\right)}{2c} \\
&\quad + \frac{\left(cf - bh - \frac{2c^2d - bcf + b^2h - 2ach}{\sqrt{b^2 - 4ac}}\right) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{2c} \\
&\quad + \frac{\left(cf - bh + \frac{2c^2d + b^2h - c(bf + 2ah)}{\sqrt{b^2 - 4ac}}\right) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{2c} \\
&= \frac{hx}{c} + \frac{\left(cf - bh + \frac{2c^2d + b^2h - c(bf + 2ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{\sqrt{2}c^{3/2}\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\left(cf - bh - \frac{2c^2d - bcf + b^2h - 2ach}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{\sqrt{2}c^{3/2}\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad - \frac{(2ce - bg) \tanh^{-1}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{2c\sqrt{b^2 - 4ac}} + \frac{g \log(a + bx^2 + cx^4)}{4c}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.31 (sec) , antiderivative size = 383, normalized size of antiderivative = 1.32

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{a + bx^2 + cx^4} dx$$

$$= \frac{4\sqrt{c}hx + \frac{2\sqrt{2}(2c^2d + b(b - \sqrt{b^2 - 4ac})h + c(-bf + \sqrt{b^2 - 4ac}f - 2ah)) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{\sqrt{b^2 - 4ac}\sqrt{b - \sqrt{b^2 - 4ac}}} - \frac{2\sqrt{2}(2c^2d + b(b + \sqrt{b^2 - 4ac})h - c(bf + \sqrt{b^2 - 4ac}f - 2ah)) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{\sqrt{b^2 - 4ac}\sqrt{b + \sqrt{b^2 - 4ac}}}}{4c}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(a + b\*x^2 + c\*x^4),x]

[Out] (4\*sqrt[c]\*h\*x + (2\*sqrt[2]\*(2\*c^2\*d + b\*(b - sqrt[b^2 - 4\*a\*c]))\*h + c\*(-(b\*f) + sqrt[b^2 - 4\*a\*c]\*f - 2\*a\*h))\*ArcTan[(sqrt[2]\*sqrt[c]\*x)/sqrt[b - sqrt[b^2 - 4\*a\*c]]])/(sqrt[b^2 - 4\*a\*c]\*sqrt[b - sqrt[b^2 - 4\*a\*c]]) - (2\*sqrt[2]\*(2\*c^2\*d + b\*(b + sqrt[b^2 - 4\*a\*c]))\*h - c\*(b\*f + sqrt[b^2 - 4\*a\*c]\*f + 2\*a\*h))\*ArcTan[(sqrt[2]\*sqrt[c]\*x)/sqrt[b + sqrt[b^2 - 4\*a\*c]]])/(sqrt[b^2 - 4\*a\*c]\*sqrt[b + sqrt[b^2 - 4\*a\*c]]) + (sqrt[c]\*(2\*c\*e + (-b + sqrt[b^2 - 4\*a\*c]))\*g)\*Log[-b + sqrt[b^2 - 4\*a\*c] - 2\*c\*x^2])/sqrt[b^2 - 4\*a\*c] + (sqrt[c]\*(-2\*c\*e + (b + sqrt[b^2 - 4\*a\*c]))\*g)\*Log[b + sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2])/sqrt[b^2 - 4\*a\*c])/(4\*c^(3/2))

**Maple [C] (verified)**

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.10 (sec) , antiderivative size = 78, normalized size of antiderivative = 0.27

method	result
risch	$\frac{hx}{c} + \frac{\sum_{-R=\text{RootOf}(cZ^4+Z^2b+a)} \left( cg\_R^3 + (-bh+cf)\_R^2 + Rce-ah+cd \right) \ln(x-\_R)}{2c}$
default	$\frac{hx}{c} + \frac{\sqrt{-4ac+b^2} \left( \frac{(-\sqrt{-4ac+b^2} cg-gbc+2e c^2) \ln(2cx^2+\sqrt{-4ac+b^2}+b)}{4c} + \frac{(\sqrt{-4ac+b^2} bh - \sqrt{-4ac+b^2} fc - 2ach + b^2 h - fbc + 2c^2 d) \sqrt{2} \arctan\left(\frac{\sqrt{-4ac+b^2} x + b}{2\sqrt{(b+\sqrt{-4ac+b^2})c}}\right)}{2\sqrt{(b+\sqrt{-4ac+b^2})c}} \right)}{c(4ac-b^2)}$

[In] int((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x,method=\_RETURNVERBOSE)

[Out] h\*x/c+1/2/c\*sum((c\*g\*\_R^3+(-b\*h+c\*f)\*\_R^2+\_R\*c\*e-a\*h+c\*d)/(2\*\_R^3\*c+\_R\*b)\*ln(x-\_R),\_R=RootOf(\_Z^4\*c+\_Z^2\*b+a))

**Fricas [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{a + bx^2 + cx^4} dx = \text{Timed out}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="fricas")

[Out] Timed out

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{a + bx^2 + cx^4} dx = \text{Timed out}$$

[In] integrate((h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a),x)

[Out] Timed out

**Maxima [F]**

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{a + bx^2 + cx^4} dx = \int \frac{hx^4 + gx^3 + fx^2 + ex + d}{cx^4 + bx^2 + a} dx$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="maxima")

[Out] h\*x/c + integrate((c\*g\*x^3 + c\*e\*x + (c\*f - b\*h)\*x^2 + c\*d - a\*h)/(c\*x^4 + b\*x^2 + a), x)/c

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 5199 vs. 2(248) = 496.

Time = 1.47 (sec) , antiderivative size = 5199, normalized size of antiderivative = 17.93

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="giac")

[Out] h\*x/c + 1/4\*g\*log(abs(c\*x^4 + b\*x^2 + a))/c - 1/8\*((2\*b^4\*c^3 - 16\*a\*b^2\*c^4 + 32\*a^2\*c^5 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^4\*c + 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^2\*c^2 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3\*c^2 - 16\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*c^3 - 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^2\*c^3 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*c^4 - 2\*(b^2 - 4\*a\*c)\*b^2\*c^3 + 8\*(b^2 - 4\*a\*c)\*a\*c^4)\*c^2\*f - (2\*b^5\*c^2 - 16\*a\*b^3\*c^3 + 32\*a^2\*b\*c^4 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^5 + 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^3\*c + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^4\*c - 16\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*b\*c^2 - 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^2\*c^2 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3\*c^2 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c^3 - 2\*(b^2 - 4\*a\*c)\*b^3\*c^2 + 8\*(b^2 - 4\*a\*c)\*a\*b\*c^3)\*c^2\*h - 2\*(sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^4\*c^3 - 8\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^2\*c^4 - 2\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3\*c^4 - 2\*b^4\*c^4 + 16\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*c^5 + 8\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c^5 + sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^2\*c^5 + 16\*a\*b^2\*c^5 - 4\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*c^6 - 32\*a^2\*c^6 + 2\*(b^2 - 4\*a\*c)\*b^2\*c^4 - 8\*(b^2 - 4\*a\*c)\*a\*c^5)\*d\*abs(c) + 2\*(sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^4\*c^2 - 8\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*b^2\*c^3 - 2\*sq

$$\begin{aligned}
& \text{rt}(2) \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b^3 \cdot c^3 - 2 \cdot a \cdot b^4 \cdot c^3 + 16 \cdot \sqrt{2} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot a^3 \cdot c^4 + 8 \cdot \sqrt{2} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot a^2 \cdot b \cdot c^4 + \sqrt{2} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b^2 \cdot c^4 + 16 \cdot a^2 \cdot b^2 \cdot c^4 - 4 \cdot \sqrt{2} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot a^2 \cdot c^5 - 32 \cdot a^3 \cdot c^5 + 2 \cdot (b^2 - 4ac) \cdot a \cdot b^2 \cdot c^3 - 8 \cdot (b^2 - 4ac) \cdot a^2 \cdot c^4 \cdot h \cdot \text{abs}(c) + 2 \cdot (2 \cdot b^3 \cdot c^6 - 8 \cdot a \cdot b \cdot c^7 - \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c) \cdot b^3 \cdot c^4 + 4 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b \cdot c^5 + 2 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot b^2 \cdot c^5 - \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot b \cdot c^6 - 2 \cdot (b^2 - 4ac) \cdot b \cdot c^6 \cdot d - (2 \cdot b^4 \cdot c^5 - 8 \cdot a \cdot b^2 \cdot c^6 - \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c) \cdot b^4 \cdot c^3 + 4 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b^2 \cdot c^4 + 2 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot b^3 \cdot c^4 - \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot b^2 \cdot c^5 - 2 \cdot (b^2 - 4ac) \cdot b^2 \cdot c^5 \cdot f + (2 \cdot b^5 \cdot c^4 - 12 \cdot a \cdot b^3 \cdot c^5 + 16 \cdot a^2 \cdot b \cdot c^6 - \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c) \cdot b^5 \cdot c^2 + 6 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b^3 \cdot c^3 + 2 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot b^4 \cdot c^3 - 8 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot a^2 \cdot b \cdot c^4 - 4 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b^2 \cdot c^4 - \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot b^3 \cdot c^4 + 2 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c + \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b \cdot c^5 - 2 \cdot (b^2 - 4ac) \cdot b^3 \cdot c^4 + 4 \cdot (b^2 - 4ac) \cdot a \cdot b \cdot c^5 \cdot h \cdot \arctan(2 \cdot \sqrt{2} \cdot \sqrt{1/2} \cdot x / \sqrt{(b \cdot c^3 + \sqrt{b^2 \cdot c^6 - 4ac^7}) / c^4}) / ((a \cdot b^4 \cdot c^3 - 8 \cdot a^2 \cdot b^2 \cdot c^4 - 2 \cdot a \cdot b^3 \cdot c^4 + 16 \cdot a^3 \cdot c^5 + 8 \cdot a^2 \cdot b \cdot c^5 + a \cdot b^2 \cdot c^5 - 4 \cdot a^2 \cdot c^6) \cdot c^2) + 1/8 \cdot ((2 \cdot b^4 \cdot c^3 - 16 \cdot a \cdot b^2 \cdot c^4 + 32 \cdot a^2 \cdot c^5 - \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c) \cdot b^4 \cdot c + 8 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c) \cdot a \cdot b^2 \cdot c^2 + 2 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot b^3 \cdot c^2 - 16 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot a^2 \cdot c^3 - 8 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b \cdot c^3 - \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot b^2 \cdot c^3 + 4 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot c^4 - 2 \cdot (b^2 - 4ac) \cdot b^2 \cdot c^3 + 8 \cdot (b^2 - 4ac) \cdot a \cdot c^4 \cdot c^2 \cdot f - (2 \cdot b^5 \cdot c^2 - 16 \cdot a \cdot b^3 \cdot c^3 + 32 \cdot a^2 \cdot b \cdot c^4 - \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c) \cdot b^5 + 8 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b^3 \cdot c + 2 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot b^4 \cdot c - 16 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot a^2 \cdot b \cdot c^2 - 8 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b^2 \cdot c^2 - \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot b^3 \cdot c^2 + 4 \cdot \sqrt{2} \cdot \sqrt{b^2 - 4ac} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b \cdot c^3 - 2 \cdot (b^2 - 4ac) \cdot b^3 \cdot c^2 + 8 \cdot (b^2 - 4ac) \cdot a \cdot b \cdot c^3 \cdot c^2 \cdot h + 2 \cdot (\sqrt{2} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c) \cdot b^4 \cdot c^3 - 8 \cdot \sqrt{2} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b^2 \cdot c^4 - 2 \cdot \sqrt{2} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot b^3 \cdot c^4 + 2 \cdot b^4 \cdot c^4 + 16 \cdot \sqrt{2} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot a^2 \cdot c^5 + 8 \cdot \sqrt{2} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot b \cdot c^5 + \sqrt{2} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot b^2 \cdot c^5 - 16 \cdot a \cdot b^2 \cdot c^5 - 4 \cdot \sqrt{2} \cdot \sqrt{b \cdot c - \sqrt{b^2 - 4ac}} \cdot c \cdot a \cdot c^6 + 32 \cdot a^2 \cdot c^6 - 2 \cdot (b^2 -
\end{aligned}$$

$$\begin{aligned}
& 4*a*c)*b^2*c^4 + 8*(b^2 - 4*a*c)*a*c^5)*d*abs(c) - 2*(sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a*b^4*c^2 - 8*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a^2*b^2*c^3 - 2*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a*b^3*c^3 + 2*a*b^4*c^3 + 16*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a^3*c^4 + 8*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a^2*b*c^4 + sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a*b^2*c^4 - 16*a^2*b^2*c^4 - 4*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a^2*c^5 + 32*a^3*c^5 - 2*(b^2 - 4*a*c)*a*b^2*c^3 + 8*(b^2 - 4*a*c)*a^2*c^4)*h*abs(c) + 2*(2*b^3*c^6 - 8*a*b*c^7 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b^3*c^4 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a*b*c^5 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b^2*c^5 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b*c^6 - 2*(b^2 - 4*a*c)*b*c^6)*d - (2*b^4*c^5 - 8*a*b^2*c^6 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b^4*c^3 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a*b^2*c^4 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b^3*c^4 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b^2*c^5 - 2*(b^2 - 4*a*c)*b^2*c^5)*f + (2*b^5*c^4 - 12*a*b^3*c^5 + 16*a^2*b*c^6 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b^5*c^2 + 6*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a*b^3*c^3 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b^4*c^3 - 8*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a^2*b*c^4 - 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a*b^2*c^4 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*b^3*c^4 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c)*a*b*c^5 - 2*(b^2 - 4*a*c)*b^3*c^4 + 4*(b^2 - 4*a*c)*a*b*c^5)*h)*arctan(2*sqrt(1/2)*x/sqrt((b*c^3 - sqrt(b^2*c^6 - 4*a*c^7))/c^4))/((a*b^4*c^3 - 8*a^2*b^2*c^4 - 2*a*b^3*c^4 + 16*a^3*c^5 + 8*a^2*b*c^5 + a*b^2*c^5 - 4*a^2*c^6)*c^2) + 1/16*(2*(b^5*c - 8*a*b^3*c^2 - 2*b^4*c^2 + 16*a^2*b*c^3 + 8*a*b^2*c^3 + b^3*c^3 - 4*a*b*c^4 - (b^4*c - 8*a*b^2*c^2 - 2*b^3*c^2 + 16*a^2*c^3 + 8*a*b*c^3 + b^2*c^3 - 4*a*c^4)*sqrt(b^2 - 4*a*c))*e*abs(c) - (b^6 - 8*a*b^4*c - 2*b^5*c + 16*a^2*b^2*c^2 + 8*a*b^3*c^2 + b^4*c^2 - 4*a*b^2*c^3 + (b^5 - 8*a*b^3*c - 2*b^4*c + 16*a^2*b*c^2 + 8*a*b^2*c^2 + b^3*c^2 - 4*a*b*c^3)*sqrt(b^2 - 4*a*c))*g*abs(c) - 2*(b^5*c^2 - 8*a*b^3*c^3 - 2*b^4*c^3 + 16*a^2*b*c^4 + 8*a*b^2*c^4 + b^3*c^4 - 4*a*b*c^5 + (b^4*c^2 - 4*a*b^2*c^3 - 2*b^3*c^3 + b^2*c^4)*sqrt(b^2 - 4*a*c))*e + (b^6*c - 8*a*b^4*c^2 - 2*b^5*c^2 + 16*a^2*b^2*c^3 + 8*a*b^3*c^3 + b^4*c^3 - 4*a*b^2*c^4 + (b^5*c - 4*a*b^3*c^2 - 2*b^4*c^2 + b^3*c^3)*sqrt(b^2 - 4*a*c))*g)*log(x^2 + 1/2*(b*c^3 + sqrt(b^2*c^6 - 4*a*c^7))/c^4))/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2*abs(c)) + 1/16*(2*(b^5*c - 8*a*b^3*c^2 - 2*b^4*c^2 + 16*a^2*b*c^3 + 8*a*b^2*c^3 + b^3*c^3 - 4*a*b*c^4 + (b^4*c - 8*a*b^2*c^2 - 2*b^3*c^2 + 16*a^2*c^3 + 8*a*b*c^3 + b^2*c^3 - 4*a*c^4)*sqrt(b^2 - 4*a*c))*e*abs(c) - (b^6 - 8*a*b^4*c - 2*b^5*c + 16*a^2*b^2*c^2 + 8*a*b^3*c^2 + b^4*c^2 - 4*a*b^2*c^3 - (b^5 - 8*a*b^3*c - 2*b^4*c + 16*a^2*b*c^2 + 8*a*b^2*c^2 + b^3*c^2 - 4*a*b*c^3)*sqrt(b^2 - 4*a*c))*g*abs(c) - 2*(b^5*c^2 - 8*a*b^3*c^3 - 2*b^4*c^3 + 16*a^2*b*c^4 + 8*a*b^2*c^4 + b^3*c^4 - 4*a*b*c^5 + (b^4*c^2 - 4*a*b^2*c^3 - 2*b^3*c^3 + b^2*c^4)*sqrt(b^2 - 4*a*c))*e + (b^
\end{aligned}$$

$6*c - 8*a*b^4*c^2 - 2*b^5*c^2 + 16*a^2*b^2*c^3 + 8*a*b^3*c^3 + b^4*c^3 - 4*a*b^2*c^4 - (b^5*c - 4*a*b^3*c^2 - 2*b^4*c^2 + b^3*c^3)*\text{sqrt}(b^2 - 4*a*c)) * g) * \log(x^2 + 1/2*(b*c^3 - \text{sqrt}(b^2*c^6 - 4*a*c^7))/c^4) / ((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2*\text{abs}(c))$

## Mupad [B] (verification not implemented)

Time = 8.47 (sec) , antiderivative size = 5981, normalized size of antiderivative = 20.62

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

[In] `int((d + e*x + f*x^2 + g*x^3 + h*x^4)/(a + b*x^2 + c*x^4),x)`

[Out] `symsum(log((x*(c^3*e^3 + c^3*d^2*g + b^3*e*h^2 - a*b*c*g^3 - 2*c^3*d*e*f + a*c^2*e*g^2 + b*c^2*e*f^2 - a*c^2*f^2*g - 2*b*c^2*e^2*g + b^2*c*e*g^2 - a*b^2*g*h^2 + a^2*c*g*h^2 - 2*a*b*c*e*h^2 + 2*b*c^2*d*e*h - 2*a*c^2*d*g*h + 2*a*c^2*e*f*h - 2*b^2*c*e*f*h + 2*a*b*c*f*g*h))/c - root(128*a^2*b^2*c^4*z^4 - 16*a*b^4*c^3*z^4 - 256*a^3*c^5*z^4 - 128*a^2*b^2*c^3*g*z^3 + 16*a*b^4*c^2*g*z^3 + 256*a^3*c^4*g*z^3 + 32*a^2*b*c^3*e*g*z^2 + 32*a^2*b*c^3*d*h*z^2 - 8*a*b^3*c^2*e*g*z^2 - 8*a*b^3*c^2*d*h*z^2 + 16*a*b^2*c^3*d*f*z^2 + 8*a*b^4*c*f*h*z^2 - 48*a^2*b^2*c^2*f*h*z^2 - 48*a^3*b*c^2*h^2*z^2 + 28*a^2*b^3*c*h^2*z^2 + 16*a^2*b*c^3*f^2*z^2 - 4*a*b^3*c^2*f^2*z^2 + 8*a*b^2*c^3*e^2*z^2 + 64*a^3*c^3*f*h*z^2 - 64*a^2*c^4*d*f*z^2 - 4*a*b^4*c*g^2*z^2 + 16*a*b*c^4*d^2*z^2 + 40*a^2*b^2*c^2*g^2*z^2 - 96*a^3*c^3*g^2*z^2 - 32*a^2*c^4*e^2*z^2 - 4*b^3*c^3*d^2*z^2 - 4*a*b^5*h^2*z^2 + 8*a^2*b^2*c*f*g*h*z + 32*a^2*b*c^2*e*f*h*z - 8*a*b^2*c^2*d*f*g*z + 8*a*b^2*c^2*d*e*h*z - 8*a*b^3*c*e*f*h*z - 20*a^2*b^2*c*e*h^2*z - 16*a^2*b*c^2*e*g^2*z - 4*a*b^2*c^2*e^2*g*z + 4*a*b^2*c^2*e*f^2*z - 32*a^3*c^2*f*g*h*z + 32*a^2*c^3*d*f*g*z - 32*a^2*c^3*d*e*h*z + 16*a^3*b*c*g*h^2*z + 4*a*b^3*c*e*g^2*z - 16*a*b*c^3*d^2*g*z - 4*a^2*b^3*g*h^2*z + 16*a^3*c^2*e*h^2*z + 16*a^2*c^3*e^2*g*z + 4*b^3*c^2*d^2*g*z - 16*a^2*c^3*e*f^2*z - 4*b^2*c^3*d^2*e*z - 4*a^2*b^2*c*g^3*z + 4*a*b^4*e*h^2*z + 16*a*c^4*d^2*e*z + 16*a^3*c^2*g^3*z - 4*a^2*b*c*e*f*g*h - 4*a*b*c^2*d*e*f*g + 8*a^2*c^2*d*e*g*h - 2*a^2*b*c*d*g^2*h + 2*a*b^2*c*e^2*f*h - 4*a*b^2*c*d*f^2*h - 2*a^2*b*c*d*f*h^2 - 2*a*b*c^2*d^2*f*h + 2*a*b^2*c*d*f*g^2 - 2*a*b*c^2*d*e^2*h - 4*a^2*c^2*e^2*f*h + 2*a^2*b^2*e*g*h^2 + 4*a^2*c^2*e*f^2*g + 4*a^2*c^2*d*f^2*h - 4*a^2*c^2*d*f*g^2 + 2*b^2*c^2*d^2*e*g + 3*a^2*b*c*e^2*h^2 + 4*a*b^2*c*d^2*h^2 + 3*a*b*c^2*d^2*g^2 + 4*a^3*c*f*g^2*h - 4*a^3*c*e*g*h^2 + 2*b^3*c*d^2*f*h + 2*a*b^3*d*f*h^2 - 4*a*c^3*d^2*e*g + 2*a^2*b*c*f^3*h + 4*a*c^3*d*e^2*f + 2*a^2*b*c*e*g^3 + 2*a*b*c^2*e^3*g + 2*a*b*c^2*d*f^3 + 2*a^3*b*f*h^3 + 4*a^3*c*d*h^3 + 4*a*c^3*d^3*h + 2*b*c^3*d^3*f - a^2*b*c*f^2*g^2 - a*b^2*c*e^2*g^2 - a*b*c^2*e^2*f^2 - 6*a^2*c^2*d^2*h^2 - 2*a^2*c^2*e^2*g^2 - 2*a^3*c*f^2*h^2 - 2*b^2*c^2*d^3*h - 2*a^2*b^2*d*h^3 - 2*a*c^3*d^2*f^2 - a^2*b^2*f^2*h^2 - b^2*c^2*d^2*f^2 - a^3*b*g^2*h^2 - b^3*c*d^2*g^2 - a*b^3*`

$$\begin{aligned}
& e^2 h^2 - b^3 c^3 d^2 e^2 - b^4 d^2 h^2 - a^2 c^2 f^4 - a^3 c^3 g^4 - a^3 c^3 e^4 \\
& - a^4 h^4 - c^4 d^4, z, k) \cdot (\text{root}(128 a^2 b^2 c^4 z^4 - 16 a^3 b^4 c^3 z^4 - \\
& 256 a^3 c^5 z^4 - 128 a^2 b^2 c^3 g z^3 + 16 a^3 b^4 c^2 g z^3 + 256 a^3 c^4 g z^3 \\
& + 32 a^2 b^3 c^3 e g z^2 + 32 a^2 b^3 c^3 d h z^2 - 8 a^3 b^3 c^2 e g z^2 - \\
& 8 a^3 b^3 c^2 d h z^2 + 16 a^3 b^2 c^3 d f z^2 + 8 a^3 b^4 c^3 f h z^2 - 48 a^2 b^2 c^2 f h z^2 \\
& - 48 a^3 b^3 c^2 h^2 z^2 + 28 a^2 b^3 c^3 h^2 z^2 + 16 a^2 b^3 c^3 f^2 z^2 - 4 a^3 b^3 c^2 f^2 z^2 \\
& + 8 a^3 b^2 c^3 e^2 z^2 + 64 a^3 c^3 f h z^2 - 64 a^2 c^4 d f z^2 - 4 a^3 b^4 c^3 g^2 z^2 \\
& + 16 a^3 b^3 c^4 d^2 z^2 + 40 a^2 b^2 c^2 g^2 z^2 - 96 a^3 c^3 g^2 z^2 - 32 a^2 c^4 e^2 z^2 \\
& - 4 b^3 c^3 d^2 z^2 - 4 a^3 b^5 h^2 z^2 + 8 a^2 b^2 c^3 f g h z + 32 a^2 b^3 c^2 e f h z \\
& - 8 a^3 b^2 c^2 d f g z + 8 a^3 b^2 c^2 d e h z - 8 a^3 b^3 c^2 e f h z - 20 a^2 b^2 c^2 e h^2 z \\
& - 16 a^2 b^3 c^2 e g^2 z - 4 a^3 b^2 c^2 e^2 g z + 4 a^3 b^2 c^2 e f^2 z - 32 a^3 c^3 f g h z \\
& + 32 a^2 c^3 d f g z - 32 a^2 c^3 d e h z + 16 a^3 b^3 c^3 g h^2 z + 4 a^3 b^3 c^3 e g^2 z \\
& - 16 a^3 b^3 c^3 d^2 g z - 4 a^2 b^3 c^3 g h^2 z + 16 a^3 c^3 e h^2 z + 16 a^2 c^3 e^2 g z \\
& + 4 b^3 c^3 d^2 g z - 16 a^2 c^3 e f^2 z - 4 b^2 c^3 d^2 e z - 4 a^2 b^2 c^3 g^3 z \\
& + 4 a^3 b^4 e h^2 z + 16 a^3 c^4 d^2 e z + 16 a^3 c^2 g^3 z - 4 a^2 b^3 c^3 e f g h \\
& - 4 a^3 b^3 c^2 d e f g + 8 a^2 c^2 d e g h - 2 a^2 b^3 c^3 d g^2 h + 2 a^3 b^2 c^3 e^2 f h \\
& - 4 a^3 b^2 c^3 d f^2 h - 2 a^2 b^3 c^3 d f h^2 - 2 a^3 b^3 c^2 d^2 f h + 2 a^3 b^2 c^3 d^2 e f h \\
& + 2 a^3 b^2 c^3 d e^2 h - 4 a^2 c^2 e^2 f h + 2 a^2 b^2 c^3 e g h^2 + 4 a^2 c^2 e f^2 g \\
& + 4 a^2 c^2 d f^2 h - 4 a^2 c^2 d d f g^2 + 2 b^2 c^2 d^2 e g + 3 a^2 b^3 c^3 e^2 h^2 \\
& + 4 a^3 b^2 c^3 d^2 h^2 + 3 a^3 b^3 c^2 d^2 g^2 + 4 a^3 c^3 f g^2 h - 4 a^3 c^3 e g h^2 \\
& + 2 b^3 c^3 d^2 f h + 2 a^3 b^3 d f h^2 - 4 a^3 c^3 d^2 e g + 2 a^2 b^3 c^3 f^3 h \\
& + 4 a^3 c^3 d e^2 f + 2 a^2 b^3 c^3 e g^3 + 2 a^3 b^3 c^2 e^3 g + 2 a^3 b^3 c^2 d f^3 \\
& + 2 a^3 b^3 f h^3 + 4 a^3 c^3 d h^3 + 4 a^3 c^3 d^3 f - a^2 b^3 c^3 f^2 g^2 - a^3 b^2 c^3 e^2 g^2 \\
& - a^3 b^3 c^2 e^2 f^2 - 6 a^2 c^2 d^2 h^2 - 2 a^2 c^2 e^2 g^2 - 2 a^3 c^3 f^2 h^2 - 2 b^2 c^2 d^3 h \\
& - 2 a^2 b^2 d^3 h^3 - 2 a^3 c^3 d^2 f^2 - a^2 b^2 f^2 h^2 - b^2 c^2 d^2 f^2 \\
& - a^3 b^3 g^2 h^2 - b^3 c^3 d^2 g^2 - a^3 b^3 e^2 h^2 - b^3 c^3 d^2 e^2 - b^4 d^2 h^2 \\
& - a^2 c^2 f^4 - a^3 c^3 g^4 - a^3 c^3 e^4 - a^4 h^4 - c^4 d^4, z, k) \cdot ((x(4 b^2 c^3 e \\
& - 8 b^3 c^2 g - 16 a^3 c^4 e + 32 a^3 b^3 c^3 g))/c - (4 b^2 c^3 d + 16 a^2 c^3 h \\
& - 16 a^3 c^4 d - 4 a^3 b^2 c^2 h)/c + (\text{root}(128 a^2 b^2 c^4 z^4 - 16 a^3 b^4 c^3 z^4 \\
& - 256 a^3 c^5 z^4 - 128 a^2 b^2 c^3 g z^3 + 16 a^3 b^4 c^2 g z^3 + 256 a^3 c^4 g z^3 \\
& + 32 a^2 b^3 c^3 e g z^2 + 32 a^2 b^3 c^3 d h z^2 - 8 a^3 b^3 c^2 e g z^2 - 8 a^3 b^3 c^2 d h z^2 \\
& + 16 a^3 b^2 c^3 d f z^2 + 8 a^3 b^4 c^3 f h z^2 - 48 a^2 b^2 c^2 f h z^2 - 48 a^3 b^3 c^2 h^2 z^2 \\
& + 28 a^2 b^3 c^3 h^2 z^2 + 16 a^2 b^3 c^3 f^2 z^2 - 4 a^3 b^3 c^2 f^2 z^2 + 8 a^3 b^2 c^3 e^2 z^2 \\
& + 64 a^3 c^3 f h z^2 - 64 a^2 c^4 d f z^2 - 4 a^3 b^4 c^3 g^2 z^2 + 16 a^3 b^3 c^4 d^2 z^2 \\
& + 40 a^2 b^2 c^2 g^2 z^2 - 96 a^3 c^3 g^2 z^2 - 32 a^2 c^4 e^2 z^2 - 4 b^3 c^3 d^2 z^2 \\
& - 4 a^3 b^5 h^2 z^2 + 8 a^2 b^2 c^3 f g h z + 32 a^2 b^3 c^2 e f h z - 8 a^3 b^2 c^2 d f g z \\
& + 8 a^3 b^2 c^2 d e h z - 8 a^3 b^3 c^2 e f h z - 20 a^2 b^2 c^2 e h^2 z - 16 a^2 b^3 c^2 e g^2 z \\
& - 4 a^3 b^2 c^2 e^2 g z + 4 a^3 b^2 c^2 e f^2 z - 32 a^3 c^3 f g h z + 32 a^2 c^3 d f g z \\
& - 32 a^2 c^3 d e h z + 16 a^3 b^3 c^3 g h^2 z + 4 a^3 b^3 c^3 e g^2 z - 16 a^3 b^3 c^3 d^2 g z \\
& - 4 a^2 b^3 c^3 g h^2 z + 16 a^3 c^3 e h^2 z + 16 a^2 c^3 e^2 g z + 4 b^3 c^2 d^2 g z \\
& - 16 a^2 c^3 e f^2 z - 4 b^2 c^3 d^2 e z - 4 a^2 b^2 c^3 g^3 z + 4 a^3 b^4 e
\end{aligned}$$





$$\begin{aligned}
& a^3c^3d^3h + 2b^3c^3d^3f - a^2b^2c^2f^2g^2 - a^2b^2c^2e^2g^2 - a^2b^2c^2e^2f^2 \\
& - 6a^2c^2d^2h^2 - 2a^2c^2e^2g^2 - 2a^3c^2f^2h^2 - 2b^2c^2d^2h^3 \\
& - 2a^2b^2d^2h^3 - 2a^3c^2d^2f^2 - a^2b^2f^2h^2 - b^2c^2d^2f^2 \\
& - a^3b^2g^2h^2 - b^3c^2d^2g^2 - a^2b^3e^2h^2 - b^3c^2d^2e^2 - b^4d^2h^2 \\
& - a^2c^2f^4 - a^3c^2g^4 - a^3c^2e^4 - a^4h^4 - c^4d^4, z, k), k \\
& , 1, 4) + (h*x)/c
\end{aligned}$$

$$3.24 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{a+bx^2+cx^4} dx$$

Optimal result	203
Rubi [A] (verified)	204
Mathematica [A] (verified)	207
Maple [C] (verified)	207
Fricas [F(-1)]	208
Sympy [F(-1)]	208
Maxima [F]	209
Giac [B] (verification not implemented)	209
Mupad [B] (verification not implemented)	212

### Optimal result

Integrand size = 40, antiderivative size = 321

$$\begin{aligned} & \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{a+bx^2+cx^4} dx \\ &= \frac{hx}{c} + \frac{ix^2}{2c} + \frac{\left(cf - bh + \frac{2c^2d+b^2h-c(bf+2ah)}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{\sqrt{2}c^{3/2}\sqrt{b-\sqrt{b^2-4ac}}} \\ &+ \frac{\left(cf - bh - \frac{2c^2d-bcf+b^2h-2ach}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{\sqrt{2}c^{3/2}\sqrt{b+\sqrt{b^2-4ac}}} \\ &- \frac{(2c^2e - bcg + b^2i - 2aci) \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{2c^2\sqrt{b^2-4ac}} + \frac{(cg - bi) \log(a + bx^2 + cx^4)}{4c^2} \end{aligned}$$

```
[Out] h*x/c+1/2*i*x^2/c+1/4*(-b*i+c*g)*ln(c*x^4+b*x^2+a)/c^2-1/2*(-2*a*c*i+b^2*i-
b*c*g+2*c^2*e)*arctanh((2*c*x^2+b)/(-4*a*c+b^2)^(1/2))/c^2/(-4*a*c+b^2)^(1/
2)+1/2*arctan(x*2^(1/2)*c^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2))*(c*f-b*h+(2*c
^2*d+b^2*h-c*(2*a*h+b*f))/(-4*a*c+b^2)^(1/2))/c^(3/2)*2^(1/2)/(b-(-4*a*c+b
^2)^(1/2))^(1/2)+1/2*arctan(x*2^(1/2)*c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2))*
(c*f-b*h+(2*a*c*h-b^2*h+b*c*f-2*c^2*d)/(-4*a*c+b^2)^(1/2))/c^(3/2)*2^(1/2)/
(b+(-4*a*c+b^2)^(1/2))^(1/2)
```

**Rubi [A] (verified)**

Time = 0.30 (sec) , antiderivative size = 321, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.250$ , Rules used = {1687, 1690, 1180, 211, 1677, 1671, 648, 632, 212, 642}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{a + bx^2 + cx^4} dx$$

$$= \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{-c(2ah+bf)+b^2h+2c^2d}{\sqrt{b^2-4ac}} - bh + cf\right)}{\sqrt{2}c^{3/2}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left(-\frac{2ach+b^2h-bcf+2c^2d}{\sqrt{b^2-4ac}} - bh + cf\right)}{\sqrt{2}c^{3/2}\sqrt{\sqrt{b^2-4ac}+b}} - \frac{\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right) (-2aci + b^2i - bcg + 2c^2e)}{2c^2\sqrt{b^2-4ac}} + \frac{(cg - bi) \log(a + bx^2 + cx^4)}{4c^2} + \frac{hx}{c} + \frac{ix^2}{2c}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(a + b\*x^2 + c\*x^4),x]

[Out] (h\*x)/c + (i\*x^2)/(2\*c) + ((c\*f - b\*h + (2\*c^2\*d + b^2\*h - c\*(b\*f + 2\*a\*h))/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]])/(Sqrt[2]\*c^(3/2)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + ((c\*f - b\*h - (2\*c^2\*d - b\*c\*f + b^2\*h - 2\*a\*c\*h)/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]])/(Sqrt[2]\*c^(3/2)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) - ((2\*c^2\*e - b\*c\*g + b^2\*i - 2\*a\*c\*i)\*ArcTanh[(b + 2\*c\*x^2)/Sqrt[b^2 - 4\*a\*c]])/(2\*c^2\*Sqrt[b^2 - 4\*a\*c]) + ((c\*g - b\*i)\*Log[a + b\*x^2 + c\*x^4])/(4\*c^2)

Rule 211

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

Rule 212

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

Rule 642

```
Int[((d_) + (e_)*(x_))/((a_) + (b_)*(x_) + (c_)*(x_)^2), x_Symbol] := S
imp[d*(Log[RemoveContent[a + b*x + c*x^2, x]]/b), x] /; FreeQ[{a, b, c, d,
e}, x] && EqQ[2*c*d - b*e, 0]
```

Rule 648

```
Int[((d_) + (e_)*(x_))/((a_) + (b_)*(x_) + (c_)*(x_)^2), x_Symbol] := D
ist[(2*c*d - b*e)/(2*c), Int[1/(a + b*x + c*x^2), x], x] + Dist[e/(2*c), In
t[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && !NiceSqrtQ[b^2 - 4*a*c]
```

Rule 1180

```
Int[((d_) + (e_)*(x_)^2)/((a_) + (b_)*(x_)^2 + (c_)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

Rule 1671

```
Int[(Pq_)*((a_) + (b_)*(x_) + (c_)*(x_)^2)^(p_), x_Symbol] := Int[Expand
Integrand[Pq*(a + b*x + c*x^2)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq
, x] && IGtQ[p, -2]
```

Rule 1677

```
Int[(Pq_)*(x_)^(m_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] :
> Dist[1/2, Subst[Int[x^((m - 1)/2)*SubstFor[x^2, Pq, x]*(a + b*x + c*x^2)^
p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x^2] && IntegerQ[
(m - 1)/2]
```

Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]* (a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]* (a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

Rule 1690

```
Int[(Pq_)/((a_) + (b_)*(x_)^2 + (c_)*(x_)^4), x_Symbol] := Int[ExpandInte
grand[Pq/(a + b*x^2 + c*x^4), x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^
```

2] &amp;&amp; Expon[Pq, x^2] &gt; 1

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d + fx^2 + hx^4}{a + bx^2 + cx^4} dx + \int \frac{x(e + gx^2 + ix^4)}{a + bx^2 + cx^4} dx \\
&= \frac{1}{2} \text{Subst} \left( \int \frac{e + gx + ix^2}{a + bx + cx^2} dx, x, x^2 \right) + \int \left( \frac{h}{c} + \frac{cd - ah + (cf - bh)x^2}{c(a + bx^2 + cx^4)} \right) dx \\
&= \frac{hx}{c} + \frac{1}{2} \text{Subst} \left( \int \left( \frac{i}{c} + \frac{ce - ai + (cg - bi)x}{c(a + bx + cx^2)} \right) dx, x, x^2 \right) + \frac{\int \frac{cd - ah + (cf - bh)x^2}{a + bx^2 + cx^4} dx}{c} \\
&= \frac{hx}{c} + \frac{ix^2}{2c} + \frac{\text{Subst} \left( \int \frac{ce - ai + (cg - bi)x}{a + bx + cx^2} dx, x, x^2 \right)}{2c} \\
&\quad + \frac{\left( cf - bh - \frac{2c^2d - bcf + b^2h - 2ach}{\sqrt{b^2 - 4ac}} \right) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{2c} \\
&\quad + \frac{\left( cf - bh + \frac{2c^2d + b^2h - c(bf + 2ah)}{\sqrt{b^2 - 4ac}} \right) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{2c} \\
&= \frac{hx}{c} + \frac{ix^2}{2c} + \frac{\left( cf - bh + \frac{2c^2d + b^2h - c(bf + 2ah)}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{\sqrt{2}c^{3/2}\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\left( cf - bh - \frac{2c^2d - bcf + b^2h - 2ach}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{\sqrt{2}c^{3/2}\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{(cg - bi) \text{Subst} \left( \int \frac{b + 2cx}{a + bx + cx^2} dx, x, x^2 \right)}{4c^2} \\
&\quad + \frac{(2c^2e - bcg + b^2i - 2aci) \text{Subst} \left( \int \frac{1}{a + bx + cx^2} dx, x, x^2 \right)}{4c^2} \\
&= \frac{hx}{c} + \frac{ix^2}{2c} + \frac{\left( cf - bh + \frac{2c^2d + b^2h - c(bf + 2ah)}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{\sqrt{2}c^{3/2}\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\left( cf - bh - \frac{2c^2d - bcf + b^2h - 2ach}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{\sqrt{2}c^{3/2}\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{(cg - bi) \log(a + bx^2 + cx^4)}{4c^2} \\
&\quad - \frac{(2c^2e - bcg + b^2i - 2aci) \text{Subst} \left( \int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2 \right)}{2c^2}
\end{aligned}$$

$$\begin{aligned}
&= \frac{hx}{c} + \frac{ix^2}{2c} + \frac{\left(cf - bh + \frac{2c^2d + b^2h - c(bf + 2ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{\sqrt{2}c^{3/2}\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\left(cf - bh - \frac{2c^2d - bcf + b^2h - 2ach}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{\sqrt{2}c^{3/2}\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad - \frac{(2c^2e - bcg + b^2i - 2aci) \tanh^{-1}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{2c^2\sqrt{b^2 - 4ac}} + \frac{(cg - bi) \log(a + bx^2 + cx^4)}{4c^2}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.39 (sec) , antiderivative size = 441, normalized size of antiderivative = 1.37

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{a + bx^2 + cx^4} dx$$

$$= \frac{4chx + 2cix^2 + \frac{2\sqrt{2}\sqrt{c}(2c^2d + b(b - \sqrt{b^2 - 4ac})h + c(-bf + \sqrt{b^2 - 4ac}f - 2ah)) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{\sqrt{b^2 - 4ac}\sqrt{b - \sqrt{b^2 - 4ac}}} - \frac{2\sqrt{2}\sqrt{c}(2c^2d + b(b + \sqrt{b^2 - 4ac})h + c(bf + \sqrt{b^2 - 4ac}f + 2ah)) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{\sqrt{b^2 - 4ac}\sqrt{b + \sqrt{b^2 - 4ac}}} - \frac{(2c^2e - bcg + b^2i - 2aci) \tanh^{-1}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{2c^2\sqrt{b^2 - 4ac}} + \frac{(cg - bi) \log(a + bx^2 + cx^4)}{4c^2}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(a + b\*x^2 + c\*x^4),x]

[Out] (4\*c\*h\*x + 2\*c\*i\*x^2 + (2\*sqrt[2]\*sqrt[c]\*(2\*c^2\*d + b\*(b - sqrt[b^2 - 4\*a\*c]))\*h + c\*(-(b\*f) + sqrt[b^2 - 4\*a\*c]\*f - 2\*a\*h))\*ArcTan[(sqrt[2]\*sqrt[c]\*x)/sqrt[b - sqrt[b^2 - 4\*a\*c]]]/(sqrt[b^2 - 4\*a\*c]\*sqrt[b - sqrt[b^2 - 4\*a\*c]]) - (2\*sqrt[2]\*sqrt[c]\*(2\*c^2\*d + b\*(b + sqrt[b^2 - 4\*a\*c]))\*h - c\*(b\*f + sqrt[b^2 - 4\*a\*c]\*f + 2\*a\*h))\*ArcTan[(sqrt[2]\*sqrt[c]\*x)/sqrt[b + sqrt[b^2 - 4\*a\*c]]]/(sqrt[b^2 - 4\*a\*c]\*sqrt[b + sqrt[b^2 - 4\*a\*c]]) + ((2\*c^2\*e + b\*(b - sqrt[b^2 - 4\*a\*c])\*i + c\*(-(b\*g) + sqrt[b^2 - 4\*a\*c]\*g - 2\*a\*i))\*Log[-b + sqrt[b^2 - 4\*a\*c] - 2\*c\*x^2])/sqrt[b^2 - 4\*a\*c] - ((2\*c^2\*e + b\*(b + sqrt[b^2 - 4\*a\*c])\*i - c\*(b\*g + sqrt[b^2 - 4\*a\*c]\*g + 2\*a\*i))\*Log[b + sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2])/sqrt[b^2 - 4\*a\*c])/(4\*c^2)

### Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.10 (sec) , antiderivative size = 99, normalized size of antiderivative = 0.31

method	result
risch	$\frac{hx}{c} + \frac{ix^2}{2c} + \frac{\sum_{R=\text{RootOf}(cZ^4+Z^2b+a)} \left( (-bi+gc)R^3 + (-bh+cf)R^2 + (-ai+ec)R - ah+cd \right) \ln(x-R)}{2cR^3 + Rb}$
default	$\frac{hx + \frac{1}{2}ix^2}{c} + \frac{\sqrt{-4ac+b^2} \left( \frac{(\sqrt{-4ac+b^2} bi - \sqrt{-4ac+b^2} cg - 2aci + b^2 i - gbc + 2e c^2) \ln(2c x^2 + \sqrt{-4ac+b^2} b)}{4c} + \frac{(\sqrt{-4ac+b^2} bh - \sqrt{-4ac+b^2} fc - 2)}{c(4ac-b^2)} \right)}{c(4ac-b^2)}$

```
[In] int((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a),x,method=_RETURNVERBOSE)
```

```
[Out] h*x/c+1/2*i*x^2/c+1/2/c*sum(((b*i+c*g)*_R^3+(-b*h+c*f)*_R^2+(-a*i+c*e)*_R-a*h+c*d)/(2*_R^3*c+_R*b)*ln(x-_R),_R=RootOf(_Z^4*c+_Z^2*b+a))
```

## Fricas [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{a + bx^2 + cx^4} dx = \text{Timed out}$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a),x, algorithm="fricas")
```

```
[Out] Timed out
```

## Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{a + bx^2 + cx^4} dx = \text{Timed out}$$

```
[In] integrate((i*x**5+h*x**4+g*x**3+f*x**2+e*x+d)/(c*x**4+b*x**2+a),x)
```

```
[Out] Timed out
```



**Maxima [F]**

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{a + bx^2 + cx^4} dx = \int \frac{ix^5 + hx^4 + gx^3 + fx^2 + ex + d}{cx^4 + bx^2 + a} dx$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="maxima")

[Out] 1/2\*(i\*x^2 + 2\*h\*x)/c - integrate(-((c\*g - b\*i)\*x^3 + (c\*f - b\*h)\*x^2 + c\*d - a\*h + (c\*e - a\*i)\*x)/(c\*x^4 + b\*x^2 + a), x)/c

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 5941 vs. 2(277) = 554.

Time = 1.55 (sec) , antiderivative size = 5941, normalized size of antiderivative = 18.51

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="giac")

[Out] 1/4\*(c\*g - b\*i)\*log(abs(c\*x^4 + b\*x^2 + a))/c^2 + 1/2\*(c\*i\*x^2 + 2\*c\*h\*x)/c^2 + 1/8\*((2\*b^4\*c^3 - 16\*a\*b^2\*c^4 + 32\*a^2\*c^5 - sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^4\*c + 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^2\*c^2 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3\*c^2 - 16\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*c^3 - 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^2\*c^3 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*c^4 - 2\*(b^2 - 4\*a\*c)\*b^2\*c^3 + 8\*(b^2 - 4\*a\*c)\*a\*c^4)\*c^2\*f - (2\*b^5\*c^2 - 16\*a\*b^3\*c^3 + 32\*a^2\*b\*c^4 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^5 + 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^3\*c + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*b^4\*c - 16\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*b\*c^2 - 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^2\*c^2 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3\*c^2 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c^3 - 2\*(b^2 - 4\*a\*c)\*b^3\*c^2 + 8\*(b^2 - 4\*a\*c)\*a\*b\*c^3)\*c^2\*h + 2\*(sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^4\*c^3 - 8\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^2\*c^4 - 2\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3\*c^4 - 2\*b^4\*c^4 + 16\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*c^5 + 8\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c^5 + sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^2\*c^5 + 16\*a\*b^2\*c^5 - 4\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*c^6 - 32\*a

$$\begin{aligned}
& ^2*c^6 + 2*(b^2 - 4*a*c)*b^2*c^4 - 8*(b^2 - 4*a*c)*a*c^5)*d*abs(c) - 2*(sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^4*c^2 - 8*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*b^2*c^3 - 2*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^3*c^3 - 2*a*b^4*c^3 + 16*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^3*c^4 + 8*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*b*c^4 + sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^2*c^4 + 16*a^2*b^2*c^4 - 4*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*c^5 - 32*a^3*c^5 + 2*(b^2 - 4*a*c)*a*b^2*c^3 - 8*(b^2 - 4*a*c)*a^2*c^4)*h*abs(c) + 2*(2*b^3*c^6 - 8*a*b*c^7 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^3*c^4 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b*c^5 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^2*c^5 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b*c^6 - 2*(b^2 - 4*a*c)*b*c^6)*d - (2*b^4*c^5 - 8*a*b^2*c^6 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^4*c^3 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^2*c^4 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^3*c^4 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^2*c^5 - 2*(b^2 - 4*a*c)*b^2*c^5)*f + (2*b^5*c^4 - 12*a*b^3*c^5 + 16*a^2*b*c^6 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^5*c^2 + 6*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^3*c^3 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^4*c^3 - 8*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*b*c^4 - 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^2*c^4 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^3*c^4 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b*c^5 - 2*(b^2 - 4*a*c)*b^3*c^4 + 4*(b^2 - 4*a*c)*a*b*c^5)*h)*arctan(2*sqrt(1/2)*x/sqrt((b*c^5 + sqrt(b^2*c^10 - 4*a*c^11))/c^6))/((a*b^4*c^3 - 8*a^2*b^2*c^4 - 2*a*b^3*c^4 + 16*a^3*c^5 + 8*a^2*b*c^5 + a*b^2*c^5 - 4*a^2*c^6)*c^2) - 1/8*((2*b^4*c^3 - 16*a*b^2*c^4 + 32*a^2*c^5 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^4*c + 8*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*b^2*c^2 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^3*c^2 - 16*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a^2*c^3 - 8*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*b*c^3 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^2*c^3 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*c^4 - 2*(b^2 - 4*a*c)*b^2*c^3 + 8*(b^2 - 4*a*c)*a*c^4)*c^2*f - (2*b^5*c^2 - 16*a*b^3*c^3 + 32*a^2*b*c^4 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^5 + 8*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*b^3*c + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^4*c - 16*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a^2*b*c^2 - 8*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*b^2*c^2 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^3*c^2 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*b*c^3 - 2*(b^2 - 4*a*c)*b^3*c^2 + 8*(b^2 - 4*a*c)*a*b*c^3)*c^2*h - 2*(sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^4*c^3 - 8*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*b^2*c^4 - 2*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^3*c^4 + 2*b^4*c^4 + 16*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a^2*c^5 + 8*s
\end{aligned}$$

$$\begin{aligned}
& \text{qrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^2 c^5 + \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot b^2 c^5 - 16 a^2 b^2 c^5 - 4 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 c^6 + 32 a^2 c^6 - 2(b^2 - 4ac) \cdot b^2 c^4 + 8(b^2 - 4ac) \cdot a^2 c^5 \\
& \cdot d \cdot \text{abs}(c) + 2(\text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot c) \cdot a^2 b^4 c^2 - 8 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^2 c^3 - 2 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^3 c^3 + 2 a^2 b^4 c^3 + 16 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^2 c^4 + 8 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^2 c^4 + \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^2 c^4 - 16 a^2 b^2 c^4 - 4 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 c^5 + 32 a^3 c^5 - 2(b^2 - 4ac) \cdot a^2 b^2 c^3 + 8(b^2 - 4ac) \cdot a^2 c^4 \cdot h \cdot \text{abs}(c) + 2(2 b^3 c^6 - 8 a^2 b^3 c^7 - \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot b^3 c^4 + 4 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^2 c^5 + 2 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot b^2 c^5 - \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot b^2 c^6 - 2(b^2 - 4ac) \cdot b^2 c^6) \cdot d - (2 b^4 c^5 - 8 a^2 b^2 c^6 - \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot b^4 c^3 + 4 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^2 c^4 + 2 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot b^3 c^4 - \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot b^2 c^5 - 2(b^2 - 4ac) \cdot b^2 c^5) \cdot f + (2 b^5 c^4 - 12 a^2 b^3 c^5 + 16 a^2 b^2 c^6 - \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot b^5 c^2 + 6 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^3 c^3 + 2 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot b^4 c^3 - 8 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^2 c^4 - 4 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^2 c^4 - \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^3 c^4 + 2 \cdot \text{sqrt}(2) \cdot \text{sqrt}(b^2 - 4ac) \cdot \text{sqrt}(b^2 - 4ac) \cdot c \cdot a^2 b^2 c^5 - 2(b^2 - 4ac) \cdot b^3 c^4 + 4(b^2 - 4ac) \cdot a^2 b^2 c^5) \cdot h) \cdot \arctan(2 \cdot \text{sqrt}(1/2) \cdot x / \text{sqrt}((b^2 c^5 - \text{sqrt}(b^2 c^{10} - 4 a^2 c^{11})) / c^6)) / ((a^2 b^4 c^3 - 8 a^2 b^2 c^4 - 2 a^2 b^3 c^4 + 16 a^3 c^5 + 8 a^2 b^2 c^5 + a^2 b^2 c^5 - 4 a^2 c^6) \cdot c^2) + 1/16(2(b^5 c^2 - 8 a^2 b^3 c^3 - 2 b^4 c^3 + 16 a^2 b^2 c^4 + 8 a^2 b^2 c^4 + b^3 c^4 - 4 a^2 b^2 c^5 + (b^4 c^2 - 8 a^2 b^2 c^3 - 2 b^3 c^3 + 16 a^2 c^4 + 8 a^2 b^2 c^4 + b^2 c^4 - 4 a^2 c^5) \cdot \text{sqrt}(b^2 - 4ac))) \cdot e \cdot \text{abs}(c) - (b^6 c - 8 a^2 b^4 c^2 - 2 b^5 c^2 + 16 a^2 b^2 c^3 + 8 a^2 b^3 c^3 + b^4 c^3 - 4 a^2 b^2 c^4 + (b^5 c - 8 a^2 b^3 c^2 - 2 b^4 c^2 + 16 a^2 b^2 c^3 + 8 a^2 b^2 c^3 + b^3 c^3 - 4 a^2 b^2 c^4) \cdot \text{sqrt}(b^2 - 4ac)) \cdot g \cdot \text{abs}(c) + (b^7 - 10 a^2 b^5 c - 2 b^6 c + 32 a^2 b^3 c^2 + 12 a^2 b^4 c^2 + b^5 c^2 - 32 a^3 b^2 c^3 - 16 a^2 b^2 c^3 - 6 a^2 b^3 c^3 + 8 a^2 b^2 c^4 + (b^6 - 10 a^2 b^4 c - 2 b^5 c + 32 a^2 b^2 c^2 + 12 a^2 b^3 c^2 + b^4 c^2 - 32 a^3 c^3 - 16 a^2 b^2 c^3 - 6 a^2 b^2 c^3 + 8 a^2 c^4) \cdot \text{sqrt}(b^2 - 4ac)) \cdot i \cdot \text{abs}(c) + 2(b^5 c^3 - 8 a^2 b^3 c^4 - 2 b^4 c^4 + 16 a^2 b^2 c^5 + 8 a^2 b^2 c^5 + b^3 c^5 - 4 a^2 b^2 c^6 + (b^4 c^3 - 4 a^2 b^2 c^4 - 2 b^3 c^4 + b^2 c^5) \cdot \text{sqrt}(b^2 - 4ac)) \cdot e - (b^6 c^2 - 8 a^2 b^4 c^3 - 2 b^5 c^3 + 16 a^2 b^2 c^4 + 8 a^2 b^3 c^4 + b^4 c^4 - 4 a^2 b^2 c^5 - (b^5 c^2 - 4 a^2 b^3 c^3 - 2 b^4 c^3 + b^3 c^4) \cdot \text{sqrt}(b^2 - 4ac)) \cdot g + (b^7 c - 10 a^2 b^5 c^2 - 2 b^6 c^2 + 32 a^2 b^3 c^3 + 12 a^2 b^4 c^3 + b^5 c^3 - 32 a^3 b^2 c^4 - 16 a^2 b^2 c^4 - 6 a^2 b^3 c^4 + 8 a^2 b^2 c^5 + (b^6 c - 6 a^2 b^4 c^2 - 2 b^5 c^2 + 8 a^2 b^2 c^3 + 4 a^2 b^3 c^3 + b^4 c^3 - 2
\end{aligned}$$

```

a*b^2*c^4)*sqrt(b^2 - 4*a*c))*i)*log(x^2 + 1/2*(b*c^5 + sqrt(b^2*c^10 - 4*a
*c^11))/c^6)/((a*b^4*c - 8*a^2*b^2*c^2 - 2*a*b^3*c^2 + 16*a^3*c^3 + 8*a^2*b
*c^3 + a*b^2*c^3 - 4*a^2*c^4)*c^2*abs(c)) + 1/16*(2*(b^5*c^2 - 8*a*b^3*c^3
- 2*b^4*c^3 + 16*a^2*b*c^4 + 8*a*b^2*c^4 + b^3*c^4 - 4*a*b*c^5 + (b^4*c^2 -
8*a*b^2*c^3 - 2*b^3*c^3 + 16*a^2*c^4 + 8*a*b*c^4 + b^2*c^4 - 4*a*c^5)*sqrt
(b^2 - 4*a*c))*e*abs(c) - (b^6*c - 8*a*b^4*c^2 - 2*b^5*c^2 + 16*a^2*b^2*c^3
+ 8*a*b^3*c^3 + b^4*c^3 - 4*a*b^2*c^4 - (b^5*c - 8*a*b^3*c^2 - 2*b^4*c^2 +
16*a^2*b*c^3 + 8*a*b^2*c^3 + b^3*c^3 - 4*a*b*c^4)*sqrt(b^2 - 4*a*c))*g*abs
(c) + (b^7 - 10*a*b^5*c - 2*b^6*c + 32*a^2*b^3*c^2 + 12*a*b^4*c^2 + b^5*c^2
- 32*a^3*b*c^3 - 16*a^2*b^2*c^3 - 6*a*b^3*c^3 + 8*a^2*b*c^4 - (b^6 - 10*a*
b^4*c - 2*b^5*c + 32*a^2*b^2*c^2 + 12*a*b^3*c^2 + b^4*c^2 - 32*a^3*c^3 - 16
*a^2*b*c^3 - 6*a*b^2*c^3 + 8*a^2*c^4)*sqrt(b^2 - 4*a*c))*i*abs(c) - 2*(b^5*
c^3 - 8*a*b^3*c^4 - 2*b^4*c^4 + 16*a^2*b*c^5 + 8*a*b^2*c^5 + b^3*c^5 - 4*a*
b*c^6 + (b^4*c^3 - 4*a*b^2*c^4 - 2*b^3*c^4 + b^2*c^5)*sqrt(b^2 - 4*a*c))*e
+ (b^6*c^2 - 8*a*b^4*c^3 - 2*b^5*c^3 + 16*a^2*b^2*c^4 + 8*a*b^3*c^4 + b^4*c
^4 - 4*a*b^2*c^5 - (b^5*c^2 - 4*a*b^3*c^3 - 2*b^4*c^3 + b^3*c^4)*sqrt(b^2 -
4*a*c))*g - (b^7*c - 10*a*b^5*c^2 - 2*b^6*c^2 + 32*a^2*b^3*c^3 + 12*a*b^4*
c^3 + b^5*c^3 - 32*a^3*b*c^4 - 16*a^2*b^2*c^4 - 6*a*b^3*c^4 + 8*a^2*b*c^5 -
(b^6*c - 6*a*b^4*c^2 - 2*b^5*c^2 + 8*a^2*b^2*c^3 + 4*a*b^3*c^3 + b^4*c^3 -
2*a*b^2*c^4)*sqrt(b^2 - 4*a*c))*i)*log(x^2 + 1/2*(b*c^5 - sqrt(b^2*c^10 -
4*a*c^11))/c^6)/((a*b^4*c - 8*a^2*b^2*c^2 - 2*a*b^3*c^2 + 16*a^3*c^3 + 8*a^
2*b*c^3 + a*b^2*c^3 - 4*a^2*c^4)*c^2*abs(c))

```

## Mupad [B] (verification not implemented)

Time = 8.74 (sec) , antiderivative size = 11383, normalized size of antiderivative = 35.46

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(a + b\*x^2 + c\*x^4),x)

```

[Out] symsum(log((x*(c^4*e^3 - a^3*c*i^3 + c^4*d^2*g + b^4*e*i^2 + a^2*b^2*i^3 +
b^2*c^2*e*g^2 + 3*a^2*c^2*e*i^2 + a^2*c^2*g*h^2 + 2*b^2*c^2*e^2*i - a^2*c^2
*g^2*i - 2*c^4*d*e*f - a*b*c^2*g^3 + a*c^3*e*g^2 + b*c^3*e*f^2 - a*c^3*f^2*
g - 2*b*c^3*e^2*g - 3*a*c^3*e^2*i - b*c^3*d^2*i + b^3*c*e*h^2 - a*b^3*g*i^2
- 2*a*b*c^2*e*h^2 - 3*a*b^2*c*e*i^2 - a*b^2*c*g*h^2 + 2*a*b^2*c*g^2*i + a^
2*b*c*h^2*i - 2*b^2*c^2*e*f*h - 2*a^2*c^2*f*h*i + 2*b*c^3*d*e*h + 2*a*c^3*d
*f*i - 2*a*c^3*d*g*h + 2*a*c^3*e*f*h - 2*b^3*c*e*g*i + 2*a*b*c^2*e*g*i + 2*
a*b*c^2*f*g*h))/c^2 - (a*c^3*f^3 - c^4*d*e^2 + c^4*d^2*f - b^4*d*i^2 - b^2*
c^2*d*g^2 - a^2*c^2*d*i^2 + a^2*c^2*f*h^2 - a^2*c^2*g^2*h - a^2*b^2*h*i^2 -
a^2*b*c*h^3 + a*c^3*d*g^2 - b*c^3*d*f^2 + a*c^3*e^2*h - b*c^3*d^2*h - b^3*
c*d*h^2 + a*b^3*f*i^2 + a^3*c*h*i^2 + 2*a*b*c^2*d*h^2 + a*b*c^2*f*g^2 + 3*a
*b^2*c*d*i^2 - 2*a*b*c^2*f^2*h + a*b^2*c*f*h^2 - 2*a^2*b*c*f*i^2 - 2*b^2*c^
2*d*e*i + 2*b^2*c^2*d*f*h - 2*a^2*c^2*e*h*i + 2*a^2*c^2*f*g*i + 2*b*c^3*d*e

```

$$\begin{aligned}
& *g + 2*a*c^3*d*e*i - 2*a*c^3*d*f*h - 2*a*c^3*e*f*g + 2*b^3*c*d*g*i - 4*a*b* \\
& c^2*d*g*i + 2*a*b*c^2*e*f*i - 2*a*b^2*c*f*g*i + 2*a^2*b*c*g*h*i)/c^2 - \text{root} \\
& (128*a^2*b^2*c^5*z^4 - 16*a*b^4*c^4*z^4 - 256*a^3*c^6*z^4 + 128*a^2*b^3*c^3 \\
& *i*z^3 - 128*a^2*b^2*c^4*g*z^3 - 256*a^3*b*c^4*i*z^3 - 16*a*b^5*c^2*i*z^3 + \\
& 16*a*b^4*c^3*g*z^3 + 256*a^3*c^5*g*z^3 + 160*a^3*b*c^3*g*i*z^2 + 8*a*b^4*c \\
& ^2*f*h*z^2 + 8*a*b^4*c^2*e*i*z^2 + 32*a^2*b*c^4*e*g*z^2 + 32*a^2*b*c^4*d*h* \\
& z^2 - 8*a*b^3*c^3*e*g*z^2 - 8*a*b^3*c^3*d*h*z^2 + 16*a*b^2*c^4*d*f*z^2 + 8* \\
& a*b^5*c*g*i*z^2 - 72*a^2*b^3*c^2*g*i*z^2 - 48*a^2*b^2*c^3*f*h*z^2 - 48*a^2* \\
& b^2*c^3*e*i*z^2 + 32*a^2*b^4*c*i^2*z^2 - 48*a^3*b*c^3*h^2*z^2 - 4*a*b^4*c^2 \\
& *g^2*z^2 + 16*a^2*b*c^4*f^2*z^2 - 4*a*b^3*c^3*f^2*z^2 + 8*a*b^2*c^4*e^2*z^2 \\
& + 64*a^3*c^4*f*h*z^2 + 64*a^3*c^4*e*i*z^2 - 64*a^2*c^5*d*f*z^2 - 4*a*b^5*c \\
& *h^2*z^2 + 16*a*b*c^5*d^2*z^2 - 56*a^3*b^2*c^2*i^2*z^2 + 28*a^2*b^3*c^2*h^2 \\
& *z^2 + 40*a^2*b^2*c^3*g^2*z^2 - 32*a^4*c^3*i^2*z^2 - 96*a^3*c^4*g^2*z^2 - 3 \\
& 2*a^2*c^5*e^2*z^2 - 4*b^3*c^4*d^2*z^2 - 4*a*b^6*i^2*z^2 + 32*a^2*b*c^3*e*f* \\
& h*z - 32*a^2*b*c^3*d*f*i*z - 8*a*b^3*c^2*e*f*h*z + 8*a*b^3*c^2*d*f*i*z - 8* \\
& a*b^2*c^3*d*f*g*z + 8*a*b^2*c^3*d*e*h*z - 8*a*b^4*c*e*g*i*z + 40*a^2*b^2*c^ \\
& 2*e*g*i*z + 8*a^2*b^2*c^2*f*g*h*z - 8*a^2*b^2*c^2*d*h*i*z + 4*a^3*b^2*c*h^2 \\
& *i*z - 32*a^3*b*c^2*g^2*i*z + 12*a^3*b^2*c*g*i^2*z + 8*a^2*b^3*c*g^2*i*z + \\
& 16*a^3*b*c^2*g*h^2*z - 4*a^2*b^3*c*g*h^2*z + 32*a^3*b*c^2*e*i^2*z - 24*a^2* \\
& b^3*c*e*i^2*z - 16*a^2*b*c^3*e^2*i*z + 4*a*b^3*c^2*e^2*i*z + 20*a*b^2*c^3*d \\
& ^2*i*z - 16*a^2*b*c^3*e*g^2*z + 4*a*b^3*c^2*e*g^2*z - 4*a*b^2*c^3*e^2*g*z + \\
& 4*a*b^2*c^3*e*f^2*z - 32*a^3*c^3*f*g*h*z - 32*a^3*c^3*e*g*i*z + 32*a^3*c^3 \\
& *d*h*i*z + 32*a^2*c^4*d*f*g*z - 32*a^2*c^4*d*e*h*z + 4*a*b^4*c*e*h^2*z - 16 \\
& *a*b*c^4*d^2*g*z - 4*a^2*b^2*c^2*f^2*i*z - 20*a^2*b^2*c^2*e*h^2*z - 4*a^2*b \\
& ^2*c^2*g^3*z - 16*a^4*c^2*h^2*i*z + 16*a^4*c^2*g*i^2*z + 16*a^3*c^3*f^2*i*z \\
& - 4*a^2*b^4*g*i^2*z - 4*b^4*c^2*d^2*i*z + 16*a^3*c^3*e*h^2*z - 16*a^2*c^4*d \\
& ^2*i*z + 16*a^2*c^4*e^2*g*z + 4*b^3*c^3*d^2*g*z - 16*a^2*c^4*e*f^2*z - 4*b \\
& ^2*c^4*d^2*e*z + 4*a*b^5*e*i^2*z - 16*a^4*b*c*i^3*z + 16*a*c^5*d^2*e*z + 4* \\
& a^3*b^3*i^3*z + 16*a^3*c^3*g^3*z + 4*a^2*b^2*c*d*g*h*i + 12*a^2*b*c^2*d*f*g \\
& *i - 4*a^2*b*c^2*e*f*g*h - 4*a^2*b*c^2*d*e*h*i + 4*a*b^2*c^2*d*e*f*i - 4*a^ \\
& 3*b*c*f*g*h*i - 4*a*b^3*c*d*f*g*i - 4*a*b*c^3*d*e*f*g + 2*a^2*b^2*c*f^2*g*i \\
& - 4*a^2*b^2*c*e*g^2*i - 2*a^2*b*c^2*e^2*g*i - 8*a*b^2*c^2*d^2*g*i + 2*a^2* \\
& b^2*c*e*g*h^2 - 2*a^2*b*c^2*e*f^2*i - 8*a^2*b^2*c*d*f*i^2 - 2*a^2*b*c^2*d*g \\
& ^2*h + 2*a*b^2*c^2*e^2*f*h - 4*a*b^2*c^2*d*f^2*h - 2*a^2*b*c^2*d*f*h^2 + 2* \\
& a*b^2*c^2*d*f*g^2 + 8*a^3*c^2*e*f*h*i - 8*a^3*c^2*d*g*h*i + 8*a^2*c^3*d*e*g \\
& *h - 8*a^2*c^3*d*e*f*i - 2*a^3*b*c*e*h^2*i + 6*a^3*b*c*d*h*i^2 - 2*a^3*b*c* \\
& e*g*i^2 + 2*a*b^3*c*e^2*g*i + 6*a*b*c^3*d^2*e*i + 2*a*b^3*c*d*f*h^2 - 2*a*b \\
& *c^3*d^2*f*h - 2*a*b*c^3*d*e^2*h + 4*a^2*b^2*c*e^2*i^2 - 5*a^2*b*c^2*d^2*i^ \\
& 2 + 3*a^2*b*c^2*e^2*h^2 + 4*a*b^2*c^2*d^2*h^2 - 4*a^3*c^2*f^2*g*i + 2*a^3*b \\
& ^2*f*h*i^2 + 4*a^3*c^2*f*g^2*h + 4*a^3*c^2*e*g^2*i - 4*a^3*c^2*e*g*h^2 + 4* \\
& a^2*c^3*d^2*g*i + 2*a^2*b^3*e*g*i^2 - 2*a^2*b^3*d*h*i^2 + 4*a^3*c^2*d*f*i^2 \\
& - 4*a^2*c^3*e^2*f*h + 2*b^3*c^2*d^2*f*h - 2*b^3*c^2*d^2*e*i + 4*a^2*c^3*e* \\
& f^2*g + 4*a^2*c^3*d*f^2*h - 4*a^2*c^3*d*f*g^2 + 3*a^3*b*c*f^2*i^2 + 2*b^2*c \\
& ^3*d^2*e*g + 2*a^2*b*c^2*f^3*h - 2*a*b^2*c^2*e^3*i + 5*a*b^3*c*d^2*i^2 - 2* \\
& a^2*b^2*c*d*h^3 + 2*a^2*b*c^2*e*g^3 + 3*a*b*c^3*d^2*g^2 + 4*a^4*c*g*h^2*i -
\end{aligned}$$

$$\begin{aligned}
& 4a^4c^*f^*h^*i^2 + 2b^4c^*d^2g^*i + 2a^3b^*c^*g^3i + 2a^*b^4d^*f^*i^2 - 4a^*c^4d^2e^*g + 2a^3b^*c^*f^*h^3 + 4a^*c^4d^2e^2f + 2a^*b^*c^3e^3g + 2a^*b^*c^3d^*f^3 - a^2b^2c^*f^2h^2 - a^2b^*c^2f^2g^2 - a^*b^2c^2e^2g^2 + 2a^4b^*g^*i^3 + 4a^4c^*e^*i^3 + 4a^*c^4d^3h + 2b^*c^4d^3f - a^3b^*c^*g^2h^2 - a^*b^3c^*e^2h^2 - 6a^3c^2e^2i^2 - 2a^3c^2f^2h^2 - a^*b^*c^3e^2f^2 - 6a^2c^3d^2h^2 - 2a^2c^3e^2g^2 - 2a^4c^*g^2i^2 + 4a^2c^3e^3i - 2b^2c^3d^3h - 2a^3b^2e^*i^3 + 4a^3c^2d^*h^3 - 2a^*c^4d^2f^2 - a^3b^2g^2i^2 - a^2b^3f^2i^2 - b^3c^2d^2g^2 - b^2c^3d^2f^2 - a^4b^*h^2i^2 - b^4c^*d^2h^2 - a^*b^4e^2i^2 - b^*c^4d^2e^2 - b^5d^2i^2 - a^3c^2g^4 - a^2c^3f^4 - a^4c^*h^4 - a^*c^4e^4 - a^5i^4 - c^5d^4, \\
& z, 1) * (\text{root}(128a^2b^2c^5z^4 - 16a^*b^4c^4z^4 - 256a^3c^6z^4 + 128a^2b^3c^3i^*z^3 - 128a^2b^2c^4g^*z^3 - 256a^3b^*c^4i^*z^3 - 16a^*b^5c^2i^*z^3 + 16a^*b^4c^3g^*z^3 + 256a^3c^5g^*z^3 + 160a^3b^*c^3g^*i^*z^2 + 8a^*b^4c^2f^*h^*z^2 + 8a^*b^4c^2e^*i^*z^2 + 32a^2b^*c^4e^*g^*z^2 + 32a^2b^*c^4d^*h^*z^2 - 8a^*b^3c^3e^*g^*z^2 - 8a^*b^3c^3d^*h^*z^2 + 16a^*b^2c^4d^*f^*z^2 + 8a^*b^5c^*g^*i^*z^2 - 72a^2b^3c^2g^*i^*z^2 - 48a^2b^2c^3f^*h^*z^2 - 48a^2b^2c^3e^*i^*z^2 + 32a^2b^4c^*i^2z^2 - 48a^3b^*c^3h^2z^2 - 4a^*b^4c^2g^2z^2 + 16a^2b^*c^4f^2z^2 - 4a^*b^3c^3f^2z^2 + 8a^*b^2c^4e^2z^2 + 64a^3c^4f^*h^*z^2 + 64a^3c^4e^*i^*z^2 - 64a^2c^5d^*f^*z^2 - 4a^*b^5c^*h^2z^2 + 16a^*b^*c^5d^2z^2 - 56a^3b^2c^2i^2z^2 + 28a^2b^3c^2h^2z^2 + 40a^2b^2c^3g^2z^2 - 32a^4c^3i^2z^2 - 96a^3c^4g^2z^2 - 32a^2c^5e^2z^2 - 4b^3c^4d^2z^2 - 4a^*b^6i^2z^2 + 32a^2b^*c^3e^*f^*h^*z - 32a^2b^*c^3d^*f^*i^*z - 8a^*b^3c^2e^*f^*h^*z + 8a^*b^3c^2d^*f^*i^*z - 8a^*b^2c^3d^*f^*g^*z + 8a^*b^2c^3d^*e^*h^*z - 8a^*b^4c^*e^*g^*i^*z + 40a^2b^2c^2e^*g^*i^*z + 8a^2b^2c^2f^*g^*h^*z - 8a^2b^2c^2d^*h^*i^*z + 4a^3b^2c^*h^2i^*z - 32a^3b^*c^2g^2i^*z + 12a^3b^2c^*g^*i^2z + 8a^2b^3c^*g^2i^*z + 16a^3b^*c^2g^*h^2z - 4a^2b^3c^*g^*h^2z + 32a^3b^*c^2e^*i^2z - 24a^2b^3c^*e^*i^2z - 16a^2b^*c^3e^2i^*z + 4a^*b^3c^2e^2i^*z + 20a^*b^2c^3d^2i^*z - 16a^2b^*c^3e^*g^2z + 4a^*b^3c^2e^*g^2z - 4a^*b^2c^3e^2g^*z + 4a^*b^2c^3e^*f^2z - 32a^3c^3f^*g^*h^*z - 32a^3c^3e^*g^*i^*z + 32a^3c^3d^*h^*i^*z + 32a^2c^4d^*f^*g^*z - 32a^2c^4d^*e^*h^*z + 4a^*b^4c^*e^*h^2z - 16a^*b^*c^4d^2g^*z - 4a^2b^2c^2f^2i^*z - 20a^2b^2c^2e^*h^2z - 4a^2b^2c^2g^3z - 16a^4c^2h^2i^*z + 16a^4c^2g^*i^2z + 16a^3c^3f^2i^*z - 4a^2b^4g^*i^2z - 4b^4c^2d^2i^*z + 16a^3c^3e^*h^2z - 16a^2c^4d^2i^*z + 16a^2c^4e^2g^*z + 4b^3c^3d^2g^*z - 16a^2c^4e^*f^2z - 4b^2c^4d^2e^*z + 4a^*b^5e^*i^2z - 16a^4b^*c^i^3z + 16a^*c^5d^2e^*z + 4a^3b^3i^3z + 16a^3c^3g^3z + 4a^2b^2c^*d^*g^*h^*i + 12a^2b^*c^2d^*f^*g^*i - 4a^2b^*c^2e^*f^*g^*h - 4a^2b^*c^2d^*e^*h^*i + 4a^*b^2c^2d^*e^*f^*i - 4a^3b^*c^*f^*g^*h^*i - 4a^*b^3c^*d^*f^*g^*i - 4a^*b^*c^3d^*e^*f^*g + 2a^2b^2c^*f^2g^*i - 4a^2b^2c^*e^*g^2i - 2a^2b^*c^2e^2g^*i - 8a^*b^2c^2d^2g^*i + 2a^2b^2c^*e^*g^*h^2 - 2a^2b^*c^2e^*f^2i - 8a^2b^2c^*d^*f^*i^2 - 2a^2b^*c^2d^*g^2h + 2a^*b^2c^2e^2f^*h - 4a^*b^2c^2d^*f^2h - 2a^2b^*c^2d^*f^*h^2 + 2a^*b^2c^2d^*f^*g^2 + 8a^3c^2e^*f^*h^*i - 8a^3c^2d^*g^*h^*i + 8a^2c^3d^*e^*g^*h - 8a^2c^3d^*e^*f^*i - 2a^3b^*c^*e^*h^2i + 6a^3b^*c^*d^*h^i^2 - 2a^3b^*c^*e^*g^*i^2 + 2a^*b^3c^*e^2g^*i + 6a^*b^*c^3d^2e^*i + 2a^*b^3c^*d^*f^*
\end{aligned}$$

$$\begin{aligned}
& h^2 - 2*a*b*c^3*d^2*f*h - 2*a*b*c^3*d*e^2*h + 4*a^2*b^2*c*e^2*i^2 - 5*a^2*b \\
& *c^2*d^2*i^2 + 3*a^2*b*c^2*e^2*h^2 + 4*a*b^2*c^2*d^2*h^2 - 4*a^3*c^2*f^2*g* \\
& i + 2*a^3*b^2*f*h*i^2 + 4*a^3*c^2*f*g^2*h + 4*a^3*c^2*e*g^2*i - 4*a^3*c^2*e \\
& *g*h^2 + 4*a^2*c^3*d^2*g*i + 2*a^2*b^3*e*g*i^2 - 2*a^2*b^3*d*h*i^2 + 4*a^3*c \\
& ^2*d*f*i^2 - 4*a^2*c^3*e^2*f*h + 2*b^3*c^2*d^2*f*h - 2*b^3*c^2*d^2*e*i + 4 \\
& *a^2*c^3*e*f^2*g + 4*a^2*c^3*d*f^2*h - 4*a^2*c^3*d*f*g^2 + 3*a^3*b*c*f^2*i^ \\
& 2 + 2*b^2*c^3*d^2*e*g + 2*a^2*b*c^2*f^3*h - 2*a*b^2*c^2*e^3*i + 5*a*b^3*c*d \\
& ^2*i^2 - 2*a^2*b^2*c*d*h^3 + 2*a^2*b*c^2*e*g^3 + 3*a*b*c^3*d^2*g^2 + 4*a^4* \\
& c*g*h^2*i - 4*a^4*c*f*h*i^2 + 2*b^4*c*d^2*g*i + 2*a^3*b*c*g^3*i + 2*a*b^4*d \\
& *f*i^2 - 4*a*c^4*d^2*e*g + 2*a^3*b*c*f*h^3 + 4*a*c^4*d*e^2*f + 2*a*b*c^3*e^ \\
& 3*g + 2*a*b*c^3*d*f^3 - a^2*b^2*c*f^2*h^2 - a^2*b*c^2*f^2*g^2 - a*b^2*c^2*e \\
& ^2*g^2 + 2*a^4*b*g*i^3 + 4*a^4*c*e*i^3 + 4*a*c^4*d^3*h + 2*b*c^4*d^3*f - a^ \\
& 3*b*c*g^2*h^2 - a*b^3*c*e^2*h^2 - 6*a^3*c^2*e^2*i^2 - 2*a^3*c^2*f^2*h^2 - a \\
& *b*c^3*e^2*f^2 - 6*a^2*c^3*d^2*h^2 - 2*a^2*c^3*e^2*g^2 - 2*a^4*c*g^2*i^2 + \\
& 4*a^2*c^3*e^3*i - 2*b^2*c^3*d^3*h - 2*a^3*b^2*e*i^3 + 4*a^3*c^2*d*h^3 - 2*a \\
& *c^4*d^2*f^2 - a^3*b^2*g^2*i^2 - a^2*b^3*f^2*i^2 - b^3*c^2*d^2*g^2 - b^2*c^ \\
& 3*d^2*f^2 - a^4*b*h^2*i^2 - b^4*c*d^2*h^2 - a*b^4*e^2*i^2 - b*c^4*d^2*e^2 - \\
& b^5*d^2*i^2 - a^3*c^2*g^4 - a^2*c^3*f^4 - a^4*c*h^4 - a*c^4*e^4 - a^5*i^4 \\
& - c^5*d^4, z, 1)*((x*(4*b^2*c^4*e - 8*b^3*c^3*g + 16*a^2*c^4*i + 8*b^4*c^2* \\
& i - 16*a*c^5*e + 32*a*b*c^4*g - 36*a*b^2*c^3*i))/c^2 - (4*b^2*c^4*d + 16*a^ \\
& 2*c^4*h - 16*a*c^5*d - 4*a*b^2*c^3*h)/c^2 + (root(128*a^2*b^2*c^5*z^4 - 16* \\
& a*b^4*c^4*z^4 - 256*a^3*c^6*z^4 + 128*a^2*b^3*c^3*i*z^3 - 128*a^2*b^2*c^4*g \\
& *z^3 - 256*a^3*b*c^4*i*z^3 - 16*a*b^5*c^2*i*z^3 + 16*a*b^4*c^3*g*z^3 + 256* \\
& a^3*c^5*g*z^3 + 160*a^3*b*c^3*g*i*z^2 + 8*a*b^4*c^2*f*h*z^2 + 8*a*b^4*c^2*e \\
& *i*z^2 + 32*a^2*b*c^4*e*g*z^2 + 32*a^2*b*c^4*d*h*z^2 - 8*a*b^3*c^3*e*g*z^2 \\
& - 8*a*b^3*c^3*d*h*z^2 + 16*a*b^2*c^4*d*f*z^2 + 8*a*b^5*c*g*i*z^2 - 72*a^2*b \\
& ^3*c^2*g*i*z^2 - 48*a^2*b^2*c^3*f*h*z^2 - 48*a^2*b^2*c^3*e*i*z^2 + 32*a^2*b \\
& ^4*c*i^2*z^2 - 48*a^3*b*c^3*h^2*z^2 - 4*a*b^4*c^2*g^2*z^2 + 16*a^2*b*c^4*f^ \\
& 2*z^2 - 4*a*b^3*c^3*f^2*z^2 + 8*a*b^2*c^4*e^2*z^2 + 64*a^3*c^4*f*h*z^2 + 64 \\
& *a^3*c^4*e*i*z^2 - 64*a^2*c^5*d*f*z^2 - 4*a*b^5*c*h^2*z^2 + 16*a*b*c^5*d^2* \\
& z^2 - 56*a^3*b^2*c^2*i^2*z^2 + 28*a^2*b^3*c^2*h^2*z^2 + 40*a^2*b^2*c^3*g^2* \\
& z^2 - 32*a^4*c^3*i^2*z^2 - 96*a^3*c^4*g^2*z^2 - 32*a^2*c^5*e^2*z^2 - 4*b^3*c \\
& ^4*d^2*z^2 - 4*a*b^6*i^2*z^2 + 32*a^2*b*c^3*e*f*h*z - 32*a^2*b*c^3*d*f*i*z \\
& - 8*a*b^3*c^2*e*f*h*z + 8*a*b^3*c^2*d*f*i*z - 8*a*b^2*c^3*d*f*g*z + 8*a*b^ \\
& 2*c^3*d*e*h*z - 8*a*b^4*c*e*g*i*z + 40*a^2*b^2*c^2*e*g*i*z + 8*a^2*b^2*c^2* \\
& f*g*h*z - 8*a^2*b^2*c^2*d*h*i*z + 4*a^3*b^2*c*h^2*i*z - 32*a^3*b*c^2*g^2*i* \\
& z + 12*a^3*b^2*c*g*i^2*z + 8*a^2*b^3*c*g^2*i*z + 16*a^3*b*c^2*g*h^2*z - 4*a \\
& ^2*b^3*c*g*h^2*z + 32*a^3*b*c^2*e*i^2*z - 24*a^2*b^3*c*e*i^2*z - 16*a^2*b*c \\
& ^3*e^2*i*z + 4*a*b^3*c^2*e^2*i*z + 20*a*b^2*c^3*d^2*i*z - 16*a^2*b*c^3*e*g^ \\
& 2*z + 4*a*b^3*c^2*e*g^2*z - 4*a*b^2*c^3*e^2*g*z + 4*a*b^2*c^3*e*f^2*z - 32* \\
& a^3*c^3*f*g*h*z - 32*a^3*c^3*e*g*i*z + 32*a^3*c^3*d*h*i*z + 32*a^2*c^4*d*f* \\
& g*z - 32*a^2*c^4*d*e*h*z + 4*a*b^4*c*e*h^2*z - 16*a*b*c^4*d^2*g*z - 4*a^2*b \\
& ^2*c^2*f^2*i*z - 20*a^2*b^2*c^2*e*h^2*z - 4*a^2*b^2*c^2*g^3*z - 16*a^4*c^2* \\
& h^2*i*z + 16*a^4*c^2*g*i^2*z + 16*a^3*c^3*f^2*i*z - 4*a^2*b^4*g*i^2*z - 4*b \\
& ^4*c^2*d^2*i*z + 16*a^3*c^3*e*h^2*z - 16*a^2*c^4*d^2*i*z + 16*a^2*c^4*e^2*g
\end{aligned}$$

$$\begin{aligned}
& *z + 4*b^3*c^3*d^2*g*z - 16*a^2*c^4*e*f^2*z - 4*b^2*c^4*d^2*e*z + 4*a*b^5*e \\
& *i^2*z - 16*a^4*b*c*i^3*z + 16*a*c^5*d^2*e*z + 4*a^3*b^3*i^3*z + 16*a^3*c^3 \\
& *g^3*z + 4*a^2*b^2*c*d*g*h*i + 12*a^2*b*c^2*d*f*g*i - 4*a^2*b*c^2*e*f*g*h - \\
& 4*a^2*b*c^2*d*e*h*i + 4*a*b^2*c^2*d*e*f*i - 4*a^3*b*c*f*g*h*i - 4*a*b^3*c* \\
& d*f*g*i - 4*a*b*c^3*d*e*f*g + 2*a^2*b^2*c*f^2*g*i - 4*a^2*b^2*c*e*g^2*i - 2 \\
& *a^2*b*c^2*e^2*g*i - 8*a*b^2*c^2*d^2*g*i + 2*a^2*b^2*c*e*g*h^2 - 2*a^2*b*c^2 \\
& *e*f^2*i - 8*a^2*b^2*c*d*f*i^2 - 2*a^2*b*c^2*d*g^2*h + 2*a*b^2*c^2*e^2*f*h \\
& - 4*a*b^2*c^2*d*f^2*h - 2*a^2*b*c^2*d*f*h^2 + 2*a*b^2*c^2*d*f*g^2 + 8*a^3*c \\
& c^2*e*f*h*i - 8*a^3*c^2*d*g*h*i + 8*a^2*c^3*d*e*g*h - 8*a^2*c^3*d*e*f*i - 2 \\
& *a^3*b*c*e*h^2*i + 6*a^3*b*c*d*h*i^2 - 2*a^3*b*c*e*g*i^2 + 2*a*b^3*c*e^2*g* \\
& i + 6*a*b*c^3*d^2*e*i + 2*a*b^3*c*d*f*h^2 - 2*a*b*c^3*d^2*f*h - 2*a*b*c^3*d \\
& *e^2*h + 4*a^2*b^2*c*e^2*i^2 - 5*a^2*b*c^2*d^2*i^2 + 3*a^2*b*c^2*e^2*h^2 + \\
& 4*a*b^2*c^2*d^2*h^2 - 4*a^3*c^2*f^2*g*i + 2*a^3*b^2*f*h*i^2 + 4*a^3*c^2*f*g \\
& ^2*h + 4*a^3*c^2*e*g^2*i - 4*a^3*c^2*e*g*h^2 + 4*a^2*c^3*d^2*g*i + 2*a^2*b^ \\
& 3*e*g*i^2 - 2*a^2*b^3*d*h*i^2 + 4*a^3*c^2*d*f*i^2 - 4*a^2*c^3*e^2*f*h + 2*b \\
& ^3*c^2*d^2*f*h - 2*b^3*c^2*d^2*e*i + 4*a^2*c^3*e*f^2*g + 4*a^2*c^3*d*f^2*h \\
& - 4*a^2*c^3*d*f*g^2 + 3*a^3*b*c*f^2*i^2 + 2*b^2*c^3*d^2*e*g + 2*a^2*b*c^2*f \\
& ^3*h - 2*a*b^2*c^2*e^3*i + 5*a*b^3*c*d^2*i^2 - 2*a^2*b^2*c*d*h^3 + 2*a^2*b* \\
& c^2*e*g^3 + 3*a*b*c^3*d^2*g^2 + 4*a^4*c*g*h^2*i - 4*a^4*c*f*h*i^2 + 2*b^4*c \\
& *d^2*g*i + 2*a^3*b*c*g^3*i + 2*a*b^4*d*f*i^2 - 4*a*c^4*d^2*e*g + 2*a^3*b*c* \\
& f*h^3 + 4*a*c^4*d*e^2*f + 2*a*b*c^3*e^3*g + 2*a*b*c^3*d*f^3 - a^2*b^2*c*f^2 \\
& *h^2 - a^2*b*c^2*f^2*g^2 - a*b^2*c^2*e^2*g^2 + 2*a^4*b*g*i^3 + 4*a^4*c*e*i^ \\
& 3 + 4*a*c^4*d^3*h + 2*b*c^4*d^3*f - a^3*b*c*g^2*h^2 - a*b^3*c*e^2*h^2 - 6*a \\
& ^3*c^2*e^2*i^2 - 2*a^3*c^2*f^2*h^2 - a*b*c^3*e^2*f^2 - 6*a^2*c^3*d^2*h^2 - \\
& 2*a^2*c^3*e^2*g^2 - 2*a^4*c*g^2*i^2 + 4*a^2*c^3*e^3*i - 2*b^2*c^3*d^3*h - 2 \\
& *a^3*b^2*e*i^3 + 4*a^3*c^2*d*h^3 - 2*a*c^4*d^2*f^2 - a^3*b^2*g^2*i^2 - a^2* \\
& b^3*f^2*i^2 - b^3*c^2*d^2*g^2 - b^2*c^3*d^2*f^2 - a^4*b*h^2*i^2 - b^4*c*d^2 \\
& *h^2 - a*b^4*e^2*i^2 - b*c^4*d^2*e^2 - b^5*d^2*i^2 - a^3*c^2*g^4 - a^2*c^3* \\
& f^4 - a^4*c*h^4 - a*c^4*e^4 - a^5*i^4 - c^5*d^4, z, 1)*x*(8*b^3*c^4 - 32*a* \\
& b*c^5)/c^2) - (4*b*c^4*d*e + 8*a*c^4*d*g - 8*a*c^4*e*f - 4*b^2*c^3*d*g + 4 \\
& *b^3*c^2*d*i + 8*a^2*c^3*f*i - 8*a^2*c^3*g*h - 4*a*b^2*c^2*f*i + 4*a^2*b*c^ \\
& 2*h*i - 12*a*b*c^3*d*i + 4*a*b*c^3*e*h + 4*a*b*c^3*f*g)/c^2 + (x*(4*c^5*d^2 \\
& + 2*b^5*i^2 - 4*a*c^4*f^2 - 2*b*c^4*e^2 + 2*b^4*c*h^2 + 2*b^2*c^3*f^2 + 4* \\
& a^2*c^3*h^2 + 2*b^3*c^2*g^2 - 8*a*b^2*c^2*h^2 + 6*a^2*b*c^2*i^2 - 4*b*c^4*d \\
& *f - 8*a*c^4*d*h + 8*a*c^4*e*g - 4*b^4*c*g*i - 10*a*b*c^3*g^2 - 10*a*b^3*c* \\
& i^2 + 4*b^2*c^3*d*h - 4*b^3*c^2*f*h - 8*a^2*c^3*g*i + 20*a*b^2*c^2*g*i - 4* \\
& a*b*c^3*e*i + 12*a*b*c^3*f*h))/c^2))*root(128*a^2*b^2*c^5*z^4 - 16*a*b^4*c^ \\
& 4*z^4 - 256*a^3*c^6*z^4 + 128*a^2*b^3*c^3*i*z^3 - 128*a^2*b^2*c^4*g*z^3 - 2 \\
& 56*a^3*b*c^4*i*z^3 - 16*a*b^5*c^2*i*z^3 + 16*a*b^4*c^3*g*z^3 + 256*a^3*c^5* \\
& g*z^3 + 160*a^3*b*c^3*g*i*z^2 + 8*a*b^4*c^2*f*h*z^2 + 8*a*b^4*c^2*e*i*z^2 + \\
& 32*a^2*b*c^4*e*g*z^2 + 32*a^2*b*c^4*d*h*z^2 - 8*a*b^3*c^3*e*g*z^2 - 8*a*b^ \\
& 3*c^3*d*h*z^2 + 16*a*b^2*c^4*d*f*z^2 + 8*a*b^5*c*g*i*z^2 - 72*a^2*b^3*c^2*g \\
& *i*z^2 - 48*a^2*b^2*c^3*f*h*z^2 - 48*a^2*b^2*c^3*e*i*z^2 + 32*a^2*b^4*c*i^2 \\
& *z^2 - 48*a^3*b*c^3*h^2*z^2 - 4*a*b^4*c^2*g^2*z^2 + 16*a^2*b*c^4*f^2*z^2 - \\
& 4*a*b^3*c^3*f^2*z^2 + 8*a*b^2*c^4*e^2*z^2 + 64*a^3*c^4*f*h*z^2 + 64*a^3*c^4
\end{aligned}$$



$$\begin{aligned}
& *e*i*z^2 - 64*a^2*c^5*d*f*z^2 - 4*a*b^5*c*h^2*z^2 + 16*a*b*c^5*d^2*z^2 - 56 \\
& *a^3*b^2*c^2*i^2*z^2 + 28*a^2*b^3*c^2*h^2*z^2 + 40*a^2*b^2*c^3*g^2*z^2 - 32 \\
& *a^4*c^3*i^2*z^2 - 96*a^3*c^4*g^2*z^2 - 32*a^2*c^5*e^2*z^2 - 4*b^3*c^4*d^2* \\
& z^2 - 4*a*b^6*i^2*z^2 + 32*a^2*b*c^3*e*f*h*z - 32*a^2*b*c^3*d*f*i*z - 8*a*b \\
& ^3*c^2*e*f*h*z + 8*a*b^3*c^2*d*f*i*z - 8*a*b^2*c^3*d*f*g*z + 8*a*b^2*c^3*d* \\
& e*h*z - 8*a*b^4*c*e*g*i*z + 40*a^2*b^2*c^2*e*g*i*z + 8*a^2*b^2*c^2*f*g*h*z \\
& - 8*a^2*b^2*c^2*d*h*i*z + 4*a^3*b^2*c*h^2*i*z - 32*a^3*b*c^2*g^2*i*z + 12*a \\
& ^3*b^2*c*g*i^2*z + 8*a^2*b^3*c*g^2*i*z + 16*a^3*b*c^2*g*h^2*z - 4*a^2*b^3*c \\
& *g*h^2*z + 32*a^3*b*c^2*e*i^2*z - 24*a^2*b^3*c*e*i^2*z - 16*a^2*b*c^3*e^2*i \\
& *z + 4*a*b^3*c^2*e^2*i*z + 20*a*b^2*c^3*d^2*i*z - 16*a^2*b*c^3*e*g^2*z + 4* \\
& a*b^3*c^2*e*g^2*z - 4*a*b^2*c^3*e^2*g*z + 4*a*b^2*c^3*e*f^2*z - 32*a^3*c^3* \\
& f*g*h*z - 32*a^3*c^3*e*g*i*z + 32*a^3*c^3*d*h*i*z + 32*a^2*c^4*d*f*g*z - 32 \\
& *a^2*c^4*d*e*h*z + 4*a*b^4*c*e*h^2*z - 16*a*b*c^4*d^2*g*z - 4*a^2*b^2*c^2*f \\
& ^2*i*z - 20*a^2*b^2*c^2*e*h^2*z - 4*a^2*b^2*c^2*g^3*z - 16*a^4*c^2*h^2*i*z \\
& + 16*a^4*c^2*g*i^2*z + 16*a^3*c^3*f^2*i*z - 4*a^2*b^4*g*i^2*z - 4*b^4*c^2*d \\
& ^2*i*z + 16*a^3*c^3*e*h^2*z - 16*a^2*c^4*d^2*i*z + 16*a^2*c^4*e^2*g*z + 4*b \\
& ^3*c^3*d^2*g*z - 16*a^2*c^4*e*f^2*z - 4*b^2*c^4*d^2*e*z + 4*a*b^5*e*i^2*z - \\
& 16*a^4*b*c*i^3*z + 16*a*c^5*d^2*e*z + 4*a^3*b^3*i^3*z + 16*a^3*c^3*g^3*z + \\
& 4*a^2*b^2*c*d*g*h*i + 12*a^2*b*c^2*d*f*g*i - 4*a^2*b*c^2*e*f*g*h - 4*a^2*b \\
& *c^2*d*e*h*i + 4*a*b^2*c^2*d*e*f*i - 4*a^3*b*c*f*g*h*i - 4*a*b^3*c*d*f*g*i \\
& - 4*a*b*c^3*d*e*f*g + 2*a^2*b^2*c*f^2*g*i - 4*a^2*b^2*c*e*g^2*i - 2*a^2*b*c \\
& ^2*e^2*g*i - 8*a*b^2*c^2*d^2*g*i + 2*a^2*b^2*c*e*g*h^2 - 2*a^2*b*c^2*e*f^2* \\
& i - 8*a^2*b^2*c*d*f*i^2 - 2*a^2*b*c^2*d*g^2*h + 2*a*b^2*c^2*e^2*f*h - 4*a*b \\
& ^2*c^2*d*f^2*h - 2*a^2*b*c^2*d*f*h^2 + 2*a*b^2*c^2*d*f*g^2 + 8*a^3*c^2*e*f* \\
& h*i - 8*a^3*c^2*d*g*h*i + 8*a^2*c^3*d*e*g*h - 8*a^2*c^3*d*e*f*i - 2*a^3*b*c \\
& *e*h^2*i + 6*a^3*b*c*d*h*i^2 - 2*a^3*b*c*e*g*i^2 + 2*a*b^3*c*e^2*g*i + 6*a* \\
& b*c^3*d^2*e*i + 2*a*b^3*c*d*f*h^2 - 2*a*b*c^3*d^2*f*h - 2*a*b*c^3*d*e^2*h + \\
& 4*a^2*b^2*c*e^2*i^2 - 5*a^2*b*c^2*d^2*i^2 + 3*a^2*b*c^2*e^2*h^2 + 4*a*b^2*c \\
& ^2*d^2*h^2 - 4*a^3*c^2*f^2*g*i + 2*a^3*b^2*f*h*i^2 + 4*a^3*c^2*f*g^2*h + 4 \\
& *a^3*c^2*e*g^2*i - 4*a^3*c^2*e*g*h^2 + 4*a^2*c^3*d^2*g*i + 2*a^2*b^3*e*g*i^ \\
& 2 - 2*a^2*b^3*d*h*i^2 + 4*a^3*c^2*d*f*i^2 - 4*a^2*c^3*e^2*f*h + 2*b^3*c^2*d \\
& ^2*f*h - 2*b^3*c^2*d^2*e*i + 4*a^2*c^3*e*f^2*g + 4*a^2*c^3*d*f^2*h - 4*a^2* \\
& c^3*d*f*g^2 + 3*a^3*b*c*f^2*i^2 + 2*b^2*c^3*d^2*e*g + 2*a^2*b*c^2*f^3*h - 2 \\
& *a*b^2*c^2*e^3*i + 5*a*b^3*c*d^2*i^2 - 2*a^2*b^2*c*d*h^3 + 2*a^2*b*c^2*e*g^ \\
& 3 + 3*a*b*c^3*d^2*g^2 + 4*a^4*c*g*h^2*i - 4*a^4*c*f*h*i^2 + 2*b^4*c*d^2*g*i \\
& + 2*a^3*b*c*g^3*i + 2*a*b^4*d*f*i^2 - 4*a*c^4*d^2*e*g + 2*a^3*b*c*f*h^3 + \\
& 4*a*c^4*d*e^2*f + 2*a*b*c^3*e^3*g + 2*a*b*c^3*d*f^3 - a^2*b^2*c*f^2*h^2 - a \\
& ^2*b*c^2*f^2*g^2 - a*b^2*c^2*e^2*g^2 + 2*a^4*b*g*i^3 + 4*a^4*c*e*i^3 + 4*a* \\
& c^4*d^3*h + 2*b*c^4*d^3*f - a^3*b*c*g^2*h^2 - a*b^3*c*e^2*h^2 - 6*a^3*c^2*e \\
& ^2*i^2 - 2*a^3*c^2*f^2*h^2 - a*b*c^3*e^2*f^2 - 6*a^2*c^3*d^2*h^2 - 2*a^2*c^ \\
& 3*e^2*g^2 - 2*a^4*c*g^2*i^2 + 4*a^2*c^3*e^3*i - 2*b^2*c^3*d^3*h - 2*a^3*b^2 \\
& *e*i^3 + 4*a^3*c^2*d*h^3 - 2*a*c^4*d^2*f^2 - a^3*b^2*g^2*i^2 - a^2*b^3*f^2* \\
& i^2 - b^3*c^2*d^2*g^2 - b^2*c^3*d^2*f^2 - a^4*b*h^2*i^2 - b^4*c*d^2*h^2 - a \\
& *b^4*e^2*i^2 - b*c^4*d^2*e^2 - b^5*d^2*i^2 - a^3*c^2*g^4 - a^2*c^3*f^4 - a^ \\
& 4*c*h^4 - a*c^4*e^4 - a^5*i^4 - c^5*d^4, z, 1), 1, 1, 4) + (h*x)/c + (i*x^2
\end{aligned}$$

)/(2\*c)

$$3.25 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+jx^5+kx^6+lx^7+mx^8}{a+bx^2+cx^4} dx$$

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### Optimal result

Integrand size = 55, antiderivative size = 545

$$\int \frac{d+ex+fx^2+gx^3+hx^4+jx^5+kx^6+lx^7+mx^8}{a+bx^2+cx^4} dx$$

$$= \frac{(c^2h+b^2m-c(bk+am))x}{c^3} + \frac{(cj-bl)x^2}{2c^2} + \frac{(ck-bm)x^3}{3c^2} + \frac{lx^4}{4c} + \frac{mx^5}{5c}$$

$$+ \frac{\left( c^3f - c^2(bh+ak) - b^3m + bc(bk+2am) + \frac{2c^4d-c^3(bf+2ah)+b^4m-b^2c(bk+4am)+c^2(b^2h+3abk+2a^2m)}{\sqrt{b^2-4ac}} \right) \arctan\left( \frac{\sqrt{2}c^{7/2}\sqrt{b-\sqrt{b^2-4ac}}}{\sqrt{b^2-4ac}} \right)}{\sqrt{2}c^{7/2}\sqrt{b-\sqrt{b^2-4ac}}}$$

$$+ \frac{\left( c^3f - c^2(bh+ak) - b^3m + bc(bk+2am) - \frac{2c^4d-c^3(bf+2ah)+b^4m-b^2c(bk+4am)+c^2(b^2h+3abk+2a^2m)}{\sqrt{b^2-4ac}} \right) \arctan\left( \frac{\sqrt{2}c^{7/2}\sqrt{b+\sqrt{b^2-4ac}}}{\sqrt{b^2-4ac}} \right)}{\sqrt{2}c^{7/2}\sqrt{b+\sqrt{b^2-4ac}}}$$

$$- \frac{(2c^3e - c^2(bg+2aj) - b^3l + bc(bj+3al)) \operatorname{arctanh}\left( \frac{b+2cx^2}{\sqrt{b^2-4ac}} \right)}{2c^3\sqrt{b^2-4ac}}$$

$$+ \frac{(c^2g+b^2l-c(bj+al)) \log(a+bx^2+cx^4)}{4c^3}$$

```
[Out] (c^2*h+b^2*m-c*(a*m+b*k))*x/c^3+1/2*(-b*l+c*j)*x^2/c^2+1/3*(-b*m+c*k)*x^3/c^2+1/4*1*x^4/c+1/5*m*x^5/c+1/4*(c^2*g+b^2*l-c*(a*l+b*j))*ln(c*x^4+b*x^2+a)/c^3-1/2*(2*c^3*e-c^2*(2*a*j+b*g)-b^3*l+b*c*(3*a*l+b*j))*arctanh((2*c*x^2+b)/(-4*a*c+b^2)^(1/2))/c^3/(-4*a*c+b^2)^(1/2)+1/2*arctan(x*2^(1/2)*c^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2))*(c^3*f-c^2*(a*k+b*h)-b^3*m+b*c*(2*a*m+b*k)+(2*c^4*d-c^3*(2*a*h+b*f)+b^4*m-b^2*c*(4*a*m+b*k)+c^2*(2*a^2*m+3*a*b*k+b^2*h)))/(-4*a*c+b^2)^(1/2))/c^(7/2)*2^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2)+1/2*arctan(x*2^(1/2)*c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2))*(c^3*f-c^2*(a*k+b*h)-b^3*m+b*c*(2*a*m+b*k)+(-2*c^4*d+c^3*(2*a*h+b*f)-b^4*m+b^2*c*(4*a*m+b*k)-c^2*(2*a^2*m+3*a*b*k+b^2*h)))/(-4*a*c+b^2)^(1/2))/c^(7/2)*2^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2)
```

## Rubi [A] (verified)

Time = 2.85 (sec) , antiderivative size = 545, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.182$ , Rules used = {1687, 1690, 1180, 211, 1677, 1671, 648, 632, 212, 642}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{a + bx^2 + cx^4} dx$$

$$= \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{c^2(2a^2m+3abk+b^2h)-b^2c(4am+bk)-c^3(2ah+bf)+b^4m+2c^4d}{\sqrt{b^2-4ac}} - c^2(ak+bh) + bc(2am+bk) + b^3\right)}{\sqrt{2}c^{7/2}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left(-\frac{c^2(2a^2m+3abk+b^2h)-b^2c(4am+bk)-c^3(2ah+bf)+b^4m+2c^4d}{\sqrt{b^2-4ac}} - c^2(ak+bh) + bc(2am+bk) + b^3\right)}{\sqrt{2}c^{7/2}\sqrt{\sqrt{b^2-4ac}+b}} - \frac{\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right) (-c^2(2aj+bg) + bc(3al+bj) + b^3(-l) + 2c^3e)}{2c^3\sqrt{b^2-4ac}} + \frac{\log(a + bx^2 + cx^4) (-c(al+bj) + b^2l + c^2g)}{4c^3} + \frac{x(-c(am+bk) + b^2m + c^2h)}{c^3} + \frac{x^2(cj-bl)}{2c^2} + \frac{x^3(ck-bm)}{3c^2} + \frac{lx^4}{4c} + \frac{mx^5}{5c}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + j\*x^5 + k\*x^6 + l\*x^7 + m\*x^8)/(a + b\*x^2 + c\*x^4), x]

[Out] ((c^2\*h + b^2\*m - c\*(b\*k + a\*m))\*x)/c^3 + ((c\*j - b\*l)\*x^2)/(2\*c^2) + ((c\*k - b\*m)\*x^3)/(3\*c^2) + (1\*x^4)/(4\*c) + (m\*x^5)/(5\*c) + ((c^3\*f - c^2\*(b\*h + a\*k) - b^3\*m + b\*c\*(b\*k + 2\*a\*m) + (2\*c^4\*d - c^3\*(b\*f + 2\*a\*h) + b^4\*m - b^2\*c\*(b\*k + 4\*a\*m) + c^2\*(b^2\*h + 3\*a\*b\*k + 2\*a^2\*m))/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]]]/(Sqrt[2]\*c^(7/2)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + ((c^3\*f - c^2\*(b\*h + a\*k) - b^3\*m + b\*c\*(b\*k + 2\*a\*m) - (2\*c^4\*d - c^3\*(b\*f + 2\*a\*h) + b^4\*m - b^2\*c\*(b\*k + 4\*a\*m) + c^2\*(b^2\*h + 3\*a\*b\*k + 2\*a^2\*m))/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]]]/(Sqrt[2]\*c^(7/2)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) - ((2\*c^3\*e - c^2\*(b\*g + 2\*a\*j) - b^3\*l + b\*c\*(b\*j + 3\*a\*l))\*ArcTanh[(b + 2\*c\*x^2)/Sqrt[b^2 - 4\*a\*c]])/(2\*c^3\*Sqrt[b^2 - 4\*a\*c]) + ((c^2\*g + b^2\*l - c\*(b\*j + a\*l))\*Log[a + b\*x^2 + c\*x^4])/(4\*c^3)

## Rule 211

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

## Rule 212

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt

$Q[a, 0] \parallel LtQ[b, 0]$

### Rule 632

$\text{Int}[(a_.) + (b_.)x + (c_.)x^2]^{-1}, x\_Symbol] \rightarrow \text{Dist}[-2, \text{Subst}[\text{Int}[1/\text{Simp}[b^2 - 4ac - x^2, x], x], x, b + 2cx], x] /;$   $\text{FreeQ}\{a, b, c, x\}$  &&  $\text{NeQ}[b^2 - 4ac, 0]$

### Rule 642

$\text{Int}[(d_.) + (e_.)x]/(a_.) + (b_.)x + (c_.)x^2, x\_Symbol] \rightarrow \text{Simp}[d \cdot (\text{Log}[\text{RemoveContent}[a + bx + cx^2, x]]/b), x] /;$   $\text{FreeQ}\{a, b, c, d, e, x\}$  &&  $\text{EqQ}[2cd - be, 0]$

### Rule 648

$\text{Int}[(d_.) + (e_.)x]/(a_.) + (b_.)x + (c_.)x^2, x\_Symbol] \rightarrow \text{Dist}[(2cd - be)/(2c), \text{Int}[1/(a + bx + cx^2), x], x] + \text{Dist}[e/(2c), \text{Int}[(b + 2cx)/(a + bx + cx^2), x], x] /;$   $\text{FreeQ}\{a, b, c, d, e, x\}$  &&  $\text{NeQ}[2cd - be, 0]$  &&  $\text{NeQ}[b^2 - 4ac, 0]$  &&  $\text{!NiceSqrtQ}[b^2 - 4ac]$

### Rule 1180

$\text{Int}[(d_.) + (e_.)x^2]/(a_.) + (b_.)x^2 + (c_.)x^4, x\_Symbol] \rightarrow \text{With}\{q = \text{Rt}[b^2 - 4ac, 2]\}, \text{Dist}[e/2 + (2cd - be)/(2q), \text{Int}[1/(b/2 - q/2 + cx^2), x], x] + \text{Dist}[e/2 - (2cd - be)/(2q), \text{Int}[1/(b/2 + q/2 + cx^2), x], x] /;$   $\text{FreeQ}\{a, b, c, d, e, x\}$  &&  $\text{NeQ}[b^2 - 4ac, 0]$  &&  $\text{NeQ}[c^2d^2 - a^2e^2, 0]$  &&  $\text{PosQ}[b^2 - 4ac]$

### Rule 1671

$\text{Int}[(Pq_.) * ((a_.) + (b_.)x + (c_.)x^2)^{p_}], x\_Symbol] \rightarrow \text{Int}[\text{ExpandIntegrand}[Pq * (a + bx + cx^2)^p, x], x] /;$   $\text{FreeQ}\{a, b, c, x\}$  &&  $\text{PolyQ}[Pq, x]$  &&  $\text{IGtQ}[p, -2]$

### Rule 1677

$\text{Int}[(Pq_.) * x^{(m_.)} * ((a_.) + (b_.)x^2 + (c_.)x^4)^{p_}], x\_Symbol] \rightarrow \text{Dist}[1/2, \text{Subst}[\text{Int}[x^{(m-1)/2} * \text{SubstFor}[x^2, Pq, x] * (a + bx + cx^2)^p, x], x, x^2], x] /;$   $\text{FreeQ}\{a, b, c, p, x\}$  &&  $\text{PolyQ}[Pq, x^2]$  &&  $\text{IntegerQ}[(m-1)/2]$

### Rule 1687

$\text{Int}[(Pq_.) * ((a_.) + (b_.)x^2 + (c_.)x^4)^{p_}], x\_Symbol] \rightarrow \text{Module}\{q = \text{Expon}[Pq, x], k\}, \text{Int}[\text{Sum}[\text{Coeff}[Pq, x, 2k] * x^{2k}, \{k, 0, q/2\}] * (a + b$

$*x^2 + c*x^4)^p, x] + \text{Int}[x*\text{Sum}[\text{Coeff}[\text{Pq}, x, 2*k + 1]*x^{(2*k)}, \{k, 0, (q - 1)/2\}](a + b*x^2 + c*x^4)^p, x] /; \text{FreeQ}[\{a, b, c, p\}, x] \&\& \text{PolyQ}[\text{Pq}, x] \&\& \text{!PolyQ}[\text{Pq}, x^2]$

### Rule 1690

$\text{Int}[(\text{Pq}_)/((a_.) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x\_Symbol] := \text{Int}[\text{ExpandInte grand}[\text{Pq}/(a + b*x^2 + c*x^4), x], x] /; \text{FreeQ}[\{a, b, c\}, x] \&\& \text{PolyQ}[\text{Pq}, x^2] \&\& \text{Expon}[\text{Pq}, x^2] > 1$

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{x(e + gx^2 + jx^4 + lx^6)}{a + bx^2 + cx^4} dx + \int \frac{d + fx^2 + hx^4 + kx^6 + mx^8}{a + bx^2 + cx^4} dx \\
 &= \frac{1}{2} \text{Subst} \left( \int \frac{e + gx + jx^2 + lx^3}{a + bx + cx^2} dx, x, x^2 \right) \\
 &\quad + \int \left( \frac{c^2h + b^2m - c(bk + am)}{c^3} + \frac{(ck - bm)x^2}{c^2} + \frac{mx^4}{c} \right. \\
 &\quad \left. + \frac{c^3d - ac^2h - ab^2m + ac(bk + am) + (c^3f - c^2(bh + ak) - b^3m + bc(bk + 2am))x^2}{c^3(a + bx^2 + cx^4)} \right) dx \\
 &= \frac{(c^2h + b^2m - c(bk + am))x}{c^3} + \frac{(ck - bm)x^3}{3c^2} + \frac{mx^5}{5c} + \frac{1}{2} \text{Subst} \left( \int \left( \frac{cj - bl}{c^2} + \frac{lx}{c} \right. \right. \\
 &\quad \left. \left. + \frac{c^2e - acj + abl + (c^2g + b^2l - c(bj + al))x}{c^2(a + bx + cx^2)} \right) dx, x, x^2 \right) \\
 &\quad + \int \frac{c^3d - ac^2h - ab^2m + ac(bk + am) + (c^3f - c^2(bh + ak) - b^3m + bc(bk + 2am))x^2}{c^3(a + bx^2 + cx^4)} dx \\
 &= \frac{(c^2h + b^2m - c(bk + am))x}{c^3} + \frac{(cj - bl)x^2}{2c^2} + \frac{(ck - bm)x^3}{3c^2} \\
 &\quad + \frac{lx^4}{4c} + \frac{mx^5}{5c} + \frac{\text{Subst} \left( \int \frac{c^2e - acj + abl + (c^2g + b^2l - c(bj + al))x}{a + bx + cx^2} dx, x, x^2 \right)}{2c^2} \\
 &\quad + \frac{\left( c^3f - c^2(bh + ak) - b^3m + bc(bk + 2am) - \frac{2c^4d - c^3(bf + 2ah) + b^4m - b^2c(bk + 4am) + c^2(b^2h + 3abk + 2a^2m)}{\sqrt{b^2 - 4ac}} \right)}{2c^3} \\
 &\quad + \frac{\left( c^3f - c^2(bh + ak) - b^3m + bc(bk + 2am) + \frac{2c^4d - c^3(bf + 2ah) + b^4m - b^2c(bk + 4am) + c^2(b^2h + 3abk + 2a^2m)}{\sqrt{b^2 - 4ac}} \right)}{2c^3}
 \end{aligned}$$

$$\begin{aligned}
&= \frac{(c^2h + b^2m - c(bk + am))x}{c^3} + \frac{(cj - bl)x^2}{2c^2} + \frac{(ck - bm)x^3}{3c^2} + \frac{lx^4}{4c} + \frac{mx^5}{5c} \\
&\quad + \frac{\left(c^3f - c^2(bh + ak) - b^3m + bc(bk + 2am) + \frac{2c^4d - c^3(bf + 2ah) + b^4m - b^2c(bk + 4am) + c^2(b^2h + 3abk + 2a^2m)}{\sqrt{b^2 - 4ac}}\right)}{\sqrt{2c^{7/2}\sqrt{b - \sqrt{b^2 - 4ac}}}} \\
&\quad + \frac{\left(c^3f - c^2(bh + ak) - b^3m + bc(bk + 2am) - \frac{2c^4d - c^3(bf + 2ah) + b^4m - b^2c(bk + 4am) + c^2(b^2h + 3abk + 2a^2m)}{\sqrt{b^2 - 4ac}}\right)}{\sqrt{2c^{7/2}\sqrt{b + \sqrt{b^2 - 4ac}}}} \\
&\quad + \frac{(c^2g + b^2l - c(bj + al)) \text{Subst}\left(\int \frac{b+2cx}{a+bx+cx^2} dx, x, x^2\right)}{4c^3} \\
&\quad + \frac{(2c^3e - c^2(bg + 2aj) - b^3l + bc(bj + 3al)) \text{Subst}\left(\int \frac{1}{a+bx+cx^2} dx, x, x^2\right)}{4c^3} \\
&= \frac{(c^2h + b^2m - c(bk + am))x}{c^3} + \frac{(cj - bl)x^2}{2c^2} + \frac{(ck - bm)x^3}{3c^2} + \frac{lx^4}{4c} + \frac{mx^5}{5c} \\
&\quad + \frac{\left(c^3f - c^2(bh + ak) - b^3m + bc(bk + 2am) + \frac{2c^4d - c^3(bf + 2ah) + b^4m - b^2c(bk + 4am) + c^2(b^2h + 3abk + 2a^2m)}{\sqrt{b^2 - 4ac}}\right)}{\sqrt{2c^{7/2}\sqrt{b - \sqrt{b^2 - 4ac}}}} \\
&\quad + \frac{\left(c^3f - c^2(bh + ak) - b^3m + bc(bk + 2am) - \frac{2c^4d - c^3(bf + 2ah) + b^4m - b^2c(bk + 4am) + c^2(b^2h + 3abk + 2a^2m)}{\sqrt{b^2 - 4ac}}\right)}{\sqrt{2c^{7/2}\sqrt{b + \sqrt{b^2 - 4ac}}}} \\
&\quad + \frac{(c^2g + b^2l - c(bj + al)) \log(a + bx^2 + cx^4)}{4c^3} \\
&\quad - \frac{(2c^3e - c^2(bg + 2aj) - b^3l + bc(bj + 3al)) \text{Subst}\left(\int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2\right)}{2c^3} \\
&= \frac{(c^2h + b^2m - c(bk + am))x}{c^3} + \frac{(cj - bl)x^2}{2c^2} + \frac{(ck - bm)x^3}{3c^2} + \frac{lx^4}{4c} + \frac{mx^5}{5c} \\
&\quad + \frac{\left(c^3f - c^2(bh + ak) - b^3m + bc(bk + 2am) + \frac{2c^4d - c^3(bf + 2ah) + b^4m - b^2c(bk + 4am) + c^2(b^2h + 3abk + 2a^2m)}{\sqrt{b^2 - 4ac}}\right)}{\sqrt{2c^{7/2}\sqrt{b - \sqrt{b^2 - 4ac}}}} \\
&\quad + \frac{\left(c^3f - c^2(bh + ak) - b^3m + bc(bk + 2am) - \frac{2c^4d - c^3(bf + 2ah) + b^4m - b^2c(bk + 4am) + c^2(b^2h + 3abk + 2a^2m)}{\sqrt{b^2 - 4ac}}\right)}{\sqrt{2c^{7/2}\sqrt{b + \sqrt{b^2 - 4ac}}}} \\
&\quad - \frac{(2c^3e - c^2(bg + 2aj) - b^3l + bc(bj + 3al)) \tanh^{-1}\left(\frac{b+2cx^2}{\sqrt{b^2 - 4ac}}\right)}{2c^3\sqrt{b^2 - 4ac}} \\
&\quad + \frac{(c^2g + b^2l - c(bj + al)) \log(a + bx^2 + cx^4)}{4c^3}
\end{aligned}$$

## Mathematica [A] (verified)

Time = 0.73 (sec) , antiderivative size = 816, normalized size of antiderivative = 1.50

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{a + bx^2 + cx^4} dx$$

$$= \frac{(c^2h + b^2m - c(bk + am))x}{c^3} + \frac{(cj - bl)x^2}{2c^2} + \frac{(ck - bm)x^3}{3c^2} + \frac{lx^4}{4c} + \frac{mx^5}{5c}$$

$$+ \frac{(2c^4d + c^3(-bf + \sqrt{b^2 - 4ac}f - 2ah) + b^3(b - \sqrt{b^2 - 4ac})m + c^2(b^2h - b\sqrt{b^2 - 4ac}h + 3abk - a\sqrt{b^2 - 4ac}k))}{\sqrt{2}c^{7/2}\sqrt{b^2 - 4ac}\sqrt{b - \sqrt{b^2 - 4ac}}}$$

$$- \frac{(2c^4d - c^3(bf + \sqrt{b^2 - 4ac}f + 2ah) + b^3(b + \sqrt{b^2 - 4ac})m + c^2(b^2h + b\sqrt{b^2 - 4ac}h + 3abk + a\sqrt{b^2 - 4ac}k))}{\sqrt{2}c^{7/2}\sqrt{b^2 - 4ac}\sqrt{b + \sqrt{b^2 - 4ac}}}$$

$$+ \frac{(2c^3e + c^2(-bg + \sqrt{b^2 - 4ac}g - 2aj) + b^2(-b + \sqrt{b^2 - 4ac})l + c(b^2j - b\sqrt{b^2 - 4ac}j + 3abl - a\sqrt{b^2 - 4ac}l))}{4c^3\sqrt{b^2 - 4ac}}$$

$$+ \frac{(-2c^3e + c^2(bg + \sqrt{b^2 - 4ac}g + 2aj) + b^2(b + \sqrt{b^2 - 4ac})l - c(b^2j + b\sqrt{b^2 - 4ac}j + 3abl + a\sqrt{b^2 - 4ac}l))}{4c^3\sqrt{b^2 - 4ac}}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + j\*x^5 + k\*x^6 + l\*x^7 + m\*x^8)/(a + b\*x^2 + c\*x^4),x]

[Out] ((c^2\*h + b^2\*m - c\*(b\*k + a\*m))\*x)/c^3 + ((c\*j - b\*l)\*x^2)/(2\*c^2) + ((c\*k - b\*m)\*x^3)/(3\*c^2) + (l\*x^4)/(4\*c) + (m\*x^5)/(5\*c) + ((2\*c^4\*d + c^3\*(-(b\*f) + Sqrt[b^2 - 4\*a\*c]\*f - 2\*a\*h) + b^3\*(b - Sqrt[b^2 - 4\*a\*c])\*m + c^2\*(b^2\*h - b\*Sqrt[b^2 - 4\*a\*c]\*h + 3\*a\*b\*k - a\*Sqrt[b^2 - 4\*a\*c]\*k + 2\*a^2\*m) + b\*c\*(-(b^2\*k) + b\*Sqrt[b^2 - 4\*a\*c]\*k - 4\*a\*b\*m + 2\*a\*Sqrt[b^2 - 4\*a\*c]\*m))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]])/(Sqrt[2]\*c^(7/2)\*Sqrt[b^2 - 4\*a\*c]\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) - ((2\*c^4\*d - c^3\*(b\*f + Sqrt[b^2 - 4\*a\*c]\*f + 2\*a\*h) + b^3\*(b + Sqrt[b^2 - 4\*a\*c])\*m + c^2\*(b^2\*h + b\*Sqrt[b^2 - 4\*a\*c]\*h + 3\*a\*b\*k + a\*Sqrt[b^2 - 4\*a\*c]\*k + 2\*a^2\*m) - b\*c\*(b^2\*k + b\*Sqrt[b^2 - 4\*a\*c]\*k + 4\*a\*b\*m + 2\*a\*Sqrt[b^2 - 4\*a\*c]\*m))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]])/(Sqrt[2]\*c^(7/2)\*Sqrt[b^2 - 4\*a\*c]\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) + ((2\*c^3\*e + c^2\*(-(b\*g) + Sqrt[b^2 - 4\*a\*c]\*g - 2\*a\*j) + b^2\*(-b + Sqrt[b^2 - 4\*a\*c])\*l + c\*(b^2\*j - b\*Sqrt[b^2 - 4\*a\*c]\*j + 3\*a\*b\*l - a\*Sqrt[b^2 - 4\*a\*c]\*l))\*Log[-b + Sqrt[b^2 - 4\*a\*c] - 2\*c\*x^2])/(4\*c^3\*Sqrt[b^2 - 4\*a\*c]) + ((-2\*c^3\*e + c^2\*(b\*g + Sqrt[b^2 - 4\*a\*c]\*g + 2\*a\*j) + b^2\*(b + Sqrt[b^2 - 4\*a\*c])\*l - c\*(b^2\*j + b\*Sqrt[b^2 - 4\*a\*c]\*j + 3\*a\*b\*l + a\*Sqrt[b^2 - 4\*a\*c]\*l))\*Log[b + Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2])/(4\*c^3\*Sqrt[b^2 - 4\*a\*c])



**Maple [C] (verified)**

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.76 (sec) , antiderivative size = 246, normalized size of antiderivative = 0.45

method	result
risch	$\frac{m x^5}{5c} + \frac{l x^4}{4c} - \frac{b m x^3}{3c^2} + \frac{k x^3}{3c} - \frac{b l x^2}{2c^2} + \frac{j x^2}{2c} - \frac{a m x}{c^2} + \frac{b^2 m x}{c^3} - \frac{b k x}{c^2} + \frac{h x}{c} + \frac{-R=\text{RootOf}(\sum (c-Z^4+Z^2b+a))}{\sqrt{-4ac+b^2}} \left( \frac{(-\sqrt{-4ac+b^2} a c^2 l + \sqrt{-4ac+b^2} a c^2 k - \sqrt{-4ac+b^2} a c^2 h + \sqrt{-4ac+b^2} a c^2 j)}{\sqrt{-4ac+b^2}} \right)$
default	$-\frac{\frac{1}{5} m x^5 c^2 - \frac{1}{4} l x^4 c^2 + \frac{1}{3} b c m x^3 - \frac{1}{3} c^2 k x^3 + \frac{1}{2} b c l x^2 - \frac{1}{2} c^2 j x^2 + a c m x - b^2 m x + b c k x - c^2 h x}{c^3} + \frac{-R=\text{RootOf}(\sum (c-Z^4+Z^2b+a))}{\sqrt{-4ac+b^2}} \left( \frac{(-\sqrt{-4ac+b^2} a c^2 l + \sqrt{-4ac+b^2} a c^2 k - \sqrt{-4ac+b^2} a c^2 h + \sqrt{-4ac+b^2} a c^2 j)}{\sqrt{-4ac+b^2}} \right)$

```
[In] int((m*x^8+l*x^7+k*x^6+j*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a),x,method=_RETURNVERBOSE)
```

```
[Out] 1/5*m*x^5/c+1/4*l*x^4/c-1/3/c^2*b*m*x^3+1/3/c*k*x^3-1/2/c^2*b*l*x^2+1/2/c*j*x^2-1/c^2*a*m*x+1/c^3*b^2*m*x-1/c^2*b*k*x+h*x/c+1/2/c^3*sum((c*(-a*c*l+b^2*l-b*c*j+c^2*g)*_R^3+_R^2*(2*a*b*c*m-a*c^2*k-b^3*m+b^2*c*k-b*c^2*h+c^3*f)+c*(a*b*l-a*c*j+c^2*e)*_R+a^2*c*m-a*b^2*m+a*b*c*k-a*c^2*h+c^3*d)/(2*_R^3*c+_R*b)*ln(x-_R),_R=RootOf(_Z^4*c+_Z^2*b+a))
```

**Fricas [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{a + bx^2 + cx^4} dx = \text{Timed out}$$

```
[In] integrate((m*x^8+l*x^7+k*x^6+j*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a),x,algorithm="fricas")
```

```
[Out] Timed out
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{a + bx^2 + cx^4} dx = \text{Timed out}$$

[In] integrate((m\*x\*\*8+l\*x\*\*7+k\*x\*\*6+j\*x\*\*5+h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a),x)

[Out] Timed out

**Maxima [F]**

$$\begin{aligned} & \int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{a + bx^2 + cx^4} dx \\ &= \int \frac{mx^8 + lx^7 + kx^6 + jx^5 + hx^4 + gx^3 + fx^2 + ex + d}{cx^4 + bx^2 + a} dx \end{aligned}$$

[In] integrate((m\*x^8+l\*x^7+k\*x^6+j\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="maxima")

[Out] 1/60\*(12\*c^2\*m\*x^5 + 15\*c^2\*l\*x^4 + 20\*(c^2\*k - b\*c\*m)\*x^3 + 30\*(c^2\*j - b\*c\*l)\*x^2 + 60\*(c^2\*h - b\*c\*k + (b^2 - a\*c)\*m)\*x)/c^3 - integrate(-(c^3\*d - a\*c^2\*h + a\*b\*c\*k + (c^3\*g - b\*c^2\*j + (b^2\*c - a\*c^2)\*l)\*x^3 + (c^3\*f - b\*c^2\*h + (b^2\*c - a\*c^2)\*k - (b^3 - 2\*a\*b\*c)\*m)\*x^2 - (a\*b^2 - a^2\*c)\*m + (c^3\*e - a\*c^2\*j + a\*b\*c\*l)\*x)/(c\*x^4 + b\*x^2 + a), x)/c^3

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 11830 vs. 2(495) = 990.

Time = 2.10 (sec) , antiderivative size = 11830, normalized size of antiderivative = 21.71

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

[In] integrate((m\*x^8+l\*x^7+k\*x^6+j\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a),x, algorithm="giac")

[Out] 1/8\*((2\*b^4\*c^5 - 16\*a\*b^2\*c^6 + 32\*a^2\*c^7 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^4\*c^3 + 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^2\*c^4 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^3\*c^4 - 16\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*c^5 - 8\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2

$$\begin{aligned}
& - 4*a*c)*c)*a*b*c^5 - \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c) \\
& )*c)*b^2*c^5 + 4*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))* \\
& a*c^6 - 2*(b^2 - 4*a*c)*b^2*c^5 + 8*(b^2 - 4*a*c)*a*c^6)*c^2*f - (2*b^5*c^4 \\
& - 16*a*b^3*c^5 + 32*a^2*b*c^6 - \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}( \\
& b^2 - 4*a*c)*c)*b^5*c^2 + 8*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - \\
& 4*a*c)*c)*a*b^3*c^3 + 2*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4* \\
& a*c)*c)*b^4*c^3 - 16*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c) \\
& )*c)*a^2*b*c^4 - 8*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))* \\
& a*b^2*c^4 - \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*b^3* \\
& c^4 + 4*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a*b*c^5 - \\
& 2*(b^2 - 4*a*c)*b^3*c^4 + 8*(b^2 - 4*a*c)*a*b*c^5)*c^2*h + (2*b^6*c^3 - 18 \\
& *a*b^4*c^4 + 48*a^2*b^2*c^5 - 32*a^3*c^6 - \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b \\
& *c + \text{sqrt}(b^2 - 4*a*c)*c)*b^6*c + 9*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sq} \\
& \text{rt}(b^2 - 4*a*c)*c)*a*b^4*c^2 + 2*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}( \\
& b^2 - 4*a*c)*c)*b^5*c^2 - 24*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 \\
& - 4*a*c)*c)*a^2*b^2*c^3 - 10*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 \\
& - 4*a*c)*c)*a*b^3*c^3 - \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a \\
& *c)*c)*b^4*c^3 + 16*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))* \\
& c)*a^3*c^4 + 8*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a^ \\
& 2*b*c^4 + 5*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a*b^2 \\
& *c^4 - 4*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a^2*c^5 \\
& - 2*(b^2 - 4*a*c)*b^4*c^3 + 10*(b^2 - 4*a*c)*a*b^2*c^4 - 8*(b^2 - 4*a*c)*a^ \\
& 2*c^5)*c^2*k - (2*b^7*c^2 - 20*a*b^5*c^3 + 64*a^2*b^3*c^4 - 64*a^3*b*c^5 - \\
& \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*b^7 + 10*\text{sqrt}(2)* \\
& \text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a*b^5*c + 2*\text{sqrt}(2)*\text{sqrt}( \\
& b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*b^6*c - 32*\text{sqrt}(2)*\text{sqrt}(b^2 - \\
& 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a^2*b^3*c^2 - 12*\text{sqrt}(2)*\text{sqrt}(b^2 - \\
& 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a*b^4*c^2 - \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c) \\
& )*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*b^5*c^2 + 32*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sq} \\
& \text{rt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a^3*b*c^3 + 16*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt} \\
& (b*c + \text{sqrt}(b^2 - 4*a*c))*a^2*b^2*c^3 + 6*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}( \\
& b*c + \text{sqrt}(b^2 - 4*a*c))*a*b^3*c^3 - 8*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c \\
& + \text{sqrt}(b^2 - 4*a*c))*a^2*b*c^4 - 2*(b^2 - 4*a*c)*b^5*c^2 + 12*(b^2 - 4*a \\
& *c)*a*b^3*c^3 - 16*(b^2 - 4*a*c)*a^2*b*c^4)*c^2*m + 2*(\text{sqrt}(2)*\text{sqrt}(b*c + s \\
& \text{qrt}(b^2 - 4*a*c))*b^4*c^5 - 8*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a*b \\
& ^2*c^6 - 2*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*b^3*c^6 - 2*b^4*c^6 + 16 \\
& *\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a^2*c^7 + 8*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sq} \\
& \text{rt}(b^2 - 4*a*c))*a*b*c^7 + \text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*b^2*c^7 \\
& + 16*a*b^2*c^7 - 4*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a*c^8 - 32*a^2* \\
& c^8 + 2*(b^2 - 4*a*c)*b^2*c^6 - 8*(b^2 - 4*a*c)*a*c^7)*d*\text{abs}(c) - 2*(\text{sqrt}(2) \\
& )*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a*b^4*c^4 - 8*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 \\
& - 4*a*c))*a^2*b^2*c^5 - 2*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a*b^3* \\
& c^5 - 2*a*b^4*c^5 + 16*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a^3*c^6 + 8* \\
& \text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*a^2*b*c^6 + \text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt} \\
& (b^2 - 4*a*c))*a*b^2*c^6 + 16*a^2*b^2*c^6 - 4*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2
\end{aligned}$$

$$\begin{aligned}
& - 4*a*c)*c)*a^2*c^7 - 32*a^3*c^7 + 2*(b^2 - 4*a*c)*a*b^2*c^5 - 8*(b^2 - 4* \\
& a*c)*a^2*c^6)*h*abs(c) + 2*(sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a*b^5*c \\
& ^3 - 8*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b^3*c^4 - 2*sqrt(2)*sqrt \\
& (b*c + sqrt(b^2 - 4*a*c)*c)*a*b^4*c^4 - 2*a*b^5*c^4 + 16*sqrt(2)*sqrt(b*c + \\
& sqrt(b^2 - 4*a*c)*c)*a^3*b*c^5 + 8*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c) \\
& *a^2*b^2*c^5 + sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a*b^3*c^5 + 16*a^2*b \\
& ^3*c^5 - 4*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b*c^6 - 32*a^3*b*c^6 \\
& + 2*(b^2 - 4*a*c)*a*b^3*c^4 - 8*(b^2 - 4*a*c)*a^2*b*c^5)*k*abs(c) - 2*(sqr \\
& t(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a*b^6*c^2 - 9*sqrt(2)*sqrt(b*c + sqrt( \\
& b^2 - 4*a*c)*c)*a^2*b^4*c^3 - 2*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a*b \\
& ^5*c^3 - 2*a*b^6*c^3 + 24*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^3*b^2*c \\
& ^4 + 10*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b^3*c^4 + sqrt(2)*sqrt( \\
& b*c + sqrt(b^2 - 4*a*c)*c)*a*b^4*c^4 + 18*a^2*b^4*c^4 - 16*sqrt(2)*sqrt(b*c \\
& + sqrt(b^2 - 4*a*c)*c)*a^4*c^5 - 8*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c) \\
& *a^3*b*c^5 - 5*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b^2*c^5 - 48*a^3 \\
& *b^2*c^5 + 4*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^3*c^6 + 32*a^4*c^6 + \\
& 2*(b^2 - 4*a*c)*a*b^4*c^3 - 10*(b^2 - 4*a*c)*a^2*b^2*c^4 + 8*(b^2 - 4*a*c) \\
& *a^3*c^5)*m*abs(c) + 2*(2*b^3*c^8 - 8*a*b*c^9 - sqrt(2)*sqrt(b^2 - 4*a*c)*s \\
& qrt(b*c + sqrt(b^2 - 4*a*c)*c)*b^3*c^6 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b \\
& *c + sqrt(b^2 - 4*a*c)*c)*a*b*c^7 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + \\
& sqrt(b^2 - 4*a*c)*c)*b^2*c^7 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^ \\
& 2 - 4*a*c)*c)*b*c^8 - 2*(b^2 - 4*a*c)*b*c^8)*d - (2*b^4*c^7 - 8*a*b^2*c^8 - \\
& sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*b^4*c^5 + 4*sqrt \\
& (2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a*b^2*c^6 + 2*sqrt(2) \\
& *sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*b^3*c^6 - sqrt(2)*sqrt(b \\
& ^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*b^2*c^7 - 2*(b^2 - 4*a*c)*b^2*c \\
& ^7)*f + (2*b^5*c^6 - 12*a*b^3*c^7 + 16*a^2*b*c^8 - sqrt(2)*sqrt(b^2 - 4*a*c) \\
& )*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*b^5*c^4 + 6*sqrt(2)*sqrt(b^2 - 4*a*c)*sqr \\
& t(b*c + sqrt(b^2 - 4*a*c)*c)*a*b^3*c^5 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b \\
& *c + sqrt(b^2 - 4*a*c)*c)*b^4*c^5 - 8*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + \\
& sqrt(b^2 - 4*a*c)*c)*a^2*b*c^6 - 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqr \\
& t(b^2 - 4*a*c)*c)*a*b^2*c^6 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 \\
& - 4*a*c)*c)*b^3*c^6 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4* \\
& a*c)*c)*a*b*c^7 - 2*(b^2 - 4*a*c)*b^3*c^6 + 4*(b^2 - 4*a*c)*a*b*c^7)*h - (2 \\
& *b^6*c^5 - 14*a*b^4*c^6 + 24*a^2*b^2*c^7 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b \\
& *c + sqrt(b^2 - 4*a*c)*c)*b^6*c^3 + 7*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + \\
& sqrt(b^2 - 4*a*c)*c)*a*b^4*c^4 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqr \\
& t(b^2 - 4*a*c)*c)*b^5*c^4 - 12*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^ \\
& 2 - 4*a*c)*c)*a^2*b^2*c^5 - 6*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 \\
& - 4*a*c)*c)*a*b^3*c^5 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4* \\
& a*c)*c)*b^4*c^5 + 3*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)* \\
& c)*a*b^2*c^6 - 2*(b^2 - 4*a*c)*b^4*c^5 + 6*(b^2 - 4*a*c)*a*b^2*c^6)*k + (2* \\
& b^7*c^4 - 16*a*b^5*c^5 + 36*a^2*b^3*c^6 - 16*a^3*b*c^7 - sqrt(2)*sqrt(b^2 - \\
& 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*b^7*c^2 + 8*sqrt(2)*sqrt(b^2 - 4*a* \\
& c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a*b^5*c^3 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*
\end{aligned}$$



$$\begin{aligned}
& *c) *c) *a^3 *b *c^3 + 16 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& *c) *a^2 *b^2 *c^3 + 6 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& *c) *a *b^3 *c^3 - 8 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) \\
& *a^2 *b *c^4 - 2 * (b^2 - 4 * a * c) * b^5 *c^2 + 12 * (b^2 - 4 * a * c) * a *b^3 *c^3 - 16 * (b^2 \\
& - 4 * a * c) * a^2 *b *c^4) *c^{2 * m} - 2 * (\sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * b^4 \\
& *c^5 - 8 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^2 *c^6 - 2 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& *c) * b^3 *c^6 + 2 * b^4 *c^6 + 16 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^2 *c^7 + 8 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b *c \\
& ^7 + \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * b^2 *c^7 - 16 * a *b^2 *c^7 - 4 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *c^8 + 32 * a^2 *c^8 - 2 * (b^2 - 4 * a * c) * b \\
& ^2 *c^6 + 8 * (b^2 - 4 * a * c) * a *c^7) * d * \text{abs}(c) + 2 * (\sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^4 *c^4 - 8 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^2 *b^2 *c^5 \\
& - 2 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^3 *c^5 + 2 * a *b^4 *c^5 + 16 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^3 *c^6 + 8 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^2 *b *c^6 + \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^2 *c^6 - 16 * a^2 *b^2 *c^6 - 4 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^2 *c^7 + 32 * a^3 *c^7 - 2 * (b^2 - 4 * a * c) * a *b^2 *c^5 + 8 * (b^2 - 4 * a * c) * a^2 *c^6) * h * \text{abs}(c) - 2 * (\sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^5 *c^3 - 8 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^2 *b^3 *c^4 - 2 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^4 *c^4 + 2 * a *b^5 *c^4 + 16 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^3 *b *c^5 + 8 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^2 *b^2 *c^5 + \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^3 *c^5 - 16 * a^2 *b^3 *c^5 - 4 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^2 *b *c^6 + 32 * a^3 *b *c^6 - 2 * (b^2 - 4 * a * c) * a *b^3 *c^4 + 8 * (b^2 - 4 * a * c) * a^2 *b *c^5) * k * \text{abs}(c) + 2 * (\sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^6 *c^2 - 9 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^2 *b^4 *c^3 - 2 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^5 *c^3 + 2 * a *b^6 *c^3 + 24 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^3 *b^2 *c^4 + 10 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^2 *b^3 *c^4 + \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^4 *c^4 - 18 * a^2 *b^4 *c^4 - 16 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^4 *c^5 - 8 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^3 *b *c^5 - 5 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^2 *b^2 *c^5 + 48 * a^3 *b^2 *c^5 + 4 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a^3 *c^6 - 32 * a^4 *c^6 - 2 * (b^2 - 4 * a * c) * a *b^4 *c^3 + 10 * (b^2 - 4 * a * c) * a^2 *b^2 *c^4 - 8 * (b^2 - 4 * a * c) * a^3 *c^5) * m * \text{abs}(c) + 2 * (2 * b^3 *c^8 - 8 * a *b *c^9 - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * b^3 *c^6 + 4 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b *c^7 + 2 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * b^2 *c^7 - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * b *c^8 - 2 * (b^2 - 4 * a * c) * b *c^8) * d - (2 * b^4 *c^7 - 8 * a *b^2 *c^8 - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * b^4 *c^5 + 4 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^2 *c^6 + 2 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * b^3 *c^6 - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * b^2 *c^7 - 2 * (b^2 - 4 * a * c) * b^2 *c^7) * f + (2 * b^5 *c^6 - 12 * a *b^3 *c^7 + 16 * a^2 *b *c^8 - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * b^5 *c^4 + 6 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) * a *b^3 *c^5 + 2 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} *c) *
\end{aligned}$$



$$\begin{aligned}
& c)) * g - (b^7 * c^2 - 10 * a * b^5 * c^3 - 2 * b^6 * c^3 + 32 * a^2 * b^3 * c^4 + 12 * a * b^4 * c^4 \\
& + b^5 * c^4 - 32 * a^3 * b * c^5 - 16 * a^2 * b^2 * c^5 - 6 * a * b^3 * c^5 + 8 * a^2 * b * c^6 - (b \\
& ^6 * c^2 - 6 * a * b^4 * c^3 - 2 * b^5 * c^3 + 8 * a^2 * b^2 * c^4 + 4 * a * b^3 * c^4 + b^4 * c^4 - \\
& 2 * a * b^2 * c^5) * \text{sqrt}(b^2 - 4 * a * c)) * j + (b^8 * c - 11 * a * b^6 * c^2 - 2 * b^7 * c^2 + 40 * \\
& a^2 * b^4 * c^3 + 14 * a * b^5 * c^3 + b^6 * c^3 - 48 * a^3 * b^2 * c^4 - 24 * a^2 * b^3 * c^4 - 7 * \\
& a * b^4 * c^4 + 12 * a^2 * b^2 * c^5 - (b^7 * c - 7 * a * b^5 * c^2 - 2 * b^6 * c^2 + 12 * a^2 * b^3 * \\
& c^3 + 6 * a * b^4 * c^3 + b^5 * c^3 - 3 * a * b^3 * c^4) * \text{sqrt}(b^2 - 4 * a * c)) * l * \log(x^2 + \\
& 1/2 * (b * c^{11} + \text{sqrt}(b^2 * c^{22} - 4 * a * c^{23}))/c^{12}) / ((a * b^4 * c^2 - 8 * a^2 * b^2 * c^3 \\
& - 2 * a * b^3 * c^3 + 16 * a^3 * c^4 + 8 * a^2 * b * c^4 + a * b^2 * c^4 - 4 * a^2 * c^5) * c^2 * \text{abs}(c \\
& )) + 1/16 * (2 * (b^5 * c^3 - 8 * a * b^3 * c^4 - 2 * b^4 * c^4 + 16 * a^2 * b * c^5 + 8 * a * b^2 * c^ \\
& 5 + b^3 * c^5 - 4 * a * b * c^6 + (b^4 * c^3 - 8 * a * b^2 * c^4 - 2 * b^3 * c^4 + 16 * a^2 * c^5 + \\
& 8 * a * b * c^5 + b^2 * c^5 - 4 * a * c^6) * \text{sqrt}(b^2 - 4 * a * c)) * e * \text{abs}(c) - (b^6 * c^2 - 8 * \\
& a * b^4 * c^3 - 2 * b^5 * c^3 + 16 * a^2 * b^2 * c^4 + 8 * a * b^3 * c^4 + b^4 * c^4 - 4 * a * b^2 * c^ \\
& 5 - (b^5 * c^2 - 8 * a * b^3 * c^3 - 2 * b^4 * c^3 + 16 * a^2 * b * c^4 + 8 * a * b^2 * c^4 + b^3 * c \\
& ^4 - 4 * a * b * c^5) * \text{sqrt}(b^2 - 4 * a * c)) * g * \text{abs}(c) + (b^7 * c - 10 * a * b^5 * c^2 - 2 * b^6 \\
& * c^2 + 32 * a^2 * b^3 * c^3 + 12 * a * b^4 * c^3 + b^5 * c^3 - 32 * a^3 * b * c^4 - 16 * a^2 * b^2 * \\
& c^4 - 6 * a * b^3 * c^4 + 8 * a^2 * b * c^5 - (b^6 * c - 10 * a * b^4 * c^2 - 2 * b^5 * c^2 + 32 * a^ \\
& 2 * b^2 * c^3 + 12 * a * b^3 * c^3 + b^4 * c^3 - 32 * a^3 * c^4 - 16 * a^2 * b * c^4 - 6 * a * b^2 * c^ \\
& 4 + 8 * a^2 * c^5) * \text{sqrt}(b^2 - 4 * a * c)) * j * \text{abs}(c) - (b^8 - 11 * a * b^6 * c - 2 * b^7 * c + \\
& 40 * a^2 * b^4 * c^2 + 14 * a * b^5 * c^2 + b^6 * c^2 - 48 * a^3 * b^2 * c^3 - 24 * a^2 * b^3 * c^3 - \\
& 7 * a * b^4 * c^3 + 12 * a^2 * b^2 * c^4 - (b^7 - 11 * a * b^5 * c - 2 * b^6 * c + 40 * a^2 * b^3 * c^ \\
& 2 + 14 * a * b^4 * c^2 + b^5 * c^2 - 48 * a^3 * b * c^3 - 24 * a^2 * b^2 * c^3 - 7 * a * b^3 * c^3 + \\
& 12 * a^2 * b * c^4) * \text{sqrt}(b^2 - 4 * a * c)) * l * \text{abs}(c) - 2 * (b^5 * c^4 - 8 * a * b^3 * c^5 - 2 * b^ \\
& 4 * c^5 + 16 * a^2 * b * c^6 + 8 * a * b^2 * c^6 + b^3 * c^6 - 4 * a * b * c^7 + (b^4 * c^4 - 4 * a * b \\
& ^2 * c^5 - 2 * b^3 * c^5 + b^2 * c^6) * \text{sqrt}(b^2 - 4 * a * c)) * e + (b^6 * c^3 - 8 * a * b^4 * c^4 \\
& - 2 * b^5 * c^4 + 16 * a^2 * b^2 * c^5 + 8 * a * b^3 * c^5 + b^4 * c^5 - 4 * a * b^2 * c^6 - (b^5 * \\
& c^3 - 4 * a * b^3 * c^4 - 2 * b^4 * c^4 + b^3 * c^5) * \text{sqrt}(b^2 - 4 * a * c)) * g - (b^7 * c^2 - \\
& 10 * a * b^5 * c^3 - 2 * b^6 * c^3 + 32 * a^2 * b^3 * c^4 + 12 * a * b^4 * c^4 + b^5 * c^4 - 32 * a^3 \\
& * b * c^5 - 16 * a^2 * b^2 * c^5 - 6 * a * b^3 * c^5 + 8 * a^2 * b * c^6 - (b^6 * c^2 - 6 * a * b^4 * c^ \\
& 3 - 2 * b^5 * c^3 + 8 * a^2 * b^2 * c^4 + 4 * a * b^3 * c^4 + b^4 * c^4 - 2 * a * b^2 * c^5) * \text{sqrt}(b \\
& ^2 - 4 * a * c)) * j + (b^8 * c - 11 * a * b^6 * c^2 - 2 * b^7 * c^2 + 40 * a^2 * b^4 * c^3 + 14 * a * \\
& b^5 * c^3 + b^6 * c^3 - 48 * a^3 * b^2 * c^4 - 24 * a^2 * b^3 * c^4 - 7 * a * b^4 * c^4 + 12 * a^2 * \\
& b^2 * c^5 - (b^7 * c - 7 * a * b^5 * c^2 - 2 * b^6 * c^2 + 12 * a^2 * b^3 * c^3 + 6 * a * b^4 * c^3 + \\
& b^5 * c^3 - 3 * a * b^3 * c^4) * \text{sqrt}(b^2 - 4 * a * c)) * l * \log(x^2 + 1/2 * (b * c^{11} - \text{sqrt}( \\
& b^2 * c^{22} - 4 * a * c^{23}))/c^{12}) / ((a * b^4 * c^2 - 8 * a^2 * b^2 * c^3 - 2 * a * b^3 * c^3 + 16 * \\
& a^3 * c^4 + 8 * a^2 * b * c^4 + a * b^2 * c^4 - 4 * a^2 * c^5) * c^2 * \text{abs}(c)) + 1/60 * (12 * c^4 * m \\
& * x^5 + 15 * c^4 * l * x^4 + 20 * c^4 * k * x^3 - 20 * b * c^3 * m * x^3 + 30 * c^4 * j * x^2 - 30 * b * c \\
& ^3 * l * x^2 + 60 * c^4 * h * x - 60 * b * c^3 * k * x + 60 * b^2 * c^2 * m * x - 60 * a * c^3 * m * x) / c^5
\end{aligned}$$



## Mupad [B] (verification not implemented)

Time = 10.69 (sec) , antiderivative size = 49150, normalized size of antiderivative = 90.18

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{a + bx^2 + cx^4} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + j\*x^5 + k\*x^6 + l\*x^7 + m\*x^8)/(a + b\*x^2 + c\*x^4),x)

[Out]  $x^2*(j/(2*c) - (b*1)/(2*c^2)) - x*((b*(k/c - (b*m)/c^2))/c - h/c + (a*m)/c^2) + x^3*(k/(3*c) - (b*m)/(3*c^2)) + \text{symsum}(\log((c^7*d*e^2 - a*c^6*f^3 - c^7*d^2*f + b^7*d*m^2 + a^4*c^3*k^3 + a^4*b^3*m^3 + a^2*b*c^4*h^3 + b^2*c^5*d*g^2 + b^3*c^4*d*h^2 + a^2*c^5*d*j^2 - a^2*c^5*f*h^2 + a^2*c^5*g^2*h + b^4*c^3*d*j^2 - a^3*c^4*d*l^2 - b^2*c^5*d^2*k + b^5*c^2*d*k^2 + 3*a^2*c^5*f^2*k - 3*a^3*c^4*f*k^2 + a^2*c^5*e^2*m - a^3*c^4*h*j^2 + b^3*c^4*d^2*m + a^3*c^4*h^2*k - a^4*c^3*f*m^2 + a^2*b^5*h*m^2 - a^3*c^4*g^2*m + a^4*c^3*h*l^2 - a^3*b^4*k*m^2 + a^4*c^3*j^2*m + a^5*c^2*k*m^2 - a^5*c^2*l^2*m - a^3*b^2*c^2*k^3 - a*c^6*d*g^2 + b*c^6*d*f^2 - a*c^6*e^2*h + b*c^6*d^2*h + a*c^6*d^2*k - 2*a^5*b*c*m^3 + b^6*c*d*l^2 - a*b^6*f*m^2 - 2*a*b*c^5*d*h^2 - a*b*c^5*f*g^2 + 2*a*b*c^5*f^2*h + a*b*c^5*e^2*k - 2*a*b*c^5*d^2*m - 6*a*b^5*c*d*m^2 - 2*b^2*c^5*d*f*h - a*b^5*c*f*l^2 + 2*b^2*c^5*d*e*j - 2*b^3*c^4*d*e*l + 2*b^3*c^4*d*f*k - 2*b^3*c^4*d*g*j - 2*a^2*c^5*d*f*m + 2*a^2*c^5*d*g*l - 2*a^2*c^5*d*h*k - 2*a^2*c^5*e*f*l - 2*a^2*c^5*e*g*k + 2*a^2*c^5*e*h*j - 2*a^2*c^5*f*g*j - 2*b^4*c^3*d*f*m + 2*b^4*c^3*d*g*l - 2*b^4*c^3*d*h*k + 2*b^5*c^2*d*h*m + 2*a^3*c^4*f*h*m - 2*a^3*c^4*g*h*l - 2*b^5*c^2*d*j*l + 2*a^3*c^4*d*k*m - 2*a^3*c^4*e*j*m + 2*a^3*c^4*e*k*l + 2*a^3*c^4*f*j*l + 2*a^3*c^4*g*j*k + 2*a^4*c^3*g*l*m - 2*a^4*c^3*h*k*m - 2*a^4*c^3*j*k*l - 3*a*b^2*c^4*d*j^2 - a*b^2*c^4*f*h^2 - 4*a*b^3*c^3*d*k^2 + 3*a^2*b*c^4*d*k^2 - a*b^3*c^3*f*j^2 - 5*a*b^4*c^2*d*l^2 + 2*a^2*b*c^4*f*j^2 - 2*a*b^2*c^4*f^2*k - a*b^4*c^2*f*k^2 - 4*a^3*b*c^3*d*m^2 - a*b^2*c^4*e^2*m - 3*a^3*b*c^3*f*l^2 + 2*a*b^3*c^3*f^2*m - 5*a^2*b*c^4*f^2*m + 5*a^2*b^4*c*f*m^2 + a^2*b^4*c*h*l^2 - 4*a^3*b*c^3*h^2*m - a^3*b*c^3*j^2*k - 4*a^3*b^3*c*h*m^2 + 5*a^4*b*c^2*h*m^2 - a^3*b^3*c*k*l^2 + 2*a^4*b*c^2*k*l^2 + 2*a^3*b^3*c*k^2*m - 3*a^4*b*c^2*k^2*m + a^4*b^2*c*k*m^2 + a^4*b^2*c*l^2*m - 2*b*c^6*d*e*g + 2*a*c^6*d*f*h + 2*a*c^6*e*f*g - 2*a*c^6*d*e*j - 2*b^6*c*d*k*m + 6*a^2*b^2*c^3*d*l^2 + 3*a^2*b^2*c^3*f*k^2 + 10*a^2*b^3*c^2*d*m^2 + a^2*b^2*c^3*h*j^2 + 4*a^2*b^3*c^2*f*l^2 - 2*a^2*b^2*c^3*h^2*k + a^2*b^3*c^2*h*k^2 - 6*a^3*b^2*c^2*f*m^2 - 3*a^3*b^2*c^2*h*l^2 + 2*a^2*b^3*c^2*h^2*m + 4*a*b*c^5*d*e*l - 4*a*b*c^5*d*f*k + 4*a*b*c^5*d*g*j - 2*a*b*c^5*e*f*j + 2*a*b^5*c*f*k*m + 6*a*b^2*c^4*d*f*m - 6*a*b^2*c^4*d*g*l + 6*a*b^2*c^4*d*h*k + 2*a*b^2*c^4*e*f*l + 2*a*b^2*c^4*f*g*j - 8*a*b^3*c^3*d*h*m - 2*a*b^3*c^3*f*g*l + 2*a*b^3*c^3*f*h*k + 6*a^2*b*c^4*d*h*m + 2*a^2*b*c^4*e*g*m - 2*a^2*b*c^4*e*h*l + 4*a^2*b*c^4*f*g*l - 2*a^2*b*c^4*f*h*k - 2*a^2*b*c^4*g*h*j + 8*a*b^3*c^3*d*j*l - 6*a^2*b*c^4*d*j*l - 2*a*b^4*c^2*f*h*m + 10*a*b^4*c^2*d*k*m + 2*a*b^4*c^2*f*j*l + 8*a^3*b*c^3*f*k*m - 2*a^3*b*c$

$$\begin{aligned}
&^3g^k*1 + 4*a^3*b*c^3*h*j*1 - 2*a^2*b^4*c*h*k*m - 2*a^4*b*c^2*j*1*m + 4*a^2*b^2*c^3*f*h*m + 2*a^2*b^2*c^3*g*h*1 - 12*a^2*b^2*c^3*d*k*m - 6*a^2*b^2*c^3*f*j*1 - 8*a^2*b^3*c^2*f*k*m - 2*a^2*b^3*c^2*h*j*1 + 4*a^3*b^2*c^2*h*k*m + \\
&2*a^3*b^2*c^2*j*k*1)/c^5 - \text{root}(128*a^2*b^2*c^8*z^4 - 16*a*b^4*c^7*z^4 - 2 \\
&56*a^3*c^9*z^4 + 384*a^3*b^2*c^6*1*z^3 - 144*a^2*b^4*c^5*1*z^3 + 128*a^2*b^3*c^6*j*z^3 - 128*a^2*b^2*c^7*g*z^3 + 16*a*b^6*c^4*1*z^3 - 256*a^3*b*c^7*j* \\
&z^3 - 16*a*b^5*c^5*j*z^3 + 16*a*b^4*c^6*g*z^3 - 256*a^4*c^7*1*z^3 + 256*a^3*c^8*g*z^3 - 96*a^4*b*c^5*j*1*z^2 + 8*a*b^7*c^2*j*1*z^2 + 160*a^4*b*c^5*h*m \\
&*z^2 - 8*a*b^7*c^2*h*m*z^2 + 8*a*b^6*c^3*h*k*z^2 - 8*a*b^6*c^3*g*1*z^2 + 8* \\
&a*b^6*c^3*f*m*z^2 + 160*a^3*b*c^6*g*j*z^2 - 96*a^3*b*c^6*f*k*z^2 - 96*a^3*b \\
&*c^6*e*1*z^2 - 96*a^3*b*c^6*d*m*z^2 + 8*a*b^5*c^4*g*j*z^2 - 8*a*b^5*c^4*f*k \\
&*z^2 - 8*a*b^5*c^4*e*1*z^2 - 8*a*b^5*c^4*d*m*z^2 + 8*a*b^4*c^5*e*j*z^2 + 8* \\
&a*b^4*c^5*d*k*z^2 + 8*a*b^4*c^5*f*h*z^2 + 32*a^2*b*c^7*e*g*z^2 + 32*a^2*b*c \\
&^7*d*h*z^2 - 8*a*b^3*c^6*e*g*z^2 - 8*a*b^3*c^6*d*h*z^2 + 16*a*b^2*c^7*d*f*z \\
&^2 + 8*a*b^8*c*k*m*z^2 - 304*a^4*b^2*c^4*k*m*z^2 + 264*a^3*b^4*c^3*k*m*z^2 \\
&- 80*a^2*b^6*c^2*k*m*z^2 + 184*a^3*b^3*c^4*j*1*z^2 - 72*a^2*b^5*c^3*j*1*z^2 \\
&- 200*a^3*b^3*c^4*h*m*z^2 + 72*a^2*b^5*c^3*h*m*z^2 - 240*a^3*b^2*c^5*g*1*z \\
&^2 + 144*a^3*b^2*c^5*h*k*z^2 + 144*a^3*b^2*c^5*f*m*z^2 + 80*a^2*b^4*c^4*g*1 \\
&*z^2 - 64*a^2*b^4*c^4*h*k*z^2 - 64*a^2*b^4*c^4*f*m*z^2 - 72*a^2*b^3*c^5*g*j \\
&*z^2 + 56*a^2*b^3*c^5*f*k*z^2 + 56*a^2*b^3*c^5*e*1*z^2 + 56*a^2*b^3*c^5*d*m \\
&*z^2 - 48*a^2*b^2*c^6*e*j*z^2 - 48*a^2*b^2*c^6*d*k*z^2 - 48*a^2*b^2*c^6*f*h \\
&*z^2 - 112*a^5*b*c^4*m^2*z^2 + 44*a^2*b^7*c*m^2*z^2 + 80*a^4*b*c^5*k^2*z^2 \\
&- 4*a*b^7*c^2*k^2*z^2 - 4*a*b^6*c^3*j^2*z^2 - 48*a^3*b*c^6*h^2*z^2 - 4*a*b^5 \\
&c^4*h^2*z^2 - 4*a*b^4*c^5*g^2*z^2 + 16*a^2*b*c^7*f^2*z^2 - 4*a*b^3*c^6*f^2 \\
&*z^2 + 8*a*b^2*c^7*e^2*z^2 + 64*a^5*c^5*k*m*z^2 + 192*a^4*c^6*g*1*z^2 - 64 \\
&a^4*c^6*h*k*z^2 - 64*a^4*c^6*f*m*z^2 + 64*a^3*c^7*e*j*z^2 + 64*a^3*c^7*d*k \\
&*z^2 + 64*a^3*c^7*f*h*z^2 - 4*a*b^8*c*1^2*z^2 - 64*a^2*c^8*d*f*z^2 + 16*a*b \\
&*c^8*d^2*z^2 + 252*a^4*b^3*c^3*m^2*z^2 - 168*a^3*b^5*c^2*m^2*z^2 + 168*a^4*b^2 \\
&c^4*1^2*z^2 - 132*a^3*b^4*c^3*1^2*z^2 + 40*a^2*b^6*c^2*1^2*z^2 - 100*a^3 \\
&*b^3*c^4*k^2*z^2 + 36*a^2*b^5*c^3*k^2*z^2 - 56*a^3*b^2*c^5*j^2*z^2 + 32*a^2 \\
&*b^4*c^4*j^2*z^2 + 28*a^2*b^3*c^5*h^2*z^2 + 40*a^2*b^2*c^6*g^2*z^2 - 96*a^5 \\
&c^5*1^2*z^2 - 32*a^4*c^6*j^2*z^2 - 96*a^3*c^7*g^2*z^2 - 32*a^2*c^8*e^2*z^2 \\
&- 4*b^3*c^7*d^2*z^2 - 4*a*b^9*m^2*z^2 + 32*a^5*b*c^3*h*1*m*z + 8*a^2*b^6* \\
&c*g*k*m*z + 96*a^4*b*c^4*e*k*m*z + 32*a^4*b*c^4*h*j*k*z + 32*a^4*b*c^4*g*j* \\
&1*z + 32*a^4*b*c^4*f*j*m*z - 64*a^4*b*c^4*g*h*m*z - 8*a*b^6*c^2*e*j*1*z + 8 \\
&*a*b^6*c^2*e*h*m*z - 64*a^3*b*c^5*e*h*k*z + 64*a^3*b*c^5*e*g*1*z - 64*a^3*b \\
&*c^5*e*f*m*z + 32*a^3*b*c^5*f*g*k*z - 32*a^3*b*c^5*d*h*1*z + 32*a^3*b*c^5*d \\
&>*g*m*z - 8*a*b^5*c^3*e*h*k*z + 8*a*b^5*c^3*e*g*1*z - 8*a*b^5*c^3*e*f*m*z - \\
&8*a*b^4*c^4*e*g*j*z + 8*a*b^4*c^4*e*f*k*z - 8*a*b^4*c^4*d*f*1*z + 8*a*b^4*c \\
&^4*d*e*m*z - 32*a^2*b*c^6*d*f*j*z + 32*a^2*b*c^6*d*e*k*z + 8*a*b^3*c^5*d*f* \\
&j*z - 8*a*b^3*c^5*d*e*k*z + 32*a^2*b*c^6*e*f*h*z - 8*a*b^3*c^5*e*f*h*z - 8* \\
&a*b^2*c^6*d*f*g*z + 8*a*b^2*c^6*d*e*h*z - 8*a*b^7*c*e*k*m*z - 40*a^5*b^2*c^ \\
&2*k*1*m*z + 48*a^4*b^3*c^2*j*k*m*z - 8*a^4*b^3*c^2*h*1*m*z + 104*a^4*b^2*c^ \\
&3*g*k*m*z - 56*a^3*b^4*c^2*g*k*m*z - 40*a^4*b^2*c^3*h*j*m*z + 8*a^4*b^2*c^3 \\
&*h*k*1*z + 8*a^4*b^2*c^3*f*1*m*z + 8*a^3*b^4*c^2*h*j*m*z - 152*a^3*b^3*c^3*
\end{aligned}$$

$$\begin{aligned}
& e*k*m*z + 64*a^2*b^5*c^2*e*k*m*z - 40*a^3*b^3*c^3*g*j*1*z - 8*a^3*b^3*c^3*h \\
& *j*k*z - 8*a^3*b^3*c^3*f*j*m*z + 8*a^2*b^5*c^2*g*j*1*z + 48*a^3*b^3*c^3*g*h \\
& *m*z - 8*a^2*b^5*c^2*g*h*m*z - 104*a^3*b^2*c^4*e*j*1*z + 56*a^2*b^4*c^3*e*j \\
& *1*z + 8*a^3*b^2*c^4*f*j*k*z - 8*a^3*b^2*c^4*d*k*1*z + 8*a^3*b^2*c^4*d*j*m \\
& z + 104*a^3*b^2*c^4*e*h*m*z - 56*a^2*b^4*c^3*e*h*m*z - 40*a^3*b^2*c^4*g*h*k \\
& *z - 40*a^3*b^2*c^4*f*g*m*z - 8*a^3*b^2*c^4*f*h*1*z + 8*a^2*b^4*c^3*g*h*k*z \\
& + 8*a^2*b^4*c^3*f*g*m*z + 48*a^2*b^3*c^4*e*h*k*z - 48*a^2*b^3*c^4*e*g*1*z \\
& + 48*a^2*b^3*c^4*e*f*m*z - 8*a^2*b^3*c^4*f*g*k*z + 8*a^2*b^3*c^4*d*h*1*z - \\
& 8*a^2*b^3*c^4*d*g*m*z + 40*a^2*b^2*c^5*e*g*j*z - 40*a^2*b^2*c^5*e*f*k*z + 4 \\
& 0*a^2*b^2*c^5*d*f*1*z - 40*a^2*b^2*c^5*d*e*m*z - 8*a^2*b^2*c^5*d*h*j*z + 8* \\
& a^2*b^2*c^5*d*g*k*z + 8*a^2*b^2*c^5*f*g*h*z + 8*a^4*b^4*c*k*1*m*z - 64*a^5* \\
& b*c^3*j*k*m*z - 8*a^3*b^5*c*j*k*m*z - 32*a^6*b*c^2*1*m^2*z + 24*a^5*b^3*c*1 \\
& *m^2*z - 28*a^4*b^4*c*j*m^2*z + 16*a^5*b*c^3*k^2*1*z + 4*a^3*b^5*c*j*1^2*z \\
& + 48*a^5*b*c^3*g*m^2*z + 32*a^3*b^5*c*g*m^2*z - 4*a^2*b^6*c*g*1^2*z - 36*a^ \\
& 2*b^6*c*e*m^2*z - 32*a^4*b*c^4*g*k^2*z - 16*a^3*b*c^5*f^2*1*z - 48*a^4*b*c^ \\
& 4*e*1^2*z - 32*a^3*b*c^5*g^2*j*z - 4*a*b^4*c^4*e^2*1*z + 32*a^2*b*c^6*d^2*1 \\
& *z - 24*a*b^3*c^5*d^2*1*z + 4*a*b^6*c^2*e*k^2*z + 32*a^3*b*c^5*e*j^2*z + 16 \\
& *a^3*b*c^5*g*h^2*z - 16*a^2*b*c^6*e^2*j*z + 4*a*b^5*c^3*e*j^2*z + 4*a*b^3*c \\
& ^5*e^2*j*z + 20*a*b^2*c^6*d^2*j*z + 4*a*b^4*c^4*e*h^2*z - 16*a^2*b*c^6*e*g^ \\
& 2*z + 4*a*b^3*c^5*e*g^2*z - 4*a*b^2*c^6*e^2*g*z + 4*a*b^2*c^6*e*f^2*z + 32* \\
& a^6*c^3*k*1*m*z - 32*a^5*c^4*h*k*1*z + 32*a^5*c^4*h*j*m*z - 32*a^5*c^4*g*k* \\
& m*z - 32*a^5*c^4*f*1*m*z - 32*a^4*c^5*f*j*k*z + 32*a^4*c^5*e*j*1*z + 32*a^4 \\
& *c^5*d*k*1*z - 32*a^4*c^5*d*j*m*z + 32*a^4*c^5*g*h*k*z + 32*a^4*c^5*f*h*1*z \\
& + 32*a^4*c^5*f*g*m*z - 32*a^4*c^5*e*h*m*z - 32*a^3*c^6*e*g*j*z + 32*a^3*c^ \\
& 6*e*f*k*z + 32*a^3*c^6*d*h*j*z - 32*a^3*c^6*d*g*k*z - 32*a^3*c^6*d*f*1*z + \\
& 32*a^3*c^6*d*e*m*z - 32*a^3*c^6*f*g*h*z + 4*a*b^7*c*e*1^2*z + 32*a^2*c^7*d* \\
& f*g*z - 32*a^2*c^7*d*e*h*z - 16*a*b*c^7*d^2*g*z + 52*a^5*b^2*c^2*j*m^2*z - \\
& 4*a^4*b^3*c^2*k^2*1*z + 36*a^4*b^2*c^3*j^2*1*z - 16*a^4*b^3*c^2*j*1^2*z - 8 \\
& *a^3*b^4*c^2*j^2*1*z - 20*a^4*b^2*c^3*j*k^2*z + 4*a^3*b^4*c^2*j*k^2*z - 76* \\
& a^4*b^3*c^2*g*m^2*z - 60*a^4*b^2*c^3*g*1^2*z + 44*a^3*b^2*c^4*g^2*1*z + 28* \\
& a^3*b^4*c^2*g*1^2*z - 8*a^2*b^4*c^3*g^2*1*z + 104*a^3*b^4*c^2*e*m^2*z - 100 \\
& *a^4*b^2*c^3*e*m^2*z + 24*a^3*b^3*c^3*g*k^2*z + 4*a^3*b^2*c^4*h^2*j*z - 4*a \\
& ^2*b^5*c^2*g*k^2*z + 4*a^2*b^3*c^4*f^2*1*z + 76*a^3*b^3*c^3*e*1^2*z - 32*a^ \\
& 2*b^5*c^2*e*1^2*z + 20*a^2*b^2*c^5*e^2*1*z + 12*a^3*b^2*c^4*g*j^2*z + 8*a^2 \\
& *b^3*c^4*g^2*j*z - 4*a^2*b^4*c^3*g*j^2*z + 52*a^3*b^2*c^4*e*k^2*z - 28*a^2* \\
& b^4*c^3*e*k^2*z - 4*a^2*b^2*c^5*f^2*j*z - 24*a^2*b^3*c^4*e*j^2*z - 4*a^2*b^ \\
& 3*c^4*g*h^2*z - 20*a^2*b^2*c^5*e*h^2*z + 20*a^5*b^2*c^2*1^3*z + 4*a^3*b^3*c \\
& ^3*j^3*z - 4*a^2*b^2*c^5*g^3*z - 4*a^4*b^5*1*m^2*z - 16*a^6*c^3*j*m^2*z - 1 \\
& 6*a^5*c^4*j^2*1*z + 4*a^3*b^6*j*m^2*z + 16*a^5*c^4*j*k^2*z + 48*a^5*c^4*g*1 \\
& ^2*z - 48*a^4*c^5*g^2*1*z - 4*a^2*b^7*g*m^2*z + 16*a^5*c^4*e*m^2*z - 16*a^4 \\
& *c^5*h^2*j*z + 16*a^4*c^5*g*j^2*z - 16*a^3*c^6*e^2*1*z + 4*b^5*c^4*d^2*1*z \\
& - 16*a^4*c^5*e*k^2*z + 16*a^3*c^6*f^2*j*z - 4*b^4*c^5*d^2*j*z - 16*a^2*c^7* \\
& d^2*j*z - 4*a^4*b^4*c*1^3*z + 16*a^3*c^6*e*h^2*z - 16*a^4*b*c^4*j^3*z + 16* \\
& a^2*c^7*e^2*g*z + 4*b^3*c^6*d^2*g*z - 16*a^2*c^7*e*f^2*z - 4*b^2*c^7*d^2*e* \\
& z + 4*a*b^8*e*m^2*z + 16*a*c^8*d^2*e*z - 16*a^6*c^3*1^3*z + 16*a^3*c^6*g^3*
\end{aligned}$$



$$\begin{aligned}
& 4*b*c^3*d*f*m^2 - 10*a^3*b*c^4*d*h^2*k - 10*a^2*b*c^5*d^2*g*1 - 10*a*b^3*c^4*d^2*h*k + 10*a*b^3*c^4*d^2*g*1 - 6*a*b^3*c^4*d^2*f*m - 4*a*b^4*c^3*d*f^2*m - 2*a^3*b*c^4*e*h^2*j - 2*a^2*b*c^5*d^2*f*m + 6*a^3*b*c^4*d*h*j^2 + 6*a^2*b*c^5*e^2*f*k + 6*a^2*b*c^5*d*e^2*m - 2*a^3*b*c^4*e*g*j^2 - 2*a^2*b*c^5*e^2*g*j + 2*a*b^3*c^4*e^2*g*j - 2*a*b^3*c^4*e^2*f*k - 2*a*b^3*c^4*d*e^2*m + 14*a^3*b*c^4*d*f*k^2 - 10*a^2*b*c^5*d*f^2*k - 8*a*b^2*c^5*d^2*g*j - 8*a*b^2*c^5*d^2*e*1 + 4*a*b^3*c^4*d*f^2*k + 4*a*b^2*c^5*d^2*f*k - 2*a^2*b*c^5*e*f^2*j + 2*a*b^5*c^2*d*f*k^2 + 2*a*b^4*c^3*d*f*j^2 + 2*a*b^2*c^5*d*e^2*k - 2*a^2*b*c^5*d*g^2*h + 2*a*b^2*c^5*e^2*f*h - 4*a*b^2*c^5*d*f^2*h - 2*a^2*b*c^5*d*f*h^2 + 2*a*b^3*c^4*d*f*h^2 + 2*a*b^2*c^5*d*f*g^2 + 8*a^6*c^2*h*j*1*m - 8*a^6*c^2*g*k*1*m - 8*a^5*c^3*f*j*k*1 + 8*a^5*c^3*e*j*k*m - 8*a^5*c^3*d*j*1*m + 8*a^5*c^3*g*h*k*1 - 8*a^5*c^3*g*h*j*m - 8*a^5*c^3*f*h*k*m + 8*a^5*c^3*f*g*1*m - 8*a^5*c^3*e*h*1*m - 2*a^6*b*c*h*1^2*m + 8*a^4*c^4*f*g*j*k - 8*a^4*c^4*e*h*j*k - 8*a^4*c^4*e*g*j*1 + 8*a^4*c^4*e*f*k*1 - 8*a^4*c^4*e*f*j*m + 8*a^4*c^4*d*h*j*1 - 8*a^4*c^4*d*g*k*1 + 8*a^4*c^4*d*g*j*m + 8*a^4*c^4*d*f*k*m + 8*a^4*c^4*d*e*1*m + 6*a^6*b*c*g*1*m^2 - 2*a^6*b*c*h*k*m^2 - 8*a^4*c^4*f*g*h*1 + 8*a^4*c^4*e*g*h*m + 2*a*b^6*c*e^2*k*m + 8*a^3*c^5*d*e*j*k + 8*a^3*c^5*e*f*h*j - 8*a^3*c^5*e*f*g*k - 8*a^3*c^5*d*g*h*j - 8*a^3*c^5*d*f*h*k + 8*a^3*c^5*d*f*g*1 - 8*a^3*c^5*d*e*h*1 - 8*a^3*c^5*d*e*g*m - 8*a^2*c^6*d*e*f*j + 8*a^2*c^6*d*e*g*h + 2*a*b^6*c*d*f*1^2 + 6*a*b*c^6*d^2*e*j - 2*a*b*c^6*d^2*f*h - 2*a*b*c^6*d*e^2*h - 8*a^4*b^2*c^2*g^2*k*m - 10*a^3*b^3*c^2*f^2*k*m + 2*a^4*b^2*c^2*h^2*j*1 + 18*a^3*b^2*c^3*e^2*k*m - 12*a^2*b^4*c^2*e^2*k*m - 4*a^4*b^2*c^2*g*j^2*1 + 2*a^3*b^3*c^2*g^2*j*1 + 28*a^2*b^3*c^3*d^2*k*m + 14*a^4*b^2*c^2*d*k^2*m - 8*a^3*b^2*c^3*f^2*j*1 + 2*a^4*b^2*c^2*g*j*k^2 + 2*a^4*b^2*c^2*e*k^2*1 - 2*a^3*b^3*c^2*g^2*h*m + 2*a^2*b^4*c^2*f^2*j*1 - 10*a^2*b^3*c^3*e^2*j*1 - 8*a^4*b^2*c^2*d*k*1^2 + 4*a^4*b^2*c^2*e*j*1^2 + 4*a^3*b^3*c^2*f*h^2*m + 4*a^3*b^3*c^2*e*j^2*1 + 4*a^3*b^2*c^3*f^2*h*m - 2*a^2*b^4*c^2*f^2*h*m + 18*a^2*b^2*c^4*d^2*j*1 + 10*a^2*b^3*c^3*e^2*h*m - 8*a^4*b^2*c^2*f*h*1^2 - 2*a^3*b^3*c^2*e*j*k^2 + 2*a^3*b^2*c^3*g^2*h*k + 2*a^3*b^2*c^3*f*g^2*m - 22*a^4*b^2*c^2*d*h*m^2 - 22*a^2*b^2*c^4*d^2*h*m + 18*a^4*b^2*c^2*e*g*m^2 + 16*a^3*b^2*c^3*d*h^2*m - 4*a^3*b^2*c^3*f*h^2*k - 4*a^2*b^4*c^2*d*h^2*m + 2*a^3*b^3*c^2*f*h*k^2 + 2*a^3*b^2*c^3*d*j^2*k + 2*a^2*b^3*c^3*f^2*h*k - 2*a^2*b^3*c^3*f^2*g*1 - 10*a^3*b^3*c^2*e*g*1^2 + 10*a^3*b^3*c^2*d*h*1^2 - 8*a^2*b^2*c^4*e^2*h*k - 8*a^2*b^2*c^4*e^2*f*m + 4*a^2*b^3*c^3*e*g^2*1 + 4*a^2*b^2*c^4*e^2*g*1 + 2*a^3*b^2*c^3*f*h*j^2 + 28*a^3*b^3*c^2*d*f*m^2 + 14*a^2*b^2*c^4*d*f^2*m - 8*a^3*b^2*c^3*e*g*k^2 + 4*a^3*b^2*c^3*d*h*k^2 + 4*a^2*b^3*c^3*d*h^2*k + 2*a^2*b^4*c^2*e*g*k^2 - 2*a^2*b^4*c^2*d*h*k^2 + 2*a^2*b^2*c^4*f^2*g*j + 2*a^2*b^2*c^4*e*f^2*1 + 18*a^3*b^2*c^3*d*f*1^2 - 12*a^2*b^4*c^2*d*f*1^2 - 4*a^2*b^2*c^4*e*g^2*j + 2*a^2*b^3*c^3*e*g*j^2 - 2*a^2*b^3*c^3*d*h*j^2 - 10*a^2*b^3*c^3*d*f*k^2 - 8*a^2*b^2*c^4*d*f*j^2 + 2*a^2*b^2*c^4*e*g*h^2 + 4*a^5*b^2*c*h^2*m^2 - 2*a^4*b^2*c^2*h^3*m - 5*a^5*b*c^2*g^2*m^2 + 5*a^4*b^3*c*g^2*m^2 + 3*a^5*b*c^2*h^2*1^2 + 6*a^3*b^4*c*f^2*m^2 - 2*a^3*b^2*c^3*g^3*1 + 2*a^2*b^3*c^3*f^3*m + 7*a^4*b*c^3*e^2*m^2 + 7*a^2*b^5*c*e^2*m^2 - 5*a^4*b*c^3*f^2*1^2 + 3*a^4*b*c^3*g^2*k^2 - 2*a^4*b^2*c^2*f*k^3 - 2*a^2*b^2*c^4*f^3*k + 7*a^3*b*c^4*d^2*1^2 + 7*a*b^5*c^2*d^2*1^2 - 5*a^3*b*c^4*
\end{aligned}$$

$$\begin{aligned}
& e^2k^2 + 3a^3b^3c^4f^2j^2 + 6a^2b^4c^3d^2k^2 + 2a^3b^3c^2d^2k^3 - \\
& 2a^3b^2c^3e^2j^3 - 5a^2b^3c^5d^2j^2 + 5a^2b^3c^4d^2j^2 + 3a^2b^3c^5e^2h^2 + 4a^2b^2c^5d^2h^2 - 2a^2b^2c^4d^2h^3 - 4a^6c^2j^2k^2m \\
& + 2a^6b^2j^2m^2 + 4a^6c^2j^2k^2l + 4a^6c^2h^2k^2m - 4a^6c^2h^2k^2l^2 - 4a^6c^2f^2l^2m + 4a^5c^3g^2k^2m + 2a^5b^3h^2k^2m^2 - 2a^5b^3g^2l^2m^2 + 4a^6c^2g^2j^2m^2 + 4a^6c^2f^2k^2m^2 + 4a^6c^2e^2l^2m^2 - 4a^5c^3h^2j^2l + 4a^5c^3h^2j^2k + 4a^5c^3g^2j^2l + 4a^5c^3f^2j^2m - 4a^4c^4e^2k^2m + 2a^4b^4g^2j^2m^2 - 2a^4b^4f^2k^2m^2 + 2a^4b^4e^2l^2m^2 - 4a^5c^3g^2j^2k^2 - 4a^5c^3e^2k^2l - 4a^5c^3d^2k^2m + 4a^4c^4f^2j^2l + 4a^5c^3e^2j^2l^2 + 4a^5c^3d^2k^2l^2 + 4a^4c^4f^2h^2m + 2b^6c^2d^2j^2l - 2a^3b^5e^2j^2m^2 + 2a^3b^5d^2k^2m^2 + 4a^5c^3f^2h^2l^2 - 4a^4c^4g^2h^2k - 4a^4c^4f^2g^2m - 4a^3c^5d^2j^2l - 2b^6c^2d^2h^2m + 2a^3b^5f^2h^2m^2 + 12a^5c^3d^2h^2m^2 - 12a^4c^4d^2h^2m + 12a^3c^5d^2h^2m - 4a^5c^3e^2g^2m^2 + 4a^4c^4g^2h^2j + 4a^4c^4f^2h^2k + 4a^4c^4e^2h^2l - 4a^4c^4d^2j^2k + 3a^6b^3c^2j^2m^2 - 4a^4c^4f^2h^2j^2 + 4a^3c^5e^2h^2k + 4a^3c^5e^2g^2l + 4a^3c^5e^2f^2m + 2b^5c^3d^2h^2k - 2b^5c^3d^2g^2l + 2b^5c^3d^2f^2m + 2a^5b^3c^2j^3l + 2a^2b^6e^2g^2m^2 - 2a^2b^6d^2h^2m^2 + 4a^4c^4e^2g^2k^2 + 4a^4c^4d^2h^2k^2 - 4a^3c^5f^2g^2j - 4a^3c^5e^2f^2l - 4a^3c^5d^2f^2m - 4a^4c^4d^2f^2l^2 + 4a^3c^5e^2g^2j + 4a^3c^5d^2g^2k + 2b^4c^4d^2g^2j - 2b^4c^4d^2f^2k + 2b^4c^4d^2e^2l - 6a^3b^3c^4f^3m + 4a^3c^5f^2g^2h + 4a^2c^6d^2g^2j + 4a^2c^6d^2f^2k + 4a^2c^6d^2e^2l - 2a^5b^2c^2g^2l^3 + 2a^5b^2c^2h^2k^3 + 2a^4b^3c^3h^3k - 4a^3c^5e^2g^2h^2 + 4a^3c^5d^2f^2j^2 - 4a^2c^6d^2e^2k - 2b^3c^5d^2e^2j + 8a^5b^2c^2d^2m^3 + 8a^2b^6c^2d^2m^2 + 8a^2b^2c^5d^3m - 6a^5b^3c^2e^2l^3 - 6a^2b^3c^5e^3l - 4a^2c^6e^2f^2h + 2b^3c^5d^2f^2h + 2a^4b^3c^2e^2l^3 + 2a^4b^3c^2g^2j^3 + 2a^3b^3c^4g^3j + 2a^3b^3c^4e^3l + 4a^2c^6e^2f^2g + 4a^2c^6d^2f^2h - 6a^4b^3c^3d^2k^3 - 4a^2c^6d^2f^2g^2 + 2b^2c^6d^2e^2g - 2a^2b^2c^5e^3j + 2a^3b^3c^4f^2h^3 + 2a^2b^3c^5f^3h + 2a^2b^3c^5e^2g^3 + 3a^2b^3c^6d^2g^2 - 9a^4b^2c^2f^2m^2 + 4a^4b^2c^2g^2l^2 - 14a^3b^3c^2e^2m^2 + 5a^3b^3c^2f^2l^2 - 20a^2b^4c^2d^2m^2 + 16a^3b^2c^3d^2m^2 - 9a^3b^2c^3e^2l^2 + 6a^2b^4c^2e^2l^2 + 4a^3b^2c^3f^2k^2 - 14a^2b^3c^3d^2l^2 + 5a^2b^3c^3e^2k^2 - 9a^2b^2c^4d^2k^2 + 4a^2b^2c^4e^2j^2 + 4a^7c^2k^2l^2m - 4a^7c^2j^2l^2m^2 + 2b^7c^2d^2k^2m + 2a^6b^3c^2k^3m + 2a^6b^3c^2j^3l^3 + 2a^6b^3d^2f^2m^2 - 6a^6b^3c^2f^2m^3 - 6a^6b^3c^2d^3k - 4a^6c^7d^2e^2g + 4a^6c^7d^2e^2f + 2a^6b^3c^6e^3g + 2a^6b^3c^6d^2f^3 - a^5b^2c^2j^2l^2 - a^5b^2c^2j^2k^2 - a^4b^3c^2h^2l^2 - a^3b^4c^2g^2l^2 - a^4b^3c^3h^2j^2 - a^2b^5c^2f^2l^2 - a^2b^5c^2e^2k^2 - a^3b^3c^4g^2h^2 - a^2b^4c^3e^2j^2 - a^2b^3c^5f^2g^2 - a^2b^3c^4e^2h^2 - a^2b^2c^5e^2g^2 + 2a^7b^2k^2m^3 + 4a^7c^2h^2m^3 + 4a^6c^7d^3h + 2b^6c^7d^3f - a^6b^3c^2k^2l^2 - 2a^6c^2j^2l^2 - 6a^6c^2h^2m^2 - a^2b^6c^2e^2l^2 - 6a^5c^3g^2l^2 - 2a^5c^3h^2k^2 - 2a^5c^3f^2m^2 - 6a^4c^4f^2k^2 - 6a^4c^4d^2m^2 - 2a^4c^4g^2j^2 - 2a^4c^4e^2l^2 - 6a^3c^5e^2j^2 - 2a^3c^5d^2k^2 - 2a^3c^5f^2h^2 - a^2b^3c^6e^2f^2 - 6a^2c^6d^2h^2 - 2a^2c^6e^2g^2 - a^4b^2c^2h^2
\end{aligned}$$

$$\begin{aligned}
& 2*k^2 - a^3*b^3*c^2*g^2*k^2 - a^3*b^2*c^3*g^2*j^2 - a^2*b^4*c^2*f^2*k^2 - a \\
& ^2*b^3*c^3*f^2*j^2 - a^2*b^2*c^4*f^2*h^2 - 2*a^7*c*k^2*m^2 + 4*a^5*c^3*h^3* \\
& m - 2*a^6*b^2*h*m^3 + 4*a^6*c^2*g^1*l^3 + 4*a^4*c^4*g^3*l - 2*b^4*c^4*d^3*m + \\
& 2*a^5*b^3*f*m^3 - 4*a^6*c^2*d*m^3 + 4*a^5*c^3*f*k^3 + 4*a^3*c^5*f^3*k - 4* \\
& a^2*c^6*d^3*m + 2*b^3*c^5*d^3*k - 2*a^4*b^4*d*m^3 + 4*a^4*c^4*e*j^3 + 4*a^2 \\
& *c^6*e^3*j - 2*b^2*c^6*d^3*h + 4*a^3*c^5*d*h^3 - 2*a*c^7*d^2*f^2 - a^6*b^2*k \\
& ^2*m^2 - a^5*b^3*j^2*m^2 - a^4*b^4*h^2*m^2 - a^3*b^5*g^2*m^2 - a^2*b^6*f^2 \\
& *m^2 - b^6*c^2*d^2*k^2 - b^5*c^3*d^2*j^2 - b^4*c^4*d^2*h^2 - b^3*c^5*d^2*g^ \\
& ^2 - b^2*c^6*d^2*f^2 - a^7*b^1^2*m^2 - b^7*c*d^2*l^2 - a*b^7*e^2*m^2 - b*c^7 \\
& *d^2*e^2 - b^8*d^2*m^2 - a^6*c^2*k^4 - a^5*c^3*j^4 - a^4*c^4*h^4 - a^3*c^5* \\
& g^4 - a^2*c^6*f^4 - a^7*c^1^4 - a*c^7*e^4 - a^8*m^4 - c^8*d^4, z, k1)*(root \\
& (128*a^2*b^2*c^8*z^4 - 16*a*b^4*c^7*z^4 - 256*a^3*c^9*z^4 + 384*a^3*b^2*c^6 \\
& *l*z^3 - 144*a^2*b^4*c^5*l*z^3 + 128*a^2*b^3*c^6*j*z^3 - 128*a^2*b^2*c^7*g* \\
& z^3 + 16*a*b^6*c^4*l*z^3 - 256*a^3*b*c^7*j*z^3 - 16*a*b^5*c^5*j*z^3 + 16*a* \\
& b^4*c^6*g*z^3 - 256*a^4*c^7*l*z^3 + 256*a^3*c^8*g*z^3 - 96*a^4*b*c^5*j*l*z^ \\
& ^2 + 8*a*b^7*c^2*j*l*z^2 + 160*a^4*b*c^5*h*m*z^2 - 8*a*b^7*c^2*h*m*z^2 + 8*a \\
& *b^6*c^3*h*k*z^2 - 8*a*b^6*c^3*g^1*z^2 + 8*a*b^6*c^3*f*m*z^2 + 160*a^3*b*c^ \\
& ^6*g*j*z^2 - 96*a^3*b*c^6*f*k*z^2 - 96*a^3*b*c^6*e*l*z^2 - 96*a^3*b*c^6*d*m* \\
& z^2 + 8*a*b^5*c^4*g*j*z^2 - 8*a*b^5*c^4*f*k*z^2 - 8*a*b^5*c^4*e*l*z^2 - 8*a \\
& *b^5*c^4*d*m*z^2 + 8*a*b^4*c^5*e*j*z^2 + 8*a*b^4*c^5*d*k*z^2 + 8*a*b^4*c^5* \\
& f*h*z^2 + 32*a^2*b*c^7*e*g*z^2 + 32*a^2*b*c^7*d*h*z^2 - 8*a*b^3*c^6*e*g*z^2 \\
& - 8*a*b^3*c^6*d*h*z^2 + 16*a*b^2*c^7*d*f*z^2 + 8*a*b^8*c*k*m*z^2 - 304*a^4 \\
& *b^2*c^4*k*m*z^2 + 264*a^3*b^4*c^3*k*m*z^2 - 80*a^2*b^6*c^2*k*m*z^2 + 184*a \\
& ^3*b^3*c^4*j^1*z^2 - 72*a^2*b^5*c^3*j^1*z^2 - 200*a^3*b^3*c^4*h*m*z^2 + 72* \\
& a^2*b^5*c^3*h*m*z^2 - 240*a^3*b^2*c^5*g^1*z^2 + 144*a^3*b^2*c^5*h*k*z^2 + 1 \\
& 44*a^3*b^2*c^5*f*m*z^2 + 80*a^2*b^4*c^4*g^1*z^2 - 64*a^2*b^4*c^4*h*k*z^2 - \\
& 64*a^2*b^4*c^4*f*m*z^2 - 72*a^2*b^3*c^5*g^j*z^2 + 56*a^2*b^3*c^5*f*k*z^2 + \\
& 56*a^2*b^3*c^5*e*l*z^2 + 56*a^2*b^3*c^5*d*m*z^2 - 48*a^2*b^2*c^6*e*j*z^2 - \\
& 48*a^2*b^2*c^6*d*k*z^2 - 48*a^2*b^2*c^6*f*h*z^2 - 112*a^5*b*c^4*m^2*z^2 + 4 \\
& 4*a^2*b^7*c*m^2*z^2 + 80*a^4*b*c^5*k^2*z^2 - 4*a*b^7*c^2*k^2*z^2 - 4*a*b^6* \\
& c^3*j^2*z^2 - 48*a^3*b*c^6*h^2*z^2 - 4*a*b^5*c^4*h^2*z^2 - 4*a*b^4*c^5*g^2* \\
& z^2 + 16*a^2*b*c^7*f^2*z^2 - 4*a*b^3*c^6*f^2*z^2 + 8*a*b^2*c^7*e^2*z^2 + 64 \\
& *a^5*c^5*k*m*z^2 + 192*a^4*c^6*g^1*z^2 - 64*a^4*c^6*h*k*z^2 - 64*a^4*c^6*f* \\
& m*z^2 + 64*a^3*c^7*e*j*z^2 + 64*a^3*c^7*d*k*z^2 + 64*a^3*c^7*f*h*z^2 - 4*a* \\
& b^8*c^1^2*z^2 - 64*a^2*c^8*d*f*z^2 + 16*a*b*c^8*d^2*z^2 + 252*a^4*b^3*c^3*m \\
& ^2*z^2 - 168*a^3*b^5*c^2*m^2*z^2 + 168*a^4*b^2*c^4*l^2*z^2 - 132*a^3*b^4*c^ \\
& ^3*l^2*z^2 + 40*a^2*b^6*c^2*l^2*z^2 - 100*a^3*b^3*c^4*k^2*z^2 + 36*a^2*b^5*c \\
& ^3*k^2*z^2 - 56*a^3*b^2*c^5*j^2*z^2 + 32*a^2*b^4*c^4*j^2*z^2 + 28*a^2*b^3*c \\
& ^5*h^2*z^2 + 40*a^2*b^2*c^6*g^2*z^2 - 96*a^5*c^5*l^2*z^2 - 32*a^4*c^6*j^2*z \\
& ^2 - 96*a^3*c^7*g^2*z^2 - 32*a^2*c^8*e^2*z^2 - 4*b^3*c^7*d^2*z^2 - 4*a*b^9* \\
& m^2*z^2 + 32*a^5*b*c^3*h^1*m*z + 8*a^2*b^6*c*g*k*m*z + 96*a^4*b*c^4*e*k*m*z \\
& + 32*a^4*b*c^4*h*j*k*z + 32*a^4*b*c^4*g^j*l*z + 32*a^4*b*c^4*f*j*m*z - 64* \\
& a^4*b*c^4*g^h*m*z - 8*a*b^6*c^2*e*j^1*z + 8*a*b^6*c^2*e*h*m*z - 64*a^3*b*c^ \\
& ^5*e^h*k*z + 64*a^3*b*c^5*e*g^1*z - 64*a^3*b*c^5*e*f*m*z + 32*a^3*b*c^5*f*g* \\
& k*z - 32*a^3*b*c^5*d^h^1*z + 32*a^3*b*c^5*d*g*m*z - 8*a*b^5*c^3*e^h*k*z + 8
\end{aligned}$$

$$\begin{aligned}
& *a*b^5*c^3*e*g*j^1*z - 8*a*b^5*c^3*e*f*m^1*z - 8*a*b^4*c^4*e*g*j^1*z + 8*a*b^4*c^4* \\
& e*f*k^1*z - 8*a*b^4*c^4*d*f*l^1*z + 8*a*b^4*c^4*d*e*m^1*z - 32*a^2*b*c^6*d*f*j^1* \\
& z + 32*a^2*b*c^6*d*e*k^1*z + 8*a*b^3*c^5*d*f*j^1*z - 8*a*b^3*c^5*d*e*k^1*z + 32*a^2* \\
& b*c^6*e*f*h^1*z - 8*a*b^3*c^5*e*f*h^1*z - 8*a*b^2*c^6*d*f*g^1*z + 8*a*b^2*c^6*d* \\
& e*h^1*z - 8*a*b^7*c*e*k*m^1*z - 40*a^5*b^2*c^2*k^1*m^1*z + 48*a^4*b^3*c^2*j^1*k^1*m^1* \\
& z - 8*a^4*b^3*c^2*h^1*m^1*z + 104*a^4*b^2*c^3*g^1*k^1*m^1*z - 56*a^3*b^4*c^2*g^1*k^1*m^1* \\
& z - 40*a^4*b^2*c^3*h^1*j^1*m^1*z + 8*a^4*b^2*c^3*h^1*k^1*l^1*z + 8*a^4*b^2*c^3*f^1*l^1*m^1*z \\
& + 8*a^3*b^4*c^2*h^1*j^1*m^1*z - 152*a^3*b^3*c^3*e*k^1*m^1*z + 64*a^2*b^5*c^2*e*k^1*m^1*z \\
& - 40*a^3*b^3*c^3*g^1*j^1*l^1*z - 8*a^3*b^3*c^3*h^1*j^1*k^1*z - 8*a^3*b^3*c^3*f^1*j^1*m^1*z + \\
& 8*a^2*b^5*c^2*g^1*j^1*l^1*z + 48*a^3*b^3*c^3*g^1*h^1*m^1*z - 8*a^2*b^5*c^2*g^1*h^1*m^1*z - 1 \\
& 04*a^3*b^2*c^4*e*j^1*l^1*z + 56*a^2*b^4*c^3*e*j^1*l^1*z + 8*a^3*b^2*c^4*f^1*j^1*k^1*z - 8 \\
& *a^3*b^2*c^4*d^1*k^1*l^1*z + 8*a^3*b^2*c^4*d^1*j^1*m^1*z + 104*a^3*b^2*c^4*e^1*h^1*m^1*z - 56 \\
& *a^2*b^4*c^3*e^1*h^1*m^1*z - 40*a^3*b^2*c^4*g^1*h^1*k^1*z - 40*a^3*b^2*c^4*f^1*g^1*m^1*z - 8* \\
& a^3*b^2*c^4*f^1*h^1*l^1*z + 8*a^2*b^4*c^3*g^1*h^1*k^1*z + 8*a^2*b^4*c^3*f^1*g^1*m^1*z + 48*a^2* \\
& b^3*c^4*e^1*h^1*k^1*z - 48*a^2*b^3*c^4*e^1*g^1*l^1*z + 48*a^2*b^3*c^4*e^1*f^1*m^1*z - 8*a^2* \\
& b^3*c^4*f^1*g^1*k^1*z + 8*a^2*b^3*c^4*d^1*h^1*l^1*z - 8*a^2*b^3*c^4*d^1*g^1*m^1*z + 40*a^2*b^2* \\
& c^5*e^1*g^1*j^1*z - 40*a^2*b^2*c^5*e^1*f^1*k^1*z + 40*a^2*b^2*c^5*d^1*f^1*l^1*z - 40*a^2*b^2* \\
& c^5*d^1*e^1*m^1*z - 8*a^2*b^2*c^5*d^1*h^1*j^1*z + 8*a^2*b^2*c^5*d^1*g^1*k^1*z + 8*a^2*b^2*c^5* \\
& f^1*g^1*h^1*z + 8*a^4*b^4*c*k^1*l^1*m^1*z - 64*a^5*b*c^3*j^1*k^1*m^1*z - 8*a^3*b^5*c*j^1*k^1* \\
& m^1*z - 32*a^6*b*c^2*l^1*m^2*z + 24*a^5*b^3*c^1*l^1*m^2*z - 28*a^4*b^4*c*j^1*m^2*z + \\
& 16*a^5*b*c^3*k^2*l^1*z + 4*a^3*b^5*c*j^1*l^2*z + 48*a^5*b*c^3*g^1*m^2*z + 32*a^3*b^5*c*g^1*m^2*z - \\
& 4*a^2*b^6*c*g^1*l^2*z - 36*a^2*b^6*c*e^1*m^2*z - 32*a^4*b*c^4*g^1*k^2*z - 16*a^3*b*c^5*f^2*l^1*z - \\
& 48*a^4*b*c^4*e^1*l^2*z - 32*a^3*b*c^5*g^2*j^1*z - 4*a*b^4*c^4*e^2*l^1*z + 32*a^2*b*c^6*d^2*l^1*z - \\
& 24*a*b^3*c^5*d^2*l^1*z + 4*a*b^6*c^2*e^1*k^2*z + 32*a^3*b*c^5*e^1*j^2*z + 16*a^3*b*c^5*g^1*h^2*z - \\
& 16*a^2*b*c^6*e^2*j^1*z + 4*a*b^5*c^3*e^1*j^2*z + 4*a*b^3*c^5*e^2*j^1*z + 20*a*b^2*c^6*d^2*j^1* \\
& z + 4*a*b^4*c^4*e^1*h^2*z - 16*a^2*b*c^6*e^1*g^2*z + 4*a*b^3*c^5*e^1*g^2*z - 4*a*b^2*c^6*e^2*g^1*z + \\
& 4*a*b^2*c^6*e^1*f^2*z + 32*a^6*c^3*k^1*l^1*m^1*z - 32*a^5*c^4*h^1*k^1*l^1*z + 32*a^5*c^4*h^1*j^1*m^1*z - \\
& 32*a^5*c^4*g^1*k^1*m^1*z - 32*a^5*c^4*f^1*l^1*m^1*z - 32*a^4*c^5*f^1*j^1*k^1*z + 32*a^4*c^5*e^1*j^1*l^1*z + \\
& 32*a^4*c^5*d^1*k^1*l^1*z - 32*a^4*c^5*d^1*j^1*m^1*z + 32*a^4*c^5*g^1*h^1*k^1*z + 32*a^4*c^5*f^1*h^1*l^1*z + \\
& 32*a^4*c^5*f^1*g^1*m^1*z - 32*a^4*c^5*e^1*h^1*m^1*z - 32*a^3*c^6*e^1*g^1*j^1*z + 32*a^3*c^6*e^1*f^1*k^1*z + \\
& 32*a^3*c^6*d^1*h^1*j^1*z - 32*a^3*c^6*d^1*g^1*k^1*z - 32*a^3*c^6*d^1*f^1*l^1*z + 32*a^3*c^6*d^1*e^1*m^1*z - \\
& 32*a^3*c^6*f^1*g^1*h^1*z + 4*a*b^7*c*e^1*l^2*z + 32*a^2*c^7*d^1*f^1*g^1*z - 32*a^2*c^7*d^1*e^1*h^1*z - 16* \\
& a*b*c^7*d^2*g^1*z + 52*a^5*b^2*c^2*j^1*m^2*z - 4*a^4*b^3*c^2*k^2*l^1*z + 36*a^4*b^2*c^3*j^2*l^1*z - \\
& 16*a^4*b^3*c^2*j^1*l^2*z - 8*a^3*b^4*c^2*j^2*l^1*z - 20*a^4*b^2*c^3*j^1*k^2*z + 4*a^3*b^4*c^2*j^1*k^2*z - \\
& 76*a^4*b^3*c^2*g^1*m^2*z - 60*a^4*b^2*c^3*g^1*l^2*z + 44*a^3*b^2*c^4*g^2*l^1*z + 28*a^3*b^4*c^2*g^1*l^2*z - \\
& 8*a^2*b^4*c^3*g^2*l^1*z + 104*a^3*b^4*c^2*e^1*m^2*z - 100*a^4*b^2*c^3*e^1*m^2*z + 24*a^3*b^3*c^3*g^1*k^2*z + \\
& 4*a^3*b^2*c^4*h^2*j^1*z - 4*a^2*b^5*c^2*g^1*k^2*z + 4*a^2*b^3*c^4*f^2*l^1*z + 76*a^3*b^3*c^3*e^1*l^2*z - \\
& 32*a^2*b^5*c^2*e^1*l^2*z + 20*a^2*b^2*c^5*e^2*l^1*z + 12*a^3*b^2*c^4*g^1*j^2*z + 8*a^2*b^3*c^4*g^2*j^1*z - \\
& 4*a^2*b^4*c^3*g^1*j^2*z + 52*a^3*b^2*c^4*e^1*k^2*z - 28*a^2*b^4*c^3*e^1*k^2*z - 4*a^2*b^2*c^5*f^2*j^1*z - \\
& 24*a^2*b^3*c^4*e^1*j^2*z - 4*a^2*b^3*c^4*g^1*h^2*z - 20*a^2*b^2*c^5*e^1*h^2*z + 20*a^5*b^2*c^2*l^3*z + \\
& 4*a^3*b^3*c^3*j^3*z - 4*a^2*b^2*c^5*g^3*z -
\end{aligned}$$



$$\begin{aligned}
& 4a^4b^5m^2z - 16a^6c^3jm^2z - 16a^5c^4j^2m^2z + 4a^3b^6jm^2z + 16a^5c^4jk^2z + 48a^5c^4g^2z - 48a^4c^5g^2z - 4a^2b^7gm^2z + 16a^5c^4em^2z - 16a^4c^5h^2jz + 16a^4c^5gj^2z - 16a^3c^6e^2m^2z + 4b^5c^4d^2m^2z - 16a^4c^5ek^2z + 16a^3c^6f^2jz - 4b^4c^5d^2jz - 16a^2c^7d^2jz - 4a^4b^4c^3z + 16a^3c^6eh^2z - 16a^4b^4c^4j^3z + 16a^2c^7e^2gz + 4b^3c^6d^2gz - 16a^2c^7ef^2z - 4b^2c^7d^2ez + 4ab^8em^2z + 16a^3c^8d^2ez - 16a^6c^3l^3z + 16a^3c^6g^3z + 4a^5b^2c^3gk^2m + 12a^5b^2c^2gjk^2m + 12a^5b^2c^2ek^2m - 4a^5b^2c^2hjk^2m - 4a^5b^2c^2fjk^2m - 4a^4b^3c^3gjk^2m - 4a^4b^3c^3ek^2m - 4a^5b^2c^2gh^2m + 4a^3b^4c^3ejk^2m - 4a^3b^4c^3fhk^2m + 12a^4b^3c^3djk^2m - 20a^4b^3c^3egk^2m + 12a^4b^3c^3fgh^2m + 12a^4b^3c^3d^2h^2m - 4a^4b^3c^3gh^2m - 4a^4b^3c^3fgh^2m - 4a^4b^3c^3efgh^2m - 4a^4b^3c^3d^2gh^2m - 4a^2b^5c^3egk^2m + 4a^2b^5c^3d^2h^2m - 20a^3b^4c^4d^2f^2m - 4a^3b^4c^4ef^2m - 4a^3b^4c^4d^2g^2m - 4a^3b^4c^4d^2ek^2m - 4a^3b^4c^4d^2ej^2m - 4a^3b^5c^2d^2f^2m + 12a^3b^4c^4egh^2m + 12a^3b^4c^4efg^2m + 12a^3b^4c^4d^2gh^2m + 12a^3b^4c^4d^2fh^2m - 4a^3b^4c^4fgh^2m - 4a^3b^4c^4efgh^2m + 4ab^5c^2d^2fh^2m - 4ab^4c^3d^2fh^2m + 4ab^4c^3d^2fg^2m + 12a^2b^5c^5d^2fg^2m + 12a^2b^5c^5d^2ef^2m - 4a^2b^5c^5d^2eh^2m - 4a^2b^5c^5d^2eg^2m - 4ab^3c^4d^2fg^2m - 4ab^3c^4d^2ef^2m - 4a^2b^5c^5efg^2m + 4ab^2c^5d^2ef^2m - 4a^6b^2c^3jk^2m - 4a^6b^2c^3d^2fk^2m - 4a^6b^2c^3d^2efg^2m - 16a^4b^2c^2ejk^2m + 4a^4b^2c^2fjk^2m + 4a^4b^2c^2d^2jk^2m + 12a^4b^2c^2fgh^2m + 4a^4b^2c^2g^2h^2m + 4a^4b^2c^2e^2h^2m - 4a^3b^3c^2d^2jk^2m + 20a^3b^3c^2egk^2m - 16a^3b^3c^2d^2h^2m - 4a^3b^3c^2fgh^2m - 4a^3b^3c^2efgh^2m - 40a^3b^2c^3d^2fk^2m + 24a^2b^4c^2d^2fk^2m - 16a^3b^2c^3d^2h^2m + 12a^3b^2c^3egj^2m + 4a^3b^2c^3eh^2m + 4a^3b^2c^3efj^2m + 4a^3b^2c^3d^2gk^2m - 4a^2b^4c^2efg^2m + 4a^2b^4c^2d^2h^2m - 16a^3b^2c^3egh^2m + 4a^3b^2c^3fgh^2m + 4a^2b^4c^2egh^2m + 20a^2b^3c^3d^2f^2m - 16a^2b^3c^3d^2fh^2m - 4a^2b^3c^3efg^2m - 4a^2b^3c^3d^2gh^2m - 16a^2b^2c^4d^2fg^2m + 12a^2b^2c^4d^2fh^2m + 4a^2b^2c^4d^2efg^2m + 4a^2b^2c^4d^2eh^2m + 4a^2b^2c^4d^2eg^2m + 2a^5b^2c^3j^2k^2m - 4a^5b^2c^3h^2k^2m - 2a^5b^2c^3h^2k^2m + 2a^4b^3c^3h^2k^2m + 2a^5b^2c^3h^2k^2m + 2a^5b^2c^3f^2k^2m - 2a^5b^2c^3f^2k^2m + 4a^4b^3c^3f^2k^2m - 8a^5b^2c^3g^2k^2m - 8a^5b^2c^3ek^2m + 4a^5b^2c^3fk^2m + 4a^4b^3c^3f^2k^2m - 2a^5b^2c^3g^2k^2m + 2a^2b^5c^3f^2k^2m + 6a^5b^2c^3f^2k^2m + 6a^5b^2c^3d^2l^2m - 2a^5b^2c^3g^2j^2m + 2a^4b^3c^3g^2j^2m - 2a^4b^3c^3f^2k^2m - 2a^4b^3c^3d^2l^2m - 2a^4b^3c^3g^2j^2m - 14a^4b^5c^2d^2k^2m - 10a^5b^2c^2ej^2m + 10a^4b^3c^2ej^2m - 10a^3b^4c^2d^2k^2m - 6a^4b^3c^2d^2k^2m + 6a^4b^3c^2g^2h^2m - 4a^3b^4c^2d^2k^2m - 2a^5b^2c^2d^2k^2m + 14a^5b^2c^2f^2h^2m + 14a^3b^4c^2e^2j^2m - 10a^4b^3c^2f^2h^2m - 10a^4b^3c^2f^2h^2m - 10a^4b^3c^2ej^2m - 2a^4b^3c^2g^2h^2m - 2a^4b^3c^2f^2j^2k^2m - 2a^4b^3c^2d^2j^2m - 2a^3b^4c^2ej^2m
\end{aligned}$$

$$\begin{aligned}
& + 2a^3b^4c^d*k^1^2 + 2a^b^5c^2e^2*j^1 - 12a^b^4c^3d^2*j^1 - 10a^3b^c^4e^2*h^m + 6a^4b^c^3e*j^k^2 + 2a^3b^4c^f*h^1^2 - 2a^b^5c^2e^2*h^m - 12a^3b^4c^e*g^m^2 + 12a^3b^4c^d*h^m^2 + 12a^b^4c^3d^2*h^m \\
& + 6a^3b^c^4f^2*g^1 - 2a^4b^c^3f*h^k^2 - 2a^3b^c^4f^2*h^k + 14a^4b^c^3e*g^1^2 - 10a^4b^c^3d*h^1^2 - 10a^3b^c^4e*g^2^1 - 2a^3b^c^4f*g^2^k - 2a^3b^c^4d*g^2^m + 2a^2b^5c^e*g^1^2 - 2a^2b^5c^d*h^1^2 + 2a^b^4c^3e^2*h^k - 2a^b^4c^3e^2*g^1 + 2a^b^4c^3e^2*f^m - 14a^2b^5c^d*f^m^2 + 14a^2b^c^5d^2*h^k - 10a^4b^c^3d*f^m^2 - 10a^3b^c^4d^h^2*k - 10a^2b^c^5d^2*g^1 - 10a^b^3c^4d^2*h^k + 10a^b^3c^4d^2*g^1 - 6a^b^3c^4d^2*f^m - 4a^b^4c^3d*f^2^m - 2a^3b^c^4e*h^2^j - 2a^2b^c^5d^2*f^m + 6a^3b^c^4d*h^j^2 + 6a^2b^c^5e^2*f^k + 6a^2b^c^5d^e^2^m - 2a^3b^c^4e*g^j^2 - 2a^2b^c^5e^2*g^j + 2a^b^3c^4e^2*g^j - 2a^b^3c^4e^2*f^k - 2a^b^3c^4d^e^2^m + 14a^3b^c^4d*f^k^2 - 10a^2b^c^5d^f^2^k - 8a^b^2c^5d^2*g^j - 8a^b^2c^5d^2*e^1 + 4a^b^3c^4d^f^2^k + 4a^b^2c^5d^2*f^k - 2a^2b^c^5e^f^2^j + 2a^b^5c^2d^f^k^2 + 2a^b^4c^3d^f^j^2 + 2a^b^2c^5d^e^2^k - 2a^2b^c^5d^g^2^h + 2a^b^2c^5e^2*f^h - 4a^b^2c^5d^f^2^h - 2a^2b^c^5d^f^h^2 + 2a^b^3c^4d^f^h^2 + 2a^b^2c^5d^f^g^2 + 8a^6c^2h^j^1^m - 8a^6c^2g^k^1^m - 8a^5c^3f^j^k^1 + 8a^5c^3e^j^k^m - 8a^5c^3d^j^1^m + 8a^5c^3g^h^k^1 - 8a^5c^3g^h^j^m - 8a^5c^3f^h^k^m + 8a^5c^3f^g^1^m - 8a^5c^3e^h^1^m - 2a^6b^c^h^1^2^m + 8a^4c^4f^g^j^k - 8a^4c^4e^h^j^k - 8a^4c^4e^g^j^1 + 8a^4c^4e^f^k^1 - 8a^4c^4e^f^j^m + 8a^4c^4d^h^j^1 - 8a^4c^4d^g^k^1 + 8a^4c^4d^g^j^m + 8a^4c^4d^f^k^m + 8a^4c^4d^e^1^m + 6a^6b^c^g^1^m^2 - 2a^6b^c^h^k^m^2 - 8a^4c^4f^g^h^1 + 8a^4c^4e^g^h^m + 2a^b^6c^e^2^k^m + 8a^3c^5d^e^j^k + 8a^3c^5e^f^h^j - 8a^3c^5e^f^g^k - 8a^3c^5d^g^h^j - 8a^3c^5d^f^h^k + 8a^3c^5d^f^g^1 - 8a^3c^5d^e^h^1 - 8a^3c^5d^e^g^m - 8a^2c^6d^e^f^j + 8a^2c^6d^e^g^h + 2a^b^6c^d^f^1^2 + 6a^b^c^6d^2^e^j - 2a^b^c^6d^2^f^h - 2a^b^c^6d^e^2^h - 8a^4b^2c^2g^2^k^m - 10a^3b^3c^2f^2^k^m + 2a^4b^2c^2h^2^j^1 + 18a^3b^2c^3e^2^k^m - 12a^2b^4c^2e^2^k^m - 4a^4b^2c^2g^j^2^1 + 2a^3b^3c^2g^2^j^1 + 28a^2b^3c^3d^2^k^m + 14a^4b^2c^2d^k^2^m - 8a^3b^2c^3f^2^j^1 + 2a^4b^2c^2g^j^k^2 + 2a^4b^2c^2e^k^2^1 - 2a^3b^3c^2g^2^h^m + 2a^2b^4c^2f^2^j^1 - 10a^2b^3c^3e^2^j^1 - 8a^4b^2c^2d^k^1^2 + 4a^4b^2c^2e^j^1^2 + 4a^3b^3c^2f^h^2^m + 4a^3b^3c^2e^j^2^1 + 4a^3b^2c^3f^2^h^m - 2a^2b^4c^2f^2^h^m + 18a^2b^2c^4d^2^j^1 + 10a^2b^3c^3e^2^h^m - 8a^4b^2c^2f^h^1^2 - 2a^3b^3c^2e^j^k^2 + 2a^3b^2c^3g^2^h^k + 2a^3b^2c^3f^g^2^m - 22a^4b^2c^2d^h^m^2 - 22a^2b^2c^4d^2^h^m + 18a^4b^2c^2e^g^m^2 + 16a^3b^2c^3d^h^2^m - 4a^3b^2c^3f^h^2^k - 4a^2b^4c^2d^h^2^m + 2a^3b^3c^2f^h^k^2 + 2a^3b^2c^3d^j^2^k + 2a^2b^3c^3f^2^h^k - 2a^2b^3c^3f^2^g^1 - 10a^3b^3c^2e^g^1^2 + 10a^3b^3c^2d^h^1^2 - 8a^2b^2c^4e^2^h^k - 8a^2b^2c^4e^2^f^m + 4a^2b^3c^3e^g^2^1 + 4a^2b^2c^4e^2^g^1 + 2a^3b^2c^3f^h^j^2 + 28a^3b^3c^2d^f^m^2 + 14a^2b^2c^4d^f^2^m - 8a^3b^2c^3e^g^k^2 + 4a^3b^2c^3d^h^k^2 + 4a^2b^3c^3d^h^2^k + 2a^2b^4c^2e^g^k^2 - 2a^2b^4c^2d^h^k^2 + 2a^2b^2c^4f^2^g^j + 2a^2b^2c^4e
\end{aligned}$$

$$\begin{aligned}
& *f^2*j + 18*a^3*b^2*c^3*d*f*j^2 - 12*a^2*b^4*c^2*d*f*j^2 - 4*a^2*b^2*c^4*e* \\
& g^2*j + 2*a^2*b^3*c^3*e*g*j^2 - 2*a^2*b^3*c^3*d*h*j^2 - 10*a^2*b^3*c^3*d*f* \\
& k^2 - 8*a^2*b^2*c^4*d*f*j^2 + 2*a^2*b^2*c^4*e*g*h^2 + 4*a^5*b^2*c^3*h^2*m^2 - \\
& 2*a^4*b^2*c^2*h^3*m - 5*a^5*b*c^2*g^2*m^2 + 5*a^4*b^3*c*g^2*m^2 + 3*a^5*b*c^2*h^2*j^2 + 6*a^3*b^4*c^4*f^2*m^2 - 2*a^3*b^2*c^3*g^3*j^2 + 2*a^2*b^3*c^3*f^3 \\
& *m + 7*a^4*b*c^3*e^2*m^2 + 7*a^2*b^5*c*e^2*m^2 - 5*a^4*b*c^3*f^2*j^2 + 3*a^4 \\
& *b*c^3*g^2*k^2 - 2*a^4*b^2*c^2*f*k^3 - 2*a^2*b^2*c^4*f^3*k + 7*a^3*b*c^4*d \\
& ^2*j^2 + 7*a*b^5*c^2*d^2*j^2 - 5*a^3*b*c^4*e^2*k^2 + 3*a^3*b*c^4*f^2*j^2 + \\
& 6*a*b^4*c^3*d^2*k^2 + 2*a^3*b^3*c^2*d*k^3 - 2*a^3*b^2*c^3*e*j^3 - 5*a^2*b*c^ \\
& ^5*d^2*j^2 + 5*a*b^3*c^4*d^2*j^2 + 3*a^2*b*c^5*e^2*h^2 + 4*a*b^2*c^5*d^2*h^ \\
& 2 - 2*a^2*b^2*c^4*d*h^3 - 4*a^6*c^2*j^2*k*m + 2*a^6*b^2*j*j*m^2 + 4*a^6*c^2 \\
& *j*k^2*j + 4*a^6*c^2*h*k^2*m - 4*a^6*c^2*h*k*j^2 - 4*a^6*c^2*f*j^2*m + 4*a^ \\
& 5*c^3*g^2*k*m + 2*a^5*b^3*h*k*m^2 - 2*a^5*b^3*g*j*m^2 + 4*a^6*c^2*g*j*m^2 + \\
& 4*a^6*c^2*f*k*m^2 + 4*a^6*c^2*e*j*m^2 - 4*a^5*c^3*h^2*j*j + 4*a^5*c^3*h*j^ \\
& 2*k + 4*a^5*c^3*g*j^2*j + 4*a^5*c^3*f*j^2*m - 4*a^4*c^4*e^2*k*m + 2*a^4*b^4 \\
& *g*j*m^2 - 2*a^4*b^4*f*k*m^2 + 2*a^4*b^4*e*j*m^2 - 4*a^5*c^3*g*j*k^2 - 4*a^ \\
& 5*c^3*e*k^2*j - 4*a^5*c^3*d*k^2*m + 4*a^4*c^4*f^2*j*j + 4*a^5*c^3*e*j*j^2 + \\
& 4*a^5*c^3*d*k*j^2 + 4*a^4*c^4*f^2*h*m + 2*b^6*c^2*d^2*j*j - 2*a^3*b^5*e*j* \\
& m^2 + 2*a^3*b^5*d*k*m^2 + 4*a^5*c^3*f*h*j^2 - 4*a^4*c^4*g^2*h*k - 4*a^4*c^4 \\
& *f*g^2*m - 4*a^3*c^5*d^2*j*j - 2*b^6*c^2*d^2*h*m + 2*a^3*b^5*f*h*m^2 + 12*a \\
& ^5*c^3*d*h*m^2 - 12*a^4*c^4*d*h^2*m + 12*a^3*c^5*d^2*h*m - 4*a^5*c^3*e*g*m^ \\
& 2 + 4*a^4*c^4*g*h^2*j + 4*a^4*c^4*f*h^2*k + 4*a^4*c^4*e*h^2*j - 4*a^4*c^4*d \\
& *j^2*k + 3*a^6*b*c*j^2*m^2 - 4*a^4*c^4*f*h*j^2 + 4*a^3*c^5*e^2*h*k + 4*a^3*c^ \\
& ^5*e^2*g*j + 4*a^3*c^5*e^2*f*m + 2*b^5*c^3*d^2*h*k - 2*b^5*c^3*d^2*g*j + 2 \\
& *b^5*c^3*d^2*f*m + 2*a^5*b*c^2*j^3*j + 2*a^2*b^6*e*g*m^2 - 2*a^2*b^6*d*h*m^ \\
& 2 + 4*a^4*c^4*e*g*k^2 + 4*a^4*c^4*d*h*k^2 - 4*a^3*c^5*f^2*g*j - 4*a^3*c^5*e \\
& *f^2*j - 4*a^3*c^5*d*f^2*m - 4*a^4*c^4*d*f*j^2 + 4*a^3*c^5*e*g^2*j + 4*a^3*c^ \\
& ^5*d*g^2*k + 2*b^4*c^4*d^2*g*j - 2*b^4*c^4*d^2*f*k + 2*b^4*c^4*d^2*e*j - 6 \\
& *a^3*b*c^4*f^3*m + 4*a^3*c^5*f*g^2*h + 4*a^2*c^6*d^2*g*j + 4*a^2*c^6*d^2*f* \\
& k + 4*a^2*c^6*d^2*e*j - 2*a^5*b^2*c*g*j^3 + 2*a^5*b*c^2*h*k^3 + 2*a^4*b*c^3 \\
& *h^3*k - 4*a^3*c^5*e*g*h^2 + 4*a^3*c^5*d*f*j^2 - 4*a^2*c^6*d*e^2*k - 2*b^3*c^ \\
& ^5*d^2*e*j + 8*a^5*b^2*c*d*m^3 + 8*a*b^6*c*d^2*m^2 + 8*a*b^2*c^5*d^3*m - 6 \\
& *a^5*b*c^2*e*j^3 - 6*a^2*b*c^5*e^3*j - 4*a^2*c^6*e^2*f*h + 2*b^3*c^5*d^2*f* \\
& h + 2*a^4*b^3*c*e*j^3 + 2*a^4*b*c^3*g*j^3 + 2*a^3*b*c^4*g^3*j + 2*a*b^3*c^4 \\
& *e^3*j + 4*a^2*c^6*e*f^2*g + 4*a^2*c^6*d*f^2*h - 6*a^4*b*c^3*d*k^3 - 4*a^2*c^ \\
& ^6*d*f*g^2 + 2*b^2*c^6*d^2*e*g - 2*a*b^2*c^5*e^3*j + 2*a^3*b*c^4*f*h^3 + 2 \\
& *a^2*b*c^5*f^3*h + 2*a^2*b*c^5*e*g^3 + 3*a*b*c^6*d^2*g^2 - 9*a^4*b^2*c^2*f^ \\
& 2*m^2 + 4*a^4*b^2*c^2*g^2*j^2 - 14*a^3*b^3*c^2*e^2*m^2 + 5*a^3*b^3*c^2*f^2* \\
& j^2 - 20*a^2*b^4*c^2*d^2*m^2 + 16*a^3*b^2*c^3*d^2*m^2 - 9*a^3*b^2*c^3*e^2*j^ \\
& 2 + 6*a^2*b^4*c^2*e^2*j^2 + 4*a^3*b^2*c^3*f^2*k^2 - 14*a^2*b^3*c^3*d^2*j^2 + \\
& 5*a^2*b^3*c^3*e^2*k^2 - 9*a^2*b^2*c^4*d^2*k^2 + 4*a^2*b^2*c^4*e^2*j^2 + \\
& 4*a^7*c*k*j^2*m - 4*a^7*c*j*j*m^2 + 2*b^7*c*d^2*k*m + 2*a^6*b*c*k^3*m + 2*a \\
& ^6*b*c*j*j^3 + 2*a*b^7*d*f*m^2 - 6*a^6*b*c*f*m^3 - 6*a*b*c^6*d^3*k - 4*a*c^ \\
& 7*d^2*e*g + 4*a*c^7*d*e^2*f + 2*a*b*c^6*e^3*g + 2*a*b*c^6*d*f^3 - a^5*b^2*c \\
& *j^2*j^2 - a^5*b*c^2*j^2*k^2 - a^4*b^3*c^3*h^2*j^2 - a^3*b^4*c^4*g^2*j^2 - a^4*
\end{aligned}$$

$$\begin{aligned}
& b^3c^3h^2j^2 - a^2b^5c^3f^2l^2 - a^3b^5c^2e^2k^2 - a^3b^4c^4g^2h^2 - \\
& a^4b^3c^3e^2j^2 - a^2b^3c^5f^2g^2 - a^3b^3c^4e^2h^2 - a^3b^2c^5e^2g^2 + 2a^7b^3k^3m^3 + 4a^7c^3h^3m^3 + 4a^3c^7d^3h + 2b^3c^7d^3f - a^6b \\
& *c^3k^2l^2 - 2a^6c^2j^2l^2 - 6a^6c^2h^2m^2 - a^6b^3c^2e^2l^2 - 6a^5c^3g^2l^2 - 2a^5c^3h^2k^2 - 2a^5c^3f^2m^2 - 6a^4c^4f^2k^2 - \\
& 6a^4c^4d^2m^2 - 2a^4c^4g^2j^2 - 2a^4c^4e^2l^2 - 6a^3c^5e^2j^2 - 2a^3c^5d^2k^2 - 2a^3c^5f^2h^2 - a^3b^3c^2g^2k^2 - a^3b^2c^3g^2j^2 - \\
& a^2b^4c^2f^2k^2 - a^2b^3c^3f^2j^2 - a^2b^2c^4f^2h^2 - 2a^7c^3k^2m^2 + 4a^5c^3h^3m - 2a^6b^2h^3m^3 + 4a^6c^2g^3l^3 + 4a^4c^4g^3l - 2b^4c^4d^3m + 2a^5b^3f^3m^3 - 4a^6c^2d^3m^3 + 4a^5c^3f^3k^3 + 4a^3c^5f^3k - 4a^2c^6d^3m + 2b^3c^5d^3k - 2a^4b^4d^3m^3 + 4a^4c^4e^3j^3 + 4a^2c^6e^3j - 2b^2c^6d^3h + 4a^3c^5d^3h^3 - 2a^3c^7d^2f^2 - a^6b^2k^2m^2 - a^5b^3j^2m^2 - a^4b^4h^2m^2 - a^3b^5g^2m^2 - a^2b^6f^2m^2 - b^6c^2d^2k^2 - b^5c^3d^2j^2 - b^4c^4d^2h^2 - b^3c^5d^2g^2 - b^2c^6d^2f^2 - a^7b^1l^2m^2 - b^7c^d^2l^2 - a^7b^7e^2m^2 - b^7c^7d^2e^2 - b^8d^2m^2 - a^6c^2k^4 - a^5c^3j^4 - a^4c^4h^4 - a^3c^5g^4 - a^2c^6f^4 - a^7c^1l^4 - a^8c^7e^4 - a^8m^4 - c^8d^4, z, k1) * ((16a^3c^6m - 16a^2c^7h - 4b^2c^7d + 16a^3c^8d - 20a^2b^2c^5m + 4a^3b^2c^6h - 4a^3b^3c^5k + 16a^2b^3c^6k + 4a^3b^4c^4m) / c^5 + (x*(4b^2c^7e - 8b^3c^6g + 16a^2c^7j + 8b^4c^5j - 8b^5c^4l - 16a^3c^8e + 32a^3b^3c^7g - 36a^3b^2c^6j + 44a^3b^3c^5l - 48a^2b^3c^6l)) / c^5 + (root(128a^2b^2c^8z^4 - 16a^3b^4c^7z^4 - 256a^3c^9z^4 + 384a^3b^2c^6l^3z^3 - 144a^2b^4c^5l^3z^3 + 128a^2b^3c^6j^3z^3 - 128a^2b^2c^7g^3z^3 + 16a^3b^6c^4l^3z^3 - 256a^3b^3c^7j^3z^3 - 16a^3b^5c^5j^3z^3 + 16a^3b^4c^6g^3z^3 - 256a^4c^7l^3z^3 + 256a^3c^8g^3z^3 - 96a^4b^3c^5j^3l^3z^2 + 8a^3b^7c^2j^3l^3z^2 + 160a^4b^3c^5h^3m^3z^2 - 8a^3b^7c^2h^3m^3z^2 + 8a^3b^6c^3h^3k^3z^2 - 8a^3b^6c^3g^3l^3z^2 + 8a^3b^6c^3f^3m^3z^2 + 160a^3b^3c^6g^3j^3z^2 - 96a^3b^3c^6f^3k^3z^2 - 96a^3b^3c^6e^3l^3z^2 - 96a^3b^3c^6d^3m^3z^2 + 8a^3b^5c^4g^3j^3z^2 - 8a^3b^5c^4f^3k^3z^2 - 8a^3b^5c^4e^3l^3z^2 - 8a^3b^5c^4d^3m^3z^2 + 8a^3b^4c^5e^3j^3z^2 + 8a^3b^4c^5d^3k^3z^2 + 8a^3b^4c^5f^3h^3z^2 + 32a^2b^3c^7e^3g^3z^2 + 32a^2b^3c^7d^3h^3z^2 - 8a^3b^3c^6e^3g^3z^2 - 8a^3b^3c^6d^3h^3z^2 + 16a^3b^2c^7d^3f^3z^2 + 8a^3b^8c^3k^3m^3z^2 - 304a^4b^2c^4k^3m^3z^2 + 264a^3b^4c^3k^3m^3z^2 - 80a^2b^6c^2k^3m^3z^2 + 184a^3b^3c^4j^3l^3z^2 - 72a^2b^5c^3j^3l^3z^2 - 200a^3b^3c^4h^3m^3z^2 + 72a^2b^5c^3h^3m^3z^2 - 240a^3b^2c^5g^3l^3z^2 + 144a^3b^2c^5h^3k^3z^2 + 144a^3b^2c^5f^3m^3z^2 + 80a^2b^4c^4g^3l^3z^2 - 64a^2b^4c^4h^3k^3z^2 - 64a^2b^4c^4f^3m^3z^2 - 72a^2b^3c^5g^3j^3z^2 + 56a^2b^3c^5f^3k^3z^2 + 56a^2b^3c^5e^3l^3z^2 + 56a^2b^3c^5d^3m^3z^2 - 48a^2b^2c^6e^3j^3z^2 - 48a^2b^2c^6d^3k^3z^2 - 48a^2b^2c^6f^3h^3z^2 - 112a^5b^3c^4m^2z^2 + 44a^2b^7c^3m^2z^2 + 80a^4b^3c^5k^2z^2 - 4a^3b^7c^2k^2z^2 - 4a^3b^6c^3j^2z^2 - 48a^3b^3c^6h^2z^2 - 4a^3b^5c^4h^2z^2 - 4a^3b^4c^5g^2z^2 + 16a^2b^3c^7f^2z^2 - 4a^3b^3c^6f^2z^2 + 8a^3b^2c^7e^2z^2 + 64a^5c^5k^3m^3z^2 + 192a^4c^6g^3l^3z^2 - 64a^4c^6h^3k^3z^2 - 64a^4c^6f^3m^3z^2 + 64a^3c^7e^3j^3z^2
\end{aligned}$$

$$\begin{aligned}
&^2 + 64a^3c^7dk^2z^2 + 64a^3c^7f^2hz^2 - 4ab^8c^1^2z^2 - 64a^2c^8df^2z^2 + 16ab^3c^8d^2z^2 + 252a^4b^3c^3m^2z^2 - 168a^3b^5c^2m^2z^2 + 168a^4b^2c^4l^2z^2 - 132a^3b^4c^3l^2z^2 + 40a^2b^6c^2l^2z^2 - 100a^3b^3c^4k^2z^2 + 36a^2b^5c^3k^2z^2 - 56a^3b^2c^5j^2z^2 + 32a^2b^4c^4j^2z^2 + 28a^2b^3c^5h^2z^2 + 40a^2b^2c^6g^2z^2 - 96a^5c^5l^2z^2 - 32a^4c^6j^2z^2 - 96a^3c^7g^2z^2 - 32a^2c^8e^2z^2 - 4b^3c^7d^2z^2 - 4ab^9m^2z^2 + 32a^5b^3c^3h^1m^2z + 8a^2b^6c^3g^2k^2m^2z + 96a^4b^3c^4e^2k^2m^2z + 32a^4b^3c^4h^2j^2k^2z + 32a^4b^3c^4g^2j^2l^2z + 32a^4b^3c^4f^2j^2m^2z - 64a^4b^3c^4g^2h^2m^2z - 8ab^6c^2e^2j^2l^2z + 8ab^6c^2e^2h^2m^2z - 64a^3b^3c^5e^2h^2k^2z + 64a^3b^3c^5e^2g^2l^2z - 64a^3b^3c^5e^2f^2m^2z + 32a^3b^3c^5f^2g^2k^2z - 32a^3b^3c^5d^2h^2l^2z + 32a^3b^3c^5d^2g^2m^2z - 8ab^5c^3e^2h^2k^2z + 8ab^5c^3e^2g^2l^2z - 8ab^5c^3e^2f^2m^2z - 8ab^4c^4e^2g^2j^2z + 8ab^4c^4e^2f^2k^2z - 8ab^4c^4d^2f^2l^2z + 8ab^4c^4d^2e^2m^2z - 32a^2b^3c^6d^2f^2j^2z + 32a^2b^3c^6d^2e^2k^2z + 8ab^3c^5d^2f^2j^2z - 8ab^3c^5d^2e^2k^2z + 32a^2b^3c^6e^2f^2h^2z - 8ab^3c^5e^2f^2h^2z - 8ab^2c^6d^2f^2g^2z + 8ab^2c^6d^2e^2h^2z - 8ab^7c^2e^2k^2m^2z - 40a^5b^2c^2k^2l^2m^2z + 48a^4b^3c^2j^2k^2m^2z - 8a^4b^3c^2h^2l^2m^2z + 104a^4b^2c^3g^2k^2m^2z - 56a^3b^4c^2g^2k^2m^2z - 40a^4b^2c^3h^2j^2m^2z + 8a^4b^2c^3h^2k^2l^2z + 8a^4b^2c^3f^2l^2m^2z + 8a^3b^4c^2h^2j^2m^2z - 152a^3b^3c^3e^2k^2m^2z + 64a^2b^5c^2e^2k^2m^2z - 40a^3b^3c^3g^2j^2l^2z - 8a^3b^3c^3h^2j^2k^2z - 8a^3b^3c^3f^2j^2m^2z + 8a^2b^5c^2g^2j^2l^2z + 48a^3b^3c^3g^2h^2m^2z - 8a^2b^5c^2g^2h^2m^2z - 104a^3b^2c^4e^2j^2l^2z + 56a^2b^4c^3e^2j^2l^2z + 8a^3b^2c^4f^2j^2k^2z - 8a^3b^2c^4d^2k^2l^2z + 8a^3b^2c^4d^2j^2m^2z + 104a^3b^2c^4e^2h^2m^2z - 56a^2b^4c^3e^2h^2m^2z - 40a^3b^2c^4g^2h^2k^2z - 40a^3b^2c^4f^2g^2m^2z - 8a^3b^2c^4f^2h^2l^2z + 8a^2b^4c^3g^2h^2k^2z + 8a^2b^4c^3f^2g^2m^2z + 48a^2b^3c^4e^2h^2k^2z - 48a^2b^3c^4e^2g^2l^2z + 48a^2b^3c^4e^2f^2m^2z - 8a^2b^3c^4f^2g^2k^2z + 8a^2b^3c^4d^2h^2l^2z - 8a^2b^3c^4d^2g^2m^2z + 40a^2b^2c^5e^2g^2j^2z - 40a^2b^2c^5e^2f^2k^2z + 40a^2b^2c^5d^2f^2l^2z - 40a^2b^2c^5d^2e^2m^2z - 8a^2b^2c^5d^2h^2j^2z + 8a^2b^2c^5d^2g^2k^2z + 8a^2b^2c^5f^2g^2h^2z + 8a^4b^4c^2k^2l^2m^2z - 64a^5b^3c^3j^2k^2m^2z - 8a^3b^5c^2j^2k^2m^2z - 32a^6b^3c^2l^2m^2z + 24a^5b^3c^1l^2m^2z - 28a^4b^4c^2j^2m^2z + 16a^5b^3c^3k^2l^2z + 4a^3b^5c^2j^2l^2z + 48a^5b^3c^3g^2m^2z + 32a^3b^5c^2g^2m^2z - 4a^2b^6c^2g^2l^2z - 36a^2b^6c^2e^2m^2z - 32a^4b^3c^4g^2k^2z - 16a^3b^3c^5f^2l^2z - 48a^4b^3c^4e^2l^2z - 32a^3b^3c^5g^2j^2z - 4ab^4c^4e^2l^2z + 32a^2b^3c^6d^2l^2z - 24ab^3c^5d^2l^2z + 4ab^6c^2e^2k^2z + 32a^3b^3c^5e^2j^2z + 16a^3b^3c^5g^2h^2z - 16a^2b^3c^6e^2j^2z + 4ab^5c^3e^2j^2z + 4ab^3c^5e^2j^2z + 20ab^2c^6d^2j^2z + 4ab^4c^4e^2h^2z - 16a^2b^3c^6e^2g^2z + 4ab^3c^5e^2g^2z - 4ab^2c^6e^2g^2z + 4ab^2c^6e^2f^2z + 32a^6c^3k^2l^2m^2z - 32a^5c^4h^2k^2l^2z + 32a^5c^4h^2j^2m^2z - 32a^5c^4g^2k^2m^2z - 32a^5c^4f^2l^2m^2z - 32a^4c^5f^2j^2k^2z + 32a^4c^5e^2j^2l^2z + 32a^4c^5d^2k^2l^2z - 32a^4c^5d^2j^2m^2z + 32a^4c^5g^2h^2k^2z + 32a^4c^5f^2h^2l^2z + 32a^4c^5f^2g^2m^2z - 32a^4c^5e^2h^2m^2z - 32a^3c^6e^2g^2j^2z + 32a^3c^6e^2f^2k^2z + 32a^3c^6d^2h^2j^2z - 32a^3c^6d^2g^2k^2z - 32a^3c^6d^2f^2l^2z + 32a^3c^6d^2e^2m^2z - 32a^3c^6f^2g^2h^2z + 4ab^7c^2e^2l^2
\end{aligned}$$

$$\begin{aligned}
& 2*z + 32*a^2*c^7*d*f*g*z - 32*a^2*c^7*d*e*h*z - 16*a*b*c^7*d^2*g*z + 52*a^5 \\
& *b^2*c^2*j*m^2*z - 4*a^4*b^3*c^2*k^2*l*z + 36*a^4*b^2*c^3*j^2*l*z - 16*a^4* \\
& b^3*c^2*j^1^2*z - 8*a^3*b^4*c^2*j^2*l*z - 20*a^4*b^2*c^3*j*k^2*z + 4*a^3*b^ \\
& 4*c^2*j*k^2*z - 76*a^4*b^3*c^2*g*m^2*z - 60*a^4*b^2*c^3*g*l^2*z + 44*a^3*b^ \\
& 2*c^4*g^2*l*z + 28*a^3*b^4*c^2*g*l^2*z - 8*a^2*b^4*c^3*g^2*l*z + 104*a^3*b^ \\
& 4*c^2*e*m^2*z - 100*a^4*b^2*c^3*e*m^2*z + 24*a^3*b^3*c^3*g*k^2*z + 4*a^3*b^ \\
& 2*c^4*h^2*j*z - 4*a^2*b^5*c^2*g*k^2*z + 4*a^2*b^3*c^4*f^2*l*z + 76*a^3*b^3* \\
& c^3*e*l^2*z - 32*a^2*b^5*c^2*e*l^2*z + 20*a^2*b^2*c^5*e^2*l*z + 12*a^3*b^2* \\
& c^4*g*j^2*z + 8*a^2*b^3*c^4*g^2*j*z - 4*a^2*b^4*c^3*g*j^2*z + 52*a^3*b^2*c^ \\
& 4*e*k^2*z - 28*a^2*b^4*c^3*e*k^2*z - 4*a^2*b^2*c^5*f^2*j*z - 24*a^2*b^3*c^4 \\
& *e*j^2*z - 4*a^2*b^3*c^4*g*h^2*z - 20*a^2*b^2*c^5*e*h^2*z + 20*a^5*b^2*c^2* \\
& l^3*z + 4*a^3*b^3*c^3*j^3*z - 4*a^2*b^2*c^5*g^3*z - 4*a^4*b^5*l*m^2*z - 16* \\
& a^6*c^3*j*m^2*z - 16*a^5*c^4*j^2*l*z + 4*a^3*b^6*j*m^2*z + 16*a^5*c^4*j*k^2 \\
& *z + 48*a^5*c^4*g*l^2*z - 48*a^4*c^5*g^2*l*z - 4*a^2*b^7*g*m^2*z + 16*a^5*c \\
& ^4*e*m^2*z - 16*a^4*c^5*h^2*j*z + 16*a^4*c^5*g*j^2*z - 16*a^3*c^6*e^2*l*z + \\
& 4*b^5*c^4*d^2*l*z - 16*a^4*c^5*e*k^2*z + 16*a^3*c^6*f^2*j*z - 4*b^4*c^5*d^ \\
& 2*j*z - 16*a^2*c^7*d^2*j*z - 4*a^4*b^4*c*l^3*z + 16*a^3*c^6*e*h^2*z - 16*a^ \\
& 4*b*c^4*j^3*z + 16*a^2*c^7*e^2*g*z + 4*b^3*c^6*d^2*g*z - 16*a^2*c^7*e*f^2*z \\
& - 4*b^2*c^7*d^2*e*z + 4*a*b^8*e*m^2*z + 16*a*c^8*d^2*e*z - 16*a^6*c^3*l^3* \\
& z + 16*a^3*c^6*g^3*z + 4*a^5*b^2*c*g*k*l*m + 12*a^5*b*c^2*g*j*k*m + 12*a^5* \\
& b*c^2*e*k*l*m - 4*a^5*b*c^2*h*j*k*l - 4*a^5*b*c^2*f*j*l*m - 4*a^4*b^3*c*g*j \\
& *k*m - 4*a^4*b^3*c*e*k*l*m - 4*a^5*b*c^2*g*h*l*m + 4*a^3*b^4*c*e*j*k*m - 4* \\
& a^3*b^4*c*f*h*k*m + 12*a^4*b*c^3*d*j*k*l - 20*a^4*b*c^3*e*g*k*m + 12*a^4*b* \\
& c^3*f*h*j*l + 12*a^4*b*c^3*e*h*j*m + 12*a^4*b*c^3*d*h*k*m - 4*a^4*b*c^3*g*h \\
& *j*k - 4*a^4*b*c^3*f*g*k*l - 4*a^4*b*c^3*f*g*j*m - 4*a^4*b*c^3*e*h*k*l - 4* \\
& a^4*b*c^3*e*f*l*m - 4*a^4*b*c^3*d*g*l*m - 4*a^2*b^5*c*e*g*k*m + 4*a^2*b^5*c \\
& *d*h*k*m - 20*a^3*b*c^4*d*f*j*l - 4*a^3*b*c^4*e*f*j*k - 4*a^3*b*c^4*d*g*j*k \\
& - 4*a^3*b*c^4*d*e*k*l - 4*a^3*b*c^4*d*e*j*m - 4*a*b^5*c^2*d*f*j*l + 12*a^3 \\
& *b*c^4*e*g*h*k + 12*a^3*b*c^4*e*f*g*m + 12*a^3*b*c^4*d*g*h*l + 12*a^3*b*c^4 \\
& *d*f*h*m - 4*a^3*b*c^4*f*g*h*j - 4*a^3*b*c^4*e*f*h*l + 4*a*b^5*c^2*d*f*h*m \\
& - 4*a*b^4*c^3*d*f*h*k + 4*a*b^4*c^3*d*f*g*l + 12*a^2*b*c^5*d*f*g*j + 12*a^2 \\
& *b*c^5*d*e*f*l - 4*a^2*b*c^5*d*e*h*j - 4*a^2*b*c^5*d*e*g*k - 4*a*b^3*c^4*d* \\
& f*g*j - 4*a*b^3*c^4*d*e*f*l - 4*a^2*b*c^5*e*f*g*h + 4*a*b^2*c^5*d*e*f*j - 4 \\
& *a^6*b*c^2*j*k*l*m - 4*a*b^6*c*d*f*k*m - 4*a*b*c^6*d*e*f*g - 16*a^4*b^2*c^2*e \\
& *j*k*m + 4*a^4*b^2*c^2*f*j*k*l + 4*a^4*b^2*c^2*d*j*l*m + 12*a^4*b^2*c^2*f*h \\
& *k*m + 4*a^4*b^2*c^2*g*h*j*m + 4*a^4*b^2*c^2*e*h*l*m - 4*a^3*b^3*c^2*d*j*k* \\
& l + 20*a^3*b^3*c^2*e*g*k*m - 16*a^3*b^3*c^2*d*h*k*m - 4*a^3*b^3*c^2*f*h*j*l \\
& - 4*a^3*b^3*c^2*e*h*j*m - 40*a^3*b^2*c^3*d*f*k*m + 24*a^2*b^4*c^2*d*f*k*m \\
& - 16*a^3*b^2*c^3*d*h*j*l + 12*a^3*b^2*c^3*e*g*j*l + 4*a^3*b^2*c^3*e*h*j*k + \\
& 4*a^3*b^2*c^3*e*f*j*m + 4*a^3*b^2*c^3*d*g*k*l - 4*a^2*b^4*c^2*e*g*j*l + 4* \\
& a^2*b^4*c^2*d*h*j*l - 16*a^3*b^2*c^3*e*g*h*m + 4*a^3*b^2*c^3*f*g*h*l + 4*a^ \\
& 2*b^4*c^2*e*g*h*m + 20*a^2*b^3*c^3*d*f*j*l - 16*a^2*b^3*c^3*d*f*h*m - 4*a^2 \\
& *b^3*c^3*e*g*h*k - 4*a^2*b^3*c^3*e*f*g*m - 4*a^2*b^3*c^3*d*g*h*l - 16*a^2*b \\
& ^2*c^4*d*f*g*l + 12*a^2*b^2*c^4*d*f*h*k + 4*a^2*b^2*c^4*e*f*g*k + 4*a^2*b^2 \\
& *c^4*d*g*h*j + 4*a^2*b^2*c^4*d*e*h*l + 4*a^2*b^2*c^4*d*e*g*m + 2*a^5*b^2*c*
\end{aligned}$$

$$\begin{aligned}
& j^2 * k * m - 4 * a^5 * b^2 * c * h * k^2 * m - 2 * a^5 * b * c^2 * h^2 * k * m + 2 * a^4 * b^3 * c * h^2 * k * m + \\
& 2 * a^5 * b^2 * c * h * k * l^2 + 2 * a^5 * b^2 * c * f * l^2 * m - 2 * a^5 * b * c^2 * h * j^2 * m + 2 * a^3 * b^4 * \\
& 4 * c * g^2 * k * m + 14 * a^4 * b * c^3 * f^2 * k * m - 10 * a^5 * b * c^2 * f * k^2 * m - 8 * a^5 * b^2 * c * g * j \\
& * m^2 - 8 * a^5 * b^2 * c * e * l * m^2 + 4 * a^5 * b^2 * c * f * k * m^2 + 4 * a^4 * b^3 * c * f * k^2 * m - 2 * \\
& a^5 * b * c^2 * g * k^2 * l + 2 * a^2 * b^5 * c * f^2 * k * m + 6 * a^5 * b * c^2 * f * k * l^2 + 6 * a^5 * b * c^2 \\
& * d * l^2 * m - 2 * a^5 * b * c^2 * g * j * l^2 + 2 * a^4 * b^3 * c * g * j * l^2 - 2 * a^4 * b^3 * c * f * k * l^2 \\
& - 2 * a^4 * b^3 * c * d * l^2 * m - 2 * a^4 * b * c^3 * g^2 * j * l - 14 * a * b^5 * c^2 * d^2 * k * m - 10 * a^5 \\
& * b * c^2 * e * j * m^2 + 10 * a^4 * b^3 * c * e * j * m^2 - 10 * a^3 * b * c^4 * d^2 * k * m - 6 * a^4 * b^3 * c * \\
& d * k * m^2 + 6 * a^4 * b * c^3 * g^2 * h * m - 4 * a^3 * b^4 * c * d * k^2 * m - 2 * a^5 * b * c^2 * d * k * m^2 + \\
& 14 * a^5 * b * c^2 * f * h * m^2 + 14 * a^3 * b * c^4 * e^2 * j * l - 10 * a^4 * b^3 * c * f * h * m^2 - 10 * a^4 \\
& * b * c^3 * f * h^2 * m - 10 * a^4 * b * c^3 * e * j^2 * l - 2 * a^4 * b * c^3 * g * h^2 * l - 2 * a^4 * b * c^3 * \\
& f * j^2 * k - 2 * a^4 * b * c^3 * d * j^2 * m - 2 * a^3 * b^4 * c * e * j * l^2 + 2 * a^3 * b^4 * c * d * k * l^2 + \\
& 2 * a * b^5 * c^2 * e^2 * j * l - 12 * a * b^4 * c^3 * d^2 * j * l - 10 * a^3 * b * c^4 * e^2 * h * m + 6 * a^4 * \\
& b * c^3 * e * j * k^2 + 2 * a^3 * b^4 * c * f * h * l^2 - 2 * a * b^5 * c^2 * e^2 * h * m - 12 * a^3 * b^4 * c * e * \\
& g * m^2 + 12 * a^3 * b^4 * c * d * h * m^2 + 12 * a * b^4 * c^3 * d^2 * h * m + 6 * a^3 * b * c^4 * f^2 * g * l - \\
& 2 * a^4 * b * c^3 * f * h * k^2 - 2 * a^3 * b * c^4 * f^2 * h * k + 14 * a^4 * b * c^3 * e * g * l^2 - 10 * a^4 * \\
& b * c^3 * d * h * l^2 - 10 * a^3 * b * c^4 * e * g^2 * l - 2 * a^3 * b * c^4 * f * g^2 * k - 2 * a^3 * b * c^4 * d * \\
& g^2 * m + 2 * a^2 * b^5 * c * e * g * l^2 - 2 * a^2 * b^5 * c * d * h * l^2 + 2 * a * b^4 * c^3 * e^2 * h * k - 2 \\
& * a * b^4 * c^3 * e^2 * g * l + 2 * a * b^4 * c^3 * e^2 * f * m - 14 * a^2 * b^5 * c * d * f * m^2 + 14 * a^2 * b * \\
& c^5 * d^2 * h * k - 10 * a^4 * b * c^3 * d * f * m^2 - 10 * a^3 * b * c^4 * d * h^2 * k - 10 * a^2 * b * c^5 * d^ \\
& 2 * g * l - 10 * a * b^3 * c^4 * d^2 * h * k + 10 * a * b^3 * c^4 * d^2 * g * l - 6 * a * b^3 * c^4 * d^2 * f * m - \\
& 4 * a * b^4 * c^3 * d * f^2 * m - 2 * a^3 * b * c^4 * e * h^2 * j - 2 * a^2 * b * c^5 * d^2 * f * m + 6 * a^3 * b * \\
& c^4 * d * h * j^2 + 6 * a^2 * b * c^5 * e^2 * f * k + 6 * a^2 * b * c^5 * d * e^2 * m - 2 * a^3 * b * c^4 * e * g * j \\
& ^2 - 2 * a^2 * b * c^5 * e^2 * g * j + 2 * a * b^3 * c^4 * e^2 * g * j - 2 * a * b^3 * c^4 * e^2 * f * k - 2 * a * \\
& b^3 * c^4 * d * e^2 * m + 14 * a^3 * b * c^4 * d * f * k^2 - 10 * a^2 * b * c^5 * d * f^2 * k - 8 * a * b^2 * c^5 \\
& * d^2 * g * j - 8 * a * b^2 * c^5 * d^2 * e * l + 4 * a * b^3 * c^4 * d * f^2 * k + 4 * a * b^2 * c^5 * d^2 * f * k \\
& - 2 * a^2 * b * c^5 * e * f^2 * j + 2 * a * b^5 * c^2 * d * f * k^2 + 2 * a * b^4 * c^3 * d * f * j^2 + 2 * a * b^2 \\
& * c^5 * d * e^2 * k - 2 * a^2 * b * c^5 * d * g^2 * h + 2 * a * b^2 * c^5 * e^2 * f * h - 4 * a * b^2 * c^5 * d * f^ \\
& 2 * h - 2 * a^2 * b * c^5 * d * f * h^2 + 2 * a * b^3 * c^4 * d * f * h^2 + 2 * a * b^2 * c^5 * d * f * g^2 + 8 * a \\
& ^6 * c^2 * h * j * l * m - 8 * a^6 * c^2 * g * k * l * m - 8 * a^5 * c^3 * f * j * k * l + 8 * a^5 * c^3 * e * j * k * m \\
& - 8 * a^5 * c^3 * d * j * l * m + 8 * a^5 * c^3 * g * h * k * l - 8 * a^5 * c^3 * g * h * j * m - 8 * a^5 * c^3 * f * h \\
& * k * m + 8 * a^5 * c^3 * f * g * l * m - 8 * a^5 * c^3 * e * h * l * m - 2 * a^6 * b * c * h * l^2 * m + 8 * a^4 * c^ \\
& 4 * f * g * j * k - 8 * a^4 * c^4 * e * h * j * k - 8 * a^4 * c^4 * e * g * j * l + 8 * a^4 * c^4 * e * f * k * l - 8 * a \\
& ^4 * c^4 * e * f * j * m + 8 * a^4 * c^4 * d * h * j * l - 8 * a^4 * c^4 * d * g * k * l + 8 * a^4 * c^4 * d * g * j * m \\
& + 8 * a^4 * c^4 * d * f * k * m + 8 * a^4 * c^4 * d * e * l * m + 6 * a^6 * b * c * g * l * m^2 - 2 * a^6 * b * c * h * k \\
& * m^2 - 8 * a^4 * c^4 * f * g * h * l + 8 * a^4 * c^4 * e * g * h * m + 2 * a * b^6 * c * e^2 * k * m + 8 * a^3 * c^ \\
& 5 * d * e * j * k + 8 * a^3 * c^5 * e * f * h * j - 8 * a^3 * c^5 * e * f * g * k - 8 * a^3 * c^5 * d * g * h * j - 8 * a \\
& ^3 * c^5 * d * f * h * k + 8 * a^3 * c^5 * d * f * g * l - 8 * a^3 * c^5 * d * e * h * l - 8 * a^3 * c^5 * d * e * g * m \\
& - 8 * a^2 * c^6 * d * e * f * j + 8 * a^2 * c^6 * d * e * g * h + 2 * a * b^6 * c * d * f * l^2 + 6 * a * b * c^6 * d^2 \\
& * e * j - 2 * a * b * c^6 * d^2 * f * h - 2 * a * b * c^6 * d * e^2 * h - 8 * a^4 * b^2 * c^2 * g^2 * k * m - 10 * a \\
& ^3 * b^3 * c^2 * f^2 * k * m + 2 * a^4 * b^2 * c^2 * h^2 * j * l + 18 * a^3 * b^2 * c^3 * e^2 * k * m - 12 * a^ \\
& 2 * b^4 * c^2 * e^2 * k * m - 4 * a^4 * b^2 * c^2 * g * j^2 * l + 2 * a^3 * b^3 * c^2 * g^2 * j * l + 28 * a^2 * \\
& b^3 * c^3 * d^2 * k * m + 14 * a^4 * b^2 * c^2 * d * k^2 * m - 8 * a^3 * b^2 * c^3 * f^2 * j * l + 2 * a^4 * b^ \\
& 2 * c^2 * g * j * k^2 + 2 * a^4 * b^2 * c^2 * e * k^2 * l - 2 * a^3 * b^3 * c^2 * g^2 * h * m + 2 * a^2 * b^4 * c \\
& ^2 * f^2 * j * l - 10 * a^2 * b^3 * c^3 * e^2 * j * l - 8 * a^4 * b^2 * c^2 * d * k * l^2 + 4 * a^4 * b^2 * c^2
\end{aligned}$$

$$\begin{aligned}
& *e*j^1^2 + 4*a^3*b^3*c^2*f*h^2*m + 4*a^3*b^3*c^2*e*j^2*1 + 4*a^3*b^2*c^3*f^2*h*m - 2*a^2*b^4*c^2*f^2*h*m + 18*a^2*b^2*c^4*d^2*j*1 + 10*a^2*b^3*c^3*e^2*h*m - 8*a^4*b^2*c^2*f*h*1^2 - 2*a^3*b^3*c^2*e*j*k^2 + 2*a^3*b^2*c^3*g^2*h*k + 2*a^3*b^2*c^3*f*g^2*m - 22*a^4*b^2*c^2*d*h*m^2 - 22*a^2*b^2*c^4*d^2*h*m + 18*a^4*b^2*c^2*e*g*m^2 + 16*a^3*b^2*c^3*d*h^2*m - 4*a^3*b^2*c^3*f*h^2*k - 4*a^2*b^4*c^2*d*h^2*m + 2*a^3*b^3*c^2*f*h*k^2 + 2*a^3*b^2*c^3*d*j^2*k + 2*a^2*b^3*c^3*f^2*h*k - 2*a^2*b^3*c^3*f^2*g*1 - 10*a^3*b^3*c^2*e*g*1^2 + 10*a^3*b^3*c^2*d*h*1^2 - 8*a^2*b^2*c^4*e^2*h*k - 8*a^2*b^2*c^4*e^2*f*m + 4*a^2*b^3*c^3*e*g^2*1 + 4*a^2*b^2*c^4*e^2*g*1 + 2*a^3*b^2*c^3*f*h*j^2 + 28*a^3*b^3*c^2*d*f*m^2 + 14*a^2*b^2*c^4*d*f^2*m - 8*a^3*b^2*c^3*e*g*k^2 + 4*a^3*b^2*c^3*d*h*k^2 + 4*a^2*b^3*c^3*d*h^2*k + 2*a^2*b^4*c^2*e*g*k^2 - 2*a^2*b^4*c^2*d*h*k^2 + 2*a^2*b^2*c^4*f^2*g*j + 2*a^2*b^2*c^4*e*f^2*1 + 18*a^3*b^2*c^3*d*f*1^2 - 12*a^2*b^4*c^2*d*f*1^2 - 4*a^2*b^2*c^4*e*g^2*j + 2*a^2*b^3*c^3*e*g*j^2 - 2*a^2*b^3*c^3*d*h*j^2 - 10*a^2*b^3*c^3*d*f*k^2 - 8*a^2*b^2*c^4*d*f*j^2 + 2*a^2*b^2*c^4*e*g*h^2 + 4*a^5*b^2*c^h^2*m^2 - 2*a^4*b^2*c^2*h^3*m - 5*a^5*b*c^2*g^2*m^2 + 5*a^4*b^3*c*g^2*m^2 + 3*a^5*b*c^2*h^2*1^2 + 6*a^3*b^4*c*f^2*m^2 - 2*a^3*b^2*c^3*g^3*1 + 2*a^2*b^3*c^3*f^3*m + 7*a^4*b*c^3*e^2*m^2 + 7*a^2*b^5*c*e^2*m^2 - 5*a^4*b*c^3*f^2*1^2 + 3*a^4*b*c^3*g^2*k^2 - 2*a^4*b^2*c^2*f*k^3 - 2*a^2*b^2*c^4*f^3*k + 7*a^3*b*c^4*d^2*1^2 + 7*a*b^5*c^2*d^2*1^2 - 5*a^3*b*c^4*e^2*k^2 + 3*a^3*b*c^4*f^2*j^2 + 6*a*b^4*c^3*d^2*k^2 + 2*a^3*b^3*c^2*d*k^3 - 2*a^3*b^2*c^3*e*j^3 - 5*a^2*b*c^5*d^2*j^2 + 5*a*b^3*c^4*d^2*j^2 + 3*a^2*b*c^5*e^2*h^2 + 4*a*b^2*c^5*d^2*h^2 - 2*a^2*b^2*c^4*d*h^3 - 4*a^6*c^2*j^2*k*m + 2*a^6*b^2*j*1*m^2 + 4*a^6*c^2*j*k^2*1 + 4*a^6*c^2*h*k^2*m - 4*a^6*c^2*h*k*1^2 - 4*a^6*c^2*f*1^2*m + 4*a^5*c^3*g^2*k*m + 2*a^5*b^3*h*k*m^2 - 2*a^5*b^3*g*1*m^2 + 4*a^6*c^2*g*j*m^2 + 4*a^6*c^2*f*k*m^2 + 4*a^6*c^2*e*1*m^2 - 4*a^5*c^3*h^2*j*1 + 4*a^5*c^3*h*j^2*k + 4*a^5*c^3*g*j^2*1 + 4*a^5*c^3*f*j^2*m - 4*a^4*c^4*e^2*k*m + 2*a^4*b^4*g*j*m^2 - 2*a^4*b^4*f*k*m^2 + 2*a^4*b^4*e*1*m^2 - 4*a^5*c^3*g*j*k^2 - 4*a^5*c^3*e*k^2*1 - 4*a^5*c^3*d*k^2*m + 4*a^4*c^4*f^2*j*1 + 4*a^5*c^3*e*j*1^2 + 4*a^5*c^3*d*k*1^2 + 4*a^4*c^4*f^2*h*m + 2*b^6*c^2*d^2*j*1 - 2*a^3*b^5*e*j*m^2 + 2*a^3*b^5*d*k*m^2 + 4*a^5*c^3*f*h*1^2 - 4*a^4*c^4*g^2*h*k - 4*a^4*c^4*f*g^2*m - 4*a^3*c^5*d^2*j*1 - 2*b^6*c^2*d^2*h*m + 2*a^3*b^5*f*h*m^2 + 12*a^5*c^3*d*h*m^2 - 12*a^4*c^4*d*h^2*m + 12*a^3*c^5*d^2*h*m - 4*a^5*c^3*e*g*m^2 + 4*a^4*c^4*g*h^2*j + 4*a^4*c^4*f*h^2*k + 4*a^4*c^4*e*h^2*1 - 4*a^4*c^4*d*j^2*k + 3*a^6*b*c*j^2*m^2 - 4*a^4*c^4*f*h*j^2 + 4*a^3*c^5*e^2*h*k + 4*a^3*c^5*e^2*g*1 + 4*a^3*c^5*e^2*f*m + 2*b^5*c^3*d^2*h*k - 2*b^5*c^3*d^2*g*1 + 2*b^5*c^3*d^2*f*m + 2*a^5*b*c^2*j^3*1 + 2*a^2*b^6*e*g*m^2 - 2*a^2*b^6*d*h*m^2 + 4*a^4*c^4*e*g*k^2 + 4*a^4*c^4*d*h*k^2 - 4*a^3*c^5*f^2*g*j - 4*a^3*c^5*e*f^2*1 - 4*a^3*c^5*d*f^2*m - 4*a^4*c^4*d*f*1^2 + 4*a^3*c^5*e*g^2*j + 4*a^3*c^5*d*g^2*k + 2*b^4*c^4*d^2*g*j - 2*b^4*c^4*d^2*f*k + 2*b^4*c^4*d^2*e*1 - 6*a^3*b*c^4*f^3*m + 4*a^3*c^5*f*g^2*h + 4*a^2*c^6*d^2*g*j + 4*a^2*c^6*d^2*f*k + 4*a^2*c^6*d^2*e*1 - 2*a^5*b^2*c*g*1^3 + 2*a^5*b*c^2*h*k^3 + 2*a^4*b*c^3*h^3*k - 4*a^3*c^5*e*g*h^2 + 4*a^3*c^5*d*f*j^2 - 4*a^2*c^6*d*e^2*k - 2*b^3*c^5*d^2*e*j + 8*a^5*b^2*c*d*m^3 + 8*a*b^6*c*d^2*m^2 + 8*a*b^2*c^5*d^3*m - 6*a^5*b*c^2*e*1^3 - 6*a^2*b*c^5*e^3*1 - 4*a^2*c^6*e^2*f*h + 2*b^3*c^5*d^2*f*h + 2*a^4*b^3*c*e*1^3 +
\end{aligned}$$



$$\begin{aligned}
& 2a^4b^3c^3g^3j^3 + 2a^3b^3c^4g^3j + 2ab^3c^4e^3*1 + 4a^2c^6e^3f^2 \\
& *g + 4a^2c^6d^2f^2h - 6a^4b^3c^3d^2k^3 - 4a^2c^6d^2f^2g^2 + 2b^2c^6 \\
& d^2e^3g - 2ab^2c^5e^3j + 2a^3b^3c^4f^2h^3 + 2a^2b^3c^5f^3h + 2a^2 \\
& *b^3c^5e^3g^3 + 3ab^3c^6d^2g^2 - 9a^4b^2c^2f^2m^2 + 4a^4b^2c^2g^2 \\
& *1^2 - 14a^3b^3c^2e^2m^2 + 5a^3b^3c^2f^2*1^2 - 20a^2b^4c^2d^2 \\
& *m^2 + 16a^3b^2c^3d^2m^2 - 9a^3b^2c^3e^2*1^2 + 6a^2b^4c^2e^2*1 \\
& ^2 + 4a^3b^2c^3f^2k^2 - 14a^2b^3c^3d^2*1^2 + 5a^2b^3c^3e^2k^2 \\
& - 9a^2b^2c^4d^2k^2 + 4a^2b^2c^4e^2j^2 + 4a^7c^*k^1^2m - 4a^7c \\
& *j^1m^2 + 2b^7c^*d^2k^m + 2a^6b^*c^k^3m + 2a^6b^*c^j^1^3 + 2ab^7d \\
& *f^m^2 - 6a^6b^*c^f^m^3 - 6ab^6c^*d^3k - 4a^*c^7d^2e^*g + 4a^*c^7d^*e^ \\
& ^2f + 2ab^6c^*e^3g + 2ab^6c^*d^2f^3 - a^5b^2c^*j^2*1^2 - a^5b^6c^2j^2 \\
& *k^2 - a^4b^3c^*h^2*1^2 - a^3b^4c^*g^2*1^2 - a^4b^6c^3h^2j^2 - a^2b^5c \\
& *f^2*1^2 - ab^5c^2e^2k^2 - a^3b^6c^4g^2h^2 - ab^4c^3e^2j^2 - a^2 \\
& *b^6c^5f^2g^2 - ab^3c^4e^2h^2 - ab^2c^5e^2g^2 + 2a^7b^*k^m^3 + 4a \\
& ^7c^*h^m^3 + 4a^*c^7d^3h + 2b^6c^7d^3f - a^6b^*c^k^2*1^2 - 2a^6c^2j \\
& ^2*1^2 - 6a^6c^2h^2m^2 - ab^6c^*e^2*1^2 - 6a^5c^3g^2*1^2 - 2a^5c^ \\
& ^3h^2k^2 - 2a^5c^3f^2m^2 - 6a^4c^4f^2k^2 - 6a^4c^4d^2m^2 - 2a \\
& ^4c^4g^2j^2 - 2a^4c^4e^2*1^2 - 6a^3c^5e^2j^2 - 2a^3c^5d^2k^2 \\
& - 2a^3c^5f^2h^2 - ab^6c^*e^2f^2 - 6a^2c^6d^2h^2 - 2a^2c^6e^2g \\
& ^2 - a^4b^2c^2h^2k^2 - a^3b^3c^2g^2k^2 - a^3b^2c^3g^2j^2 - a^2b \\
& ^4c^2f^2k^2 - a^2b^3c^3f^2j^2 - a^2b^2c^4f^2h^2 - 2a^7c^*k^2m \\
& ^2 + 4a^5c^3h^3m - 2a^6b^2h^3m^3 + 4a^6c^2g^3*1^3 + 4a^4c^4g^3*1 \\
& - 2b^4c^4d^3m + 2a^5b^3f^3m^3 - 4a^6c^2d^3m^3 + 4a^5c^3f^3k^3 + 4 \\
& *a^3c^5f^3k - 4a^2c^6d^3m + 2b^3c^5d^3k - 2a^4b^4d^3m^3 + 4a^ \\
& ^4c^4e^3j^3 + 4a^2c^6e^3j - 2b^2c^6d^3h + 4a^3c^5d^3h^3 - 2a^*c^7 \\
& *d^2f^2 - a^6b^2k^2m^2 - a^5b^3j^2m^2 - a^4b^4h^2m^2 - a^3b^5g^2 \\
& *m^2 - a^2b^6f^2m^2 - b^6c^2d^2k^2 - b^5c^3d^2j^2 - b^4c^4d^2h \\
& ^2 - b^3c^5d^2g^2 - b^2c^6d^2f^2 - a^7b^*1^2m^2 - b^7c^*d^2*1^2 - a^ \\
& b^7e^2m^2 - b^*c^7d^2e^2 - b^8d^2m^2 - a^6c^2k^4 - a^5c^3j^4 - a^4 \\
& *c^4h^4 - a^3c^5g^4 - a^2c^6f^4 - a^7c^*1^4 - a^*c^7e^4 - a^8m^4 - c^ \\
& ^8d^4, z, k1)*x*(8b^3c^7 - 32ab^3c^8))/c^5) - (4b^3c^7d^*e + 8a^*c^7d^*g \\
& - 8a^*c^7e^*f - 4b^2c^6d^*g - 8a^2c^6g^*h + 4b^3c^5d^*j - 8a^2c^6 \\
& d^*1 + 8a^2c^6e^*k + 8a^2c^6f^*j - 4b^4c^4d^*1 + 8a^3c^5g^*m + 8a^3 \\
& *c^5h^*1 - 8a^3c^5j^*k - 8a^4c^4*1^*m + 16ab^2c^5d^*1 - 4ab^2c^5e \\
& *k - 4ab^2c^5f^*j + 4ab^3c^4e^*m + 4ab^3c^4f^*1 - 12a^2b^3c^5e^*m \\
& - 12a^2b^3c^5f^*1 + 4a^2b^3c^5g^*k + 4a^2b^3c^5h^*j + 4a^3b^3c^4j^*m + \\
& 4a^3b^3c^4k^*1 - 4a^2b^2c^4g^*m - 4a^2b^2c^4h^*1 + 4ab^6c^6e^*h + \\
& 4ab^6c^6f^*g - 12ab^6c^6d^*j)/c^5 + (x*(4c^8d^2 + 2b^8m^2 - 4a^*c^7f \\
& ^2 - 2b^*c^7e^2 + 2b^7c^*1^2 + 2b^2c^6f^2 + 4a^2c^6h^2 + 2b^3c^5g \\
& ^2 + 2b^4c^4h^2 - 4a^3c^5k^2 + 2b^5c^3j^2 + 2b^6c^2k^2 + 4a^4 \\
& *c^4m^2 - 8ab^2c^5h^2 - 10ab^3c^4j^2 + 6a^2b^3c^5j^2 - 12ab^4c \\
& ^3k^2 - 14ab^5c^2*1^2 - 18a^3b^3c^4*1^2 - 4b^*c^7d^*f - 8a^*c^7d^*h + \\
& 8a^*c^7e^*g - 4b^7c^*k^*m + 18a^2b^2c^4k^2 + 28a^2b^3c^3*1^2 + 40a \\
& ^2b^4c^2m^2 - 32a^3b^2c^3m^2 - 10ab^6c^6g^2 + 4b^2c^6d^*h - 16a \\
& *b^6c^*m^2 - 4b^3c^5f^*h - 4b^3c^5d^*k + 8a^2c^6d^*m - 8a^2c^6e^*1
\end{aligned}$$

$$\begin{aligned}
& + 8a^2c^6fk - 8a^2c^6g*j + 4b^4c^4d*m + 4b^4c^4f*k - 4b^4c^4 \\
& *g*j - 4b^5c^3f*m + 4b^5c^3g*1 - 4b^5c^3h*k - 8a^3c^5h*m + 8a^ \\
& 3c^5j*1 + 4b^6c^2h*m - 4b^6c^2j*1 - 16a*b^2c^5d*m + 4a*b^2c^5* \\
& e*1 - 16a*b^2c^5f*k + 20a*b^2c^5g*j + 20a*b^3c^4f*m - 24a*b^3c^4 \\
& *g*1 + 20a*b^3c^4h*k - 20a^2b*c^5f*m + 28a^2b*c^5g*1 - 20a^2b*c^ \\
& 5h*k - 24a*b^4c^3h*m + 24a*b^4c^3j*1 + 28a*b^5c^2k*m + 28a^3b*c \\
& ^4k*m + 36a^2b^2c^4h*m - 32a^2b^2c^4j*1 - 56a^2b^3c^3k*m + 12* \\
& a*b*c^6f*h + 12a*b*c^6d*k - 4a*b*c^6e*j))/c^5) + (x*(c^7e^3 + c^7d^2 \\
& *g + b^7e*m^2 - a^3c^4j^3 + b^2c^5e*g^2 - a^3b^3c*1^3 + 2a^4b*c^2* \\
& 1^3 + b^3c^4e*h^2 + 3a^2c^5e*j^2 + a^2c^5g*h^2 + 2b^2c^5e^2*j + b \\
& ^4c^3e*j^2 - a^2c^5g^2*j + a^3c^4e*1^2 + b^2c^5d^2*1 + b^5c^2e*k^ \\
& 2 + a^2c^5f^2*1 - a^3c^4g*k^2 - 2b^3c^4e^2*1 - a^3c^4h^2*1 + a^4c \\
& ^3g*m^2 + a^2b^5j*m^2 - a^4c^3j*1^2 + a^4c^3k^2*1 - a^3b^4*1*m^2 - \\
& a^5c^2*1*m^2 - 2c^7d*e*f + a^2b^2c^3j^3 - a*b*c^5g^3 + a*c^6e*g^2 + \\
& b*c^6e*f^2 - a*c^6f^2*g - 2b*c^6e^2*g - 3a*c^6e^2*j - b*c^6d^2*j - \\
& a*c^6d^2*1 + b^6c*e*1^2 - a*b^6g*m^2 - 2a*b*c^5e*h^2 + 5a*b*c^5e^2*1 \\
& - 6a*b^5c*e*m^2 - 2b^2c^5e*f*h - a*b^5c*g*1^2 - 2b^2c^5d*e*k + 2* \\
& b^3c^4d*e*m + 2b^3c^4e*f*k - 2b^3c^4e*g*j + 2a^2c^5d*g*m + 2a^2 \\
& *c^5d*h*1 - 2a^2c^5e*f*m - 2a^2c^5e*g*1 - 2a^2c^5e*h*k + 2a^2c^ \\
& 5f*g*k - 2a^2c^5f*h*j - 2a^2c^5d*j*k - 2b^4c^3e*f*m + 2b^4c^3e \\
& *g*1 - 2b^4c^3e*h*k + 2b^5c^2e*h*m - 2a^3c^4g*h*m - 2b^5c^2e*j* \\
& 1 - 2a^3c^4d*1*m + 2a^3c^4e*k*m + 2a^3c^4f*j*m - 2a^3c^4f*k*1 + \\
& 2a^3c^4g*j*1 + 2a^3c^4h*j*k + 2a^4c^3h*1*m - 2a^4c^3j*k*m - 3* \\
& a*b^2c^4e*j^2 - a*b^2c^4g*h^2 - 4a*b^3c^3e*k^2 + 3a^2b*c^4e*k^2 + \\
& 2a*b^2c^4g^2*j - a*b^3c^3g*j^2 - 5a*b^4c^2e*1^2 - a*b^4c^2g*k^2 \\
& + a^2b*c^4h^2*j - 4a^3b*c^3e*m^2 - 2a*b^3c^3g^2*1 + 4a^2b*c^4g^2 \\
& *1 - 5a^3b*c^3g*1^2 + 5a^2b^4c*g*m^2 - 2a^3b*c^3j*k^2 + a^2b^4c* \\
& j*1^2 + 3a^3b*c^3j^2*1 - 4a^3b^3c*j*m^2 + 3a^4b*c^2j*m^2 + 3a^4b \\
& ^2c*1*m^2 + 2b*c^6d*e*h - 2a*c^6d*g*h + 2a*c^6e*f*h + 2a*c^6d*e*k \\
& + 2a*c^6d*f*j - 2b^6c*e*k*m + 6a^2b^2c^3e*1^2 + 3a^2b^2c^3g*k^2 \\
& + 10a^2b^3c^2e*m^2 + 4a^2b^3c^2g*1^2 - 6a^3b^2c^2g*m^2 + a^2b \\
& ^3c^2j*k^2 - 2a^2b^3c^2j^2*1 - a^3b^2c^2j*1^2 - a^3b^2c^2k^2*1 \\
& + 2a*b*c^5f*g*h - 4a*b*c^5d*e*m - 2a*b*c^5d*f*1 + 2a*b*c^5d*g*k - 4 \\
& *a*b*c^5e*f*k + 2a*b*c^5e*g*j + 2a*b^5c*g*k*m - 2a*b^2c^4d*g*m + 6* \\
& a*b^2c^4e*f*m - 4a*b^2c^4e*g*1 + 6a*b^2c^4e*h*k - 2a*b^2c^4f*g*k \\
& - 8a*b^3c^3e*h*m + 2a*b^3c^3f*g*m + 2a*b^3c^3g*h*k + 6a^2b*c^4* \\
& e*h*m - 4a^2b*c^4f*g*m - 4a^2b*c^4g*h*k + 8a*b^3c^3e*j*1 + 2a^2b \\
& *c^4d*j*m - 8a^2b*c^4e*j*1 + 2a^2b*c^4f*j*k - 2a*b^4c^2g*h*m + 10 \\
& *a*b^4c^2e*k*m + 2a*b^4c^2g*j*1 + 2a^3b*c^3f*1*m + 6a^3b*c^3g*k* \\
& m - 4a^3b*c^3h*j*m + 2a^3b*c^3h*k*1 - 2a^2b^4c*j*k*m + 2a^3b^3c \\
& *k*1*m - 4a^4b*c^2k*1*m + 6a^2b^2c^3g*h*m - 12a^2b^2c^3e*k*m - 2 \\
& *a^2b^2c^3f*j*m - 4a^2b^2c^3g*j*1 - 2a^2b^2c^3h*j*k - 8a^2b^3* \\
& c^2g*k*m + 2a^2b^3c^2h*j*m - 2a^3b^2c^2h*1*m + 6a^3b^2c^2j*k*m \\
& ))/c^5)*root(128a^2b^2c^8z^4 - 16a*b^4c^7z^4 - 256a^3c^9z^4 + 384 \\
& *a^3b^2c^6*1*z^3 - 144a^2b^4c^5*1*z^3 + 128a^2b^3c^6*j*z^3 - 128a^
\end{aligned}$$

$$\begin{aligned}
& 2*b^2*c^7*g*z^3 + 16*a*b^6*c^4*l*z^3 - 256*a^3*b*c^7*j*z^3 - 16*a*b^5*c^5*j \\
& *z^3 + 16*a*b^4*c^6*g*z^3 - 256*a^4*c^7*l*z^3 + 256*a^3*c^8*g*z^3 - 96*a^4* \\
& b*c^5*j*l*z^2 + 8*a*b^7*c^2*j*l*z^2 + 160*a^4*b*c^5*h*m*z^2 - 8*a*b^7*c^2*h \\
& *m*z^2 + 8*a*b^6*c^3*h*k*z^2 - 8*a*b^6*c^3*g*l*z^2 + 8*a*b^6*c^3*f*m*z^2 + \\
& 160*a^3*b*c^6*g*j*z^2 - 96*a^3*b*c^6*f*k*z^2 - 96*a^3*b*c^6*e*l*z^2 - 96*a^ \\
& 3*b*c^6*d*m*z^2 + 8*a*b^5*c^4*g*j*z^2 - 8*a*b^5*c^4*f*k*z^2 - 8*a*b^5*c^4*e \\
& *l*z^2 - 8*a*b^5*c^4*d*m*z^2 + 8*a*b^4*c^5*e*j*z^2 + 8*a*b^4*c^5*d*k*z^2 + \\
& 8*a*b^4*c^5*f*h*z^2 + 32*a^2*b*c^7*e*g*z^2 + 32*a^2*b*c^7*d*h*z^2 - 8*a*b^3 \\
& *c^6*e*g*z^2 - 8*a*b^3*c^6*d*h*z^2 + 16*a*b^2*c^7*d*f*z^2 + 8*a*b^8*c*k*m*z \\
& ^2 - 304*a^4*b^2*c^4*k*m*z^2 + 264*a^3*b^4*c^3*k*m*z^2 - 80*a^2*b^6*c^2*k*m \\
& *z^2 + 184*a^3*b^3*c^4*j*l*z^2 - 72*a^2*b^5*c^3*j*l*z^2 - 200*a^3*b^3*c^4*h \\
& *m*z^2 + 72*a^2*b^5*c^3*h*m*z^2 - 240*a^3*b^2*c^5*g*l*z^2 + 144*a^3*b^2*c^5 \\
& *h*k*z^2 + 144*a^3*b^2*c^5*f*m*z^2 + 80*a^2*b^4*c^4*g*l*z^2 - 64*a^2*b^4*c^ \\
& 4*h*k*z^2 - 64*a^2*b^4*c^4*f*m*z^2 - 72*a^2*b^3*c^5*g*j*z^2 + 56*a^2*b^3*c^ \\
& 5*f*k*z^2 + 56*a^2*b^3*c^5*e*l*z^2 + 56*a^2*b^3*c^5*d*m*z^2 - 48*a^2*b^2*c^ \\
& 6*e*j*z^2 - 48*a^2*b^2*c^6*d*k*z^2 - 48*a^2*b^2*c^6*f*h*z^2 - 112*a^5*b*c^4 \\
& *m^2*z^2 + 44*a^2*b^7*c*m^2*z^2 + 80*a^4*b*c^5*k^2*z^2 - 4*a*b^7*c^2*k^2*z^ \\
& 2 - 4*a*b^6*c^3*j^2*z^2 - 48*a^3*b*c^6*h^2*z^2 - 4*a*b^5*c^4*h^2*z^2 - 4*a* \\
& b^4*c^5*g^2*z^2 + 16*a^2*b*c^7*f^2*z^2 - 4*a*b^3*c^6*f^2*z^2 + 8*a*b^2*c^7* \\
& e^2*z^2 + 64*a^5*c^5*k*m*z^2 + 192*a^4*c^6*g*l*z^2 - 64*a^4*c^6*h*k*z^2 - 6 \\
& 4*a^4*c^6*f*m*z^2 + 64*a^3*c^7*e*j*z^2 + 64*a^3*c^7*d*k*z^2 + 64*a^3*c^7*f* \\
& h*z^2 - 4*a*b^8*c*l^2*z^2 - 64*a^2*c^8*d*f*z^2 + 16*a*b*c^8*d^2*z^2 + 252*a \\
& ^4*b^3*c^3*m^2*z^2 - 168*a^3*b^5*c^2*m^2*z^2 + 168*a^4*b^2*c^4*l^2*z^2 - 13 \\
& 2*a^3*b^4*c^3*l^2*z^2 + 40*a^2*b^6*c^2*l^2*z^2 - 100*a^3*b^3*c^4*k^2*z^2 + \\
& 36*a^2*b^5*c^3*k^2*z^2 - 56*a^3*b^2*c^5*j^2*z^2 + 32*a^2*b^4*c^4*j^2*z^2 + \\
& 28*a^2*b^3*c^5*h^2*z^2 + 40*a^2*b^2*c^6*g^2*z^2 - 96*a^5*c^5*l^2*z^2 - 32*a \\
& ^4*c^6*j^2*z^2 - 96*a^3*c^7*g^2*z^2 - 32*a^2*c^8*e^2*z^2 - 4*b^3*c^7*d^2*z^ \\
& 2 - 4*a*b^9*m^2*z^2 + 32*a^5*b*c^3*h*l*m*z + 8*a^2*b^6*c*g*k*m*z + 96*a^4*b \\
& *c^4*e*k*m*z + 32*a^4*b*c^4*h*j*k*z + 32*a^4*b*c^4*g*j*l*z + 32*a^4*b*c^4*f \\
& *j*m*z - 64*a^4*b*c^4*g*h*m*z - 8*a*b^6*c^2*e*j*l*z + 8*a*b^6*c^2*e*h*m*z - \\
& 64*a^3*b*c^5*e*h*k*z + 64*a^3*b*c^5*e*g*l*z - 64*a^3*b*c^5*e*f*m*z + 32*a^ \\
& 3*b*c^5*f*g*k*z - 32*a^3*b*c^5*d*h*l*z + 32*a^3*b*c^5*d*g*m*z - 8*a*b^5*c^3 \\
& *e*h*k*z + 8*a*b^5*c^3*e*g*l*z - 8*a*b^5*c^3*e*f*m*z - 8*a*b^4*c^4*e*g*j*z \\
& + 8*a*b^4*c^4*e*f*k*z - 8*a*b^4*c^4*d*f*l*z + 8*a*b^4*c^4*d*e*m*z - 32*a^2* \\
& b*c^6*d*f*j*z + 32*a^2*b*c^6*d*e*k*z + 8*a*b^3*c^5*d*f*j*z - 8*a*b^3*c^5*d* \\
& e*k*z + 32*a^2*b*c^6*e*f*h*z - 8*a*b^3*c^5*e*f*h*z - 8*a*b^2*c^6*d*f*g*z + \\
& 8*a*b^2*c^6*d*e*h*z - 8*a*b^7*c*e*k*m*z - 40*a^5*b^2*c^2*k*l*m*z + 48*a^4*b \\
& ^3*c^2*j*k*m*z - 8*a^4*b^3*c^2*h*l*m*z + 104*a^4*b^2*c^3*g*k*m*z - 56*a^3*b \\
& ^4*c^2*g*k*m*z - 40*a^4*b^2*c^3*h*j*m*z + 8*a^4*b^2*c^3*h*k*l*z + 8*a^4*b^2 \\
& *c^3*f*l*m*z + 8*a^3*b^4*c^2*h*j*m*z - 152*a^3*b^3*c^3*e*k*m*z + 64*a^2*b^5 \\
& *c^2*e*k*m*z - 40*a^3*b^3*c^3*g*j*l*z - 8*a^3*b^3*c^3*h*j*k*z - 8*a^3*b^3*c \\
& ^3*f*j*m*z + 8*a^2*b^5*c^2*g*j*l*z + 48*a^3*b^3*c^3*g*h*m*z - 8*a^2*b^5*c^2 \\
& *g*h*m*z - 104*a^3*b^2*c^4*e*j*l*z + 56*a^2*b^4*c^3*e*j*l*z + 8*a^3*b^2*c^4 \\
& *f*j*k*z - 8*a^3*b^2*c^4*d*k*l*z + 8*a^3*b^2*c^4*d*j*m*z + 104*a^3*b^2*c^4* \\
& e*h*m*z - 56*a^2*b^4*c^3*e*h*m*z - 40*a^3*b^2*c^4*g*h*k*z - 40*a^3*b^2*c^4*
\end{aligned}$$

$$\begin{aligned}
& f*g*m*z - 8*a^3*b^2*c^4*f*h*1*z + 8*a^2*b^4*c^3*g*h*k*z + 8*a^2*b^4*c^3*f*g \\
& *m*z + 48*a^2*b^3*c^4*e*h*k*z - 48*a^2*b^3*c^4*e*g*1*z + 48*a^2*b^3*c^4*e*f \\
& *m*z - 8*a^2*b^3*c^4*f*g*k*z + 8*a^2*b^3*c^4*d*h*1*z - 8*a^2*b^3*c^4*d*g*m* \\
& z + 40*a^2*b^2*c^5*e*g*j*z - 40*a^2*b^2*c^5*e*f*k*z + 40*a^2*b^2*c^5*d*f*1* \\
& z - 40*a^2*b^2*c^5*d*e*m*z - 8*a^2*b^2*c^5*d*h*j*z + 8*a^2*b^2*c^5*d*g*k*z \\
& + 8*a^2*b^2*c^5*f*g*h*z + 8*a^4*b^4*c*k*1*m*z - 64*a^5*b*c^3*j*k*m*z - 8*a^ \\
& 3*b^5*c*j*k*m*z - 32*a^6*b*c^2*1*m^2*z + 24*a^5*b^3*c*1*m^2*z - 28*a^4*b^4* \\
& c*j*m^2*z + 16*a^5*b*c^3*k^2*1*z + 4*a^3*b^5*c*j*1^2*z + 48*a^5*b*c^3*g*m^2 \\
& *z + 32*a^3*b^5*c*g*m^2*z - 4*a^2*b^6*c*g*1^2*z - 36*a^2*b^6*c*e*m^2*z - 32 \\
& *a^4*b*c^4*g*k^2*z - 16*a^3*b*c^5*f^2*1*z - 48*a^4*b*c^4*e*1^2*z - 32*a^3*b \\
& *c^5*g^2*j*z - 4*a*b^4*c^4*e^2*1*z + 32*a^2*b*c^6*d^2*1*z - 24*a*b^3*c^5*d^ \\
& 2*1*z + 4*a*b^6*c^2*e*k^2*z + 32*a^3*b*c^5*e*j^2*z + 16*a^3*b*c^5*g*h^2*z - \\
& 16*a^2*b*c^6*e^2*j*z + 4*a*b^5*c^3*e*j^2*z + 4*a*b^3*c^5*e^2*j*z + 20*a*b^ \\
& 2*c^6*d^2*j*z + 4*a*b^4*c^4*e*h^2*z - 16*a^2*b*c^6*e*g^2*z + 4*a*b^3*c^5*e* \\
& g^2*z - 4*a*b^2*c^6*e^2*g*z + 4*a*b^2*c^6*e*f^2*z + 32*a^6*c^3*k*1*m*z - 32 \\
& *a^5*c^4*h*k*1*z + 32*a^5*c^4*h*j*m*z - 32*a^5*c^4*g*k*m*z - 32*a^5*c^4*f*1 \\
& *m*z - 32*a^4*c^5*f*j*k*z + 32*a^4*c^5*e*j*1*z + 32*a^4*c^5*d*k*1*z - 32*a^ \\
& 4*c^5*d*j*m*z + 32*a^4*c^5*g*h*k*z + 32*a^4*c^5*f*h*1*z + 32*a^4*c^5*f*g*m* \\
& z - 32*a^4*c^5*e*h*m*z - 32*a^3*c^6*e*g*j*z + 32*a^3*c^6*e*f*k*z + 32*a^3*c \\
& ^6*d*h*j*z - 32*a^3*c^6*d*g*k*z - 32*a^3*c^6*d*f*1*z + 32*a^3*c^6*d*e*m*z - \\
& 32*a^3*c^6*f*g*h*z + 4*a*b^7*c*e*1^2*z + 32*a^2*c^7*d*f*g*z - 32*a^2*c^7*d \\
& *e*h*z - 16*a*b*c^7*d^2*g*z + 52*a^5*b^2*c^2*j*m^2*z - 4*a^4*b^3*c^2*k^2*1* \\
& z + 36*a^4*b^2*c^3*j^2*1*z - 16*a^4*b^3*c^2*j*1^2*z - 8*a^3*b^4*c^2*j^2*1*z \\
& - 20*a^4*b^2*c^3*j*k^2*z + 4*a^3*b^4*c^2*j*k^2*z - 76*a^4*b^3*c^2*g*m^2*z \\
& - 60*a^4*b^2*c^3*g*1^2*z + 44*a^3*b^2*c^4*g^2*1*z + 28*a^3*b^4*c^2*g*1^2*z \\
& - 8*a^2*b^4*c^3*g^2*1*z + 104*a^3*b^4*c^2*e*m^2*z - 100*a^4*b^2*c^3*e*m^2*z \\
& + 24*a^3*b^3*c^3*g*k^2*z + 4*a^3*b^2*c^4*h^2*j*z - 4*a^2*b^5*c^2*g*k^2*z + \\
& 4*a^2*b^3*c^4*f^2*1*z + 76*a^3*b^3*c^3*e*1^2*z - 32*a^2*b^5*c^2*e*1^2*z + \\
& 20*a^2*b^2*c^5*e^2*1*z + 12*a^3*b^2*c^4*g*j^2*z + 8*a^2*b^3*c^4*g^2*j*z - 4 \\
& *a^2*b^4*c^3*g*j^2*z + 52*a^3*b^2*c^4*e*k^2*z - 28*a^2*b^4*c^3*e*k^2*z - 4* \\
& a^2*b^2*c^5*f^2*j*z - 24*a^2*b^3*c^4*e*j^2*z - 4*a^2*b^3*c^4*g*h^2*z - 20*a \\
& ^2*b^2*c^5*e*h^2*z + 20*a^5*b^2*c^2*1^3*z + 4*a^3*b^3*c^3*j^3*z - 4*a^2*b^2 \\
& *c^5*g^3*z - 4*a^4*b^5*1*m^2*z - 16*a^6*c^3*j*m^2*z - 16*a^5*c^4*j^2*1*z + \\
& 4*a^3*b^6*j*m^2*z + 16*a^5*c^4*j*k^2*z + 48*a^5*c^4*g*1^2*z - 48*a^4*c^5*g^ \\
& 2*1*z - 4*a^2*b^7*g*m^2*z + 16*a^5*c^4*e*m^2*z - 16*a^4*c^5*h^2*j*z + 16*a^ \\
& 4*c^5*g*j^2*z - 16*a^3*c^6*e^2*1*z + 4*b^5*c^4*d^2*1*z - 16*a^4*c^5*e*k^2*z \\
& + 16*a^3*c^6*f^2*j*z - 4*b^4*c^5*d^2*j*z - 16*a^2*c^7*d^2*j*z - 4*a^4*b^4* \\
& c*1^3*z + 16*a^3*c^6*e*h^2*z - 16*a^4*b*c^4*j^3*z + 16*a^2*c^7*e^2*g*z + 4* \\
& b^3*c^6*d^2*g*z - 16*a^2*c^7*e*f^2*z - 4*b^2*c^7*d^2*e*z + 4*a*b^8*e*m^2*z \\
& + 16*a*c^8*d^2*e*z - 16*a^6*c^3*1^3*z + 16*a^3*c^6*g^3*z + 4*a^5*b^2*c*g*k* \\
& 1*m + 12*a^5*b*c^2*g*j*k*m + 12*a^5*b*c^2*e*k*1*m - 4*a^5*b*c^2*h*j*k*1 - 4 \\
& *a^5*b*c^2*f*j*1*m - 4*a^4*b^3*c*g*j*k*m - 4*a^4*b^3*c*e*k*1*m - 4*a^5*b*c^ \\
& 2*g*h*1*m + 4*a^3*b^4*c*e*j*k*m - 4*a^3*b^4*c*f*h*k*m + 12*a^4*b*c^3*d*j*k* \\
& 1 - 20*a^4*b*c^3*e*g*k*m + 12*a^4*b*c^3*f*h*j*1 + 12*a^4*b*c^3*e*h*j*m + 12 \\
& *a^4*b*c^3*d*h*k*m - 4*a^4*b*c^3*g*h*j*k - 4*a^4*b*c^3*f*g*k*1 - 4*a^4*b*c^
\end{aligned}$$

$$\begin{aligned}
& 3*f*g*j*m - 4*a^4*b*c^3*e*h*k*1 - 4*a^4*b*c^3*e*f*1*m - 4*a^4*b*c^3*d*g*1*m \\
& - 4*a^2*b^5*c*e*g*k*m + 4*a^2*b^5*c*d*h*k*m - 20*a^3*b*c^4*d*f*j*1 - 4*a^3 \\
& *b*c^4*e*f*j*k - 4*a^3*b*c^4*d*g*j*k - 4*a^3*b*c^4*d*e*k*1 - 4*a^3*b*c^4*d* \\
& e*j*m - 4*a*b^5*c^2*d*f*j*1 + 12*a^3*b*c^4*e*g*h*k + 12*a^3*b*c^4*e*f*g*m + \\
& 12*a^3*b*c^4*d*g*h*1 + 12*a^3*b*c^4*d*f*h*m - 4*a^3*b*c^4*f*g*h*j - 4*a^3* \\
& b*c^4*e*f*h*1 + 4*a*b^5*c^2*d*f*h*m - 4*a*b^4*c^3*d*f*h*k + 4*a*b^4*c^3*d*f \\
& *g*1 + 12*a^2*b*c^5*d*f*g*j + 12*a^2*b*c^5*d*e*f*1 - 4*a^2*b*c^5*d*e*h*j - \\
& 4*a^2*b*c^5*d*e*g*k - 4*a*b^3*c^4*d*f*g*j - 4*a*b^3*c^4*d*e*f*1 - 4*a^2*b*c \\
& ^5*e*f*g*h + 4*a*b^2*c^5*d*e*f*j - 4*a^6*b*c*j*k*1*m - 4*a*b^6*c*d*f*k*m - \\
& 4*a*b*c^6*d*e*f*g - 16*a^4*b^2*c^2*e*j*k*m + 4*a^4*b^2*c^2*f*j*k*1 + 4*a^4* \\
& b^2*c^2*d*j*1*m + 12*a^4*b^2*c^2*f*h*k*m + 4*a^4*b^2*c^2*g*h*j*m + 4*a^4*b^ \\
& 2*c^2*e*h*1*m - 4*a^3*b^3*c^2*d*j*k*1 + 20*a^3*b^3*c^2*e*g*k*m - 16*a^3*b^3 \\
& *c^2*d*h*k*m - 4*a^3*b^3*c^2*f*h*j*1 - 4*a^3*b^3*c^2*e*h*j*m - 40*a^3*b^2*c \\
& ^3*d*f*k*m + 24*a^2*b^4*c^2*d*f*k*m - 16*a^3*b^2*c^3*d*h*j*1 + 12*a^3*b^2*c \\
& ^3*e*g*j*1 + 4*a^3*b^2*c^3*e*h*j*k + 4*a^3*b^2*c^3*e*f*j*m + 4*a^3*b^2*c^3* \\
& d*g*k*1 - 4*a^2*b^4*c^2*e*g*j*1 + 4*a^2*b^4*c^2*d*h*j*1 - 16*a^3*b^2*c^3*e* \\
& g*h*m + 4*a^3*b^2*c^3*f*g*h*1 + 4*a^2*b^4*c^2*e*g*h*m + 20*a^2*b^3*c^3*d*f* \\
& j*1 - 16*a^2*b^3*c^3*d*f*h*m - 4*a^2*b^3*c^3*e*g*h*k - 4*a^2*b^3*c^3*e*f*g* \\
& m - 4*a^2*b^3*c^3*d*g*h*1 - 16*a^2*b^2*c^4*d*d*f*g*1 + 12*a^2*b^2*c^4*d*f*h*k \\
& + 4*a^2*b^2*c^4*e*f*g*k + 4*a^2*b^2*c^4*d*d*g*h*j + 4*a^2*b^2*c^4*d*e*h*1 + \\
& 4*a^2*b^2*c^4*d*e*g*m + 2*a^5*b^2*c*j^2*k*m - 4*a^5*b^2*c*h*k^2*m - 2*a^5*b \\
& *c^2*h^2*k*m + 2*a^4*b^3*c*h^2*k*m + 2*a^5*b^2*c*h*k*1^2 + 2*a^5*b^2*c*f*1^ \\
& 2*m - 2*a^5*b*c^2*h*j^2*m + 2*a^3*b^4*c*g^2*k*m + 14*a^4*b*c^3*f^2*k*m - 10 \\
& *a^5*b*c^2*f*k^2*m - 8*a^5*b^2*c*g*j*m^2 - 8*a^5*b^2*c*e*1*m^2 + 4*a^5*b^2* \\
& c*f*k*m^2 + 4*a^4*b^3*c*f*k^2*m - 2*a^5*b*c^2*g*k^2*1 + 2*a^2*b^5*c*f^2*k*m \\
& + 6*a^5*b*c^2*f*k*1^2 + 6*a^5*b*c^2*d*1^2*m - 2*a^5*b*c^2*g*j*1^2 + 2*a^4* \\
& b^3*c*g*j*1^2 - 2*a^4*b^3*c*f*k*1^2 - 2*a^4*b^3*c*d*1^2*m - 2*a^4*b*c^3*g^2 \\
& *j*1 - 14*a*b^5*c^2*d^2*k*m - 10*a^5*b*c^2*e*j*m^2 + 10*a^4*b^3*c*e*j*m^2 - \\
& 10*a^3*b*c^4*d^2*k*m - 6*a^4*b^3*c*d*k*m^2 + 6*a^4*b*c^3*g^2*h*m - 4*a^3*b \\
& ^4*c*d*k^2*m - 2*a^5*b*c^2*d*k*m^2 + 14*a^5*b*c^2*f*h*m^2 + 14*a^3*b*c^4*e^ \\
& 2*j*1 - 10*a^4*b^3*c*f*h*m^2 - 10*a^4*b*c^3*f*h^2*m - 10*a^4*b*c^3*e*j^2*1 \\
& - 2*a^4*b*c^3*g*h^2*1 - 2*a^4*b*c^3*f*j^2*k - 2*a^4*b*c^3*d*j^2*m - 2*a^3*b \\
& ^4*c*e*j*1^2 + 2*a^3*b^4*c*d*k*1^2 + 2*a*b^5*c^2*e^2*j*1 - 12*a*b^4*c^3*d^2 \\
& *j*1 - 10*a^3*b*c^4*e^2*h*m + 6*a^4*b*c^3*e*j*k^2 + 2*a^3*b^4*c*f*h*1^2 - 2 \\
& *a*b^5*c^2*e^2*h*m - 12*a^3*b^4*c*e*g*m^2 + 12*a^3*b^4*c*d*h*m^2 + 12*a*b^4 \\
& *c^3*d^2*h*m + 6*a^3*b*c^4*f^2*g*1 - 2*a^4*b*c^3*f*h*k^2 - 2*a^3*b*c^4*f^2* \\
& h*k + 14*a^4*b*c^3*e*g*1^2 - 10*a^4*b*c^3*d*h*1^2 - 10*a^3*b*c^4*e*g^2*1 - \\
& 2*a^3*b*c^4*f*g^2*k - 2*a^3*b*c^4*d*g^2*m + 2*a^2*b^5*c*e*g*1^2 - 2*a^2*b^5 \\
& *c*d*h*1^2 + 2*a*b^4*c^3*e^2*h*k - 2*a*b^4*c^3*e^2*g*1 + 2*a*b^4*c^3*e^2*f* \\
& m - 14*a^2*b^5*c*d*f*m^2 + 14*a^2*b*c^5*d^2*h*k - 10*a^4*b*c^3*d*f*m^2 - 10 \\
& *a^3*b*c^4*d*h^2*k - 10*a^2*b*c^5*d^2*g*1 - 10*a*b^3*c^4*d^2*h*k + 10*a*b^3 \\
& *c^4*d^2*g*1 - 6*a*b^3*c^4*d^2*f*m - 4*a*b^4*c^3*d*f^2*m - 2*a^3*b*c^4*e*h^ \\
& 2*j - 2*a^2*b*c^5*d^2*f*m + 6*a^3*b*c^4*d*h*j^2 + 6*a^2*b*c^5*e^2*f*k + 6*a \\
& ^2*b*c^5*d*e^2*m - 2*a^3*b*c^4*e*g*j^2 - 2*a^2*b*c^5*e^2*g*j + 2*a*b^3*c^4* \\
& e^2*g*j - 2*a*b^3*c^4*e^2*f*k - 2*a*b^3*c^4*d*e^2*m + 14*a^3*b*c^4*d*f*k^2
\end{aligned}$$

$$\begin{aligned}
& - 10a^2b^2c^5d^2f^2k - 8a^2b^2c^5d^2g^2j - 8a^2b^2c^5d^2e^2l + 4a^2b^2c^4d^2f^2k + 4a^2b^2c^5d^2f^2k - 2a^2b^2c^5e^2f^2j + 2a^2b^5c^2d^2f^2k^2 + 2a^2b^4c^3d^2f^2j^2 + 2a^2b^2c^5d^2e^2k - 2a^2b^2c^5d^2g^2h + 2a^2b^2c^5e^2f^2h - 4a^2b^2c^5d^2f^2h - 2a^2b^2c^5d^2f^2h^2 + 2a^2b^3c^4d^2f^2h^2 + 2a^2b^2c^5d^2f^2g^2 + 8a^6c^2h^2j^2l^2m - 8a^6c^2g^2k^2l^2m - 8a^5c^3f^2j^2k^2l + 8a^5c^3e^2j^2k^2m - 8a^5c^3d^2j^2l^2m + 8a^5c^3g^2h^2k^2l - 8a^5c^3g^2h^2j^2m - 8a^5c^3f^2h^2k^2m + 8a^5c^3f^2g^2l^2m - 8a^5c^3e^2h^2l^2m - 2a^6b^2c^2h^2l^2m + 8a^4c^4f^2g^2j^2k - 8a^4c^4e^2h^2j^2k - 8a^4c^4e^2g^2j^2l + 8a^4c^4e^2f^2k^2l - 8a^4c^4e^2f^2j^2m + 8a^4c^4d^2h^2j^2l - 8a^4c^4d^2g^2k^2l + 8a^4c^4d^2g^2j^2m + 8a^4c^4d^2f^2k^2m + 8a^4c^4d^2e^2l^2m + 6a^6b^2c^2g^2l^2m^2 - 2a^6b^2c^2h^2k^2m^2 - 8a^4c^4f^2g^2h^2l + 8a^4c^4e^2g^2h^2m + 2a^2b^6c^2e^2k^2m + 8a^3c^5d^2e^2j^2k + 8a^3c^5e^2f^2h^2j - 8a^3c^5e^2f^2g^2k - 8a^3c^5d^2g^2h^2j - 8a^3c^5d^2f^2h^2k + 8a^3c^5d^2f^2g^2l - 8a^3c^5d^2e^2h^2l - 8a^3c^5d^2e^2g^2m - 8a^2c^6d^2e^2f^2j + 8a^2c^6d^2e^2g^2h + 2a^2b^6c^2d^2f^2l^2 + 6a^2b^2c^6d^2e^2j - 2a^2b^2c^6d^2f^2h - 2a^2b^2c^6d^2e^2h - 8a^4b^2c^2g^2k^2m - 10a^3b^3c^2f^2k^2m + 2a^4b^2c^2h^2j^2l + 18a^3b^2c^3e^2k^2m - 12a^2b^4c^2e^2k^2m - 4a^4b^2c^2g^2j^2l + 2a^3b^3c^2g^2j^2l + 28a^2b^3c^3d^2k^2m + 14a^4b^2c^2d^2k^2m - 8a^3b^2c^3f^2j^2l + 2a^4b^2c^2g^2j^2k^2 + 2a^4b^2c^2e^2k^2l - 2a^3b^3c^2g^2h^2m + 2a^2b^4c^2f^2j^2l - 10a^2b^3c^3e^2j^2l - 8a^4b^2c^2d^2k^2l^2 + 4a^4b^2c^2e^2j^2l^2 + 4a^3b^3c^2f^2h^2m + 4a^3b^3c^2e^2j^2l + 4a^3b^2c^3f^2h^2m - 2a^2b^4c^2f^2h^2m + 18a^2b^2c^4d^2j^2l + 10a^2b^3c^3e^2h^2m - 8a^4b^2c^2f^2h^2l^2 - 2a^3b^3c^2e^2j^2k^2 + 2a^3b^2c^3g^2h^2k + 2a^3b^2c^3f^2g^2m - 22a^4b^2c^2d^2h^2m^2 - 22a^2b^2c^4d^2h^2m + 18a^4b^2c^2e^2g^2m^2 + 16a^3b^2c^3d^2h^2m - 4a^3b^2c^3f^2h^2k - 4a^2b^4c^2d^2h^2m + 2a^3b^3c^2f^2h^2k^2 + 2a^3b^2c^3d^2j^2k + 2a^2b^3c^3f^2h^2k - 2a^2b^3c^3f^2g^2l - 10a^3b^3c^2e^2g^2l^2 + 10a^3b^3c^2d^2h^2l^2 - 8a^2b^2c^4e^2h^2k - 8a^2b^2c^4e^2f^2m + 4a^2b^3c^3e^2g^2l + 4a^2b^2c^4e^2g^2l + 2a^3b^2c^3f^2h^2j^2 + 28a^3b^3c^2d^2f^2m^2 + 14a^2b^2c^4d^2f^2m - 8a^3b^2c^3e^2g^2k^2 + 4a^3b^2c^3d^2h^2k^2 + 4a^2b^3c^3d^2h^2k + 2a^2b^4c^2e^2g^2k^2 - 2a^2b^4c^2d^2h^2k^2 + 2a^2b^2c^4f^2g^2j + 2a^2b^2c^4e^2f^2l + 18a^3b^2c^3d^2f^2l^2 - 12a^2b^4c^2d^2f^2l^2 - 4a^2b^2c^4e^2g^2j + 2a^2b^3c^3e^2g^2j^2 - 2a^2b^3c^3d^2h^2j^2 - 10a^2b^3c^3d^2f^2k^2 - 8a^2b^2c^4d^2f^2j^2 + 2a^2b^2c^4e^2g^2h^2 + 4a^5b^2c^2h^2m^2 - 2a^4b^2c^2h^3m - 5a^5b^2c^2g^2m^2 + 5a^4b^3c^2g^2m^2 + 3a^5b^2c^2h^2l^2 + 6a^3b^4c^2f^2m^2 - 2a^3b^2c^3g^2l + 2a^2b^3c^3f^2l^2 + 7a^4b^2c^3e^2m^2 + 7a^2b^5c^2e^2m^2 - 5a^4b^2c^3f^2l^2 + 3a^4b^2c^3g^2k^2 - 2a^4b^2c^2f^2k^3 - 2a^2b^2c^4f^2k^3 + 7a^3b^2c^4d^2l^2 + 7a^2b^5c^2d^2l^2 - 5a^3b^2c^4e^2k^2 + 3a^3b^2c^4f^2j^2 + 6a^2b^4c^3d^2k^2 + 2a^3b^3c^2d^2k^3 - 2a^3b^2c^3e^2j^3 - 5a^2b^2c^5d^2j^2 + 5a^2b^3c^4d^2j^2 + 3a^2b^2c^5e^2h^2 + 4a^2b^2c^5d^2h^2 - 2a^2b^2c^4d^2h^3 - 4a^6c^2j^2k^2m + 2a^6b^2j^2l^2m^2 + 4a^6c^2j^2k^2l + 4a^6c^2h^2k^2m - 4a^6c^2h^2k^2l^2 - 4a^6c^2f^2l^2m + 4a^5c^3g^2k^2m + 2a^5b^3h^2k^2m^2 - 2a^5b^3g^2l^2m^2 + 4a^6c
\end{aligned}$$

$$\begin{aligned}
& ^2g*j*m^2 + 4*a^6*c^2*f*k*m^2 + 4*a^6*c^2*e*1*m^2 - 4*a^5*c^3*h^2*j*1 + 4* \\
& a^5*c^3*h*j^2*k + 4*a^5*c^3*g*j^2*1 + 4*a^5*c^3*f*j^2*m - 4*a^4*c^4*e^2*k*m \\
& + 2*a^4*b^4*g*j*m^2 - 2*a^4*b^4*f*k*m^2 + 2*a^4*b^4*e*1*m^2 - 4*a^5*c^3*g* \\
& j*k^2 - 4*a^5*c^3*e*k^2*1 - 4*a^5*c^3*d*k^2*m + 4*a^4*c^4*f^2*j*1 + 4*a^5*c \\
& ^3*e*j*1^2 + 4*a^5*c^3*d*k*1^2 + 4*a^4*c^4*f^2*h*m + 2*b^6*c^2*d^2*j*1 - 2* \\
& a^3*b^5*e*j*m^2 + 2*a^3*b^5*d*k*m^2 + 4*a^5*c^3*f*h*1^2 - 4*a^4*c^4*g^2*h*k \\
& - 4*a^4*c^4*f*g^2*m - 4*a^3*c^5*d^2*j*1 - 2*b^6*c^2*d^2*h*m + 2*a^3*b^5*f* \\
& h*m^2 + 12*a^5*c^3*d*h*m^2 - 12*a^4*c^4*d*h^2*m + 12*a^3*c^5*d^2*h*m - 4*a^ \\
& 5*c^3*e*g*m^2 + 4*a^4*c^4*g*h^2*j + 4*a^4*c^4*f*h^2*k + 4*a^4*c^4*e*h^2*1 - \\
& 4*a^4*c^4*d*j^2*k + 3*a^6*b*c*j^2*m^2 - 4*a^4*c^4*f*h*j^2 + 4*a^3*c^5*e^2* \\
& h*k + 4*a^3*c^5*e^2*g*1 + 4*a^3*c^5*e^2*f*m + 2*b^5*c^3*d^2*h*k - 2*b^5*c^3 \\
& *d^2*g*1 + 2*b^5*c^3*d^2*f*m + 2*a^5*b*c^2*j^3*1 + 2*a^2*b^6*e*g*m^2 - 2*a^ \\
& 2*b^6*d*h*m^2 + 4*a^4*c^4*e*g*k^2 + 4*a^4*c^4*d*h*k^2 - 4*a^3*c^5*f^2*g*j - \\
& 4*a^3*c^5*e*f^2*1 - 4*a^3*c^5*d*f^2*m - 4*a^4*c^4*d*f*1^2 + 4*a^3*c^5*e*g^ \\
& 2*j + 4*a^3*c^5*d*g^2*k + 2*b^4*c^4*d^2*g*j - 2*b^4*c^4*d^2*f*k + 2*b^4*c^4 \\
& *d^2*e*1 - 6*a^3*b*c^4*f^3*m + 4*a^3*c^5*f*g^2*h + 4*a^2*c^6*d^2*g*j + 4*a^ \\
& 2*c^6*d^2*f*k + 4*a^2*c^6*d^2*e*1 - 2*a^5*b^2*c*g*1^3 + 2*a^5*b*c^2*h*k^3 + \\
& 2*a^4*b*c^3*h^3*k - 4*a^3*c^5*e*g*h^2 + 4*a^3*c^5*d*f*j^2 - 4*a^2*c^6*d*e^ \\
& 2*k - 2*b^3*c^5*d^2*e*j + 8*a^5*b^2*c*d*m^3 + 8*a*b^6*c*d^2*m^2 + 8*a*b^2*c \\
& ^5*d^3*m - 6*a^5*b*c^2*e*1^3 - 6*a^2*b*c^5*e^3*1 - 4*a^2*c^6*e^2*f*h + 2*b^ \\
& 3*c^5*d^2*f*h + 2*a^4*b^3*c*e*1^3 + 2*a^4*b*c^3*g*j^3 + 2*a^3*b*c^4*g^3*j + \\
& 2*a*b^3*c^4*e^3*1 + 4*a^2*c^6*e*f^2*g + 4*a^2*c^6*d*f^2*h - 6*a^4*b*c^3*d* \\
& k^3 - 4*a^2*c^6*d*f*g^2 + 2*b^2*c^6*d^2*e*g - 2*a*b^2*c^5*e^3*j + 2*a^3*b*c \\
& ^4*f*h^3 + 2*a^2*b*c^5*f^3*h + 2*a^2*b*c^5*e*g^3 + 3*a*b*c^6*d^2*g^2 - 9*a^ \\
& 4*b^2*c^2*f^2*m^2 + 4*a^4*b^2*c^2*g^2*1^2 - 14*a^3*b^3*c^2*e^2*m^2 + 5*a^3*b \\
& ^3*c^2*f^2*1^2 - 20*a^2*b^4*c^2*d^2*m^2 + 16*a^3*b^2*c^3*d^2*m^2 - 9*a^3*b \\
& ^2*c^3*e^2*1^2 + 6*a^2*b^4*c^2*e^2*1^2 + 4*a^3*b^2*c^3*f^2*k^2 - 14*a^2*b^3 \\
& *c^3*d^2*1^2 + 5*a^2*b^3*c^3*e^2*k^2 - 9*a^2*b^2*c^4*d^2*k^2 + 4*a^2*b^2*c^ \\
& 4*e^2*j^2 + 4*a^7*c*k*1^2*m - 4*a^7*c*j*1*m^2 + 2*b^7*c*d^2*k*m + 2*a^6*b*c \\
& *k^3*m + 2*a^6*b*c*j*1^3 + 2*a*b^7*d*f*m^2 - 6*a^6*b*c*f*m^3 - 6*a*b*c^6*d^ \\
& 3*k - 4*a*c^7*d^2*e*g + 4*a*c^7*d*e^2*f + 2*a*b*c^6*e^3*g + 2*a*b*c^6*d*f^3 \\
& - a^5*b^2*c*j^2*1^2 - a^5*b*c^2*j^2*k^2 - a^4*b^3*c*h^2*1^2 - a^3*b^4*c*g^ \\
& 2*1^2 - a^4*b*c^3*h^2*j^2 - a^2*b^5*c*f^2*1^2 - a*b^5*c^2*e^2*k^2 - a^3*b*c \\
& ^4*g^2*h^2 - a*b^4*c^3*e^2*j^2 - a^2*b*c^5*f^2*g^2 - a*b^3*c^4*e^2*h^2 - a* \\
& b^2*c^5*e^2*g^2 + 2*a^7*b*k*m^3 + 4*a^7*c*h*m^3 + 4*a*c^7*d^3*h + 2*b*c^7*d \\
& ^3*f - a^6*b*c*k^2*1^2 - 2*a^6*c^2*j^2*1^2 - 6*a^6*c^2*h^2*m^2 - a*b^6*c*e^ \\
& 2*1^2 - 6*a^5*c^3*g^2*1^2 - 2*a^5*c^3*h^2*k^2 - 2*a^5*c^3*f^2*m^2 - 6*a^4*c \\
& ^4*f^2*k^2 - 6*a^4*c^4*d^2*m^2 - 2*a^4*c^4*g^2*j^2 - 2*a^4*c^4*e^2*1^2 - 6* \\
& a^3*c^5*e^2*j^2 - 2*a^3*c^5*d^2*k^2 - 2*a^3*c^5*f^2*h^2 - a*b*c^6*e^2*f^2 - \\
& 6*a^2*c^6*d^2*h^2 - 2*a^2*c^6*e^2*g^2 - a^4*b^2*c^2*h^2*k^2 - a^3*b^3*c^2* \\
& g^2*k^2 - a^3*b^2*c^3*g^2*j^2 - a^2*b^4*c^2*f^2*k^2 - a^2*b^3*c^3*f^2*j^2 - \\
& a^2*b^2*c^4*f^2*h^2 - 2*a^7*c*k^2*m^2 + 4*a^5*c^3*h^3*m - 2*a^6*b^2*h*m^3 \\
& + 4*a^6*c^2*g*1^3 + 4*a^4*c^4*g^3*1 - 2*b^4*c^4*d^3*m + 2*a^5*b^3*f*m^3 - 4 \\
& *a^6*c^2*d*m^3 + 4*a^5*c^3*f*k^3 + 4*a^3*c^5*f^3*k - 4*a^2*c^6*d^3*m + 2*b^ \\
& 3*c^5*d^3*k - 2*a^4*b^4*d*m^3 + 4*a^4*c^4*e*j^3 + 4*a^2*c^6*e^3*j - 2*b^2*c
\end{aligned}$$

$$\begin{aligned}
& ^6d^3h + 4a^3c^5d^2h^3 - 2ac^7d^2f^2 - a^6b^2k^2m^2 - a^5b^3j^2m^2 \\
& - a^4b^4h^2m^2 - a^3b^5g^2m^2 - a^2b^6f^2m^2 - b^6c^2d^2k^2 \\
& - b^5c^3d^2j^2 - b^4c^4d^2h^2 - b^3c^5d^2g^2 - b^2c^6d^2f^2 \\
& - a^7b^1^2m^2 - b^7c^2d^2l^2 - ab^7e^2m^2 - bc^7d^2e^2 - b^8d^2m^2 \\
& - a^6c^2k^4 - a^5c^3j^4 - a^4c^4h^4 - a^3c^5g^4 - a^2c^6f^4 - \\
& a^7c^1^4 - ac^7e^4 - a^8m^4 - c^8d^4, z, k1), k1, 1, 4) + (1*x^4)/(4*c \\
& ) + (m*x^5)/(5*c)
\end{aligned}$$



### 3.26 $\int \frac{d+ex}{(4-5x^2+x^4)^2} dx$

Optimal result	257
Rubi [A] (verified)	257
Mathematica [A] (verified)	260
Maple [A] (verified)	260
Fricas [B] (verification not implemented)	261
Sympy [B] (verification not implemented)	261
Maxima [A] (verification not implemented)	262
Giac [A] (verification not implemented)	263
Mupad [B] (verification not implemented)	263

#### Optimal result

Integrand size = 18, antiderivative size = 94

$$\int \frac{d+ex}{(4-5x^2+x^4)^2} dx = \frac{dx(17-5x^2)}{72(4-5x^2+x^4)} + \frac{e(5-2x^2)}{18(4-5x^2+x^4)} + \frac{19}{432} \operatorname{darctanh}\left(\frac{x}{2}\right) - \frac{1}{54} \operatorname{darctanh}(x) + \frac{1}{27} e \log(1-x^2) - \frac{1}{27} e \log(4-x^2)$$

[Out] 1/72\*d\*x\*(-5\*x^2+17)/(x^4-5\*x^2+4)+1/18\*e\*(-2\*x^2+5)/(x^4-5\*x^2+4)+19/432\*d\*arctanh(1/2\*x)-1/54\*d\*arctanh(x)+1/27\*e\*ln(-x^2+1)-1/27\*e\*ln(-x^2+4)

#### Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 94, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.500$ , Rules used = {1687, 12, 1106, 1180, 213, 1121, 628, 630, 31}

$$\int \frac{d+ex}{(4-5x^2+x^4)^2} dx = \frac{19}{432} \operatorname{darctanh}\left(\frac{x}{2}\right) - \frac{1}{54} \operatorname{darctanh}(x) + \frac{dx(17-5x^2)}{72(x^4-5x^2+4)} + \frac{1}{27} e \log(1-x^2) - \frac{1}{27} e \log(4-x^2) + \frac{e(5-2x^2)}{18(x^4-5x^2+4)}$$

[In] Int[(d + e\*x)/(4 - 5\*x^2 + x^4)^2,x]

[Out] (d\*x\*(17 - 5\*x^2))/(72\*(4 - 5\*x^2 + x^4)) + (e\*(5 - 2\*x^2))/(18\*(4 - 5\*x^2 + x^4)) + (19\*d\*ArcTanh[x/2])/432 - (d\*ArcTanh[x])/54 + (e\*Log[1 - x^2])/27 - (e\*Log[4 - x^2])/27

Rule 12

`Int[(a_)*(u_), x_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b_)*(v_)] /; FreeQ[b, x]`

### Rule 31

`Int[((a_) + (b_.)*(x_))^-1, x_Symbol] := Simp[Log[RemoveContent[a + b*x, x]]/b, x] /; FreeQ[{a, b}, x]`

### Rule 213

`Int[((a_) + (b_.)*(x_)^2)^-1, x_Symbol] := Simp[(-Rt[-a, 2]*Rt[b, 2])^-1)*ArcTanh[Rt[b, 2]*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a, 0] || GtQ[b, 0])`

### Rule 628

`Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := Simp[(b + 2*c*x)*((a + b*x + c*x^2)^(p + 1)/((p + 1)*(b^2 - 4*a*c))), x] - Dist[2*c*((2*p + 3)/((p + 1)*(b^2 - 4*a*c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4*p]`

### Rule 630

`Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^-1, x_Symbol] := With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[c/q, Int[1/Simp[b/2 - q/2 + c*x, x], x], x] - Dist[c/q, Int[1/Simp[b/2 + q/2 + c*x, x], x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && PosQ[b^2 - 4*a*c] && PerfectSquareQ[b^2 - 4*a*c]`

### Rule 1106

`Int[((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Simp[(-x)*(b^2 - 2*a*c + b*c*x^2)*((a + b*x^2 + c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(b^2 - 2*a*c + 2*(p + 1)*(b^2 - 4*a*c) + b*c*(4*p + 7)*x^2)*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && IntegerQ[2*p]`

### Rule 1121

`Int[(x_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol] := Dist[1/2, Subst[Int[(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]`

### Rule 1180

`Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] := With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2`

- q/2 + c\*x^2), x], x] + Dist[e/2 - (2\*c\*d - b\*e)/(2\*q), Int[1/(b/2 + q/2 + c\*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - a\*e^2, 0] && PosQ[b^2 - 4\*a\*c]

### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] :> Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d}{(4 - 5x^2 + x^4)^2} dx + \int \frac{ex}{(4 - 5x^2 + x^4)^2} dx \\
 &= d \int \frac{1}{(4 - 5x^2 + x^4)^2} dx + e \int \frac{x}{(4 - 5x^2 + x^4)^2} dx \\
 &= \frac{dx(17 - 5x^2)}{72(4 - 5x^2 + x^4)} - \frac{1}{72}d \int \frac{-1 + 5x^2}{4 - 5x^2 + x^4} dx + \frac{1}{2}e \text{Subst}\left(\int \frac{1}{(4 - 5x + x^2)^2} dx, x, x^2\right) \\
 &= \frac{dx(17 - 5x^2)}{72(4 - 5x^2 + x^4)} + \frac{e(5 - 2x^2)}{18(4 - 5x^2 + x^4)} + \frac{1}{54}d \int \frac{1}{-1 + x^2} dx \\
 &\quad - \frac{1}{216}(19d) \int \frac{1}{-4 + x^2} dx - \frac{1}{9}e \text{Subst}\left(\int \frac{1}{4 - 5x + x^2} dx, x, x^2\right) \\
 &= \frac{dx(17 - 5x^2)}{72(4 - 5x^2 + x^4)} + \frac{e(5 - 2x^2)}{18(4 - 5x^2 + x^4)} + \frac{19}{432}d \tanh^{-1}\left(\frac{x}{2}\right) - \frac{1}{54}d \tanh^{-1}(x) \\
 &\quad - \frac{1}{27}e \text{Subst}\left(\int \frac{1}{-4 + x} dx, x, x^2\right) + \frac{1}{27}e \text{Subst}\left(\int \frac{1}{-1 + x} dx, x, x^2\right) \\
 &= \frac{dx(17 - 5x^2)}{72(4 - 5x^2 + x^4)} + \frac{e(5 - 2x^2)}{18(4 - 5x^2 + x^4)} + \frac{19}{432}d \tanh^{-1}\left(\frac{x}{2}\right) \\
 &\quad - \frac{1}{54}d \tanh^{-1}(x) + \frac{1}{27}e \log(1 - x^2) - \frac{1}{27}e \log(4 - x^2)
 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.96

$$\int \frac{d + ex}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{864} \left( \frac{12(e(20 - 8x^2) + dx(17 - 5x^2))}{4 - 5x^2 + x^4} + 8(d + 4e) \log(1 - x) - (19d + 32e) \log(2 - x) - 8(d - 4e) \log(1 + x) + (19d - 32e) \log(2 + x) \right)$$

`[In] Integrate[(d + e*x)/(4 - 5*x^2 + x^4)^2,x]`

```
[Out] ((12*(e*(20 - 8*x^2) + d*x*(17 - 5*x^2)))/(4 - 5*x^2 + x^4) + 8*(d + 4*e)*Log[1 - x] - (19*d + 32*e)*Log[2 - x] - 8*(d - 4*e)*Log[1 + x] + (19*d - 32*e)*Log[2 + x])/864
```

**Maple [A] (verified)**

Time = 0.08 (sec) , antiderivative size = 83, normalized size of antiderivative = 0.88

method	result
norman	$-\frac{1}{9}e x^2 + \frac{17}{72}dx - \frac{5}{72}x^3d + \frac{5}{18}e + \left(-\frac{19d}{864} - \frac{e}{27}\right) \ln(x - 2) + \left(-\frac{d}{108} + \frac{e}{27}\right) \ln(x + 1) + \left(\frac{d}{108} + \frac{e}{27}\right) \ln(x - 2)$
risch	$-\frac{1}{9}e x^2 + \frac{17}{72}dx - \frac{5}{72}x^3d + \frac{5}{18}e - \frac{\ln(x+1)d}{108} + \frac{\ln(x+1)e}{27} + \frac{\ln(1-x)d}{108} + \frac{\ln(1-x)e}{27} - \frac{19 \ln(2-x)d}{864} - \frac{\ln(2-x)e}{27} + \frac{19 \ln(x-2)d}{864} + \frac{\ln(x-2)e}{27}$
default	$-\frac{\frac{d}{144} - \frac{e}{72}}{x+2} + \left(\frac{19d}{864} - \frac{e}{27}\right) \ln(x + 2) + \left(-\frac{d}{108} + \frac{e}{27}\right) \ln(x + 1) - \frac{\frac{d}{36} - \frac{e}{36}}{x+1} - \frac{\frac{d}{36} + \frac{e}{36}}{x-1} + \left(\frac{d}{108} + \frac{e}{27}\right) \ln(x - 2)$
parallelrisc	$-\frac{-240e - 204dx + 76 \ln(x-2)d + 128 \ln(x-2)e - 32 \ln(x-1)d - 128 \ln(x-1)e + 32 \ln(x-2)x^4e + 96e x^2 - 160 \ln(x-2)x^2e + 40 \ln(x-2)e}{864}$

`[In] int((e*x+d)/(x^4-5*x^2+4)^2,x,method=_RETURNVERBOSE)`

```
[Out] (-1/9*e*x^2+17/72*d*x-5/72*x^3*d+5/18*e)/(x^4-5*x^2+4)+(-19/864*d-1/27*e)*ln(x-2)+(-1/108*d+1/27*e)*ln(x+1)+(1/108*d+1/27*e)*ln(x-1)+(19/864*d-1/27*e)*ln(x+2)
```

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 169 vs. 2(80) = 160.

Time = 0.28 (sec) , antiderivative size = 169, normalized size of antiderivative = 1.80

$$\int \frac{d + ex}{(4 - 5x^2 + x^4)^2} dx = \frac{60 dx^3 + 96 ex^2 - 204 dx - ((19d - 32e)x^4 - 5(19d - 32e)x^2 + 76d - 128e) \log(x + 2) + 8((d - 4e) \log(x + 1) - 8((d + 4e)x^4 - 5(d + 4e)x^2 + 4d + 16e) \log(x - 1) + ((19d + 32e)x^4 - 5(19d + 32e)x^2 + 76d + 128e) \log(x - 2) - 240e)}{(x^4 - 5x^2 + 4)^2}$$

[In] integrate((e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out] -1/864\*(60\*d\*x^3 + 96\*e\*x^2 - 204\*d\*x - ((19\*d - 32\*e)\*x^4 - 5\*(19\*d - 32\*e)\*x^2 + 76\*d - 128\*e)\*log(x + 2) + 8\*((d - 4\*e)\*x^4 - 5\*(d - 4\*e)\*x^2 + 4\*d - 16\*e)\*log(x + 1) - 8\*((d + 4\*e)\*x^4 - 5\*(d + 4\*e)\*x^2 + 4\*d + 16\*e)\*log(x - 1) + ((19\*d + 32\*e)\*x^4 - 5\*(19\*d + 32\*e)\*x^2 + 76\*d + 128\*e)\*log(x - 2) - 240\*e)/(x^4 - 5\*x^2 + 4)

**Sympy [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 604 vs. 2(78) = 156.

Time = 2.04 (sec) , antiderivative size = 604, normalized size of antiderivative = 6.43

$$\int \frac{d + ex}{(4 - 5x^2 + x^4)^2} dx = \frac{(d - 4e) \log\left(x + \frac{-6006260d^4e + 2341251d^4(d - 4e) - 18247680d^2e^3 + 24099840d^2e^2(d - 4e) + 7387904d^2e(d - 4e)^2 - 665280d^2(d - 4e)^3 + 51675971d^5 - 66150400d^3e^2 + 318767104de^4}{1675971d^5 - 66150400d^3e^2 + 318767104de^4}\right) + (d + 4e) \log\left(x + \frac{-6006260d^4e - 2341251d^4(d + 4e) - 18247680d^2e^3 - 24099840d^2e^2(d + 4e) + 7387904d^2e(d + 4e)^2 + 665280d^2(d + 4e)^3 + 51675971d^5 - 66150400d^3e^2 + 318767104de^4}{1675971d^5 - 66150400d^3e^2 + 318767104de^4}\right) + (19d - 32e) \log\left(x + \frac{-6006260d^4e - \frac{2341251d^4 \cdot (19d - 32e)}{8} - 18247680d^2e^3 - 3012480d^2e^2 \cdot (19d - 32e) + 115436d^2e(19d - 32e)^2 + \frac{10395d^2 \cdot (19d - 32e)^3}{8}}{1675971d^5 - 66150400d^3e^2 + 318767104de^4}\right) + (19d + 32e) \log\left(x + \frac{-6006260d^4e + \frac{2341251d^4 \cdot (19d + 32e)}{8} - 18247680d^2e^3 + 3012480d^2e^2 \cdot (19d + 32e) + 115436d^2e(19d + 32e)^2 - \frac{10395d^2 \cdot (19d + 32e)^3}{8}}{1675971d^5 - 66150400d^3e^2 + 318767104de^4}\right)}{864} + \frac{-5dx^3 + 17dx - 8ex^2 + 20e}{72x^4 - 360x^2 + 288}$$

[In] integrate((e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] -(d - 4\*e)\*log(x + (-6006260\*d\*\*4\*e + 2341251\*d\*\*4\*(d - 4\*e) - 18247680\*d\*\*2\*e\*\*3 + 24099840\*d\*\*2\*e\*\*2\*(d - 4\*e) + 7387904\*d\*\*2\*e\*(d - 4\*e)\*\*2 - 665280\*d\*\*2\*(d - 4\*e)\*\*3 + 587202560\*e\*\*5 - 12582912\*e\*\*4\*(d - 4\*e) - 36700160\*e

```

**3*(d - 4*e)**2 + 786432*e**2*(d - 4*e)**3)/(1675971*d**5 - 66150400*d**3*
e**2 + 318767104*d*e**4))/108 + (d + 4*e)*log(x + (-6006260*d**4*e - 234125
1*d**4*(d + 4*e) - 18247680*d**2*e**3 - 24099840*d**2*e**2*(d + 4*e) + 7387
904*d**2*e*(d + 4*e)**2 + 665280*d**2*(d + 4*e)**3 + 587202560*e**5 + 12582
912*e**4*(d + 4*e) - 36700160*e**3*(d + 4*e)**2 - 786432*e**2*(d + 4*e)**3)
/(1675971*d**5 - 66150400*d**3*e**2 + 318767104*d*e**4))/108 + (19*d - 32*e
)*log(x + (-6006260*d**4*e - 2341251*d**4*(19*d - 32*e)/8 - 18247680*d**2*e
**3 - 3012480*d**2*e**2*(19*d - 32*e) + 115436*d**2*e*(19*d - 32*e)**2 + 10
395*d**2*(19*d - 32*e)**3/8 + 587202560*e**5 + 1572864*e**4*(19*d - 32*e) -
573440*e**3*(19*d - 32*e)**2 - 1536*e**2*(19*d - 32*e)**3)/(1675971*d**5 -
66150400*d**3*e**2 + 318767104*d*e**4))/864 - (19*d + 32*e)*log(x + (-6006
260*d**4*e + 2341251*d**4*(19*d + 32*e)/8 - 18247680*d**2*e**3 + 3012480*d
**2*e**2*(19*d + 32*e) + 115436*d**2*e*(19*d + 32*e)**2 - 10395*d**2*(19*d +
32*e)**3/8 + 587202560*e**5 - 1572864*e**4*(19*d + 32*e) - 573440*e**3*(19
*d + 32*e)**2 + 1536*e**2*(19*d + 32*e)**3)/(1675971*d**5 - 66150400*d**3*e
**2 + 318767104*d*e**4))/864 + (-5*d*x**3 + 17*d*x - 8*e*x**2 + 20*e)/(72*x
**4 - 360*x**2 + 288)

```

## Maxima [A] (verification not implemented)

none

Time = 0.18 (sec) , antiderivative size = 83, normalized size of antiderivative = 0.88

$$\int \frac{d + ex}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{864} (19d - 32e) \log(x + 2) - \frac{1}{108} (d - 4e) \log(x + 1) \\
 + \frac{1}{108} (d + 4e) \log(x - 1) - \frac{1}{864} (19d + 32e) \log(x - 2) \\
 - \frac{5dx^3 + 8ex^2 - 17dx - 20e}{72(x^4 - 5x^2 + 4)}$$

```
[In] integrate((e*x+d)/(x^4-5*x^2+4)^2,x, algorithm="maxima")
```

```
[Out] 1/864*(19*d - 32*e)*log(x + 2) - 1/108*(d - 4*e)*log(x + 1) + 1/108*(d + 4*
e)*log(x - 1) - 1/864*(19*d + 32*e)*log(x - 2) - 1/72*(5*d*x^3 + 8*e*x^2 -
17*d*x - 20*e)/(x^4 - 5*x^2 + 4)
```

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 87, normalized size of antiderivative = 0.93

$$\int \frac{d + ex}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{864} (19d - 32e) \log(|x + 2|) - \frac{1}{108} (d - 4e) \log(|x + 1|) \\ + \frac{1}{108} (d + 4e) \log(|x - 1|) - \frac{1}{864} (19d + 32e) \log(|x - 2|) \\ - \frac{5dx^3 + 8ex^2 - 17dx - 20e}{72(x^4 - 5x^2 + 4)}$$

[In] integrate((e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

```
[Out] 1/864*(19*d - 32*e)*log(abs(x + 2)) - 1/108*(d - 4*e)*log(abs(x + 1)) + 1/108*(d + 4*e)*log(abs(x - 1)) - 1/864*(19*d + 32*e)*log(abs(x - 2)) - 1/72*(5*d*x^3 + 8*e*x^2 - 17*d*x - 20*e)/(x^4 - 5*x^2 + 4)
```

**Mupad [B] (verification not implemented)**

Time = 0.05 (sec) , antiderivative size = 84, normalized size of antiderivative = 0.89

$$\int \frac{d + ex}{(4 - 5x^2 + x^4)^2} dx = \ln(x - 1) \left( \frac{d}{108} + \frac{e}{27} \right) - \ln(x + 1) \left( \frac{d}{108} - \frac{e}{27} \right) \\ - \ln(x - 2) \left( \frac{19d}{864} + \frac{e}{27} \right) + \ln(x + 2) \left( \frac{19d}{864} - \frac{e}{27} \right) \\ + \frac{-\frac{5dx^3}{72} - \frac{ex^2}{9} + \frac{17dx}{72} + \frac{5e}{18}}{x^4 - 5x^2 + 4}$$

[In] int((d + e\*x)/(x^4 - 5\*x^2 + 4)^2,x)

```
[Out] log(x - 1)*(d/108 + e/27) - log(x + 1)*(d/108 - e/27) - log(x - 2)*((19*d)/864 + e/27) + log(x + 2)*((19*d)/864 - e/27) + ((5*e)/18 + (17*d*x)/72 - (5*d*x^3)/72 - (e*x^2)/9)/(x^4 - 5*x^2 + 4)
```

$$3.27 \quad \int \frac{d+ex+fx^2}{(4-5x^2+x^4)^2} dx$$

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### Optimal result

Integrand size = 23, antiderivative size = 115

$$\int \frac{d+ex+fx^2}{(4-5x^2+x^4)^2} dx = \frac{e(5-2x^2)}{18(4-5x^2+x^4)} + \frac{x(17d+20f-(5d+8f)x^2)}{72(4-5x^2+x^4)} \\ + \frac{1}{432}(19d+52f)\operatorname{arctanh}\left(\frac{x}{2}\right) - \frac{1}{54}(d+7f)\operatorname{arctanh}(x) \\ + \frac{1}{27}e \log(1-x^2) - \frac{1}{27}e \log(4-x^2)$$

[Out] 1/18\*e\*(-2\*x^2+5)/(x^4-5\*x^2+4)+1/72\*x\*(17\*d+20\*f-(5\*d+8\*f)\*x^2)/(x^4-5\*x^2+4)+1/432\*(19\*d+52\*f)\*arctanh(1/2\*x)-1/54\*(d+7\*f)\*arctanh(x)+1/27\*e\*ln(-x^2+1)-1/27\*e\*ln(-x^2+4)

### Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 115, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.391$ , Rules used = {1687, 1192, 1180, 213, 12, 1121, 628, 630, 31}

$$\int \frac{d+ex+fx^2}{(4-5x^2+x^4)^2} dx = \frac{1}{432}\operatorname{arctanh}\left(\frac{x}{2}\right)(19d+52f) - \frac{1}{54}\operatorname{arctanh}(x)(d+7f) \\ + \frac{x(-(x^2(5d+8f))+17d+20f)}{72(x^4-5x^2+4)} + \frac{1}{27}e \log(1-x^2) \\ - \frac{1}{27}e \log(4-x^2) + \frac{e(5-2x^2)}{18(x^4-5x^2+4)}$$

[In] Int[(d + e\*x + f\*x^2)/(4 - 5\*x^2 + x^4)^2,x]



[Out]  $(e*(5 - 2*x^2))/(18*(4 - 5*x^2 + x^4)) + (x*(17*d + 20*f - (5*d + 8*f)*x^2))/(72*(4 - 5*x^2 + x^4)) + ((19*d + 52*f)*\text{ArcTanh}[x/2])/432 - ((d + 7*f)*\text{ArcTanh}[x])/54 + (e*\text{Log}[1 - x^2])/27 - (e*\text{Log}[4 - x^2])/27$

#### Rule 12

$\text{Int}[(a_*)(u_), x\_Symbol] \rightarrow \text{Dist}[a, \text{Int}[u, x], x] /; \text{FreeQ}[a, x] \ \&\& \ !\text{MatchQ}[u, (b_*)(v_)] /; \text{FreeQ}[b, x]$

#### Rule 31

$\text{Int}[(a_*) + (b_*)(x_)^{-1}, x\_Symbol] \rightarrow \text{Simp}[\text{Log}[\text{RemoveContent}[a + b*x, x]]/b, x] /; \text{FreeQ}[\{a, b\}, x]$

#### Rule 213

$\text{Int}[(a_*) + (b_*)(x_)^2)^{-1}, x\_Symbol] \rightarrow \text{Simp}[(-\text{Rt}[-a, 2]*\text{Rt}[b, 2])^{-1})*\text{ArcTanh}[\text{Rt}[b, 2]*(x/\text{Rt}[-a, 2])], x] /; \text{FreeQ}[\{a, b\}, x] \ \&\& \ \text{NegQ}[a/b] \ \&\& \ (\text{LtQ}[a, 0] \ || \ \text{GtQ}[b, 0])$

#### Rule 628

$\text{Int}[(a_*) + (b_*)(x_) + (c_*)(x_)^2)^{p_}, x\_Symbol] \rightarrow \text{Simp}[(b + 2*c*x)*((a + b*x + c*x^2)^{p+1}/((p+1)*(b^2 - 4*a*c))), x] - \text{Dist}[2*c*((2*p+3)/((p+1)*(b^2 - 4*a*c))), \text{Int}[(a + b*x + c*x^2)^{p+1}, x], x] /; \text{FreeQ}[\{a, b, c\}, x] \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0] \ \&\& \ \text{LtQ}[p, -1] \ \&\& \ \text{NeQ}[p, -3/2] \ \&\& \ \text{IntegerQ}[4*p]$

#### Rule 630

$\text{Int}[(a_*) + (b_*)(x_) + (c_*)(x_)^2)^{-1}, x\_Symbol] \rightarrow \text{With}[\{q = \text{Rt}[b^2 - 4*a*c, 2]\}, \text{Dist}[c/q, \text{Int}[1/\text{Simp}[b/2 - q/2 + c*x, x], x], x] - \text{Dist}[c/q, \text{Int}[1/\text{Simp}[b/2 + q/2 + c*x, x], x], x]] /; \text{FreeQ}[\{a, b, c\}, x] \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0] \ \&\& \ \text{PosQ}[b^2 - 4*a*c] \ \&\& \ \text{PerfectSquareQ}[b^2 - 4*a*c]$

#### Rule 1121

$\text{Int}[(x_)*((a_*) + (b_*)(x_)^2 + (c_*)(x_)^4)^{p_}, x\_Symbol] \rightarrow \text{Dist}[1/2, \text{Subst}[\text{Int}[(a + b*x + c*x^2)^p, x], x, x^2], x] /; \text{FreeQ}[\{a, b, c, p\}, x]$

#### Rule 1180

$\text{Int}[(d_*) + (e_*)(x_)^2]/((a_*) + (b_*)(x_)^2 + (c_*)(x_)^4), x\_Symbol] \rightarrow \text{With}[\{q = \text{Rt}[b^2 - 4*a*c, 2]\}, \text{Dist}[e/2 + (2*c*d - b*e)/(2*q), \text{Int}[1/(b/2 - q/2 + c*x^2), x], x] + \text{Dist}[e/2 - (2*c*d - b*e)/(2*q), \text{Int}[1/(b/2 + q/2 + c*x^2), x], x]] /; \text{FreeQ}[\{a, b, c, d, e\}, x] \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0] \ \&\& \ \text{NeQ}[c*d^2 - a*e^2, 0] \ \&\& \ \text{PosQ}[b^2 - 4*a*c]$

## Rule 1192

```
Int[((d_) + (e_)*(x_)^2)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol]
:= Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 +
c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c)), x] + Dist[1/(2*a*(p + 1)*(b^2
- 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

## Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

## Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{ex}{(4 - 5x^2 + x^4)^2} dx + \int \frac{d + fx^2}{(4 - 5x^2 + x^4)^2} dx \\
&= \frac{x(17d + 20f - (5d + 8f)x^2)}{72(4 - 5x^2 + x^4)} - \frac{1}{72} \int \frac{-d + 20f + (5d + 8f)x^2}{4 - 5x^2 + x^4} dx + e \int \frac{x}{(4 - 5x^2 + x^4)^2} dx \\
&= \frac{x(17d + 20f - (5d + 8f)x^2)}{72(4 - 5x^2 + x^4)} + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{(4 - 5x + x^2)^2} dx, x, x^2 \right) \\
&\quad - \frac{1}{54} (-d - 7f) \int \frac{1}{-1 + x^2} dx - \frac{1}{216} (19d + 52f) \int \frac{1}{-4 + x^2} dx \\
&= \frac{e(5 - 2x^2)}{18(4 - 5x^2 + x^4)} + \frac{x(17d + 20f - (5d + 8f)x^2)}{72(4 - 5x^2 + x^4)} + \frac{1}{432} (19d + 52f) \tanh^{-1} \left( \frac{x}{2} \right) \\
&\quad - \frac{1}{54} (d + 7f) \tanh^{-1}(x) - \frac{1}{9} e \text{Subst} \left( \int \frac{1}{4 - 5x + x^2} dx, x, x^2 \right) \\
&= \frac{e(5 - 2x^2)}{18(4 - 5x^2 + x^4)} + \frac{x(17d + 20f - (5d + 8f)x^2)}{72(4 - 5x^2 + x^4)} \\
&\quad + \frac{1}{432} (19d + 52f) \tanh^{-1} \left( \frac{x}{2} \right) - \frac{1}{54} (d + 7f) \tanh^{-1}(x) \\
&\quad - \frac{1}{27} e \text{Subst} \left( \int \frac{1}{-4 + x} dx, x, x^2 \right) + \frac{1}{27} e \text{Subst} \left( \int \frac{1}{-1 + x} dx, x, x^2 \right) \\
&= \frac{e(5 - 2x^2)}{18(4 - 5x^2 + x^4)} + \frac{x(17d + 20f - (5d + 8f)x^2)}{72(4 - 5x^2 + x^4)} + \frac{1}{432} (19d + 52f) \tanh^{-1} \left( \frac{x}{2} \right) \\
&\quad - \frac{1}{54} (d + 7f) \tanh^{-1}(x) + \frac{1}{27} e \log(1 - x^2) - \frac{1}{27} e \log(4 - x^2)
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.05 (sec) , antiderivative size = 112, normalized size of antiderivative = 0.97

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{864} \left( \frac{12(17dx + 20fx - 5dx^3 - 8fx^3 + e(20 - 8x^2))}{4 - 5x^2 + x^4} + 8(d + 4e + 7f) \log(1 - x) - (19d + 32e + 52f) \log(2 - x) - 8(d - 4e + 7f) \log(1 + x) + (19d - 32e + 52f) \log(2 + x) \right)$$

[In] Integrate[(d + e\*x + f\*x^2)/(4 - 5\*x^2 + x^4)^2,x]

[Out] ((12\*(17\*d\*x + 20\*f\*x - 5\*d\*x^3 - 8\*f\*x^3 + e\*(20 - 8\*x^2)))/(4 - 5\*x^2 + x^4) + 8\*(d + 4\*e + 7\*f)\*Log[1 - x] - (19\*d + 32\*e + 52\*f)\*Log[2 - x] - 8\*(d - 4\*e + 7\*f)\*Log[1 + x] + (19\*d - 32\*e + 52\*f)\*Log[2 + x])/864

**Maple [A] (verified)**

Time = 0.09 (sec) , antiderivative size = 105, normalized size of antiderivative = 0.91

method	result
norman	$\frac{\left(-\frac{5d}{72} - \frac{f}{9}\right)x^3 + \left(\frac{17d}{72} + \frac{5f}{18}\right)x - \frac{e}{9} + \frac{5e}{18}}{x^4 - 5x^2 + 4} + \left(-\frac{19d}{864} - \frac{e}{27} - \frac{13f}{216}\right) \ln(x - 2) + \left(-\frac{d}{108} + \frac{e}{27} - \frac{7f}{108}\right) \ln(x + 1)$
default	$-\frac{\frac{d}{144} - \frac{e}{72} + \frac{f}{36}}{x+2} + \left(\frac{19d}{864} - \frac{e}{27} + \frac{13f}{216}\right) \ln(x + 2) + \left(-\frac{d}{108} + \frac{e}{27} - \frac{7f}{108}\right) \ln(x + 1) - \frac{\frac{d}{36} - \frac{e}{36} + \frac{f}{36}}{x+1} - \frac{\frac{d}{36} + \frac{e}{36} - \frac{f}{36}}{x-1}$
risch	$\frac{\left(-\frac{5d}{72} - \frac{f}{9}\right)x^3 + \left(\frac{17d}{72} + \frac{5f}{18}\right)x - \frac{e}{9} + \frac{5e}{18}}{x^4 - 5x^2 + 4} + \frac{19 \ln(x+2)d}{864} - \frac{\ln(x+2)e}{27} + \frac{13 \ln(x+2)f}{216} - \frac{\ln(x+1)d}{108} + \frac{\ln(x+1)e}{27} - \frac{7 \ln(x-1)d}{108} + \frac{7 \ln(x-1)e}{27} - \frac{7 \ln(x-1)f}{108}$
parallelrisch	$-\frac{-240e+96fx^3-204dx+76 \ln(x-2)d+128 \ln(x-2)e-32 \ln(x-1)d-128 \ln(x-1)e+32 \ln(x-2)x^4e-208 \ln(x+2)f+224 \ln(x-1)d}{864}$

[In] int((f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x,method=\_RETURNVERBOSE)

[Out] ((-5/72\*d-1/9\*f)\*x^3+(17/72\*d+5/18\*f)\*x-1/9\*e\*x^2+5/18\*e)/(x^4-5\*x^2+4)+(-19/864\*d-1/27\*e-13/216\*f)\*ln(x-2)+(-1/108\*d+1/27\*e-7/108\*f)\*ln(x+1)+(1/108\*d+1/27\*e+7/108\*f)\*ln(x-1)+(19/864\*d-1/27\*e+13/216\*f)\*ln(x+2)

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 217 vs. 2(100) = 200.

Time = 0.31 (sec) , antiderivative size = 217, normalized size of antiderivative = 1.89

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^2} dx = \frac{12(5d + 8f)x^3 + 96ex^2 - 12(17d + 20f)x - ((19d - 32e + 52f)x^4 - 5(19d - 32e + 52f)x^2 + 76d - 128e + 208f)\log(x + 2) + 8((d - 4e + 7f)x^4 - 5(d - 4e + 7f)x^2 + 4d - 16e + 28f)\log(x + 1) - 8((d + 4e + 7f)x^4 - 5(d + 4e + 7f)x^2 + 4d + 16e + 28f)\log(x - 1) + ((19d + 32e + 52f)x^4 - 5(19d + 32e + 52f)x^2 + 76d + 128e + 208f)\log(x - 2) - 240e}{(x^4 - 5x^2 + 4)^2}$$

[In] integrate((f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out] -1/864\*(12\*(5\*d + 8\*f)\*x^3 + 96\*e\*x^2 - 12\*(17\*d + 20\*f)\*x - ((19\*d - 32\*e + 52\*f)\*x^4 - 5\*(19\*d - 32\*e + 52\*f)\*x^2 + 76\*d - 128\*e + 208\*f)\*log(x + 2) + 8\*((d - 4\*e + 7\*f)\*x^4 - 5\*(d - 4\*e + 7\*f)\*x^2 + 4\*d - 16\*e + 28\*f)\*log(x + 1) - 8\*((d + 4\*e + 7\*f)\*x^4 - 5\*(d + 4\*e + 7\*f)\*x^2 + 4\*d + 16\*e + 28\*f)\*log(x - 1) + ((19\*d + 32\*e + 52\*f)\*x^4 - 5\*(19\*d + 32\*e + 52\*f)\*x^2 + 76\*d + 128\*e + 208\*f)\*log(x - 2) - 240\*e)/(x^4 - 5\*x^2 + 4)

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

[In] integrate((f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 106, normalized size of antiderivative = 0.92

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{864} (19d - 32e + 52f) \log(x + 2) - \frac{1}{108} (d - 4e + 7f) \log(x + 1) + \frac{1}{108} (d + 4e + 7f) \log(x - 1) - \frac{1}{864} (19d + 32e + 52f) \log(x - 2) - \frac{(5d + 8f)x^3 + 8ex^2 - (17d + 20f)x - 20e}{72(x^4 - 5x^2 + 4)}$$

[In] integrate((f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out]  $\frac{1}{864}(19d - 32e + 52f)\log(x + 2) - \frac{1}{108}(d - 4e + 7f)\log(x + 1) + \frac{1}{108}(d + 4e + 7f)\log(x - 1) - \frac{1}{864}(19d + 32e + 52f)\log(x - 2) - \frac{1}{72}((5d + 8f)x^3 + 8ex^2 - (17d + 20f)x - 20e)/(x^4 - 5x^2 + 4)$

### Giac [A] (verification not implemented)

none

Time = 0.32 (sec) , antiderivative size = 109, normalized size of antiderivative = 0.95

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{864} (19d - 32e + 52f) \log(|x + 2|) - \frac{1}{108} (d - 4e + 7f) \log(|x + 1|) + \frac{1}{108} (d + 4e + 7f) \log(|x - 1|) - \frac{1}{864} (19d + 32e + 52f) \log(|x - 2|) - \frac{5dx^3 + 8fx^3 + 8ex^2 - 17dx - 20fx - 20e}{72(x^4 - 5x^2 + 4)}$$

[In] `integrate((f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x, algorithm="giac")`

[Out]  $\frac{1}{864}(19d - 32e + 52f)\log(\text{abs}(x + 2)) - \frac{1}{108}(d - 4e + 7f)\log(\text{abs}(x + 1)) + \frac{1}{108}(d + 4e + 7f)\log(\text{abs}(x - 1)) - \frac{1}{864}(19d + 32e + 52f)\log(\text{abs}(x - 2)) - \frac{1}{72}((5d)x^3 + 8fx^3 + 8ex^2 - 17dx - 20fx - 20e)/(x^4 - 5x^2 + 4)$

### Mupad [B] (verification not implemented)

Time = 0.06 (sec) , antiderivative size = 107, normalized size of antiderivative = 0.93

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^2} dx = \ln(x - 1) \left( \frac{d}{108} + \frac{e}{27} + \frac{7f}{108} \right) - \ln(x + 1) \left( \frac{d}{108} - \frac{e}{27} + \frac{7f}{108} \right) - \ln(x - 2) \left( \frac{19d}{864} + \frac{e}{27} + \frac{13f}{216} \right) + \ln(x + 2) \left( \frac{19d}{864} - \frac{e}{27} + \frac{13f}{216} \right) + \frac{\left( -\frac{5d}{72} - \frac{f}{9} \right) x^3 - \frac{ex^2}{9} + \left( \frac{17d}{72} + \frac{5f}{18} \right) x + \frac{5e}{18}}{x^4 - 5x^2 + 4}$$

[In] `int((d + e*x + f*x^2)/(x^4 - 5*x^2 + 4)^2,x)`

[Out]  $\log(x - 1) * (d/108 + e/27 + (7*f)/108) - \log(x + 1) * (d/108 - e/27 + (7*f)/108) - \log(x - 2) * ((19*d)/864 + e/27 + (13*f)/216) + \log(x + 2) * ((19*d)/864 - e/27 + (13*f)/216) + ((5*e)/18 - x^3 * ((5*d)/72 + f/9) - (e*x^2)/9 + x * ((17*d)/72 + (5*f)/18)) / (x^4 - 5*x^2 + 4)$

$$3.28 \quad \int \frac{d+ex+fx^2+gx^3}{(4-5x^2+x^4)^2} dx$$

Optimal result	270
Rubi [A] (verified)	270
Mathematica [A] (verified)	273
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Fricas [B] (verification not implemented)	274
Sympy [F(-1)]	274
Maxima [A] (verification not implemented)	274
Giac [A] (verification not implemented)	275
Mupad [B] (verification not implemented)	275

### Optimal result

Integrand size = 28, antiderivative size = 138

$$\int \frac{d+ex+fx^2+gx^3}{(4-5x^2+x^4)^2} dx = \frac{x(17d+20f-(5d+8f)x^2)}{72(4-5x^2+x^4)} + \frac{5e+8g-(2e+5g)x^2}{18(4-5x^2+x^4)} \\ + \frac{1}{432}(19d+52f)\operatorname{arctanh}\left(\frac{x}{2}\right) - \frac{1}{54}(d+7f)\operatorname{arctanh}(x) \\ + \frac{1}{54}(2e+5g)\log(1-x^2) - \frac{1}{54}(2e+5g)\log(4-x^2)$$

[Out] 1/72\*x\*(17\*d+20\*f-(5\*d+8\*f)\*x^2)/(x^4-5\*x^2+4)+1/18\*(5\*e+8\*g-(2\*e+5\*g)\*x^2)/(x^4-5\*x^2+4)+1/432\*(19\*d+52\*f)\*arctanh(1/2\*x)-1/54\*(d+7\*f)\*arctanh(x)+1/54\*(2\*e+5\*g)\*ln(-x^2+1)-1/54\*(2\*e+5\*g)\*ln(-x^2+4)

### Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 138, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.286$ , Rules used = {1687, 1192, 1180, 213, 1261, 652, 630, 31}

$$\int \frac{d+ex+fx^2+gx^3}{(4-5x^2+x^4)^2} dx = \frac{1}{432}\operatorname{arctanh}\left(\frac{x}{2}\right)(19d+52f) - \frac{1}{54}\operatorname{arctanh}(x)(d+7f) \\ + \frac{x(-(x^2(5d+8f))+17d+20f)}{72(x^4-5x^2+4)} + \frac{1}{54}(2e+5g)\log(1-x^2) \\ - \frac{1}{54}(2e+5g)\log(4-x^2) + \frac{-(x^2(2e+5g))+5e+8g}{18(x^4-5x^2+4)}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)/(4 - 5\*x^2 + x^4)^2,x]

[Out]  $(x*(17*d + 20*f - (5*d + 8*f)*x^2))/(72*(4 - 5*x^2 + x^4)) + (5*e + 8*g - (2*e + 5*g)*x^2)/(18*(4 - 5*x^2 + x^4)) + ((19*d + 52*f)*\text{ArcTanh}[x/2])/432 - ((d + 7*f)*\text{ArcTanh}[x])/54 + ((2*e + 5*g)*\text{Log}[1 - x^2])/54 - ((2*e + 5*g)*\text{Log}[4 - x^2])/54$

### Rule 31

$\text{Int}[(a + (b \cdot x)^{-1}), x\_Symbol] \rightarrow \text{Simp}[\text{Log}[\text{RemoveContent}[a + b \cdot x, x]]/b, x] /; \text{FreeQ}\{a, b\}, x]$

### Rule 213

$\text{Int}[(a + (b \cdot x)^2)^{-1}), x\_Symbol] \rightarrow \text{Simp}[(-\text{Rt}[-a, 2] \cdot \text{Rt}[b, 2])^{-1}) \cdot \text{ArcTanh}[\text{Rt}[b, 2] \cdot (x/\text{Rt}[-a, 2])], x] /; \text{FreeQ}\{a, b\}, x \ \&\& \ \text{NegQ}[a/b] \ \&\& \ (\text{LtQ}[a, 0] \ || \ \text{GtQ}[b, 0])$

### Rule 630

$\text{Int}[(a + (b \cdot x) + (c \cdot x)^2)^{-1}), x\_Symbol] \rightarrow \text{With}\{q = \text{Rt}[b^2 - 4 \cdot a \cdot c, 2]\}, \text{Dist}[c/q, \text{Int}[1/\text{Simp}[b/2 - q/2 + c \cdot x, x], x], x] - \text{Dist}[c/q, \text{Int}[1/\text{Simp}[b/2 + q/2 + c \cdot x, x], x], x] /; \text{FreeQ}\{a, b, c\}, x \ \&\& \ \text{NeQ}[b^2 - 4 \cdot a \cdot c, 0] \ \&\& \ \text{PosQ}[b^2 - 4 \cdot a \cdot c] \ \&\& \ \text{PerfectSquareQ}[b^2 - 4 \cdot a \cdot c]$

### Rule 652

$\text{Int}[(d + (e \cdot x) \cdot ((a + (b \cdot x) + (c \cdot x)^2)^{p_1}))], x\_Symbol] \rightarrow \text{Simp}[(b \cdot d - 2 \cdot a \cdot e + (2 \cdot c \cdot d - b \cdot e) \cdot x)/((p + 1) \cdot (b^2 - 4 \cdot a \cdot c)) \cdot (a + b \cdot x + c \cdot x^2)^{p + 1}, x] - \text{Dist}[(2 \cdot p + 3) \cdot ((2 \cdot c \cdot d - b \cdot e)/((p + 1) \cdot (b^2 - 4 \cdot a \cdot c))), \text{Int}[(a + b \cdot x + c \cdot x^2)^{p + 1}, x], x] /; \text{FreeQ}\{a, b, c, d, e\}, x \ \&\& \ \text{NeQ}[2 \cdot c \cdot d - b \cdot e, 0] \ \&\& \ \text{NeQ}[b^2 - 4 \cdot a \cdot c, 0] \ \&\& \ \text{LtQ}[p, -1] \ \&\& \ \text{NeQ}[p, -3/2]$

### Rule 1180

$\text{Int}[(d + (e \cdot x)^2)/((a + (b \cdot x)^2 + (c \cdot x)^4), x\_Symbol] \rightarrow \text{With}\{q = \text{Rt}[b^2 - 4 \cdot a \cdot c, 2]\}, \text{Dist}[e/2 + (2 \cdot c \cdot d - b \cdot e)/(2 \cdot q), \text{Int}[1/(b/2 - q/2 + c \cdot x^2), x], x] + \text{Dist}[e/2 - (2 \cdot c \cdot d - b \cdot e)/(2 \cdot q), \text{Int}[1/(b/2 + q/2 + c \cdot x^2), x], x] /; \text{FreeQ}\{a, b, c, d, e\}, x \ \&\& \ \text{NeQ}[b^2 - 4 \cdot a \cdot c, 0] \ \&\& \ \text{NeQ}[c \cdot d^2 - a \cdot e^2, 0] \ \&\& \ \text{PosQ}[b^2 - 4 \cdot a \cdot c]$

### Rule 1192

$\text{Int}[(d + (e \cdot x)^2) \cdot ((a + (b \cdot x)^2 + (c \cdot x)^4)^{p_1}), x\_Symbol] \rightarrow \text{Simp}[x \cdot (a \cdot b \cdot e - d \cdot (b^2 - 2 \cdot a \cdot c) - c \cdot (b \cdot d - 2 \cdot a \cdot e) \cdot x^2) \cdot ((a + b \cdot x^2 + c \cdot x^4)^{p + 1}/(2 \cdot a \cdot (p + 1) \cdot (b^2 - 4 \cdot a \cdot c))), x] + \text{Dist}[1/(2 \cdot a \cdot (p + 1) \cdot (b^2 - 4 \cdot a \cdot c)), \text{Int}[\text{Simp}[(2 \cdot p + 3) \cdot d \cdot b^2 - a \cdot b \cdot e - 2 \cdot a \cdot c \cdot d \cdot (4 \cdot p + 5) + (4 \cdot p + 7) \cdot (d \cdot b - 2 \cdot a \cdot e) \cdot c \cdot x^2, x] \cdot (a + b \cdot x^2 + c \cdot x^4)^{p + 1}, x], x] /; \text{FreeQ}\{a, b, c, d, e\}, x \ \&\& \ \text{NeQ}[b^2 - 4 \cdot a \cdot c, 0] \ \&\& \ \text{NeQ}[c \cdot d^2 - b \cdot d \cdot e + a \cdot e^2, 0] \ \&\&$

LtQ[p, -1] && IntegerQ[2\*p]

Rule 1261

Int[(x\_)\*((d\_) + (e\_)\*(x\_)^2)^(q\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Dist[1/2, Subst[Int[(d + e\*x)^q\*(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]

Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + fx^2}{(4 - 5x^2 + x^4)^2} dx + \int \frac{x(e + gx^2)}{(4 - 5x^2 + x^4)^2} dx \\
 &= \frac{x(17d + 20f - (5d + 8f)x^2)}{72(4 - 5x^2 + x^4)} - \frac{1}{72} \int \frac{-d + 20f + (5d + 8f)x^2}{4 - 5x^2 + x^4} dx \\
 &\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{(4 - 5x + x^2)^2} dx, x, x^2 \right) \\
 &= \frac{x(17d + 20f - (5d + 8f)x^2)}{72(4 - 5x^2 + x^4)} + \frac{5e + 8g - (2e + 5g)x^2}{18(4 - 5x^2 + x^4)} - \frac{1}{54}(-d - 7f) \int \frac{1}{-1 + x^2} dx \\
 &\quad - \frac{1}{216}(19d + 52f) \int \frac{1}{-4 + x^2} dx + \frac{1}{18}(-2e - 5g) \text{Subst} \left( \int \frac{1}{4 - 5x + x^2} dx, x, x^2 \right) \\
 &= \frac{x(17d + 20f - (5d + 8f)x^2)}{72(4 - 5x^2 + x^4)} + \frac{5e + 8g - (2e + 5g)x^2}{18(4 - 5x^2 + x^4)} + \frac{1}{432}(19d + 52f) \tanh^{-1} \left( \frac{x}{2} \right) \\
 &\quad - \frac{1}{54}(d + 7f) \tanh^{-1}(x) + \frac{1}{54}(-2e - 5g) \text{Subst} \left( \int \frac{1}{-4 + x} dx, x, x^2 \right) \\
 &\quad + \frac{1}{54}(2e + 5g) \text{Subst} \left( \int \frac{1}{-1 + x} dx, x, x^2 \right) \\
 &= \frac{x(17d + 20f - (5d + 8f)x^2)}{72(4 - 5x^2 + x^4)} + \frac{5e + 8g - (2e + 5g)x^2}{18(4 - 5x^2 + x^4)} + \frac{1}{432}(19d + 52f) \tanh^{-1} \left( \frac{x}{2} \right) \\
 &\quad - \frac{1}{54}(d + 7f) \tanh^{-1}(x) + \frac{1}{54}(2e + 5g) \log(1 - x^2) - \frac{1}{54}(2e + 5g) \log(4 - x^2)
 \end{aligned}$$



**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 134, normalized size of antiderivative = 0.97

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{864} \left( \frac{12(17dx + 20fx - 5dx^3 - 8fx^3 + e(20 - 8x^2) - 4g(-8 + 5x^2))}{4 - 5x^2 + x^4} \right. \\ \left. + 8(d + 4e + 7f + 10g) \log(1 - x) - (19d + 32e + 52f + 80g) \log(2 - x) \right. \\ \left. - 8(d - 4e + 7f - 10g) \log(1 + x) + (19d - 32e + 52f - 80g) \log(2 + x) \right)$$

`[In] Integrate[(d + e*x + f*x^2 + g*x^3)/(4 - 5*x^2 + x^4)^2,x]`

```
[Out] ((12*(17*d*x + 20*f*x - 5*d*x^3 - 8*f*x^3 + e*(20 - 8*x^2) - 4*g*(-8 + 5*x^2)))/(4 - 5*x^2 + x^4) + 8*(d + 4*e + 7*f + 10*g)*Log[1 - x] - (19*d + 32*e + 52*f + 80*g)*Log[2 - x] - 8*(d - 4*e + 7*f - 10*g)*Log[1 + x] + (19*d - 32*e + 52*f - 80*g)*Log[2 + x])/864
```

**Maple [A] (verified)**

Time = 0.10 (sec) , antiderivative size = 125, normalized size of antiderivative = 0.91

method	result
norman	$\frac{\left(-\frac{5d}{72} - \frac{f}{9}\right)x^3 + \left(\frac{17d}{72} + \frac{5f}{18}\right)x + \left(-\frac{e}{9} - \frac{5g}{18}\right)x^2 + \frac{5e}{18} + \frac{4g}{9}}{x^4 - 5x^2 + 4} + \left(-\frac{19d}{864} - \frac{e}{27} - \frac{13f}{216} - \frac{5g}{54}\right) \ln(x - 2) + \left(-\frac{d}{108} + \frac{e}{27} - \frac{7f}{108} + \frac{5g}{54}\right) \ln(x + 1) - \frac{d}{36}$
default	$-\frac{\frac{d}{144} - \frac{e}{72} + \frac{f}{36} - \frac{g}{18}}{x+2} + \left(\frac{19d}{864} - \frac{e}{27} + \frac{13f}{216} - \frac{5g}{54}\right) \ln(x + 2) + \left(-\frac{d}{108} + \frac{e}{27} - \frac{7f}{108} + \frac{5g}{54}\right) \ln(x + 1) - \frac{d}{36}$
risch	$\frac{\left(-\frac{5d}{72} - \frac{f}{9}\right)x^3 + \left(\frac{17d}{72} + \frac{5f}{18}\right)x + \left(-\frac{e}{9} - \frac{5g}{18}\right)x^2 + \frac{5e}{18} + \frac{4g}{9}}{x^4 - 5x^2 + 4} + \frac{19 \ln(x+2)d}{864} - \frac{\ln(x+2)e}{27} + \frac{13 \ln(x+2)f}{216} - \frac{5 \ln(x+2)g}{54} + \frac{\ln(1-x)}{10}$
parallelrisch	$-\frac{-384g - 240e + 96fx^3 + 240gx^2 - 204dx + 76 \ln(x-2)d + 128 \ln(x-2)e - 32 \ln(x-1)d - 128 \ln(x-1)e + 32 \ln(x-2)x^4e - 208 \ln(x-2)x^4e}{(x^4 - 5x^2 + 4)^2}$

`[In] int((g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x,method=_RETURNVERBOSE)`

```
[Out] ((-5/72*d-1/9*f)*x^3+(17/72*d+5/18*f)*x+(-1/9*e-5/18*g)*x^2+5/18*e+4/9*g)/(x^4-5*x^2+4)+(-19/864*d-1/27*e-13/216*f-5/54*g)*ln(x-2)+(-1/108*d+1/27*e-7/108*f+5/54*g)*ln(x+1)+(1/108*d+1/27*e+7/108*f+5/54*g)*ln(x-1)+(19/864*d-1/27*e+13/216*f-5/54*g)*ln(x+2)
```

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 262 vs. 2(122) = 244.

Time = 0.49 (sec) , antiderivative size = 262, normalized size of antiderivative = 1.90

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^2} dx = \frac{12(5d + 8f)x^3 + 48(2e + 5g)x^2 - 12(17d + 20f)x - ((19d - 32e + 52f - 80g)x^4 - 5(19d - 32e -$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out] -1/864\*(12\*(5\*d + 8\*f)\*x^3 + 48\*(2\*e + 5\*g)\*x^2 - 12\*(17\*d + 20\*f)\*x - ((19\*d - 32\*e + 52\*f - 80\*g)\*x^4 - 5\*(19\*d - 32\*e + 52\*f - 80\*g)\*x^2 + 76\*d - 128\*e + 208\*f - 320\*g)\*log(x + 2) + 8\*((d - 4\*e + 7\*f - 10\*g)\*x^4 - 5\*(d - 4\*e + 7\*f - 10\*g)\*x^2 + 4\*d - 16\*e + 28\*f - 40\*g)\*log(x + 1) - 8\*((d + 4\*e + 7\*f + 10\*g)\*x^4 - 5\*(d + 4\*e + 7\*f + 10\*g)\*x^2 + 4\*d + 16\*e + 28\*f + 40\*g)\*log(x - 1) + ((19\*d + 32\*e + 52\*f + 80\*g)\*x^4 - 5\*(19\*d + 32\*e + 52\*f + 80\*g)\*x^2 + 76\*d + 128\*e + 208\*f + 320\*g)\*log(x - 2) - 240\*e - 384\*g)/(x^4 - 5\*x^2 + 4)

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

[In] integrate((g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 127, normalized size of antiderivative = 0.92

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{864} (19d - 32e + 52f - 80g) \log(x + 2) - \frac{1}{108} (d - 4e + 7f - 10g) \log(x + 1) + \frac{1}{108} (d + 4e + 7f + 10g) \log(x - 1) - \frac{1}{864} (19d + 32e + 52f + 80g) \log(x - 2) - \frac{(5d + 8f)x^3 + 4(2e + 5g)x^2 - (17d + 20f)x - 20e - 32g}{72(x^4 - 5x^2 + 4)}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] 1/864\*(19\*d - 32\*e + 52\*f - 80\*g)\*log(x + 2) - 1/108\*(d - 4\*e + 7\*f - 10\*g)\*log(x + 1) + 1/108\*(d + 4\*e + 7\*f + 10\*g)\*log(x - 1) - 1/864\*(19\*d + 32\*e + 52\*f + 80\*g)\*log(x - 2) - 1/72\*((5\*d + 8\*f)\*x^3 + 4\*(2\*e + 5\*g)\*x^2 - (17\*d + 20\*f)\*x - 20\*e - 32\*g)/(x^4 - 5\*x^2 + 4)

## Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 130, normalized size of antiderivative = 0.94

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{864} (19d - 32e + 52f - 80g) \log(|x + 2|) - \frac{1}{108} (d - 4e + 7f - 10g) \log(|x + 1|) + \frac{1}{108} (d + 4e + 7f + 10g) \log(|x - 1|) - \frac{1}{864} (19d + 32e + 52f + 80g) \log(|x - 2|) - \frac{5dx^3 + 8fx^3 + 8ex^2 + 20gx^2 - 17dx - 20fx - 20e - 32g}{72(x^4 - 5x^2 + 4)}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] 1/864\*(19\*d - 32\*e + 52\*f - 80\*g)\*log(abs(x + 2)) - 1/108\*(d - 4\*e + 7\*f - 10\*g)\*log(abs(x + 1)) + 1/108\*(d + 4\*e + 7\*f + 10\*g)\*log(abs(x - 1)) - 1/864\*(19\*d + 32\*e + 52\*f + 80\*g)\*log(abs(x - 2)) - 1/72\*(5\*d\*x^3 + 8\*f\*x^3 + 8\*e\*x^2 + 20\*g\*x^2 - 17\*d\*x - 20\*f\*x - 20\*e - 32\*g)/(x^4 - 5\*x^2 + 4)

## Mupad [B] (verification not implemented)

Time = 7.88 (sec) , antiderivative size = 128, normalized size of antiderivative = 0.93

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^2} dx = \ln(x - 1) \left( \frac{d}{108} + \frac{e}{27} + \frac{7f}{108} + \frac{5g}{54} \right) - \ln(x + 1) \left( \frac{d}{108} - \frac{e}{27} + \frac{7f}{108} - \frac{5g}{54} \right) - \ln(x - 2) \left( \frac{19d}{864} + \frac{e}{27} + \frac{13f}{216} + \frac{5g}{54} \right) + \ln(x + 2) \left( \frac{19d}{864} - \frac{e}{27} + \frac{13f}{216} - \frac{5g}{54} \right) + \frac{\left(-\frac{5d}{72} - \frac{f}{9}\right)x^3 + \left(-\frac{e}{9} - \frac{5g}{18}\right)x^2 + \left(\frac{17d}{72} + \frac{5f}{18}\right)x + \frac{5e}{18} + \frac{4g}{9}}{x^4 - 5x^2 + 4}$$

```
[In] int((d + e*x + f*x^2 + g*x^3)/(x^4 - 5*x^2 + 4)^2,x)
```

```
[Out] log(x - 1)*(d/108 + e/27 + (7*f)/108 + (5*g)/54) - log(x + 1)*(d/108 - e/27  
+ (7*f)/108 - (5*g)/54) - log(x - 2)*((19*d)/864 + e/27 + (13*f)/216 + (5*  
g)/54) + log(x + 2)*((19*d)/864 - e/27 + (13*f)/216 - (5*g)/54) + ((5*e)/18  
+ (4*g)/9 - x^3*((5*d)/72 + f/9) - x^2*(e/9 + (5*g)/18) + x*((17*d)/72 + (  
5*f)/18))/(x^4 - 5*x^2 + 4)
```

$$3.29 \quad \int \frac{d+ex+fx^2+gx^3+hx^4}{(4-5x^2+x^4)^2} dx$$

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### Optimal result

Integrand size = 33, antiderivative size = 150

$$\int \frac{d+ex+fx^2+gx^3+hx^4}{(4-5x^2+x^4)^2} dx = \frac{5e+8g-(2e+5g)x^2}{18(4-5x^2+x^4)} + \frac{x(17d+20f+32h-(5d+8f+20h)x^2)}{72(4-5x^2+x^4)} + \frac{1}{432}(19d+52f+112h)\operatorname{arctanh}\left(\frac{x}{2}\right) - \frac{1}{54}(d+7f+13h)\operatorname{arctanh}(x) + \frac{1}{54}(2e+5g)\log(1-x^2) - \frac{1}{54}(2e+5g)\log(4-x^2)$$

[Out] 1/18\*(5\*e+8\*g-(2\*e+5\*g)\*x^2)/(x^4-5\*x^2+4)+1/72\*x\*(17\*d+20\*f+32\*h-(5\*d+8\*f+20\*h)\*x^2)/(x^4-5\*x^2+4)+1/432\*(19\*d+52\*f+112\*h)\*arctanh(1/2\*x)-1/54\*(d+7\*f+13\*h)\*arctanh(x)+1/54\*(2\*e+5\*g)\*ln(-x^2+1)-1/54\*(2\*e+5\*g)\*ln(-x^2+4)

### Rubi [A] (verified)

Time = 0.13 (sec) , antiderivative size = 150, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.242$ , Rules used

= {1687, 1692, 1180, 213, 1261, 652, 630, 31}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{432} \operatorname{arctanh}\left(\frac{x}{2}\right) (19d + 52f + 112h) - \frac{1}{54} \operatorname{arctanh}(x)(d + 7f + 13h) + \frac{x(-x^2(5d + 8f + 20h)) + 17d + 20f + 32h}{72(x^4 - 5x^2 + 4)} + \frac{1}{54}(2e + 5g) \log(1 - x^2) - \frac{1}{54}(2e + 5g) \log(4 - x^2) + \frac{-(x^2(2e + 5g)) + 5e + 8g}{18(x^4 - 5x^2 + 4)}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(4 - 5\*x^2 + x^4)^2,x]

[Out] (5\*e + 8\*g - (2\*e + 5\*g)\*x^2)/(18\*(4 - 5\*x^2 + x^4)) + (x\*(17\*d + 20\*f + 32\*h - (5\*d + 8\*f + 20\*h)\*x^2))/(72\*(4 - 5\*x^2 + x^4)) + ((19\*d + 52\*f + 112\*h)\*ArcTanh[x/2])/432 - ((d + 7\*f + 13\*h)\*ArcTanh[x])/54 + ((2\*e + 5\*g)\*Log[1 - x^2])/54 - ((2\*e + 5\*g)\*Log[4 - x^2])/54

### Rule 31

Int[((a\_) + (b\_.)\*(x\_))^(n\_), x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

### Rule 213

Int[((a\_) + (b\_.)\*(x\_)^2)^(n\_), x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[b, 2])^(n\_ - 1)\*ArcTanh[Rt[b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a, 0] || GtQ[b, 0])

### Rule 630

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(n\_), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[c/q, Int[1/Simp[b/2 - q/2 + c\*x, x], x], x] - Dist[c/q, Int[1/Simp[b/2 + q/2 + c\*x, x], x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[b^2 - 4\*a\*c] && PerfectSquareQ[b^2 - 4\*a\*c]

### Rule 652

Int[((d\_.) + (e\_.)\*(x\_))\*((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[((b\*d - 2\*a\*e + (2\*c\*d - b\*e)\*x)/((p + 1)\*(b^2 - 4\*a\*c)))\*(a + b\*x + c\*x^2)^(p + 1), x] - Dist[(2\*p + 3)\*((2\*c\*d - b\*e)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2]

### Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

### Rule 1261

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(
p_.), x_Symbol] := Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

### Rule 1692

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := With[{d =
Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[Poly
nomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^
4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b
^2 - 4*a*c)), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*
x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a
+ b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p
+ 7)*(b*d - 2*a*e)*x^2, x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^
2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1]
```

### Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{x(e + gx^2)}{(4 - 5x^2 + x^4)^2} dx + \int \frac{d + fx^2 + hx^4}{(4 - 5x^2 + x^4)^2} dx \\ &= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{72(4 - 5x^2 + x^4)} \\ &\quad - \frac{1}{72} \int \frac{-d + 20f + 32h + (5d + 8f + 20h)x^2}{4 - 5x^2 + x^4} dx \\ &\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{(4 - 5x + x^2)^2} dx, x, x^2 \right) \end{aligned}$$

$$\begin{aligned}
&= \frac{5e + 8g - (2e + 5g)x^2}{18(4 - 5x^2 + x^4)} + \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{72(4 - 5x^2 + x^4)} \\
&\quad + \frac{1}{18}(-2e - 5g)\text{Subst}\left(\int \frac{1}{4 - 5x + x^2} dx, x, x^2\right) \\
&\quad - \frac{1}{54}(-d - 7f - 13h) \int \frac{1}{-1 + x^2} dx - \frac{1}{216}(19d + 52f + 112h) \int \frac{1}{-4 + x^2} dx \\
&= \frac{5e + 8g - (2e + 5g)x^2}{18(4 - 5x^2 + x^4)} + \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{72(4 - 5x^2 + x^4)} \\
&\quad + \frac{1}{432}(19d + 52f + 112h) \tanh^{-1}\left(\frac{x}{2}\right) - \frac{1}{54}(d + 7f + 13h) \tanh^{-1}(x) \\
&\quad + \frac{1}{54}(-2e - 5g)\text{Subst}\left(\int \frac{1}{-4 + x} dx, x, x^2\right) \\
&\quad + \frac{1}{54}(2e + 5g)\text{Subst}\left(\int \frac{1}{-1 + x} dx, x, x^2\right) \\
&= \frac{5e + 8g - (2e + 5g)x^2}{18(4 - 5x^2 + x^4)} + \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{72(4 - 5x^2 + x^4)} \\
&\quad + \frac{1}{432}(19d + 52f + 112h) \tanh^{-1}\left(\frac{x}{2}\right) - \frac{1}{54}(d + 7f + 13h) \tanh^{-1}(x) \\
&\quad + \frac{1}{54}(2e + 5g) \log(1 - x^2) - \frac{1}{54}(2e + 5g) \log(4 - x^2)
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 159, normalized size of antiderivative = 1.06

$$\begin{aligned}
&\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^2} dx \\
&= \frac{1}{864} \left( -\frac{12(4e(-5 + 2x^2) + 4g(-8 + 5x^2) + x(4f(-5 + 2x^2) + d(-17 + 5x^2) + 4h(-8 + 5x^2)))}{4 - 5x^2 + x^4} \right. \\
&\quad \left. + 8(d + 4e + 7f + 10g + 13h) \log(1 - x) - (19d + 32e + 52f + 80g + 112h) \log(2 - x) \right. \\
&\quad \left. - 8(d - 4e + 7f - 10g + 13h) \log(1 + x) + (19d - 32e + 52f - 80g + 112h) \log(2 + x) \right)
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(4 - 5\*x^2 + x^4)^2,x]

[Out] ((-12\*(4\*e\*(-5 + 2\*x^2) + 4\*g\*(-8 + 5\*x^2) + x\*(4\*f\*(-5 + 2\*x^2) + d\*(-17 + 5\*x^2) + 4\*h\*(-8 + 5\*x^2))))/(4 - 5\*x^2 + x^4) + 8\*(d + 4\*e + 7\*f + 10\*g + 13\*h)\*Log[1 - x] - (19\*d + 32\*e + 52\*f + 80\*g + 112\*h)\*Log[2 - x] - 8\*(d - 4\*e + 7\*f - 10\*g + 13\*h)\*Log[1 + x] + (19\*d - 32\*e + 52\*f - 80\*g + 112\*h)\*Log[2 + x])/864



**Maple [A] (verified)**

Time = 0.10 (sec) , antiderivative size = 143, normalized size of antiderivative = 0.95

method	result
norman	$\frac{\left(-\frac{5d}{72}-\frac{f}{9}-\frac{5h}{18}\right)x^3+\left(\frac{17d}{72}+\frac{5f}{18}+\frac{4h}{9}\right)x+\left(-\frac{e}{9}-\frac{5g}{18}\right)x^2+\frac{5e}{18}+\frac{4g}{9}}{x^4-5x^2+4} + \left(-\frac{19d}{864}-\frac{e}{27}-\frac{13f}{216}-\frac{5g}{54}-\frac{7h}{54}\right)\ln(x-2) + \left(\frac{d}{144}-\frac{e}{72}+\frac{f}{36}-\frac{g}{18}+\frac{h}{9}\right) + \left(\frac{19d}{864}-\frac{e}{27}+\frac{13f}{216}-\frac{5g}{54}+\frac{7h}{54}\right)\ln(x+2) + \left(-\frac{d}{108}+\frac{e}{27}-\frac{7f}{108}+\frac{5g}{54}-\frac{13h}{108}\right)\ln(x+1)$
default	
risch	$\frac{\left(-\frac{5d}{72}-\frac{f}{9}-\frac{5h}{18}\right)x^3+\left(\frac{17d}{72}+\frac{5f}{18}+\frac{4h}{9}\right)x+\left(-\frac{e}{9}-\frac{5g}{18}\right)x^2+\frac{5e}{18}+\frac{4g}{9}}{x^4-5x^2+4} - \frac{\ln(x+1)d}{108} + \frac{\ln(x+1)e}{27} - \frac{7\ln(x+1)f}{108} + \frac{5\ln(x+1)g}{54} - \frac{-384g-240e+96fx^3+240gx^2+240hx^3-204dx+76\ln(x-2)d+128\ln(x-2)e-32\ln(x-1)d-128\ln(x-1)e+32\ln(x-2)x^4e}{x^4-5x^2+4}$
parallelrisch	

[In] int((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x,method=\_RETURNVERBOSE)

[Out]  $\left(-\frac{5}{72}d-\frac{1}{9}f-\frac{5}{18}h\right)x^3+\left(\frac{17}{72}d+\frac{5}{18}f+\frac{4}{9}h\right)x+\left(-\frac{1}{9}e-\frac{5}{18}g\right)x^2+\frac{5}{18}e+\frac{4}{9}g\right)/\left(x^4-5x^2+4\right)+\left(-\frac{19}{864}d-\frac{1}{27}e-\frac{13}{216}f-\frac{5}{54}g-\frac{7}{54}h\right)*\ln(x-2)+\left(-\frac{1}{108}d+\frac{1}{27}e-\frac{7}{108}f+\frac{5}{54}g-\frac{13}{108}h\right)*\ln(x+1)+\left(\frac{1}{108}d+\frac{1}{27}e+\frac{7}{108}f+\frac{5}{54}g+\frac{13}{108}h\right)*\ln(x-1)+\left(\frac{19}{864}d-\frac{1}{27}e+\frac{13}{216}f-\frac{5}{54}g+\frac{7}{54}h\right)*\ln(x+2)$

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 304 vs. 2(134) = 268.

Time = 1.40 (sec) , antiderivative size = 304, normalized size of antiderivative = 2.03

$$\int \frac{d+ex+fx^2+gx^3+hx^4}{(4-5x^2+x^4)^2} dx = \frac{12(5d+8f+20h)x^3+48(2e+5g)x^2-12(17d+20f+32h)x-((19d-32e+52f-80g+112h)x^4-5(19d-32e+52f-80g+112h)x^2+76d-128e+208f-320g+448h)\log(x+2)+8((d-4e+7f-10g+13h)x^4-5(d-4e+7f-10g+13h)x^2+4d-16e+28f-40g+52h)\log(x+1)-8((d+4e+7f+10g+13h)x^4-5(d+4e+7f+10g+13h)x^2+4d+16e+28f+40g+52h)\log(x-1)+((19d+32e+52f+80g+112h)x^4-5(19d+32e+52f+80g+112h)x^2+76d+128e+208f+320g+448h)\log(x-2)-240e-384g)/(x^4-5x^2+4)}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out]  $-1/864*(12*(5*d+8*f+20*h)*x^3+48*(2*e+5*g)*x^2-12*(17*d+20*f+32*h)*x-((19*d-32*e+52*f-80*g+112*h)*x^4-5*(19*d-32*e+52*f-80*g+112*h)*x^2+76*d-128*e+208*f-320*g+448*h)*\log(x+2)+8*((d-4*e+7*f-10*g+13*h)*x^4-5*(d-4*e+7*f-10*g+13*h)*x^2+4*d-16*e+28*f-40*g+52*h)*\log(x+1)-8*((d+4*e+7*f+10*g+13*h)*x^4-5*(d+4*e+7*f+10*g+13*h)*x^2+4*d+16*e+28*f+40*g+52*h)*\log(x-1)+((19*d+32*e+52*f+80*g+112*h)*x^4-5*(19*d+32*e+52*f+80*g+112*h)*x^2+76*d+128*e+208*f+320*g+448*h)*\log(x-2)-240*e-384*g)/(x^4-5*x^2+4)$

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

```
[In] integrate((h*x**4+g*x**3+f*x**2+e*x+d)/(x**4-5*x**2+4)**2,x)
```

```
[Out] Timed out
```

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 145, normalized size of antiderivative = 0.97

$$\begin{aligned} & \int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^2} dx \\ &= \frac{1}{864} (19d - 32e + 52f - 80g + 112h) \log(x + 2) \\ & \quad - \frac{1}{108} (d - 4e + 7f - 10g + 13h) \log(x + 1) \\ & \quad + \frac{1}{108} (d + 4e + 7f + 10g + 13h) \log(x - 1) \\ & \quad - \frac{1}{864} (19d + 32e + 52f + 80g + 112h) \log(x - 2) \\ & \quad - \frac{(5d + 8f + 20h)x^3 + 4(2e + 5g)x^2 - (17d + 20f + 32h)x - 20e - 32g}{72(x^4 - 5x^2 + 4)} \end{aligned}$$

```
[In] integrate((h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x, algorithm="maxima")
```

```
[Out] 1/864*(19*d - 32*e + 52*f - 80*g + 112*h)*log(x + 2) - 1/108*(d - 4*e + 7*f
- 10*g + 13*h)*log(x + 1) + 1/108*(d + 4*e + 7*f + 10*g + 13*h)*log(x - 1)
- 1/864*(19*d + 32*e + 52*f + 80*g + 112*h)*log(x - 2) - 1/72*((5*d + 8*f
+ 20*h)*x^3 + 4*(2*e + 5*g)*x^2 - (17*d + 20*f + 32*h)*x - 20*e - 32*g)/(x^
4 - 5*x^2 + 4)
```

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 152, normalized size of antiderivative = 1.01

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{864} (19d - 32e + 52f - 80g + 112h) \log(|x + 2|)$$

$$- \frac{1}{108} (d - 4e + 7f - 10g + 13h) \log(|x + 1|)$$

$$+ \frac{1}{108} (d + 4e + 7f + 10g + 13h) \log(|x - 1|)$$

$$- \frac{1}{864} (19d + 32e + 52f + 80g + 112h) \log(|x - 2|)$$

$$- \frac{5dx^3 + 8fx^3 + 20hx^3 + 8ex^2 + 20gx^2 - 17dx - 20fx - 32hx - 20e - 32g}{72(x^4 - 5x^2 + 4)}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

```
[Out] 1/864*(19*d - 32*e + 52*f - 80*g + 112*h)*log(abs(x + 2)) - 1/108*(d - 4*e
+ 7*f - 10*g + 13*h)*log(abs(x + 1)) + 1/108*(d + 4*e + 7*f + 10*g + 13*h)*
log(abs(x - 1)) - 1/864*(19*d + 32*e + 52*f + 80*g + 112*h)*log(abs(x - 2))
- 1/72*(5*d*x^3 + 8*f*x^3 + 20*h*x^3 + 8*e*x^2 + 20*g*x^2 - 17*d*x - 20*f*
x - 32*h*x - 20*e - 32*g)/(x^4 - 5*x^2 + 4)
```

**Mupad [B] (verification not implemented)**

Time = 7.98 (sec) , antiderivative size = 146, normalized size of antiderivative = 0.97

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{\left(-\frac{5d}{72} - \frac{f}{9} - \frac{5h}{18}\right)x^3 + \left(-\frac{e}{9} - \frac{5g}{18}\right)x^2 + \left(\frac{17d}{72} + \frac{5f}{18} + \frac{4h}{9}\right)x + \frac{5e}{18} + \frac{4g}{9}}{x^4 - 5x^2 + 4}$$

$$+ \ln(x - 1) \left(\frac{d}{108} + \frac{e}{27} + \frac{7f}{108} + \frac{5g}{54} + \frac{13h}{108}\right) - \ln(x + 1) \left(\frac{d}{108} - \frac{e}{27} + \frac{7f}{108} - \frac{5g}{54} + \frac{13h}{108}\right)$$

$$- \ln(x - 2) \left(\frac{19d}{864} + \frac{e}{27} + \frac{13f}{216} + \frac{5g}{54} + \frac{7h}{54}\right) + \ln(x + 2) \left(\frac{19d}{864} - \frac{e}{27} + \frac{13f}{216} - \frac{5g}{54} + \frac{7h}{54}\right)$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(x^4 - 5\*x^2 + 4)^2,x)

```
[Out] ((5*e)/18 + (4*g)/9 - x^2*(e/9 + (5*g)/18) + x*((17*d)/72 + (5*f)/18 + (4*h
)/9) - x^3*((5*d)/72 + f/9 + (5*h)/18))/(x^4 - 5*x^2 + 4) + log(x - 1)*(d/1
08 + e/27 + (7*f)/108 + (5*g)/54 + (13*h)/108) - log(x + 1)*(d/108 - e/27 +
(7*f)/108 - (5*g)/54 + (13*h)/108) - log(x - 2)*((19*d)/864 + e/27 + (13*f
)/216 + (5*g)/54 + (7*h)/54) + log(x + 2)*((19*d)/864 - e/27 + (13*f)/216 -
(5*g)/54 + (7*h)/54)
```

$$3.30 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(4-5x^2+x^4)^2} dx$$

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### Optimal result

Integrand size = 38, antiderivative size = 162

$$\int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(4-5x^2+x^4)^2} dx = \frac{x(17d+20f+32h-(5d+8f+20h)x^2)}{72(4-5x^2+x^4)} + \frac{5e+8g+20i-(2e+5g+17i)x^2}{18(4-5x^2+x^4)} + \frac{1}{432}(19d+52f+112h)\operatorname{arctanh}\left(\frac{x}{2}\right) - \frac{1}{54}(d+7f+13h)\operatorname{arctanh}(x) + \frac{1}{54}(2e+5g+8i)\log(1-x^2) - \frac{1}{54}(2e+5g+8i)\log(4-x^2)$$

```
[Out] 1/72*x*(17*d+20*f+32*h-(5*d+8*f+20*h)*x^2)/(x^4-5*x^2+4)+1/18*(5*e+8*g+20*i
-(2*e+5*g+17*i)*x^2)/(x^4-5*x^2+4)+1/432*(19*d+52*f+112*h)*arctanh(1/2*x)-1
/54*(d+7*f+13*h)*arctanh(x)+1/54*(2*e+5*g+8*i)*ln(-x^2+1)-1/54*(2*e+5*g+8*i
)*ln(-x^2+4)
```

**Rubi [A] (verified)**

Time = 0.15 (sec) , antiderivative size = 162, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.237$ , Rules used = {1687, 1692, 1180, 213, 1677, 1674, 12, 630, 31}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{432} \operatorname{arctanh}\left(\frac{x}{2}\right) (19d + 52f + 112h) - \frac{1}{54} \operatorname{arctanh}(x) (d + 7f + 13h) + \frac{x(-x^2(5d + 8f + 20h)) + 17d + 20f + 32h}{72(x^4 - 5x^2 + 4)} + \frac{1}{54} \log(1 - x^2) (2e + 5g + 8i) - \frac{1}{54} \log(4 - x^2) (2e + 5g + 8i) + \frac{-(x^2(2e + 5g + 17i)) + 5e + 8g + 20i}{18(x^4 - 5x^2 + 4)}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(4 - 5\*x^2 + x^4)^2,x]

[Out] (x\*(17\*d + 20\*f + 32\*h - (5\*d + 8\*f + 20\*h)\*x^2))/(72\*(4 - 5\*x^2 + x^4)) + (5\*e + 8\*g + 20\*i - (2\*e + 5\*g + 17\*i)\*x^2)/(18\*(4 - 5\*x^2 + x^4)) + ((19\*d + 52\*f + 112\*h)\*ArcTanh[x/2])/432 - ((d + 7\*f + 13\*h)\*ArcTanh[x])/54 + ((2\*e + 5\*g + 8\*i)\*Log[1 - x^2])/54 - ((2\*e + 5\*g + 8\*i)\*Log[4 - x^2])/54

Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

Rule 31

Int[((a\_) + (b\_.)\*(x\_))^-1, x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

Rule 213

Int[((a\_) + (b\_.)\*(x\_)^2)^-1, x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[b, 2])^-1)\*ArcTanh[Rt[b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a, 0] || GtQ[b, 0])

Rule 630

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^-1, x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[c/q, Int[1/Simp[b/2 - q/2 + c\*x, x], x] - Dist[c/q, Int[1/Simp[b/2 + q/2 + c\*x, x], x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2

- 4\*a\*c, 0] && PosQ[b^2 - 4\*a\*c] && PerfectSquareQ[b^2 - 4\*a\*c]

### Rule 1180

```
Int[((d_) + (e_)*(x_)^2)/((a_) + (b_)*(x_)^2 + (c_)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

### Rule 1674

```
Int[(Pq_)*((a_) + (b_)*(x_) + (c_)*(x_)^2)^(p_), x_Symbol] :=> With[{Q =
PolynomialQuotient[Pq, a + b*x + c*x^2, x], f = Coeff[PolynomialRemainder[P
q, a + b*x + c*x^2, x], x, 0], g = Coeff[PolynomialRemainder[Pq, a + b*x +
c*x^2, x], x, 1]}, Simp[(b*f - 2*a*g + (2*c*f - b*g)*x)*((a + b*x + c*x^2)^
(p + 1)/((p + 1)*(b^2 - 4*a*c))), x] + Dist[1/((p + 1)*(b^2 - 4*a*c)), Int[
(a + b*x + c*x^2)^(p + 1)*ExpandToSum[(p + 1)*(b^2 - 4*a*c)*Q - (2*p + 3)*
(2*c*f - b*g), x], x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && NeQ[b^2
- 4*a*c, 0] && LtQ[p, -1]
```

### Rule 1677

```
Int[(Pq_)*(x_)^(m_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] :
> Dist[1/2, Subst[Int[x^((m - 1)/2)*SubstFor[x^2, Pq, x]*(a + b*x + c*x^2)^
p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x^2] && IntegerQ[
(m - 1)/2]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] :=> Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

### Rule 1692

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] :=> With[{d =
Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[Poly
nomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^
4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b
^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*
x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a
+ b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p
+ 7)*(b*d - 2*a*e)*x^2, x], x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^
```

2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1]

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d + fx^2 + hx^4}{(4 - 5x^2 + x^4)^2} dx + \int \frac{x(e + gx^2 + ix^4)}{(4 - 5x^2 + x^4)^2} dx \\
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{72(4 - 5x^2 + x^4)} \\
&\quad - \frac{1}{72} \int \frac{-d + 20f + 32h + (5d + 8f + 20h)x^2}{4 - 5x^2 + x^4} dx \\
&\quad + \frac{1}{2} \text{Subst}\left(\int \frac{e + gx + ix^2}{(4 - 5x + x^2)^2} dx, x, x^2\right) \\
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{72(4 - 5x^2 + x^4)} + \frac{5e + 8g + 20i - (2e + 5g + 17i)x^2}{18(4 - 5x^2 + x^4)} \\
&\quad - \frac{1}{18} \text{Subst}\left(\int \frac{2e + 5g + 8i}{4 - 5x + x^2} dx, x, x^2\right) - \frac{1}{54}(-d - 7f - 13h) \int \frac{1}{-1 + x^2} dx \\
&\quad - \frac{1}{216}(19d + 52f + 112h) \int \frac{1}{-4 + x^2} dx \\
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{72(4 - 5x^2 + x^4)} + \frac{5e + 8g + 20i - (2e + 5g + 17i)x^2}{18(4 - 5x^2 + x^4)} \\
&\quad + \frac{1}{432}(19d + 52f + 112h) \tanh^{-1}\left(\frac{x}{2}\right) - \frac{1}{54}(d + 7f + 13h) \tanh^{-1}(x) \\
&\quad - \frac{1}{18}(2e + 5g + 8i) \text{Subst}\left(\int \frac{1}{4 - 5x + x^2} dx, x, x^2\right) \\
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{72(4 - 5x^2 + x^4)} + \frac{5e + 8g + 20i - (2e + 5g + 17i)x^2}{18(4 - 5x^2 + x^4)} \\
&\quad + \frac{1}{432}(19d + 52f + 112h) \tanh^{-1}\left(\frac{x}{2}\right) - \frac{1}{54}(d + 7f + 13h) \tanh^{-1}(x) \\
&\quad - \frac{1}{54}(-2e - 5g - 8i) \text{Subst}\left(\int \frac{1}{-1 + x} dx, x, x^2\right) \\
&\quad - \frac{1}{54}(2e + 5g + 8i) \text{Subst}\left(\int \frac{1}{-4 + x} dx, x, x^2\right) \\
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{72(4 - 5x^2 + x^4)} + \frac{5e + 8g + 20i - (2e + 5g + 17i)x^2}{18(4 - 5x^2 + x^4)} \\
&\quad + \frac{1}{432}(19d + 52f + 112h) \tanh^{-1}\left(\frac{x}{2}\right) - \frac{1}{54}(d + 7f + 13h) \tanh^{-1}(x) \\
&\quad + \frac{1}{54}(2e + 5g + 8i) \log(1 - x^2) - \frac{1}{54}(2e + 5g + 8i) \log(4 - x^2)
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.06 (sec) , antiderivative size = 185, normalized size of antiderivative = 1.14

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{20e + 32g + 80i + 17dx + 20fx + 32hx - 8ex^2 - 20gx^2 - 68ix^2 - 5dx^3 - 8fx^3 - 20hx^3}{72(4 - 5x^2 + x^4)}$$

$$+ \frac{1}{108}(d + 4e + 7f + 10g + 13h + 16i) \log(1 - x)$$

$$+ \frac{1}{864}(-19d - 32e - 52f - 80g - 112h - 128i) \log(2 - x)$$

$$+ \frac{1}{108}(-d + 4e - 7f + 10g - 13h + 16i) \log(1 + x)$$

$$+ \frac{1}{864}(19d - 32e + 52f - 80g + 112h - 128i) \log(2 + x)$$

`[In] Integrate[(d + e*x + f*x^2 + g*x^3 + h*x^4 + i*x^5)/(4 - 5*x^2 + x^4)^2,x]`

```
[Out] (20*e + 32*g + 80*i + 17*d*x + 20*f*x + 32*h*x - 8*e*x^2 - 20*g*x^2 - 68*i*x^2 - 5*d*x^3 - 8*f*x^3 - 20*h*x^3)/(72*(4 - 5*x^2 + x^4)) + ((d + 4*e + 7*f + 10*g + 13*h + 16*i)*Log[1 - x])/108 + ((-19*d - 32*e - 52*f - 80*g - 112*h - 128*i)*Log[2 - x])/864 + ((-d + 4*e - 7*f + 10*g - 13*h + 16*i)*Log[1 + x])/108 + ((19*d - 32*e + 52*f - 80*g + 112*h - 128*i)*Log[2 + x])/864
```

**Maple [A] (verified)**

Time = 0.12 (sec) , antiderivative size = 161, normalized size of antiderivative = 0.99

method	result
norman	$\frac{\left(-\frac{5d}{72} - \frac{f}{9} - \frac{5h}{18}\right)x^3 + \left(\frac{17d}{72} + \frac{5f}{18} + \frac{4h}{9}\right)x + \left(-\frac{5g}{18} - \frac{e}{9} - \frac{17i}{18}\right)x^2 + \frac{4g}{9} + \frac{5e}{18} + \frac{10i}{9}}{x^4 - 5x^2 + 4} + \left(-\frac{19d}{864} - \frac{e}{27} - \frac{13f}{216} - \frac{5g}{54} - \frac{7h}{54} - \frac{4i}{27}\right) \ln$
default	$-\frac{\frac{d}{144} - \frac{e}{72} + \frac{f}{36} - \frac{g}{18} + \frac{h}{9} - \frac{2i}{9}}{x+2} + \left(\frac{19d}{864} - \frac{e}{27} + \frac{13f}{216} - \frac{5g}{54} + \frac{7h}{54} - \frac{4i}{27}\right) \ln(x+2) + \left(-\frac{d}{108} + \frac{e}{27} - \frac{7f}{108} + \frac{5g}{54} - \frac{7h}{108} + \frac{4i}{27}\right) \ln$
risch	$\frac{4 \ln(x+1)i}{27} + \frac{\left(-\frac{5d}{72} - \frac{f}{9} - \frac{5h}{18}\right)x^3 + \left(\frac{17d}{72} + \frac{5f}{18} + \frac{4h}{9}\right)x + \left(-\frac{5g}{18} - \frac{e}{9} - \frac{17i}{18}\right)x^2 + \frac{4g}{9} + \frac{5e}{18} + \frac{10i}{9}}{x^4 - 5x^2 + 4} + \frac{13 \ln(x+2)f}{216} + \frac{7 \ln(1-x)f}{108} - \frac{7 \ln(x-2)g}{108}$
parallelrisc	$-\frac{-960i - 384g - 240e + 96fx^3 + 240gx^2 + 240hx^3 - 204dx + 816ix^2 + 76 \ln(x-2)d + 128 \ln(x-2)e - 32 \ln(x-1)d - 128 \ln(x-1)e - 512i}{72(4 - 5x^2 + x^4)}$

`[In] int((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x,method=_RETURNVERBOSE)`

```
[Out] ((-5/72*d-1/9*f-5/18*h)*x^3+(17/72*d+5/18*f+4/9*h)*x+(-5/18*g-1/9*e-17/18*i)*x^2+4/9*g+5/18*e+10/9*i)/(x^4-5*x^2+4)+(-19/864*d-1/27*e-13/216*f-5/54*g-7/54*h-4/27*i)*ln(x-2)+(-1/108*d+1/27*e-7/108*f+5/54*g-13/108*h+4/27*i)*ln(x+2)
```



$x+1)+(1/108*d+1/27*e+7/108*f+5/54*g+13/108*h+4/27*i)*\ln(x-1)+(19/864*d-1/27*e+13/216*f-5/54*g+7/54*h-4/27*i)*\ln(x+2)$

### Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 346 vs.  $2(146) = 292$ .

Time = 6.24 (sec) , antiderivative size = 346, normalized size of antiderivative = 2.14

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^2} dx = \frac{12(5d + 8f + 20h)x^3 + 48(2e + 5g + 17i)x^2 - 12(17d + 20f + 32h)x - ((19d - 32e + 52f - 80g + 112h - 128i)x^4 - 5(19d - 32e + 52f - 80g + 112h - 128i)x^2 + 76d - 128e + 208f - 320g + 448h - 512i)\log(x + 2) + 8((d - 4e + 7f - 10g + 13h - 16i)x^4 - 5(d - 4e + 7f - 10g + 13h - 16i)x^2 + 4d - 16e + 28f - 40g + 52h - 64i)\log(x + 1) - 8((d + 4e + 7f + 10g + 13h + 16i)x^4 - 5(d + 4e + 7f + 10g + 13h + 16i)x^2 + 4d + 16e + 28f + 40g + 52h + 64i)\log(x - 1) + ((19d + 32e + 52f + 80g + 112h + 128i)x^4 - 5(19d + 32e + 52f + 80g + 112h + 128i)x^2 + 76d + 128e + 208f + 320g + 448h + 512i)\log(x - 2) - 240e - 384g - 960i}{(x^4 - 5x^2 + 4)^2}$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out]  $-1/864*(12*(5*d + 8*f + 20*h)*x^3 + 48*(2*e + 5*g + 17*i)*x^2 - 12*(17*d + 20*f + 32*h)*x - ((19*d - 32*e + 52*f - 80*g + 112*h - 128*i)*x^4 - 5*(19*d - 32*e + 52*f - 80*g + 112*h - 128*i)*x^2 + 76*d - 128*e + 208*f - 320*g + 448*h - 512*i)*\log(x + 2) + 8*((d - 4*e + 7*f - 10*g + 13*h - 16*i)*x^4 - 5*(d - 4*e + 7*f - 10*g + 13*h - 16*i)*x^2 + 4*d - 16*e + 28*f - 40*g + 52*h - 64*i)*\log(x + 1) - 8*((d + 4*e + 7*f + 10*g + 13*h + 16*i)*x^4 - 5*(d + 4*e + 7*f + 10*g + 13*h + 16*i)*x^2 + 4*d + 16*e + 28*f + 40*g + 52*h + 64*i)*\log(x - 1) + ((19*d + 32*e + 52*f + 80*g + 112*h + 128*i)*x^4 - 5*(19*d + 32*e + 52*f + 80*g + 112*h + 128*i)*x^2 + 76*d + 128*e + 208*f + 320*g + 448*h + 512*i)*\log(x - 2) - 240*e - 384*g - 960*i)/(x^4 - 5*x^2 + 4)$

### Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

[In] integrate((i\*x\*\*5+h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.20 (sec) , antiderivative size = 163, normalized size of antiderivative = 1.01

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{864} (19d - 32e + 52f - 80g + 112h - 128i) \log(x + 2)$$

$$- \frac{1}{108} (d - 4e + 7f - 10g + 13h - 16i) \log(x + 1)$$

$$+ \frac{1}{108} (d + 4e + 7f + 10g + 13h + 16i) \log(x - 1)$$

$$- \frac{1}{864} (19d + 32e + 52f + 80g + 112h + 128i) \log(x - 2)$$

$$- \frac{(5d + 8f + 20h)x^3 + 4(2e + 5g + 17i)x^2 - (17d + 20f + 32h)x - 20e - 32g - 80i}{72(x^4 - 5x^2 + 4)}$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] 1/864\*(19\*d - 32\*e + 52\*f - 80\*g + 112\*h - 128\*i)\*log(x + 2) - 1/108\*(d - 4\*e + 7\*f - 10\*g + 13\*h - 16\*i)\*log(x + 1) + 1/108\*(d + 4\*e + 7\*f + 10\*g + 13\*h + 16\*i)\*log(x - 1) - 1/864\*(19\*d + 32\*e + 52\*f + 80\*g + 112\*h + 128\*i)\*log(x - 2) - 1/72\*((5\*d + 8\*f + 20\*h)\*x^3 + 4\*(2\*e + 5\*g + 17\*i)\*x^2 - (17\*d + 20\*f + 32\*h)\*x - 20\*e - 32\*g - 80\*i)/(x^4 - 5\*x^2 + 4)

**Giac [A] (verification not implemented)**

none

Time = 0.31 (sec) , antiderivative size = 173, normalized size of antiderivative = 1.07

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{864} (19d - 32e + 52f - 80g + 112h - 128i) \log(|x + 2|)$$

$$- \frac{1}{108} (d - 4e + 7f - 10g + 13h - 16i) \log(|x + 1|)$$

$$+ \frac{1}{108} (d + 4e + 7f + 10g + 13h + 16i) \log(|x - 1|)$$

$$- \frac{1}{864} (19d + 32e + 52f + 80g + 112h + 128i) \log(|x - 2|)$$

$$- \frac{5dx^3 + 8fx^3 + 20hx^3 + 8ex^2 + 20gx^2 + 68ix^2 - 17dx - 20fx - 32hx - 20e - 32g - 80i}{72(x^4 - 5x^2 + 4)}$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] 1/864\*(19\*d - 32\*e + 52\*f - 80\*g + 112\*h - 128\*i)\*log(abs(x + 2)) - 1/108\*(d - 4\*e + 7\*f - 10\*g + 13\*h - 16\*i)\*log(abs(x + 1)) + 1/108\*(d + 4\*e + 7\*f + 10\*g + 13\*h + 16\*i)\*log(abs(x - 1)) - 1/864\*(19\*d + 32\*e + 52\*f + 80\*g + 112\*h + 128\*i)\*log(abs(x - 2)) - 1/72\*(5\*d\*x^3 + 8\*f\*x^3 + 20\*h\*x^3 + 8\*e\*x^2 + 20\*g\*x^2 + 68\*i\*x^2 - 17\*d\*x - 20\*f\*x - 32\*h\*x - 20\*e - 32\*g - 80\*i)/(x^4 - 5\*x^2 + 4)

## Mupad [B] (verification not implemented)

Time = 0.35 (sec) , antiderivative size = 164, normalized size of antiderivative = 1.01

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{\left(-\frac{5d}{72} - \frac{f}{9} - \frac{5h}{18}\right) x^3 + \left(-\frac{e}{9} - \frac{5g}{18} - \frac{17i}{18}\right) x^2 + \left(\frac{17d}{72} + \frac{5f}{18} + \frac{4h}{9}\right) x + \frac{5e}{18} + \frac{4g}{9} + \frac{10i}{9}}{x^4 - 5x^2 + 4}$$

$$+ \ln(x - 1) \left( \frac{d}{108} + \frac{e}{27} + \frac{7f}{108} + \frac{5g}{54} + \frac{13h}{108} + \frac{4i}{27} \right)$$

$$- \ln(x + 1) \left( \frac{d}{108} - \frac{e}{27} + \frac{7f}{108} - \frac{5g}{54} + \frac{13h}{108} - \frac{4i}{27} \right)$$

$$- \ln(x - 2) \left( \frac{19d}{864} + \frac{e}{27} + \frac{13f}{216} + \frac{5g}{54} + \frac{7h}{54} + \frac{4i}{27} \right)$$

$$+ \ln(x + 2) \left( \frac{19d}{864} - \frac{e}{27} + \frac{13f}{216} - \frac{5g}{54} + \frac{7h}{54} - \frac{4i}{27} \right)$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(x^4 - 5\*x^2 + 4)^2,x)

[Out] ((5\*e)/18 + (4\*g)/9 + (10\*i)/9 + x\*((17\*d)/72 + (5\*f)/18 + (4\*h)/9) - x^3\*((5\*d)/72 + f/9 + (5\*h)/18) - x^2\*(e/9 + (5\*g)/18 + (17\*i)/18))/(x^4 - 5\*x^2 + 4) + log(x - 1)\*(d/108 + e/27 + (7\*f)/108 + (5\*g)/54 + (13\*h)/108 + (4\*i)/27) - log(x + 1)\*(d/108 - e/27 + (7\*f)/108 - (5\*g)/54 + (13\*h)/108 - (4\*i)/27) - log(x - 2)\*((19\*d)/864 + e/27 + (13\*f)/216 + (5\*g)/54 + (7\*h)/54 + (4\*i)/27) + log(x + 2)\*((19\*d)/864 - e/27 + (13\*f)/216 - (5\*g)/54 + (7\*h)/54 - (4\*i)/27)

### 3.31 $\int \frac{d+ex}{(1+x^2+x^4)^2} dx$

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#### Optimal result

Integrand size = 16, antiderivative size = 140

$$\int \frac{d+ex}{(1+x^2+x^4)^2} dx = \frac{dx(1-x^2)}{6(1+x^2+x^4)} + \frac{e(1+2x^2)}{6(1+x^2+x^4)} - \frac{d \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{3\sqrt{3}} + \frac{d \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{3\sqrt{3}}$$

$$+ \frac{2e \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{4}d \log(1-x+x^2) + \frac{1}{4}d \log(1+x+x^2)$$

[Out] 1/6\*d\*x\*(-x^2+1)/(x^4+x^2+1)+1/6\*e\*(2\*x^2+1)/(x^4+x^2+1)-1/4\*d\*ln(x^2-x+1)+1/4\*d\*ln(x^2+x+1)-1/9\*d\*arctan(1/3\*(1-2\*x)\*3^(1/2))\*3^(1/2)+1/9\*d\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)+2/9\*e\*arctan(1/3\*(2\*x^2+1)\*3^(1/2))\*3^(1/2)

#### Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 140, normalized size of antiderivative = 1.00, number of steps used = 17, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.625$ , Rules used = {1687, 12, 1106, 1183, 648, 632, 210, 642, 1121, 628}

$$\int \frac{d+ex}{(1+x^2+x^4)^2} dx = -\frac{d \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{3\sqrt{3}} + \frac{d \arctan\left(\frac{2x+1}{\sqrt{3}}\right)}{3\sqrt{3}}$$

$$+ \frac{2e \arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{4}d \log(x^2-x+1)$$

$$+ \frac{1}{4}d \log(x^2+x+1) + \frac{dx(1-x^2)}{6(x^4+x^2+1)} + \frac{e(2x^2+1)}{6(x^4+x^2+1)}$$

[In] Int[(d + e\*x)/(1 + x^2 + x^4)^2,x]

```
[Out] (d*x*(1 - x^2))/(6*(1 + x^2 + x^4)) + (e*(1 + 2*x^2))/(6*(1 + x^2 + x^4)) -
(d*ArcTan[(1 - 2*x)/Sqrt[3]])/(3*Sqrt[3]) + (d*ArcTan[(1 + 2*x)/Sqrt[3]])/(
(3*Sqrt[3]) + (2*e*ArcTan[(1 + 2*x^2)/Sqrt[3]])/(3*Sqrt[3]) - (d*Log[1 - x
+ x^2])/4 + (d*Log[1 + x + x^2])/4
```

### Rule 12

```
Int[(a_)*(u_), x_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !Match
Q[u, (b_)*(v_)] /; FreeQ[b, x]
```

### Rule 210

```
Int[((a_) + (b_)*(x_)^2)^(-1), x_Symbol] := Simp[(-Rt[-a, 2]*Rt[-b, 2])^(
-1)*ArcTan[Rt[-b, 2]*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] &
& (LtQ[a, 0] || LtQ[b, 0])
```

### Rule 628

```
Int[((a_) + (b_)*(x_) + (c_)*(x_)^2)^(p_), x_Symbol] := Simp[(b + 2*c*x)
*((a + b*x + c*x^2)^(p + 1)/((p + 1)*(b^2 - 4*a*c))), x] - Dist[2*c*((2*p +
3)/((p + 1)*(b^2 - 4*a*c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; Free
Q[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && Int
egerQ[4*p]
```

### Rule 632

```
Int[((a_) + (b_)*(x_) + (c_)*(x_)^2)^(-1), x_Symbol] := Dist[-2, Subst[I
nt[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]
```

### Rule 642

```
Int[((d_) + (e_)*(x_))/((a_) + (b_)*(x_) + (c_)*(x_)^2), x_Symbol] := S
imp[d*(Log[RemoveContent[a + b*x + c*x^2, x]]/b), x] /; FreeQ[{a, b, c, d,
e}, x] && EqQ[2*c*d - b*e, 0]
```

### Rule 648

```
Int[((d_) + (e_)*(x_))/((a_) + (b_)*(x_) + (c_)*(x_)^2), x_Symbol] := D
ist[(2*c*d - b*e)/(2*c), Int[1/(a + b*x + c*x^2), x], x] + Dist[e/(2*c), In
t[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && !NiceSqrtQ[b^2 - 4*a*c]
```

### Rule 1106

```
Int[((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Simp[(-x)*(b^2
- 2*a*c + b*c*x^2)*((a + b*x^2 + c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))
```

), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[(b^2 - 2\*a\*c + 2\*(p + 1)\*(b^2 - 4\*a\*c) + b\*c\*(4\*p + 7)\*x^2)\*(a + b\*x^2 + c\*x^4)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && IntegerQ[2\*p]

### Rule 1121

Int[(x\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Dist[1/2, Subst[Int[(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]

### Rule 1183

Int[((d\_) + (e\_)\*(x\_)^2)/((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4), x\_Symbol] :> With[{q = Rt[a/c, 2]}, With[{r = Rt[2\*q - b/c, 2]}, Dist[1/(2\*c\*q\*r), Int[(d\*r - (d - e\*q)\*x)/(q - r\*x + x^2), x], x] + Dist[1/(2\*c\*q\*r), Int[(d\*r + (d - e\*q)\*x)/(q + r\*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && NegQ[b^2 - 4\*a\*c]

### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}](a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}](a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d}{(1+x^2+x^4)^2} dx + \int \frac{ex}{(1+x^2+x^4)^2} dx \\
 &= d \int \frac{1}{(1+x^2+x^4)^2} dx + e \int \frac{x}{(1+x^2+x^4)^2} dx \\
 &= \frac{dx(1-x^2)}{6(1+x^2+x^4)} + \frac{1}{6}d \int \frac{5-x^2}{1+x^2+x^4} dx + \frac{1}{2}e \text{Subst}\left(\int \frac{1}{(1+x+x^2)^2} dx, x, x^2\right) \\
 &= \frac{dx(1-x^2)}{6(1+x^2+x^4)} + \frac{e(1+2x^2)}{6(1+x^2+x^4)} + \frac{1}{12}d \int \frac{5-6x}{1-x+x^2} dx \\
 &\quad + \frac{1}{12}d \int \frac{5+6x}{1+x+x^2} dx + \frac{1}{3}e \text{Subst}\left(\int \frac{1}{1+x+x^2} dx, x, x^2\right) \\
 &= \frac{dx(1-x^2)}{6(1+x^2+x^4)} + \frac{e(1+2x^2)}{6(1+x^2+x^4)} + \frac{1}{6}d \int \frac{1}{1-x+x^2} dx + \frac{1}{6}d \int \frac{1}{1+x+x^2} dx \\
 &\quad - \frac{1}{4}d \int \frac{-1+2x}{1-x+x^2} dx + \frac{1}{4}d \int \frac{1+2x}{1+x+x^2} dx - \frac{1}{3}(2e) \text{Subst}\left(\int \frac{1}{-3-x^2} dx, x, 1\right. \\
 &\quad \left.+ 2x^2\right)
 \end{aligned}$$

$$\begin{aligned}
&= \frac{dx(1-x^2)}{6(1+x^2+x^4)} + \frac{e(1+2x^2)}{6(1+x^2+x^4)} + \frac{2e \tan^{-1}\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} \\
&\quad - \frac{1}{4}d \log(1-x+x^2) + \frac{1}{4}d \log(1+x+x^2) \\
&\quad - \frac{1}{3}d\text{Subst}\left(\int \frac{1}{-3-x^2} dx, x, -1+2x\right) - \frac{1}{3}d\text{Subst}\left(\int \frac{1}{-3-x^2} dx, x, 1+2x\right) \\
&= \frac{dx(1-x^2)}{6(1+x^2+x^4)} + \frac{e(1+2x^2)}{6(1+x^2+x^4)} - \frac{d \tan^{-1}\left(\frac{1-2x}{\sqrt{3}}\right)}{3\sqrt{3}} + \frac{d \tan^{-1}\left(\frac{1+2x}{\sqrt{3}}\right)}{3\sqrt{3}} \\
&\quad + \frac{2e \tan^{-1}\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{4}d \log(1-x+x^2) + \frac{1}{4}d \log(1+x+x^2)
\end{aligned}$$

### Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.35 (sec) , antiderivative size = 146, normalized size of antiderivative = 1.04

$$\begin{aligned}
\int \frac{d+ex}{(1+x^2+x^4)^2} dx &= \frac{e+dx+2ex^2-dx^3}{6(1+x^2+x^4)} - \frac{(-11i+\sqrt{3})d \arctan\left(\frac{1}{2}(-i+\sqrt{3})x\right)}{6\sqrt{6+6i\sqrt{3}}} \\
&\quad - \frac{(11i+\sqrt{3})d \arctan\left(\frac{1}{2}(i+\sqrt{3})x\right)}{6\sqrt{6-6i\sqrt{3}}} - \frac{2e \arctan\left(\frac{\sqrt{3}}{1+2x^2}\right)}{3\sqrt{3}}
\end{aligned}$$

[In] Integrate[(d + e\*x)/(1 + x^2 + x^4)^2,x]

[Out] (e + d\*x + 2\*e\*x^2 - d\*x^3)/(6\*(1 + x^2 + x^4)) - ((-11\*I + Sqrt[3])\*d\*ArcTan[(-I + Sqrt[3])\*x/2])/(6\*Sqrt[6 + (6\*I)\*Sqrt[3]]) - ((11\*I + Sqrt[3])\*d\*ArcTan[(I + Sqrt[3])\*x/2])/(6\*Sqrt[6 - (6\*I)\*Sqrt[3]]) - (2\*e\*ArcTan[Sqrt[3]/(1 + 2\*x^2)])/(3\*Sqrt[3])

### Maple [A] (verified)

Time = 0.15 (sec) , antiderivative size = 124, normalized size of antiderivative = 0.89

method	result
default	$ -\frac{\left(\frac{d}{3}-\frac{e}{3}\right)x-\frac{2d}{3}-\frac{e}{3}}{4(x^2-x+1)} - \frac{d \ln(x^2-x+1)}{4} - \frac{(-2d-4e)\sqrt{3} \arctan\left(\frac{(2x-1)\sqrt{3}}{3}\right)}{18} + \frac{\left(-\frac{d}{3}-\frac{e}{3}\right)x-\frac{2d}{3}+\frac{e}{3}}{4x^2+4x+4} + \frac{d \ln(x^2+x+1)}{4} + \frac{(2d-4e)\sqrt{3} \arctan\left(\frac{(2x+1)\sqrt{3}}{3}\right)}{18} $
risch	$ \frac{d \ln(10044d^2x^2+5952e^2x^2+10044d^2x+5952e^2x+10044d^2+5952e^2)}{4} + \frac{\sqrt{3}d \arctan\left(\frac{18d^2x\sqrt{3}}{27d^2+16e^2} + \frac{32e^2x\sqrt{3}}{3(27d^2+16e^2)} + \frac{9\sqrt{3}d^2}{27d^2+16e^2} + \frac{1}{3(27d^2+16e^2)}\right)}{9} $

[In] int((e\*x+d)/(x^4+x^2+1)^2,x,method=\_RETURNVERBOSE)

[Out]  $-1/4*((1/3*d-1/3*e)*x-2/3*d-1/3*e)/(x^2-x+1)-1/4*d*\ln(x^2-x+1)-1/18*(-2*d-4*e)*3^{(1/2)}*\arctan(1/3*(2*x-1)*3^{(1/2)})+1/4*((-1/3*d-1/3*e)*x-2/3*d+1/3*e)/(x^2+x+1)+1/4*d*\ln(x^2+x+1)+1/18*(2*d-4*e)*\arctan(1/3*(1+2*x)*3^{(1/2)})*3^{(1/2)}$

## Fricas [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 154, normalized size of antiderivative = 1.10

$$\int \frac{d+ex}{(1+x^2+x^4)^2} dx = \frac{6dx^3 - 12ex^2 - 4\sqrt{3}((d-2e)x^4 + (d-2e)x^2 + d-2e) \arctan\left(\frac{1}{3}\sqrt{3}(2x+1)\right) - 4\sqrt{3}((d+2e)x^4 + (d+2e)x^2 + d+2e) \arctan\left(\frac{1}{3}\sqrt{3}(2x-1)\right) - 6dx - 9(dx^4 + dx^2 + d) \log(x^2 + x + 1) + 9(dx^4 + dx^2 + d) \log(x^2 - x + 1) - 6e}{(1+x^2+x^4)^2}$$

[In] `integrate((e*x+d)/(x^4+x^2+1)^2,x, algorithm="fricas")`

[Out]  $-1/36*(6*d*x^3 - 12*e*x^2 - 4*\sqrt{3}*((d - 2*e)*x^4 + (d - 2*e)*x^2 + d - 2*e)*\arctan(1/3*\sqrt{3}*(2*x + 1)) - 4*\sqrt{3}*((d + 2*e)*x^4 + (d + 2*e)*x^2 + d + 2*e)*\arctan(1/3*\sqrt{3}*(2*x - 1)) - 6*d*x - 9*(d*x^4 + d*x^2 + d) * \log(x^2 + x + 1) + 9*(d*x^4 + d*x^2 + d) * \log(x^2 - x + 1) - 6*e)/(x^4 + x^2 + 1)$

## Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 2.01 (sec) , antiderivative size = 952, normalized size of antiderivative = 6.80

$$\int \frac{d+ex}{(1+x^2+x^4)^2} dx = \text{Too large to display}$$

[In] `integrate((e*x+d)/(x**4+x**2+1)**2,x)`

[Out]  $(-d/4 - \sqrt{3}*I*(d + 2*e)/18)*\log(x + (-10309*d**4*e + 1026*d**4*(-d/4 - \sqrt{3}*I*(d + 2*e)/18) - 7200*d**2*e**3 - 31536*d**2*e**2*(-d/4 - \sqrt{3}*I*(d + 2*e)/18) + 108432*d**2*e*(-d/4 - \sqrt{3}*I*(d + 2*e)/18)**2 + 163296*d**2*(-d/4 - \sqrt{3}*I*(d + 2*e)/18)**3 + 1792*e**5 + 11520*e**4*(-d/4 - \sqrt{3}*I*(d + 2*e)/18) + 48384*e**3*(-d/4 - \sqrt{3}*I*(d + 2*e)/18)**2 + 311040*e**2*(-d/4 - \sqrt{3}*I*(d + 2*e)/18)**3)/(3348*d**5 - 11408*d**3*e**2 - 7936*d*e**4) + (-d/4 + \sqrt{3}*I*(d + 2*e)/18)*\log(x + (-10309*d**4*e + 1026*d**4*(-d/4 + \sqrt{3}*I*(d + 2*e)/18) - 7200*d**2*e**3 - 31536*d**2*e**2*(-d/4 + \sqrt{3}*I*(d + 2*e)/18) + 108432*d**2*e*(-d/4 + \sqrt{3}*I*(d + 2*e)/18)**2 + 163296*d**2*(-d/4 + \sqrt{3}*I*(d + 2*e)/18)**3 + 1792*e**5 + 11520*e**4*(-d/4 + \sqrt{3}*I*(d + 2*e)/18) + 48384*e**3*(-d/4 + \sqrt{3}*I*(d + 2*e)/18)**2 + 311040*e**2*(-d/4 + \sqrt{3}*I*(d + 2*e)/18)**3)/(3348*d**5 - 11408*d**3*e**2 - 7936*d*e**4)$



+ 2\*e)/18)\*\*2 + 311040\*e\*\*2\*(-d/4 + sqrt(3)\*I\*(d + 2\*e)/18)\*\*3)/(3348\*d\*\*5 - 11408\*d\*\*3\*e\*\*2 - 7936\*d\*e\*\*4)) + (d/4 - sqrt(3)\*I\*(d - 2\*e)/18)\*log(x + (-10309\*d\*\*4\*e + 1026\*d\*\*4\*(d/4 - sqrt(3)\*I\*(d - 2\*e)/18) - 7200\*d\*\*2\*e\*\*3 - 31536\*d\*\*2\*e\*\*2\*(d/4 - sqrt(3)\*I\*(d - 2\*e)/18) + 108432\*d\*\*2\*e\*(d/4 - sqrt(3)\*I\*(d - 2\*e)/18)\*\*2 + 163296\*d\*\*2\*(d/4 - sqrt(3)\*I\*(d - 2\*e)/18)\*\*3 + 1792\*e\*\*5 + 11520\*e\*\*4\*(d/4 - sqrt(3)\*I\*(d - 2\*e)/18) + 48384\*e\*\*3\*(d/4 - sqrt(3)\*I\*(d - 2\*e)/18)\*\*2 + 311040\*e\*\*2\*(d/4 - sqrt(3)\*I\*(d - 2\*e)/18)\*\*3)/(3348\*d\*\*5 - 11408\*d\*\*3\*e\*\*2 - 7936\*d\*e\*\*4)) + (d/4 + sqrt(3)\*I\*(d - 2\*e)/18)\*log(x + (-10309\*d\*\*4\*e + 1026\*d\*\*4\*(d/4 + sqrt(3)\*I\*(d - 2\*e)/18) - 7200\*d\*\*2\*e\*\*3 - 31536\*d\*\*2\*e\*\*2\*(d/4 + sqrt(3)\*I\*(d - 2\*e)/18) + 108432\*d\*\*2\*e\*(d/4 + sqrt(3)\*I\*(d - 2\*e)/18)\*\*2 + 163296\*d\*\*2\*(d/4 + sqrt(3)\*I\*(d - 2\*e)/18)\*\*3 + 1792\*e\*\*5 + 11520\*e\*\*4\*(d/4 + sqrt(3)\*I\*(d - 2\*e)/18) + 48384\*e\*\*3\*(d/4 + sqrt(3)\*I\*(d - 2\*e)/18)\*\*2 + 311040\*e\*\*2\*(d/4 + sqrt(3)\*I\*(d - 2\*e)/18)\*\*3)/(3348\*d\*\*5 - 11408\*d\*\*3\*e\*\*2 - 7936\*d\*e\*\*4)) + (-d\*x\*\*3 + d\*x + 2\*e\*x\*\*2 + e)/(6\*x\*\*4 + 6\*x\*\*2 + 6)

### Maxima [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 96, normalized size of antiderivative = 0.69

$$\int \frac{d + ex}{(1 + x^2 + x^4)^2} dx = \frac{1}{9} \sqrt{3}(d - 2e) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) + \frac{1}{9} \sqrt{3}(d + 2e) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) + \frac{1}{4} d \log(x^2 + x + 1) - \frac{1}{4} d \log(x^2 - x + 1) - \frac{dx^3 - 2ex^2 - dx - e}{6(x^4 + x^2 + 1)}$$

[In] integrate((e\*x+d)/(x^4+x^2+1)^2,x, algorithm="maxima")

[Out] 1/9\*sqrt(3)\*(d - 2\*e)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/9\*sqrt(3)\*(d + 2\*e)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/4\*d\*log(x^2 + x + 1) - 1/4\*d\*log(x^2 - x + 1) - 1/6\*(d\*x^3 - 2\*e\*x^2 - d\*x - e)/(x^4 + x^2 + 1)

### Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 96, normalized size of antiderivative = 0.69

$$\int \frac{d + ex}{(1 + x^2 + x^4)^2} dx = \frac{1}{9} \sqrt{3}(d - 2e) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) + \frac{1}{9} \sqrt{3}(d + 2e) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) + \frac{1}{4} d \log(x^2 + x + 1) - \frac{1}{4} d \log(x^2 - x + 1) - \frac{dx^3 - 2ex^2 - dx - e}{6(x^4 + x^2 + 1)}$$

[In] integrate((e\*x+d)/(x^4+x^2+1)^2,x, algorithm="giac")

[Out]  $\frac{1}{9}\sqrt{3}(d - 2e)\arctan\left(\frac{1}{3}\sqrt{3}(2x + 1)\right) + \frac{1}{9}\sqrt{3}(d + 2e)\arctan\left(\frac{1}{3}\sqrt{3}(2x - 1)\right) + \frac{1}{4}d\log(x^2 + x + 1) - \frac{1}{4}e\log(x^2 - x + 1) - \frac{1}{6}(dx^3 - 2ex^2 - dx - e)/(x^4 + x^2 + 1)$

### Mupad [B] (verification not implemented)

Time = 0.14 (sec) , antiderivative size = 149, normalized size of antiderivative = 1.06

$$\int \frac{d + ex}{(1 + x^2 + x^4)^2} dx = \frac{-\frac{dx^3}{6} + \frac{ex^2}{3} + \frac{dx}{6} + \frac{e}{6}}{x^4 + x^2 + 1} - \ln\left(x - \frac{1}{2} - \frac{\sqrt{3}li}{2}\right) \left(\frac{d}{4} + \frac{\sqrt{3}dli}{18} + \frac{\sqrt{3}eli}{9}\right) + \ln\left(x + \frac{1}{2} - \frac{\sqrt{3}li}{2}\right) \left(\frac{d}{4} - \frac{\sqrt{3}dli}{18} + \frac{\sqrt{3}eli}{9}\right) + \ln\left(x - \frac{1}{2} + \frac{\sqrt{3}li}{2}\right) \left(-\frac{d}{4} + \frac{\sqrt{3}dli}{18} + \frac{\sqrt{3}eli}{9}\right) + \ln\left(x + \frac{1}{2} + \frac{\sqrt{3}li}{2}\right) \left(\frac{d}{4} + \frac{\sqrt{3}dli}{18} - \frac{\sqrt{3}eli}{9}\right)$$

[In] int((d + e\*x)/(x^2 + x^4 + 1)^2,x)

[Out]  $\frac{e}{6} + \frac{d*x}{6} - \frac{d*x^3}{6} + \frac{e*x^2}{3} / (x^2 + x^4 + 1) - \log(x - (3^{1/2})*li)/2 - 1/2*(d/4 + (3^{1/2}*d*li)/18 + (3^{1/2}*e*li)/9) + \log(x - (3^{1/2})*li)/2 + 1/2*(d/4 - (3^{1/2}*d*li)/18 + (3^{1/2}*e*li)/9) + \log(x + (3^{1/2})*li)/2 - 1/2*((3^{1/2}*d*li)/18 - d/4 + (3^{1/2}*e*li)/9) + \log(x + (3^{1/2})*li)/2 + 1/2*(d/4 + (3^{1/2}*d*li)/18 - (3^{1/2}*e*li)/9)$

### 3.32 $\int \frac{d+ex+fx^2}{(1+x^2+x^4)^2} dx$

Optimal result	299
Rubi [A] (verified)	300
Mathematica [C] (verified)	302
Maple [A] (verified)	303
Fricas [A] (verification not implemented)	304
Sympy [C] (verification not implemented)	304
Maxima [A] (verification not implemented)	307
Giac [A] (verification not implemented)	307
Mupad [B] (verification not implemented)	308

#### Optimal result

Integrand size = 21, antiderivative size = 165

$$\int \frac{d+ex+fx^2}{(1+x^2+x^4)^2} dx = \frac{e(1+2x^2)}{6(1+x^2+x^4)} + \frac{x(d+f-(d-2f)x^2)}{6(1+x^2+x^4)} - \frac{(4d+f)\arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{12\sqrt{3}}$$

$$+ \frac{(4d+f)\arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{12\sqrt{3}} + \frac{2e\arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}}$$

$$- \frac{1}{8}(2d-f)\log(1-x+x^2) + \frac{1}{8}(2d-f)\log(1+x+x^2)$$

```
[Out] 1/6*e*(2*x^2+1)/(x^4+x^2+1)+1/6*x*(d+f-(d-2*f)*x^2)/(x^4+x^2+1)-1/8*(2*d-f)
*ln(x^2-x+1)+1/8*(2*d-f)*ln(x^2+x+1)-1/36*(4*d+f)*arctan(1/3*(1-2*x)*3^(1/2)
))*3^(1/2)+1/36*(4*d+f)*arctan(1/3*(1+2*x)*3^(1/2))*3^(1/2)+2/9*e*arctan(1/
3*(2*x^2+1)*3^(1/2))*3^(1/2)
```

**Rubi [A] (verified)**

Time = 0.09 (sec) , antiderivative size = 165, normalized size of antiderivative = 1.00, number of steps used = 16, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.476$ , Rules used = {1687, 1192, 1183, 648, 632, 210, 642, 12, 1121, 628}

$$\int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^2} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(4d+f)}{12\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(4d+f)}{12\sqrt{3}} + \frac{2e \arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{8}(2d-f)\log(x^2-x+1) + \frac{1}{8}(2d-f)\log(x^2+x+1) + \frac{x(-x^2(d-2f))+d+f}{6(x^4+x^2+1)} + \frac{e(2x^2+1)}{6(x^4+x^2+1)}$$

[In] Int[(d + e\*x + f\*x^2)/(1 + x^2 + x^4)^2,x]

[Out] (e\*(1 + 2\*x^2))/(6\*(1 + x^2 + x^4)) + (x\*(d + f - (d - 2\*f)\*x^2))/(6\*(1 + x^2 + x^4)) - ((4\*d + f)\*ArcTan[(1 - 2\*x)/Sqrt[3]])/(12\*Sqrt[3]) + ((4\*d + f)\*ArcTan[(1 + 2\*x)/Sqrt[3]])/(12\*Sqrt[3]) + (2\*e\*ArcTan[(1 + 2\*x^2)/Sqrt[3]])/(3\*Sqrt[3]) - ((2\*d - f)\*Log[1 - x + x^2])/8 + ((2\*d - f)\*Log[1 + x + x^2])/8

Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

Rule 210

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-(Rt[-a, 2]\*Rt[-b, 2])^(-1))\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

Rule 628

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p + 1)/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x, x] /; FreeQ[{a, b, c},

x] && NeQ[b^2 - 4\*a\*c, 0]

#### Rule 642

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := Simp[d\*(Log[RemoveContent[a + b\*x + c\*x^2, x]]/b), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[2\*c\*d - b\*e, 0]

#### Rule 648

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := Dist[(2\*c\*d - b\*e)/(2\*c), Int[1/(a + b\*x + c\*x^2), x], x] + Dist[e/(2\*c), Int[(b + 2\*c\*x)/(a + b\*x + c\*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && !NiceSqrtQ[b^2 - 4\*a\*c]

#### Rule 1121

Int[(x\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Dist[1/2, Subst[Int[(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]

#### Rule 1183

Int[((d\_) + (e\_)\*(x\_)^2)/((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4), x\_Symbol] :> With[{q = Rt[a/c, 2]}, With[{r = Rt[2\*q - b/c, 2]}, Dist[1/(2\*c\*q\*r), Int[(d\*r - (d - e\*q)\*x)/(q - r\*x + x^2), x], x] + Dist[1/(2\*c\*q\*r), Int[(d\*r + (d - e\*q)\*x)/(q + r\*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && NegQ[b^2 - 4\*a\*c]

#### Rule 1192

Int[((d\_) + (e\_)\*(x\_)^2)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Simp[x\*(a\*b\*e - d\*(b^2 - 2\*a\*c) - c\*(b\*d - 2\*a\*e)\*x^2)\*((a + b\*x^2 + c\*x^4)^(p + 1)/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c))), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[Simp[(2\*p + 3)\*d\*b^2 - a\*b\*e - 2\*a\*c\*d\*(4\*p + 5) + (4\*p + 7)\*(d\*b - 2\*a\*e)\*c\*x^2, x]\*(a + b\*x^2 + c\*x^4)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && LtQ[p, -1] && IntegerQ[2\*p]

#### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{ex}{(1+x^2+x^4)^2} dx + \int \frac{d+fx^2}{(1+x^2+x^4)^2} dx \\
&= \frac{x(d+f-(d-2f)x^2)}{6(1+x^2+x^4)} + \frac{1}{6} \int \frac{5d-f+(-d+2f)x^2}{1+x^2+x^4} dx + e \int \frac{x}{(1+x^2+x^4)^2} dx \\
&= \frac{x(d+f-(d-2f)x^2)}{6(1+x^2+x^4)} + \frac{1}{12} \int \frac{5d-f-(6d-3f)x}{1-x+x^2} dx \\
&\quad + \frac{1}{12} \int \frac{5d-f+(6d-3f)x}{1+x+x^2} dx + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{(1+x+x^2)^2} dx, x, x^2 \right) \\
&= \frac{e(1+2x^2)}{6(1+x^2+x^4)} + \frac{x(d+f-(d-2f)x^2)}{6(1+x^2+x^4)} + \frac{1}{3} e \text{Subst} \left( \int \frac{1}{1+x+x^2} dx, x, x^2 \right) \\
&\quad + \frac{1}{8} (2d-f) \int \frac{1+2x}{1+x+x^2} dx + \frac{1}{8} (-2d+f) \int \frac{-1+2x}{1-x+x^2} dx \\
&\quad + \frac{1}{24} (4d+f) \int \frac{1}{1-x+x^2} dx + \frac{1}{24} (4d+f) \int \frac{1}{1+x+x^2} dx \\
&= \frac{e(1+2x^2)}{6(1+x^2+x^4)} + \frac{x(d+f-(d-2f)x^2)}{6(1+x^2+x^4)} - \frac{1}{8} (2d-f) \log(1-x+x^2) \\
&\quad + \frac{1}{8} (2d-f) \log(1+x+x^2) - \frac{1}{3} (2e) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x^2 \right) \\
&\quad + \frac{1}{12} (-4d-f) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, -1+2x \right) \\
&\quad + \frac{1}{12} (-4d-f) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x \right) \\
&= \frac{e(1+2x^2)}{6(1+x^2+x^4)} + \frac{x(d+f-(d-2f)x^2)}{6(1+x^2+x^4)} - \frac{(4d+f) \tan^{-1} \left( \frac{1-2x}{\sqrt{3}} \right)}{12\sqrt{3}} + \frac{(4d+f) \tan^{-1} \left( \frac{1+2x}{\sqrt{3}} \right)}{12\sqrt{3}} \\
&\quad + \frac{2e \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{3\sqrt{3}} - \frac{1}{8} (2d-f) \log(1-x+x^2) + \frac{1}{8} (2d-f) \log(1+x+x^2)
\end{aligned}$$

**Mathematica [C] (verified)**

Result contains complex when optimal does not.

Time = 0.28 (sec) , antiderivative size = 186, normalized size of antiderivative = 1.13

$$\int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^2} dx = \frac{1}{36} \left( \frac{6(e + 2ex^2 + x(d + f - dx^2 + 2fx^2))}{1 + x^2 + x^4} \right. \\ - \frac{((-11i + \sqrt{3})d - 2(-2i + \sqrt{3})f) \arctan\left(\frac{1}{2}(-i + \sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1 + i\sqrt{3})}} \\ \left. - \frac{((11i + \sqrt{3})d - 2(2i + \sqrt{3})f) \arctan\left(\frac{1}{2}(i + \sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1 - i\sqrt{3})}} \right. \\ \left. - 8\sqrt{3}e \arctan\left(\frac{\sqrt{3}}{1 + 2x^2}\right) \right)$$

[In] Integrate[(d + e\*x + f\*x^2)/(1 + x^2 + x^4)^2,x]

[Out] ((6\*(e + 2\*e\*x^2 + x\*(d + f - d\*x^2 + 2\*f\*x^2)))/(1 + x^2 + x^4) - (((-11\*I + Sqrt[3])\*d - 2\*(-2\*I + Sqrt[3])\*f)\*ArcTan[(-I + Sqrt[3])\*x]/2))/Sqrt[(1 + I\*Sqrt[3])/6] - (((11\*I + Sqrt[3])\*d - 2\*(2\*I + Sqrt[3])\*f)\*ArcTan[(I + Sqrt[3])\*x]/2))/Sqrt[(1 - I\*Sqrt[3])/6] - 8\*Sqrt[3]\*e\*ArcTan[Sqrt[3]/(1 + 2\*x^2)]/36

## Maple [A] (verified)

Time = 0.27 (sec) , antiderivative size = 154, normalized size of antiderivative = 0.93

method	result
default	$-\frac{\left(\frac{d}{3} - \frac{e}{3} - \frac{2f}{3}\right)x - \frac{2d}{3} - \frac{e}{3} + \frac{f}{3}}{4(x^2 - x + 1)} - \frac{(6d - 3f) \ln(x^2 - x + 1)}{24} - \frac{(-2d - 4e - \frac{f}{2})\sqrt{3} \arctan\left(\frac{(2x-1)\sqrt{3}}{3}\right)}{18} + \frac{\left(-\frac{d}{3} - \frac{e}{3} + \frac{2f}{3}\right)x - \frac{2d}{3} + \frac{e}{3} + \frac{f}{3}}{4x^2 + 4x + 4}$
risch	Expression too large to display

[In] int((f\*x^2+e\*x+d)/(x^4+x^2+1)^2,x,method=\_RETURNVERBOSE)

[Out] -1/4\*((1/3\*d-1/3\*e-2/3\*f)\*x-2/3\*d-1/3\*e+1/3\*f)/(x^2-x+1)-1/24\*(6\*d-3\*f)\*ln(x^2-x+1)-1/18\*(-2\*d-4\*e-1/2\*f)\*3^(1/2)\*arctan(1/3\*(2\*x-1)\*3^(1/2))+1/4\*((-1/3\*d-1/3\*e+2/3\*f)\*x-2/3\*d+1/3\*e+1/3\*f)/(x^2+x+1)+1/24\*(6\*d-3\*f)\*ln(x^2+x+1)+1/18\*(2\*d-4\*e+1/2\*f)\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)

**Fricas [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 212, normalized size of antiderivative = 1.28

$$\int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^2} dx = \frac{12(d - 2f)x^3 - 24ex^2 - 2\sqrt{3}((4d - 8e + f)x^4 + (4d - 8e + f)x^2 + 4d - 8e + f) \arctan\left(\frac{1}{3}\sqrt{3}(2x + 1)\right)}{(1 + x^2 + x^4)^2}$$

```
[In] integrate((f*x^2+e*x+d)/(x^4+x^2+1)^2,x, algorithm="fricas")
```

```
[Out] -1/72*(12*(d - 2*f)*x^3 - 24*e*x^2 - 2*sqrt(3)*((4*d - 8*e + f)*x^4 + (4*d - 8*e + f)*x^2 + 4*d - 8*e + f)*arctan(1/3*sqrt(3)*(2*x + 1)) - 2*sqrt(3)*((4*d + 8*e + f)*x^4 + (4*d + 8*e + f)*x^2 + 4*d + 8*e + f)*arctan(1/3*sqrt(3)*(2*x - 1)) - 12*(d + f)*x - 9*((2*d - f)*x^4 + (2*d - f)*x^2 + 2*d - f)*log(x^2 + x + 1) + 9*((2*d - f)*x^4 + (2*d - f)*x^2 + 2*d - f)*log(x^2 - x + 1) - 12*e)/(x^4 + x^2 + 1)
```

**Sympy [C] (verification not implemented)**

Result contains complex when optimal does not.

Time = 81.03 (sec) , antiderivative size = 4106, normalized size of antiderivative = 24.88

$$\int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^2} dx = \text{Too large to display}$$

```
[In] integrate((f*x**2+e*x+d)/(x**4+x**2+1)**2,x)
```

```
[Out] (-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72)*log(x + (-164944*d**5*e + 16416*d**5*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72) + 336520*d**4*e*f + 200664*d**4*f*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72) - 115200*d**3*e**3 - 504576*d**3*e**2*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72) - 272380*d**3*e*f**2 + 1734912*d**3*e*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72)**2 - 229500*d**3*f**2*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72) + 2612736*d**3*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72)**3 + 51840*d**2*e**3*f + 881280*d**2*e**2*f*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72) + 119420*d**2*e*f**3 - 2477952*d**2*e*f*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72)**2 + 50436*d**2*f**3*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72) - 2519424*d**2*f*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72)**3 + 28672*d*e**5 + 184320*d*e**4*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72) + 8640*d*e**3*f**2 + 774144*d*e**3*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72)**2 - 409536*d*e**2*f**2*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72) + 4976640*d*e**2*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72)**3 - 31040*d*e*f**4 + 1270080*d*e*f**2*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72)**3 - 31040*d*e*f**4 + 1270080*d*e*f**2*(-d/4 + f/8 - sqrt(3)*I*(4*d + 8*e + f)/72)**3
```



$$\begin{aligned}
& 8 - \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 2 + 14040 * d * f ** 4 * (-d/4 + f/8 - \sqrt{3} * I * (4*d + 8*e + f) / 72) + 139968 * d * f ** 2 * (-d/4 + f/8 - \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 3 - 20480 * e ** 5 * f - 36864 * e ** 4 * f * (-d/4 + f/8 - \sqrt{3} * I * (4*d + 8*e + f) / 72) - 2880 * e ** 3 * f ** 3 - 552960 * e ** 3 * f * (-d/4 + f/8 - \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 2 + 70848 * e ** 2 * f ** 3 * (-d/4 + f/8 - \sqrt{3} * I * (4*d + 8*e + f) / 72) \\
& - 995328 * e ** 2 * f * (-d/4 + f/8 - \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 3 + 3956 * e * f ** 5 - 209088 * e * f ** 3 * (-d/4 + f/8 - \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 2 - 3996 * f ** 5 * (-d/4 + f/8 - \sqrt{3} * I * (4*d + 8*e + f) / 72) + 233280 * f ** 3 * (-d/4 + f/8 - \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 3) / (53568 * d ** 6 - 69984 * d ** 5 * f - 182528 * d ** 4 * e ** 2 + 23652 * d ** 4 * f ** 2 + 377344 * d ** 3 * e ** 2 * f + 5400 * d ** 3 * f ** 3 - 126976 * d ** 2 * e ** 4 - 278400 * d ** 2 * e ** 2 * f ** 2 - 4131 * d ** 2 * f ** 4 + 102400 * d * e ** 4 * f + 93568 * d * e ** 2 * f ** 3 + 81 * d * f ** 5 - 28672 * e ** 4 * f ** 2 - 11648 * e ** 2 * f ** 4 + 189 * f ** 6) + (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) * \log(x + (-164944 * d ** 5 * e + 16416 * d ** 5 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) + 336520 * d ** 4 * e * f + 200664 * d ** 4 * f * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) - 115200 * d ** 3 * e ** 3 - 504576 * d ** 3 * e ** 2 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) - 272380 * d ** 3 * e * f ** 2 + 1734912 * d ** 3 * e * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 2 - 229500 * d ** 3 * f ** 2 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) + 2612736 * d ** 3 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 3 + 51840 * d ** 2 * e ** 3 * f + 881280 * d ** 2 * e ** 2 * f * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) + 119420 * d ** 2 * e * f ** 3 - 2477952 * d ** 2 * e * f * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 2 + 50436 * d ** 2 * f ** 3 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) - 2519424 * d ** 2 * f * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 3 + 28672 * d * e ** 5 + 184320 * d * e ** 4 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) + 8640 * d * e ** 3 * f ** 2 + 774144 * d * e ** 3 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 2 - 409536 * d * e ** 2 * f ** 2 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) + 4976640 * d * e ** 2 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 3 - 31040 * d * e * f ** 4 + 1270080 * d * e * f ** 2 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 2 + 14040 * d * f ** 4 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) + 139968 * d * f ** 2 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 3 - 20480 * e ** 5 * f - 36864 * e ** 4 * f * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) - 2880 * e ** 3 * f ** 3 - 552960 * e ** 3 * f * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 2 + 70848 * e ** 2 * f ** 3 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) - 995328 * e ** 2 * f * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 3 + 3956 * e * f ** 5 - 209088 * e * f ** 3 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 2 - 3996 * f ** 5 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) + 233280 * f ** 3 * (-d/4 + f/8 + \sqrt{3} * I * (4*d + 8*e + f) / 72) ** 3) / (53568 * d ** 6 - 69984 * d ** 5 * f - 182528 * d ** 4 * e ** 2 + 23652 * d ** 4 * f ** 2 + 377344 * d ** 3 * e ** 2 * f + 5400 * d ** 3 * f ** 3 - 126976 * d ** 2 * e ** 4 - 278400 * d ** 2 * e ** 2 * f ** 2 - 4131 * d ** 2 * f ** 4 + 102400 * d * e ** 4 * f + 93568 * d * e ** 2 * f ** 3 + 81 * d * f ** 5 - 28672 * e ** 4 * f ** 2 - 11648 * e ** 2 * f ** 4 + 189 * f ** 6) + (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) * \log(x + (-164944 * d ** 5 * e + 16416 * d ** 5 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) + 336520 * d ** 4 * e * f + 200664 * d ** 4 * f * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) - 115200 * d ** 3 * e ** 3 - 504576 * d ** 3 * e ** 2 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) - 272380 * d ** 3 * e * f ** 2 + 1734912 * d ** 3 * e * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 2 - 229500 * d ** 3 * f ** 2 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) + 2612736 * d ** 3 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 3 + 51840 * d ** 2 * e ** 3 * f + 881280 * d ** 2 * e ** 2 * f * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) + 119420 * d ** 2 * e * f ** 3 - 2477952 * d ** 2 * e * f * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 2 + 50436 * d ** 2 * f ** 3 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) - 2519424 * d ** 2 * f * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 3 + 28672 * d * e ** 5 + 184320 * d * e ** 4 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) + 8640 * d * e ** 3 * f ** 2 + 774144 * d * e ** 3 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 2 - 409536 * d * e ** 2 * f ** 2 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) + 4976640 * d * e ** 2 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 3 - 31040 * d * e * f ** 4 + 1270080 * d * e * f ** 2 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 2 + 14040 * d * f ** 4 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) + 139968 * d * f ** 2 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 3 - 20480 * e ** 5 * f - 36864 * e ** 4 * f * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) - 2880 * e ** 3 * f ** 3 - 552960 * e ** 3 * f * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 2 + 70848 * e ** 2 * f ** 3 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) - 995328 * e ** 2 * f * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 3 + 3956 * e * f ** 5 - 209088 * e * f ** 3 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 2 - 3996 * f ** 5 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) + 233280 * f ** 3 * (d/4 - f/8 - \sqrt{3} * I * (4*d - 8*e + f) / 72) ** 3) / (53568 * d ** 6 - 69984 * d ** 5 * f - 182528 * d ** 4 * e ** 2 + 23652 * d ** 4 * f ** 2 + 377344 * d ** 3 * e ** 2 * f + 5400 * d ** 3 * f ** 3 - 126976 * d ** 2 * e ** 4 - 278400 * d ** 2 * e ** 2 * f ** 2 - 4131 * d ** 2 * f ** 4 + 102400 * d * e ** 4 * f + 93568 * d * e ** 2 * f ** 3 + 81 * d * f ** 5 - 28672 * e ** 4 * f ** 2 - 11648 * e ** 2 * f ** 4 + 189 * f ** 6)
\end{aligned}$$

$$\begin{aligned}
& t(3)*I*(4*d - 8*e + f)/72)**3 + 51840*d**2*e**3*f + 881280*d**2*e**2*f*(d/4 \\
& - f/8 - \sqrt{3}*I*(4*d - 8*e + f)/72) + 119420*d**2*e*f**3 - 2477952*d**2* \\
& e*f*(d/4 - f/8 - \sqrt{3}*I*(4*d - 8*e + f)/72)**2 + 50436*d**2*f**3*(d/4 - \\
& f/8 - \sqrt{3}*I*(4*d - 8*e + f)/72) - 2519424*d**2*f*(d/4 - f/8 - \sqrt{3}*I \\
& *(4*d - 8*e + f)/72)**3 + 28672*d*e**5 + 184320*d*e**4*(d/4 - f/8 - \sqrt{3}) \\
& *I*(4*d - 8*e + f)/72) + 8640*d*e**3*f**2 + 774144*d*e**3*(d/4 - f/8 - \sqrt{ \\
& (3)*I*(4*d - 8*e + f)/72)**2 - 409536*d*e**2*f**2*(d/4 - f/8 - \sqrt{3}*I*(4 \\
& *d - 8*e + f)/72) + 4976640*d*e**2*(d/4 - f/8 - \sqrt{3}*I*(4*d - 8*e + f)/ \\
& 2)**3 - 31040*d*e*f**4 + 1270080*d*e*f**2*(d/4 - f/8 - \sqrt{3}*I*(4*d - 8*e \\
& + f)/72)**2 + 14040*d*f**4*(d/4 - f/8 - \sqrt{3}*I*(4*d - 8*e + f)/72) + 13 \\
& 9968*d*f**2*(d/4 - f/8 - \sqrt{3}*I*(4*d - 8*e + f)/72)**3 - 20480*e**5*f - \\
& 36864*e**4*f*(d/4 - f/8 - \sqrt{3}*I*(4*d - 8*e + f)/72) - 2880*e**3*f**3 - \\
& 552960*e**3*f*(d/4 - f/8 - \sqrt{3}*I*(4*d - 8*e + f)/72)**2 + 70848*e**2*f* \\
& **3*(d/4 - f/8 - \sqrt{3}*I*(4*d - 8*e + f)/72) - 995328*e**2*f*(d/4 - f/8 - \\
& \sqrt{3}*I*(4*d - 8*e + f)/72)**3 + 3956*e*f**5 - 209088*e*f**3*(d/4 - f/8 - \\
& \sqrt{3}*I*(4*d - 8*e + f)/72)**2 - 3996*f**5*(d/4 - f/8 - \sqrt{3}*I*(4*d - \\
& 8*e + f)/72) + 233280*f**3*(d/4 - f/8 - \sqrt{3}*I*(4*d - 8*e + f)/72)**3)/ \\
& (53568*d**6 - 69984*d**5*f - 182528*d**4*e**2 + 23652*d**4*f**2 + 377344*d* \\
& **3*e**2*f + 5400*d**3*f**3 - 126976*d**2*e**4 - 278400*d**2*e**2*f**2 - 413 \\
& 1*d**2*f**4 + 102400*d*e**4*f + 93568*d*e**2*f**3 + 81*d*f**5 - 28672*e**4* \\
& f**2 - 11648*e**2*f**4 + 189*f**6) + (d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f \\
& )/72)*\log(x + (-164944*d**5*e + 16416*d**5*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8* \\
& e + f)/72) + 336520*d**4*e*f + 200664*d**4*f*(d/4 - f/8 + \sqrt{3}*I*(4*d - \\
& 8*e + f)/72) - 115200*d**3*e**3 - 504576*d**3*e**2*(d/4 - f/8 + \sqrt{3}*I*( \\
& 4*d - 8*e + f)/72) - 272380*d**3*e*f**2 + 1734912*d**3*e*(d/4 - f/8 + \sqrt{ \\
& (3)*I*(4*d - 8*e + f)/72)**2 - 229500*d**3*f**2*(d/4 - f/8 + \sqrt{3}*I*(4*d \\
& - 8*e + f)/72) + 2612736*d**3*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72)**3 \\
& + 51840*d**2*e**3*f + 881280*d**2*e**2*f*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e \\
& + f)/72) + 119420*d**2*e*f**3 - 2477952*d**2*e*f*(d/4 - f/8 + \sqrt{3}*I*(4 \\
& *d - 8*e + f)/72)**2 + 50436*d**2*f**3*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + \\
& f)/72) - 2519424*d**2*f*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72)**3 + 286 \\
& 72*d*e**5 + 184320*d*e**4*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72) + 8640 \\
& *d*e**3*f**2 + 774144*d*e**3*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72)**2 \\
& - 409536*d*e**2*f**2*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72) + 4976640*d \\
& *e**2*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72)**3 - 31040*d*e*f**4 + 1270 \\
& 080*d*e*f**2*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72)**2 + 14040*d*f**4*( \\
& d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72) + 139968*d*f**2*(d/4 - f/8 + \sqrt{ \\
& (3)*I*(4*d - 8*e + f)/72)**3 - 20480*e**5*f - 36864*e**4*f*(d/4 - f/8 + \sqrt{ \\
& (3)*I*(4*d - 8*e + f)/72) - 2880*e**3*f**3 - 552960*e**3*f*(d/4 - f/8 + \sqrt{ \\
& (3)*I*(4*d - 8*e + f)/72)**2 + 70848*e**2*f**3*(d/4 - f/8 + \sqrt{3}*I*(4* \\
& d - 8*e + f)/72) - 995328*e**2*f*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72) \\
& **3 + 3956*e*f**5 - 209088*e*f**3*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72 \\
& )**2 - 3996*f**5*(d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72) + 233280*f**3*( \\
& d/4 - f/8 + \sqrt{3}*I*(4*d - 8*e + f)/72)**3)/(53568*d**6 - 69984*d**5*f - \\
& 182528*d**4*e**2 + 23652*d**4*f**2 + 377344*d**3*e**2*f + 5400*d**3*f**3 -
\end{aligned}$$

126976\*d\*\*2\*e\*\*4 - 278400\*d\*\*2\*e\*\*2\*f\*\*2 - 4131\*d\*\*2\*f\*\*4 + 102400\*d\*e\*\*4\*f  
 + 93568\*d\*e\*\*2\*f\*\*3 + 81\*d\*f\*\*5 - 28672\*e\*\*4\*f\*\*2 - 11648\*e\*\*2\*f\*\*4 + 189\*  
 f\*\*6)) + (2\*e\*x\*\*2 + e + x\*\*3\*(-d + 2\*f) + x\*(d + f))/(6\*x\*\*4 + 6\*x\*\*2 + 6)

### Maxima [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 120, normalized size of antiderivative = 0.73

$$\int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^2} dx = \frac{1}{36} \sqrt{3}(4d - 8e + f) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) \\
+ \frac{1}{36} \sqrt{3}(4d + 8e + f) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) \\
+ \frac{1}{8}(2d - f) \log(x^2 + x + 1) - \frac{1}{8}(2d - f) \log(x^2 - x + 1) \\
- \frac{(d - 2f)x^3 - 2ex^2 - (d + f)x - e}{6(x^4 + x^2 + 1)}$$

[In] integrate((f\*x^2+e\*x+d)/(x^4+x^2+1)^2,x, algorithm="maxima")

[Out] 1/36\*sqrt(3)\*(4\*d - 8\*e + f)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/36\*sqrt(3)\*(  
 4\*d + 8\*e + f)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/8\*(2\*d - f)\*log(x^2 + x +  
 1) - 1/8\*(2\*d - f)\*log(x^2 - x + 1) - 1/6\*((d - 2\*f)\*x^3 - 2\*e\*x^2 - (d + f  
 )\*x - e)/(x^4 + x^2 + 1)

### Giac [A] (verification not implemented)

none

Time = 0.32 (sec) , antiderivative size = 124, normalized size of antiderivative = 0.75

$$\int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^2} dx = \frac{1}{36} \sqrt{3}(4d - 8e + f) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) \\
+ \frac{1}{36} \sqrt{3}(4d + 8e + f) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) \\
+ \frac{1}{8}(2d - f) \log(x^2 + x + 1) - \frac{1}{8}(2d - f) \log(x^2 - x + 1) \\
- \frac{dx^3 - 2fx^3 - 2ex^2 - dx - fx - e}{6(x^4 + x^2 + 1)}$$

[In] integrate((f\*x^2+e\*x+d)/(x^4+x^2+1)^2,x, algorithm="giac")

[Out] 1/36\*sqrt(3)\*(4\*d - 8\*e + f)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/36\*sqrt(3)\*(  
 4\*d + 8\*e + f)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/8\*(2\*d - f)\*log(x^2 + x +  
 1) - 1/8\*(2\*d - f)\*log(x^2 - x + 1) - 1/6\*(d\*x^3 - 2\*f\*x^3 - 2\*e\*x^2 - d\*x  
 - f\*x - e)/(x^4 + x^2 + 1)

**Mupad [B] (verification not implemented)**

Time = 0.18 (sec) , antiderivative size = 201, normalized size of antiderivative = 1.22

$$\int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^2} dx = \frac{\left(\frac{f}{3} - \frac{d}{6}\right) x^3 + \frac{ex^2}{3} + \left(\frac{d}{6} + \frac{f}{6}\right) x + \frac{e}{6}}{x^4 + x^2 + 1}$$

$$- \ln \left( x - \frac{1}{2} - \frac{\sqrt{3} \operatorname{Im} i}{2} \right) \left( \frac{d}{4} - \frac{f}{8} + \frac{\sqrt{3} d \operatorname{Im} i}{18} + \frac{\sqrt{3} e \operatorname{Im} i}{9} + \frac{\sqrt{3} f \operatorname{Im} i}{72} \right)$$

$$- \ln \left( x + \frac{1}{2} - \frac{\sqrt{3} \operatorname{Im} i}{2} \right) \left( \frac{f}{8} - \frac{d}{4} + \frac{\sqrt{3} d \operatorname{Im} i}{18} - \frac{\sqrt{3} e \operatorname{Im} i}{9} + \frac{\sqrt{3} f \operatorname{Im} i}{72} \right)$$

$$+ \ln \left( x - \frac{1}{2} + \frac{\sqrt{3} \operatorname{Im} i}{2} \right) \left( \frac{f}{8} - \frac{d}{4} + \frac{\sqrt{3} d \operatorname{Im} i}{18} + \frac{\sqrt{3} e \operatorname{Im} i}{9} + \frac{\sqrt{3} f \operatorname{Im} i}{72} \right)$$

$$+ \ln \left( x + \frac{1}{2} + \frac{\sqrt{3} \operatorname{Im} i}{2} \right) \left( \frac{d}{4} - \frac{f}{8} + \frac{\sqrt{3} d \operatorname{Im} i}{18} - \frac{\sqrt{3} e \operatorname{Im} i}{9} + \frac{\sqrt{3} f \operatorname{Im} i}{72} \right)$$

`[In] int((d + e*x + f*x^2)/(x^2 + x^4 + 1)^2,x)`

```
[Out] (e/6 - x^3*(d/6 - f/3) + (e*x^2)/3 + x*(d/6 + f/6))/(x^2 + x^4 + 1) - log(x
- (3^(1/2)*1i)/2 - 1/2)*(d/4 - f/8 + (3^(1/2)*d*1i)/18 + (3^(1/2)*e*1i)/9
+ (3^(1/2)*f*1i)/72) - log(x - (3^(1/2)*1i)/2 + 1/2)*(f/8 - d/4 + (3^(1/2)*
d*1i)/18 - (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/72) + log(x + (3^(1/2)*1i)/2 -
1/2)*(f/8 - d/4 + (3^(1/2)*d*1i)/18 + (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/72
) + log(x + (3^(1/2)*1i)/2 + 1/2)*(d/4 - f/8 + (3^(1/2)*d*1i)/18 - (3^(1/2)
*e*1i)/9 + (3^(1/2)*f*1i)/72)
```

### 3.33 $\int \frac{d+ex+fx^2+gx^3}{(1+x^2+x^4)^2} dx$

Optimal result	309
Rubi [A] (verified)	309
Mathematica [C] (verified)	313
Maple [A] (verified)	313
Fricas [A] (verification not implemented)	314
Sympy [F(-1)]	314
Maxima [A] (verification not implemented)	314
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Mupad [B] (verification not implemented)	316

#### Optimal result

Integrand size = 26, antiderivative size = 179

$$\int \frac{d+ex+fx^2+gx^3}{(1+x^2+x^4)^2} dx = \frac{x(d+f-(d-2f)x^2)}{6(1+x^2+x^4)} + \frac{e-2g+(2e-g)x^2}{6(1+x^2+x^4)}$$

$$- \frac{(4d+f) \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{12\sqrt{3}} + \frac{(4d+f) \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{12\sqrt{3}}$$

$$+ \frac{(2e-g) \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{8}(2d-f) \log(1-x+x^2)$$

$$+ \frac{1}{8}(2d-f) \log(1+x+x^2)$$

[Out] 1/6\*x\*(d+f-(d-2\*f)\*x^2)/(x^4+x^2+1)+1/6\*(e-2\*g+(2\*e-g)\*x^2)/(x^4+x^2+1)-1/8\*(2\*d-f)\*ln(x^2-x+1)+1/8\*(2\*d-f)\*ln(x^2+x+1)-1/36\*(4\*d+f)\*arctan(1/3\*(1-2\*x))\*3^(1/2))\*3^(1/2)+1/36\*(4\*d+f)\*arctan(1/3\*(1+2\*x))\*3^(1/2))\*3^(1/2)+1/9\*(2\*e-g)\*arctan(1/3\*(2\*x^2+1))\*3^(1/2))\*3^(1/2)

#### Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 179, normalized size of antiderivative = 1.00, number of steps used = 15, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.346$ , Rules used

= {1687, 1192, 1183, 648, 632, 210, 642, 1261, 652}

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^2} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(4d + f)}{12\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(4d + f)}{12\sqrt{3}}$$

$$+ \frac{\arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)(2e - g)}{3\sqrt{3}} - \frac{1}{8}(2d - f)\log(x^2 - x + 1)$$

$$+ \frac{1}{8}(2d - f)\log(x^2 + x + 1)$$

$$+ \frac{x(-(x^2(d - 2f)) + d + f)}{6(x^4 + x^2 + 1)} + \frac{x^2(2e - g) + e - 2g}{6(x^4 + x^2 + 1)}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)/(1 + x^2 + x^4)^2,x]

[Out] (x\*(d + f - (d - 2\*f)\*x^2))/(6\*(1 + x^2 + x^4)) + (e - 2\*g + (2\*e - g)\*x^2)/(6\*(1 + x^2 + x^4)) - ((4\*d + f)\*ArcTan[(1 - 2\*x)/Sqrt[3]])/(12\*Sqrt[3]) + ((4\*d + f)\*ArcTan[(1 + 2\*x)/Sqrt[3]])/(12\*Sqrt[3]) + ((2\*e - g)\*ArcTan[(1 + 2\*x^2)/Sqrt[3]])/(3\*Sqrt[3]) - ((2\*d - f)\*Log[1 - x + x^2])/8 + ((2\*d - f)\*Log[1 + x + x^2])/8

#### Rule 210

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[-b, 2])^(-1))\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

#### Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

#### Rule 642

Int[((d\_) + (e\_.)\*(x\_))/((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] := Simp[d\*(Log[RemoveContent[a + b\*x + c\*x^2, x]]/b), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[2\*c\*d - b\*e, 0]

#### Rule 648

Int[((d\_.) + (e\_.)\*(x\_))/((a\_) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] := Dist[(2\*c\*d - b\*e)/(2\*c), Int[1/(a + b\*x + c\*x^2), x], x] + Dist[e/(2\*c), Int[(b + 2\*c\*x)/(a + b\*x + c\*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && !NiceSqrtQ[b^2 - 4\*a\*c]

#### Rule 652

```
Int[((d_.) + (e_.)*(x_))*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol]
:> Simp[((b*d - 2*a*e + (2*c*d - b*e)*x)/((p + 1)*(b^2 - 4*a*c)))*(a + b*x
+ c*x^2)^(p + 1), x] - Dist[(2*p + 3)*((2*c*d - b*e)/((p + 1)*(b^2 - 4*a*
c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] &&
NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2]
```

### Rule 1183

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[a/c, 2]}, With[{r = Rt[2*q - b/c, 2]}, Dist[1/(2*c*q*r), Int
[(d*r - (d - e*q)*x)/(q - r*x + x^2), x], x] + Dist[1/(2*c*q*r), Int[(d*r +
(d - e*q)*x)/(q + r*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && NegQ[b^2 - 4*a*c]
```

### Rule 1192

```
Int[((d_) + (e_.)*(x_)^2)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symb
ol] :> Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 +
c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2
- 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

### Rule 1261

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(
p_.), x_Symbol] :> Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] :> Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

### Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + fx^2}{(1 + x^2 + x^4)^2} dx + \int \frac{x(e + gx^2)}{(1 + x^2 + x^4)^2} dx \\ &= \frac{x(d + f - (d - 2f)x^2)}{6(1 + x^2 + x^4)} + \frac{1}{6} \int \frac{5d - f + (-d + 2f)x^2}{1 + x^2 + x^4} dx \\ &\quad + \frac{1}{2} \text{Subst}\left(\int \frac{e + gx}{(1 + x + x^2)^2} dx, x, x^2\right) \end{aligned}$$

$$\begin{aligned}
&= \frac{x(d+f-(d-2f)x^2)}{6(1+x^2+x^4)} + \frac{e-2g+(2e-g)x^2}{6(1+x^2+x^4)} + \frac{1}{12} \int \frac{5d-f-(6d-3f)x}{1-x+x^2} dx \\
&\quad + \frac{1}{12} \int \frac{5d-f+(6d-3f)x}{1+x+x^2} dx + \frac{1}{6}(2e-g) \text{Subst} \left( \int \frac{1}{1+x+x^2} dx, x, x^2 \right) \\
&= \frac{x(d+f-(d-2f)x^2)}{6(1+x^2+x^4)} + \frac{e-2g+(2e-g)x^2}{6(1+x^2+x^4)} + \frac{1}{8}(2d-f) \int \frac{1+2x}{1+x+x^2} dx \\
&\quad + \frac{1}{8}(-2d+f) \int \frac{-1+2x}{1-x+x^2} dx + \frac{1}{24}(4d+f) \int \frac{1}{1-x+x^2} dx \\
&\quad + \frac{1}{24}(4d+f) \int \frac{1}{1+x+x^2} dx + \frac{1}{3}(-2e+g) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x^2 \right) \\
&= \frac{x(d+f-(d-2f)x^2)}{6(1+x^2+x^4)} + \frac{e-2g+(2e-g)x^2}{6(1+x^2+x^4)} + \frac{(2e-g) \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{3\sqrt{3}} \\
&\quad - \frac{1}{8}(2d-f) \log(1-x+x^2) + \frac{1}{8}(2d-f) \log(1+x+x^2) \\
&\quad + \frac{1}{12}(-4d-f) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, -1+2x \right) \\
&\quad + \frac{1}{12}(-4d-f) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x \right) \\
&= \frac{x(d+f-(d-2f)x^2)}{6(1+x^2+x^4)} + \frac{e-2g+(2e-g)x^2}{6(1+x^2+x^4)} - \frac{(4d+f) \tan^{-1} \left( \frac{1-2x}{\sqrt{3}} \right)}{12\sqrt{3}} \\
&\quad + \frac{(4d+f) \tan^{-1} \left( \frac{1+2x}{\sqrt{3}} \right)}{12\sqrt{3}} + \frac{(2e-g) \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{3\sqrt{3}} \\
&\quad - \frac{1}{8}(2d-f) \log(1-x+x^2) + \frac{1}{8}(2d-f) \log(1+x+x^2)
\end{aligned}$$



**Mathematica [C] (verified)**

Result contains complex when optimal does not.

Time = 0.27 (sec) , antiderivative size = 200, normalized size of antiderivative = 1.12

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^2} dx = \frac{1}{36} \left( \frac{6(e + 2ex^2 - g(2 + x^2) + x(d + f - dx^2 + 2fx^2))}{1 + x^2 + x^4} \right. \\ \left. - \frac{((-11i + \sqrt{3})d - 2(-2i + \sqrt{3})f) \arctan\left(\frac{1}{2}(-i + \sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1 + i\sqrt{3})}} \right. \\ \left. - \frac{((11i + \sqrt{3})d - 2(2i + \sqrt{3})f) \arctan\left(\frac{1}{2}(i + \sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1 - i\sqrt{3})}} \right) \\ - 4\sqrt{3}(2e - g) \arctan\left(\frac{\sqrt{3}}{1 + 2x^2}\right)$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)/(1 + x^2 + x^4)^2,x]

[Out] ((6\*(e + 2\*e\*x^2 - g\*(2 + x^2) + x\*(d + f - d\*x^2 + 2\*f\*x^2)))/(1 + x^2 + x^4) - (((-11\*I + Sqrt[3])\*d - 2\*(-2\*I + Sqrt[3])\*f)\*ArcTan[(-I + Sqrt[3])\*x]/2))/Sqrt[(1 + I\*Sqrt[3])/6] - (((11\*I + Sqrt[3])\*d - 2\*(2\*I + Sqrt[3])\*f)\*ArcTan[(I + Sqrt[3])\*x]/2))/Sqrt[(1 - I\*Sqrt[3])/6] - 4\*Sqrt[3]\*(2\*e - g)\*ArcTan[Sqrt[3]/(1 + 2\*x^2)]/36

**Maple [A] (verified)**

Time = 0.28 (sec) , antiderivative size = 172, normalized size of antiderivative = 0.96

method	result
default	$-\frac{\left(\frac{d}{3} - \frac{e}{3} - \frac{g}{3} - \frac{2f}{3}\right)x - \frac{2d}{3} - \frac{e}{3} + \frac{2g}{3} + \frac{f}{3}}{4(x^2 - x + 1)} - \frac{(6d - 3f) \ln(x^2 - x + 1)}{24} - \frac{(-2d - 4e - \frac{f}{2} + 2g)\sqrt{3} \arctan\left(\frac{(2x-1)\sqrt{3}}{3}\right)}{18} + \frac{\left(-\frac{d}{3} - \frac{e}{3} - \frac{g}{3} + \frac{2f}{3}\right)}{4x^2 + 4}$
risch	Expression too large to display

[In] int((g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^2,x,method=\_RETURNVERBOSE)

[Out] -1/4\*((1/3\*d-1/3\*e-1/3\*g-2/3\*f)\*x-2/3\*d-1/3\*e+2/3\*g+1/3\*f)/(x^2-x+1)-1/24\*(6\*d-3\*f)\*ln(x^2-x+1)-1/18\*(-2\*d-4\*e-1/2\*f+2\*g)\*3^(1/2)\*arctan(1/3\*(2\*x-1)\*3^(1/2))+1/4\*((-1/3\*d-1/3\*e-1/3\*g+2/3\*f)\*x-2/3\*d+1/3\*e-2/3\*g+1/3\*f)/(x^2+x+1)+1/24\*(6\*d-3\*f)\*ln(x^2+x+1)+1/18\*(2\*d-4\*e+1/2\*f+2\*g)\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)

**Fricas [A] (verification not implemented)**

none

Time = 0.46 (sec) , antiderivative size = 239, normalized size of antiderivative = 1.34

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^2} dx = \frac{12(d - 2f)x^3 - 12(2e - g)x^2 - 2\sqrt{3}((4d - 8e + f + 4g)x^4 + (4d - 8e + f + 4g)x^2 + 4d - 8e + f)}$$

```
[In] integrate((g*x^3+f*x^2+e*x+d)/(x^4+x^2+1)^2,x, algorithm="fricas")
```

```
[Out] -1/72*(12*(d - 2*f)*x^3 - 12*(2*e - g)*x^2 - 2*sqrt(3)*((4*d - 8*e + f + 4*
g)*x^4 + (4*d - 8*e + f + 4*g)*x^2 + 4*d - 8*e + f + 4*g)*arctan(1/3*sqrt(3
)*(2*x + 1)) - 2*sqrt(3)*((4*d + 8*e + f - 4*g)*x^4 + (4*d + 8*e + f - 4*g)
*x^2 + 4*d + 8*e + f - 4*g)*arctan(1/3*sqrt(3)*(2*x - 1)) - 12*(d + f)*x -
9*((2*d - f)*x^4 + (2*d - f)*x^2 + 2*d - f)*log(x^2 + x + 1) + 9*((2*d - f)
*x^4 + (2*d - f)*x^2 + 2*d - f)*log(x^2 - x + 1) - 12*e + 24*g)/(x^4 + x^2
+ 1)
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^2} dx = \text{Timed out}$$

```
[In] integrate((g*x**3+f*x**2+e*x+d)/(x**4+x**2+1)**2,x)
```

```
[Out] Timed out
```

**Maxima [A] (verification not implemented)**

none

Time = 0.27 (sec) , antiderivative size = 135, normalized size of antiderivative = 0.75

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^2} dx = \frac{1}{36} \sqrt{3}(4d - 8e + f + 4g) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) + \frac{1}{36} \sqrt{3}(4d + 8e + f - 4g) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) + \frac{1}{8} (2d - f) \log(x^2 + x + 1) - \frac{1}{8} (2d - f) \log(x^2 - x + 1) - \frac{(d - 2f)x^3 - (2e - g)x^2 - (d + f)x - e + 2g}{6(x^4 + x^2 + 1)}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^2,x, algorithm="maxima")

[Out] 1/36\*sqrt(3)\*(4\*d - 8\*e + f + 4\*g)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/36\*sqrt(3)\*(4\*d + 8\*e + f - 4\*g)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/8\*(2\*d - f)\*log(x^2 + x + 1) - 1/8\*(2\*d - f)\*log(x^2 - x + 1) - 1/6\*((d - 2\*f)\*x^3 - (2\*e - g)\*x^2 - (d + f)\*x - e + 2\*g)/(x^4 + x^2 + 1)

## Giac [A] (verification not implemented)

none

Time = 0.33 (sec) , antiderivative size = 138, normalized size of antiderivative = 0.77

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^2} dx = \frac{1}{36} \sqrt{3}(4d - 8e + f + 4g) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) + \frac{1}{36} \sqrt{3}(4d + 8e + f - 4g) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) + \frac{1}{8}(2d - f) \log(x^2 + x + 1) - \frac{1}{8}(2d - f) \log(x^2 - x + 1) - \frac{dx^3 - 2fx^3 - 2ex^2 + gx^2 - dx - fx - e + 2g}{6(x^4 + x^2 + 1)}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^2,x, algorithm="giac")

[Out] 1/36\*sqrt(3)\*(4\*d - 8\*e + f + 4\*g)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/36\*sqrt(3)\*(4\*d + 8\*e + f - 4\*g)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/8\*(2\*d - f)\*log(x^2 + x + 1) - 1/8\*(2\*d - f)\*log(x^2 - x + 1) - 1/6\*(d\*x^3 - 2\*f\*x^3 - 2\*e\*x^2 + g\*x^2 - d\*x - f\*x - e + 2\*g)/(x^4 + x^2 + 1)

**Mupad [B] (verification not implemented)**

Time = 8.14 (sec) , antiderivative size = 237, normalized size of antiderivative = 1.32

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^2} dx = \frac{\left(\frac{f}{3} - \frac{d}{6}\right) x^3 + \left(\frac{e}{3} - \frac{g}{6}\right) x^2 + \left(\frac{d}{6} + \frac{f}{6}\right) x + \frac{e}{6} - \frac{g}{3}}{x^4 + x^2 + 1} - \ln\left(x - \frac{1}{2} - \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{d}{4} - \frac{f}{8} + \frac{\sqrt{3} d \operatorname{li}}{18} + \frac{\sqrt{3} e \operatorname{li}}{9} + \frac{\sqrt{3} f \operatorname{li}}{72} - \frac{\sqrt{3} g \operatorname{li}}{18}\right) - \ln\left(x + \frac{1}{2} - \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{f}{8} - \frac{d}{4} + \frac{\sqrt{3} d \operatorname{li}}{18} - \frac{\sqrt{3} e \operatorname{li}}{9} + \frac{\sqrt{3} f \operatorname{li}}{72} + \frac{\sqrt{3} g \operatorname{li}}{18}\right) + \ln\left(x - \frac{1}{2} + \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{f}{8} - \frac{d}{4} + \frac{\sqrt{3} d \operatorname{li}}{18} + \frac{\sqrt{3} e \operatorname{li}}{9} + \frac{\sqrt{3} f \operatorname{li}}{72} - \frac{\sqrt{3} g \operatorname{li}}{18}\right) + \ln\left(x + \frac{1}{2} + \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{d}{4} - \frac{f}{8} + \frac{\sqrt{3} d \operatorname{li}}{18} + \frac{\sqrt{3} e \operatorname{li}}{9} + \frac{\sqrt{3} f \operatorname{li}}{72} + \frac{\sqrt{3} g \operatorname{li}}{18}\right)$$

[In] int((d + e\*x + f\*x^2 + g\*x^3)/(x^2 + x^4 + 1)^2,x)

```
[Out] (e/6 - g/3 - x^3*(d/6 - f/3) + x^2*(e/3 - g/6) + x*(d/6 + f/6))/(x^2 + x^4 + 1) - log(x - (3^(1/2)*1i)/2 - 1/2)*(d/4 - f/8 + (3^(1/2)*d*1i)/18 + (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/72 - (3^(1/2)*g*1i)/18) - log(x - (3^(1/2)*1i)/2 + 1/2)*(f/8 - d/4 + (3^(1/2)*d*1i)/18 - (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/72 + (3^(1/2)*g*1i)/18) + log(x + (3^(1/2)*1i)/2 - 1/2)*(f/8 - d/4 + (3^(1/2)*d*1i)/18 + (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/72 - (3^(1/2)*g*1i)/18) + log(x + (3^(1/2)*1i)/2 + 1/2)*(d/4 - f/8 + (3^(1/2)*d*1i)/18 - (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/72 + (3^(1/2)*g*1i)/18)
```

$$3.34 \quad \int \frac{d+ex+fx^2+gx^3+hx^4}{(1+x^2+x^4)^2} dx$$

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### Optimal result

Integrand size = 31, antiderivative size = 187

$$\int \frac{d+ex+fx^2+gx^3+hx^4}{(1+x^2+x^4)^2} dx = \frac{e-2g+(2e-g)x^2}{6(1+x^2+x^4)} + \frac{x(d+f-2h-(d-2f+h)x^2)}{6(1+x^2+x^4)} - \frac{(4d+f+h) \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{12\sqrt{3}} + \frac{(4d+f+h) \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{12\sqrt{3}} + \frac{(2e-g) \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{8}(2d-f+h) \log(1-x+x^2) + \frac{1}{8}(2d-f+h) \log(1+x+x^2)$$

```
[Out] 1/6*(e-2*g+(2*e-g)*x^2)/(x^4+x^2+1)+1/6*x*(d+f-2*h-(d-2*f+h)*x^2)/(x^4+x^2+1)-1/8*(2*d-f+h)*ln(x^2-x+1)+1/8*(2*d-f+h)*ln(x^2+x+1)-1/36*(4*d+f+h)*arctan(1/3*(1-2*x)*3^(1/2))*3^(1/2)+1/36*(4*d+f+h)*arctan(1/3*(1+2*x)*3^(1/2))*3^(1/2)+1/9*(2*e-g)*arctan(1/3*(2*x^2+1)*3^(1/2))*3^(1/2)
```

**Rubi [A] (verified)**

Time = 0.11 (sec) , antiderivative size = 187, normalized size of antiderivative = 1.00, number of steps used = 15, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.290$ , Rules used = {1687, 1692, 1183, 648, 632, 210, 642, 1261, 652}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^2} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(4d + f + h)}{12\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(4d + f + h)}{12\sqrt{3}} + \frac{\arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)(2e - g)}{3\sqrt{3}} - \frac{1}{8} \log(x^2 - x + 1)(2d - f + h) + \frac{1}{8} \log(x^2 + x + 1)(2d - f + h) + \frac{x(-x^2(d - 2f + h)) + d + f - 2h}{6(x^4 + x^2 + 1)} + \frac{x^2(2e - g) + e - 2g}{6(x^4 + x^2 + 1)}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(1 + x^2 + x^4)^2,x]

[Out] (e - 2\*g + (2\*e - g)\*x^2)/(6\*(1 + x^2 + x^4)) + (x\*(d + f - 2\*h - (d - 2\*f + h)\*x^2))/(6\*(1 + x^2 + x^4)) - ((4\*d + f + h)\*ArcTan[(1 - 2\*x)/Sqrt[3]])/(12\*Sqrt[3]) + ((4\*d + f + h)\*ArcTan[(1 + 2\*x)/Sqrt[3]])/(12\*Sqrt[3]) + ((2\*e - g)\*ArcTan[(1 + 2\*x^2)/Sqrt[3]])/(3\*Sqrt[3]) - ((2\*d - f + h)\*Log[1 - x + x^2])/8 + ((2\*d - f + h)\*Log[1 + x + x^2])/8

Rule 210

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] :> Simp[(-Rt[-a, 2]\*Rt[-b, 2])^(-1))\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] :> Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

Rule 642

Int[((d\_) + (e\_.)\*(x\_))/((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] :> Simp[d\*(Log[RemoveContent[a + b\*x + c\*x^2, x]]/b), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[2\*c\*d - b\*e, 0]

Rule 648

```
Int[((d_.) + (e_.)*(x_))/((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] := Dist[(2*c*d - b*e)/(2*c), Int[1/(a + b*x + c*x^2), x], x] + Dist[e/(2*c), Int[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && !NiceSqrtQ[b^2 - 4*a*c]
```

Rule 652

```
Int[((d_.) + (e_.)*(x_))*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := Simp[((b*d - 2*a*e + (2*c*d - b*e)*x)/((p + 1)*(b^2 - 4*a*c))*(a + b*x + c*x^2)^(p + 1), x] - Dist[(2*p + 3)*((2*c*d - b*e)/((p + 1)*(b^2 - 4*a*c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2]
```

Rule 1183

```
Int[((d_.) + (e_.)*(x_)^2)/((a_.) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] := With[{q = Rt[a/c, 2]}, With[{r = Rt[2*q - b/c, 2]}, Dist[1/(2*c*q*r), Int[(d*r - (d - e*q)*x)/(q - r*x + x^2), x], x] + Dist[1/(2*c*q*r), Int[(d*r + (d - e*q)*x)/(q + r*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && NegQ[b^2 - 4*a*c]
```

Rule 1261

```
Int[(x_)*((d_.) + (e_.)*(x_)^2)^(q_.)*((a_.) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol] := Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

Rule 1687

```
Int[(Pq_)*((a_.) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*x^(2*k) + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*x^(2*k) + c*x^4]^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]
```

Rule 1692

```
Int[(Pq_)*((a_.) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := With[{d = Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b^2 - 4*a*c)), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a + b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p
```

+ 7)\*(b\*d - 2\*a\*e)\*x^2, x], x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1]

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{x(e + gx^2)}{(1 + x^2 + x^4)^2} dx + \int \frac{d + fx^2 + hx^4}{(1 + x^2 + x^4)^2} dx \\
&= \frac{x(d + f - 2h - (d - 2f + h)x^2)}{6(1 + x^2 + x^4)} + \frac{1}{6} \int \frac{5d - f + 2h + (-d + 2f - h)x^2}{1 + x^2 + x^4} dx \\
&\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{(1 + x + x^2)^2} dx, x, x^2 \right) \\
&= \frac{e - 2g + (2e - g)x^2}{6(1 + x^2 + x^4)} + \frac{x(d + f - 2h - (d - 2f + h)x^2)}{6(1 + x^2 + x^4)} \\
&\quad + \frac{1}{12} \int \frac{5d - f + 2h - (6d - 3f + 3h)x}{1 - x + x^2} dx \\
&\quad + \frac{1}{12} \int \frac{5d - f + 2h + (6d - 3f + 3h)x}{1 + x + x^2} dx \\
&\quad + \frac{1}{6} (2e - g) \text{Subst} \left( \int \frac{1}{1 + x + x^2} dx, x, x^2 \right) \\
&= \frac{e - 2g + (2e - g)x^2}{6(1 + x^2 + x^4)} + \frac{x(d + f - 2h - (d - 2f + h)x^2)}{6(1 + x^2 + x^4)} \\
&\quad + \frac{1}{3} (-2e + g) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, 1 + 2x^2 \right) \\
&\quad + \frac{1}{8} (-2d + f - h) \int \frac{-1 + 2x}{1 - x + x^2} dx + \frac{1}{8} (2d - f + h) \int \frac{1 + 2x}{1 + x + x^2} dx \\
&\quad + \frac{1}{24} (4d + f + h) \int \frac{1}{1 - x + x^2} dx + \frac{1}{24} (4d + f + h) \int \frac{1}{1 + x + x^2} dx \\
&= \frac{e - 2g + (2e - g)x^2}{6(1 + x^2 + x^4)} + \frac{x(d + f - 2h - (d - 2f + h)x^2)}{6(1 + x^2 + x^4)} + \frac{(2e - g) \tan^{-1} \left( \frac{1 + 2x^2}{\sqrt{3}} \right)}{3\sqrt{3}} \\
&\quad - \frac{1}{8} (2d - f + h) \log(1 - x + x^2) + \frac{1}{8} (2d - f + h) \log(1 + x + x^2) \\
&\quad + \frac{1}{12} (-4d - f - h) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, -1 + 2x \right) \\
&\quad + \frac{1}{12} (-4d - f - h) \text{Subst} \left( \int \frac{1}{-3 - x^2} dx, x, 1 + 2x \right)
\end{aligned}$$



$$\begin{aligned}
&= \frac{e - 2g + (2e - g)x^2}{6(1 + x^2 + x^4)} + \frac{x(d + f - 2h - (d - 2f + h)x^2)}{6(1 + x^2 + x^4)} \\
&\quad - \frac{(4d + f + h) \tan^{-1}\left(\frac{1-2x}{\sqrt{3}}\right)}{12\sqrt{3}} + \frac{(4d + f + h) \tan^{-1}\left(\frac{1+2x}{\sqrt{3}}\right)}{12\sqrt{3}} \\
&\quad + \frac{(2e - g) \tan^{-1}\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{8}(2d - f + h) \log(1 - x + x^2) \\
&\quad + \frac{1}{8}(2d - f + h) \log(1 + x + x^2)
\end{aligned}$$

### Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.39 (sec) , antiderivative size = 234, normalized size of antiderivative = 1.25

$$\begin{aligned}
&\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^2} dx \\
&= \frac{1}{36} \left( -\frac{6(g(2 + x^2) - e(1 + 2x^2) + x(d(-1 + x^2) + h(2 + x^2) - f(1 + 2x^2)))}{1 + x^2 + x^4} \right. \\
&\quad - \frac{((-11i + \sqrt{3})d - 2(-2i + \sqrt{3})f + (-5i + \sqrt{3})h) \arctan\left(\frac{1}{2}(-i + \sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1 + i\sqrt{3})}} \\
&\quad \left. - \frac{((11i + \sqrt{3})d - 2(2i + \sqrt{3})f + (5i + \sqrt{3})h) \arctan\left(\frac{1}{2}(i + \sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1 - i\sqrt{3})}} \right. \\
&\quad \left. - 4\sqrt{3}(2e - g) \arctan\left(\frac{\sqrt{3}}{1 + 2x^2}\right) \right)
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(1 + x^2 + x^4)^2,x]

[Out] ((-6\*(g\*(2 + x^2) - e\*(1 + 2\*x^2) + x\*(d\*(-1 + x^2) + h\*(2 + x^2) - f\*(1 + 2\*x^2))))/(1 + x^2 + x^4) - (((-11\*I + Sqrt[3])\*d - 2\*(-2\*I + Sqrt[3])\*f + (-5\*I + Sqrt[3])\*h)\*ArcTan[(-I + Sqrt[3])\*x/2])/Sqrt[(1 + I\*Sqrt[3])/6] - (((11\*I + Sqrt[3])\*d - 2\*(2\*I + Sqrt[3])\*f + (5\*I + Sqrt[3])\*h)\*ArcTan[(I + Sqrt[3])\*x/2])/Sqrt[(1 - I\*Sqrt[3])/6] - 4\*Sqrt[3]\*(2\*e - g)\*ArcTan[Sqrt[3]/(1 + 2\*x^2)])/36

**Maple [A] (verified)**

Time = 0.41 (sec) , antiderivative size = 196, normalized size of antiderivative = 1.05

method	result
default	$-\frac{\left(\frac{d}{3}-\frac{2f}{3}-\frac{g}{3}-\frac{e}{3}+\frac{h}{3}\right)x-\frac{2d}{3}+\frac{f}{3}+\frac{2g}{3}-\frac{e}{3}+\frac{h}{3}}{4(x^2-x+1)} - \frac{(6d-3f+3h)\ln(x^2-x+1)}{24} - \frac{(-2d-4e-\frac{f}{2}+2g-\frac{h}{2})\sqrt{3}\arctan\left(\frac{(2x-1)\sqrt{3}}{3}\right)}{18} + \dots$
risch	Expression too large to display

[In] int((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^2,x,method=\_RETURNVERBOSE)

[Out] 
$$-1/4*\left(\frac{1}{3}d-\frac{2}{3}f-\frac{1}{3}g-\frac{1}{3}e+\frac{1}{3}h\right)*x-\frac{2}{3}d+\frac{1}{3}f+\frac{2}{3}g-\frac{1}{3}e+\frac{1}{3}h)/(x^2-x+1)-1/24*(6*d-3*f+3*h)*\ln(x^2-x+1)-1/18*(-2*d-4*e-1/2*f+2*g-1/2*h)*3^{(1/2)}*\arctan(1/3*(2*x-1)*3^{(1/2)})+1/4*((-1/3*d+2/3*f-1/3*g-1/3*e-1/3*h)*x-\frac{2}{3}d+\frac{1}{3}f-\frac{2}{3}g+\frac{1}{3}e+\frac{1}{3}h)/(x^2+x+1)+1/24*(6*d-3*f+3*h)*\ln(x^2+x+1)+1/18*(2*d-4*e+1/2*f+2*g+1/2*h)*\arctan(1/3*(1+2*x)*3^{(1/2)})*3^{(1/2)}$$

**Fricas [A] (verification not implemented)**

none

Time = 1.10 (sec) , antiderivative size = 255, normalized size of antiderivative = 1.36

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^2} dx = \frac{12(d - 2f + h)x^3 - 12(2e - g)x^2 - 2\sqrt{3}((4d - 8e + f + 4g + h)x^4 + (4d - 8e + f + 4g + h)x^2 + 4g + h)}{(1 + x^2 + x^4)^2}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^2,x, algorithm="fricas")

[Out] 
$$-1/72*(12*(d - 2*f + h)*x^3 - 12*(2*e - g)*x^2 - 2*\sqrt{3}*((4*d - 8*e + f + 4*g + h)*x^4 + (4*d - 8*e + f + 4*g + h)*x^2 + 4*d - 8*e + f + 4*g + h)*\arctan(1/3*\sqrt{3}*(2*x + 1)) - 2*\sqrt{3}*((4*d + 8*e + f - 4*g + h)*x^4 + (4*d + 8*e + f - 4*g + h)*x^2 + 4*d + 8*e + f - 4*g + h)*\arctan(1/3*\sqrt{3}*(2*x - 1)) - 12*(d + f - 2*h)*x - 9*((2*d - f + h)*x^4 + (2*d - f + h)*x^2 + 2*d - f + h)*\log(x^2 + x + 1) + 9*((2*d - f + h)*x^4 + (2*d - f + h)*x^2 + 2*d - f + h)*\log(x^2 - x + 1) - 12*e + 24*g)/(x^4 + x^2 + 1)$$

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^2} dx = \text{Timed out}$$

```
[In] integrate((h*x**4+g*x**3+f*x**2+e*x+d)/(x**4+x**2+1)**2,x)
```

```
[Out] Timed out
```

**Maxima [A] (verification not implemented)**

none

Time = 0.28 (sec) , antiderivative size = 143, normalized size of antiderivative = 0.76

$$\begin{aligned} & \int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^2} dx \\ &= \frac{1}{36} \sqrt{3}(4d - 8e + f + 4g + h) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) \\ &+ \frac{1}{36} \sqrt{3}(4d + 8e + f - 4g + h) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) \\ &+ \frac{1}{8} (2d - f + h) \log(x^2 + x + 1) - \frac{1}{8} (2d - f + h) \log(x^2 - x + 1) \\ &- \frac{(d - 2f + h)x^3 - (2e - g)x^2 - (d + f - 2h)x - e + 2g}{6(x^4 + x^2 + 1)} \end{aligned}$$

```
[In] integrate((h*x^4+g*x^3+f*x^2+e*x+d)/(x^4+x^2+1)^2,x, algorithm="maxima")
```

```
[Out] 1/36*sqrt(3)*(4*d - 8*e + f + 4*g + h)*arctan(1/3*sqrt(3)*(2*x + 1)) + 1/36
*sqrt(3)*(4*d + 8*e + f - 4*g + h)*arctan(1/3*sqrt(3)*(2*x - 1)) + 1/8*(2*d
- f + h)*log(x^2 + x + 1) - 1/8*(2*d - f + h)*log(x^2 - x + 1) - 1/6*((d -
2*f + h)*x^3 - (2*e - g)*x^2 - (d + f - 2*h)*x - e + 2*g)/(x^4 + x^2 + 1)
```

**Giac [A] (verification not implemented)**

none

Time = 0.42 (sec) , antiderivative size = 151, normalized size of antiderivative = 0.81

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^2} dx$$

$$= \frac{1}{36} \sqrt{3}(4d - 8e + f + 4g + h) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right)$$

$$+ \frac{1}{36} \sqrt{3}(4d + 8e + f - 4g + h) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right)$$

$$+ \frac{1}{8}(2d - f + h) \log(x^2 + x + 1) - \frac{1}{8}(2d - f + h) \log(x^2 - x + 1)$$

$$- \frac{dx^3 - 2fx^3 + hx^3 - 2ex^2 + gx^2 - dx - fx + 2hx - e + 2g}{6(x^4 + x^2 + 1)}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^2,x, algorithm="giac")

[Out] 1/36\*sqrt(3)\*(4\*d - 8\*e + f + 4\*g + h)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/36\*sqrt(3)\*(4\*d + 8\*e + f - 4\*g + h)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/8\*(2\*d - f + h)\*log(x^2 + x + 1) - 1/8\*(2\*d - f + h)\*log(x^2 - x + 1) - 1/6\*(d\*x^3 - 2\*f\*x^3 + h\*x^3 - 2\*e\*x^2 + g\*x^2 - d\*x - f\*x + 2\*h\*x - e + 2\*g)/(x^4 + x^2 + 1)

## Mupad [B] (verification not implemented)

Time = 3.31 (sec) , antiderivative size = 1547, normalized size of antiderivative = 8.27

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^2} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(x^2 + x^4 + 1)^2,x)

[Out] (e/6 - g/3 + x^2\*(e/3 - g/6) + x\*(d/6 + f/6 - h/3) - x^3\*(d/6 - f/3 + h/6))/(x^2 + x^4 + 1) - log(60\*d\*g - 153\*d\*f - 120\*d\*e + 24\*e\*f + 135\*d\*h - 48\*e\*h - 12\*f\*g - 81\*f\*h + 24\*g\*h + 3^(1/2)\*d^2\*90i + 3^(1/2)\*f^2\*9i + 3^(1/2)\*h^2\*18i - 198\*d^2\*x - 36\*f^2\*x - 45\*h^2\*x + 126\*d^2 + 45\*f^2 + 36\*h^2 + 3^(1/2)\*d\*e\*56i - 3^(1/2)\*d\*f\*63i - 3^(1/2)\*d\*g\*28i - 3^(1/2)\*e\*f\*40i + 3^(1/2)\*d\*h\*81i + 3^(1/2)\*e\*h\*32i + 3^(1/2)\*f\*g\*20i - 3^(1/2)\*f\*h\*27i - 3^(1/2)\*g\*h\*16i - 24\*d\*e\*x + 171\*d\*f\*x + 12\*d\*g\*x + 48\*e\*f\*x - 189\*d\*h\*x - 24\*e\*h\*x - 24\*f\*g\*x + 81\*f\*h\*x + 12\*g\*h\*x + 3^(1/2)\*d^2\*x\*18i + 3^(1/2)\*f^2\*x\*18i + 3^(1/2)\*h^2\*x\*9i - 3^(1/2)\*d\*f\*x\*45i + 3^(1/2)\*d\*g\*x\*44i + 3^(1/2)\*e\*f\*x\*32i + 3^(1/2)\*d\*h\*x\*27i - 3^(1/2)\*e\*h\*x\*40i - 3^(1/2)\*f\*g\*x\*16i - 3^(1/2)\*f\*h\*x\*27i + 3^(1/2)\*g\*h\*x\*20i - 3^(1/2)\*d\*e\*x\*88i)\*(d/4 - f/8 + h/8 + (3^(1/2)\*d\*1i)/18 + (3^(1/2)\*e\*1i)/9 + (3^(1/2)\*f\*1i)/72 - (3^(1/2)\*g\*1i)/18 + (3^(1/2)\*h\*1i)/72) - log(120\*d\*e - 153\*d\*f - 60\*d\*g - 24\*e\*f + 135\*d\*h + 48\*e\*h + 12\*f\*g - 81\*f\*h - 24\*g\*h - 3^(1/2)\*d^2\*90i - 3^(1/2)\*f^2\*9i - 3^(1/2)\*h^2\*18i - 198\*d^2\*x - 36\*f^2\*x - 45\*h^2\*x + 126\*d^2 + 45\*f^2 + 36\*h^2 + 3^(1/2)\*d\*e\*56i - 3^(1/2)\*d\*f\*63i - 3^(1/2)\*d\*g\*28i - 3^(1/2)\*e\*f\*40i + 3^(1/2)\*d\*h\*81i + 3^(1/2)\*e\*h\*32i + 3^(1/2)\*f\*g\*20i - 3^(1/2)\*f\*h\*27i - 3^(1/2)\*g\*h\*16i - 24\*d\*e\*x + 171\*d\*f\*x + 12\*d\*g\*x + 48\*e\*f\*x - 189\*d\*h\*x - 24\*e\*h\*x - 24\*f\*g\*x + 81\*f\*h\*x + 12\*g\*h\*x + 3^(1/2)\*d^2\*x\*18i + 3^(1/2)\*f^2\*x\*18i + 3^(1/2)\*h^2\*x\*9i - 3^(1/2)\*d\*f\*x\*45i + 3^(1/2)\*d\*g\*x\*44i + 3^(1/2)\*e\*f\*x\*32i + 3^(1/2)\*d\*h\*x\*27i - 3^(1/2)\*e\*h\*x\*40i - 3^(1/2)\*f\*g\*x\*16i - 3^(1/2)\*f\*h\*x\*27i + 3^(1/2)\*g\*h\*x\*20i - 3^(1/2)\*d\*e\*x\*88i)

$$\begin{aligned}
& 2*18i + 198*d^2*x + 36*f^2*x + 45*h^2*x + 126*d^2 + 45*f^2 + 36*h^2 + 3^(1/2) \\
& *d*e*56i + 3^(1/2)*d*f*63i - 3^(1/2)*d*g*28i - 3^(1/2)*e*f*40i - 3^(1/2)* \\
& d*h*81i + 3^(1/2)*e*h*32i + 3^(1/2)*f*g*20i + 3^(1/2)*f*h*27i - 3^(1/2)*g*h \\
& *16i - 24*d*e*x - 171*d*f*x + 12*d*g*x + 48*e*f*x + 189*d*h*x - 24*e*h*x - \\
& 24*f*g*x - 81*f*h*x + 12*g*h*x + 3^(1/2)*d^2*x*18i + 3^(1/2)*f^2*x*18i + 3^ \\
& (1/2)*h^2*x*9i - 3^(1/2)*d*f*x*45i - 3^(1/2)*d*g*x*44i - 3^(1/2)*e*f*x*32i \\
& + 3^(1/2)*d*h*x*27i + 3^(1/2)*e*h*x*40i + 3^(1/2)*f*g*x*16i - 3^(1/2)*f*h*x \\
& *27i - 3^(1/2)*g*h*x*20i + 3^(1/2)*d*e*x*88i)*(f/8 - d/4 - h/8 + (3^(1/2)*d \\
& *1i)/18 - (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/72 + (3^(1/2)*g*1i)/18 + (3^(1/ \\
& 2)*h*1i)/72) + \log(120*d*e - 153*d*f - 60*d*g - 24*e*f + 135*d*h + 48*e*h + \\
& 12*f*g - 81*f*h - 24*g*h + 3^(1/2)*d^2*90i + 3^(1/2)*f^2*9i + 3^(1/2)*h^2* \\
& 18i + 198*d^2*x + 36*f^2*x + 45*h^2*x + 126*d^2 + 45*f^2 + 36*h^2 - 3^(1/2) \\
& *d*e*56i - 3^(1/2)*d*f*63i + 3^(1/2)*d*g*28i + 3^(1/2)*e*f*40i + 3^(1/2)*d* \\
& h*81i - 3^(1/2)*e*h*32i - 3^(1/2)*f*g*20i - 3^(1/2)*f*h*27i + 3^(1/2)*g*h*1 \\
& 6i - 24*d*e*x - 171*d*f*x + 12*d*g*x + 48*e*f*x + 189*d*h*x - 24*e*h*x - 24 \\
& *f*g*x - 81*f*h*x + 12*g*h*x - 3^(1/2)*d^2*x*18i - 3^(1/2)*f^2*x*18i - 3^(1 \\
& /2)*h^2*x*9i + 3^(1/2)*d*f*x*45i + 3^(1/2)*d*g*x*44i + 3^(1/2)*e*f*x*32i - \\
& 3^(1/2)*d*h*x*27i - 3^(1/2)*e*h*x*40i - 3^(1/2)*f*g*x*16i + 3^(1/2)*f*h*x*2 \\
& 7i + 3^(1/2)*g*h*x*20i - 3^(1/2)*d*e*x*88i)*(d/4 - f/8 + h/8 + (3^(1/2)*d*1 \\
& i)/18 - (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/72 + (3^(1/2)*g*1i)/18 + (3^(1/2) \\
& *h*1i)/72) + \log(120*d*e + 153*d*f - 60*d*g - 24*e*f - 135*d*h + 48*e*h + 1 \\
& 2*f*g + 81*f*h - 24*g*h + 3^(1/2)*d^2*90i + 3^(1/2)*f^2*9i + 3^(1/2)*h^2*18 \\
& i + 198*d^2*x + 36*f^2*x + 45*h^2*x - 126*d^2 - 45*f^2 - 36*h^2 + 3^(1/2)*d \\
& *e*56i - 3^(1/2)*d*f*63i - 3^(1/2)*d*g*28i - 3^(1/2)*e*f*40i + 3^(1/2)*d*h* \\
& 81i + 3^(1/2)*e*h*32i + 3^(1/2)*f*g*20i - 3^(1/2)*f*h*27i - 3^(1/2)*g*h*16i \\
& + 24*d*e*x - 171*d*f*x - 12*d*g*x - 48*e*f*x + 189*d*h*x + 24*e*h*x + 24*f \\
& *g*x - 81*f*h*x - 12*g*h*x + 3^(1/2)*d^2*x*18i + 3^(1/2)*f^2*x*18i + 3^(1/2) \\
& )*h^2*x*9i - 3^(1/2)*d*f*x*45i + 3^(1/2)*d*g*x*44i + 3^(1/2)*e*f*x*32i + 3^ \\
& (1/2)*d*h*x*27i - 3^(1/2)*e*h*x*40i - 3^(1/2)*f*g*x*16i - 3^(1/2)*f*h*x*27i \\
& + 3^(1/2)*g*h*x*20i - 3^(1/2)*d*e*x*88i)*(f/8 - d/4 - h/8 + (3^(1/2)*d*1i) \\
& /18 + (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/72 - (3^(1/2)*g*1i)/18 + (3^(1/2)*h \\
& *1i)/72)
\end{aligned}$$

$$3.35 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(1+x^2+x^4)^2} dx$$

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### Optimal result

Integrand size = 36, antiderivative size = 194

$$\int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(1+x^2+x^4)^2} dx = \frac{x(d+f-2h-(d-2f+h)x^2)}{6(1+x^2+x^4)} + \frac{e-2g+i+(2e-g-i)x^2}{6(1+x^2+x^4)} - \frac{(4d+f+h) \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{12\sqrt{3}} + \frac{(4d+f+h) \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{12\sqrt{3}} + \frac{(2e-g+2i) \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{8}(2d-f+h) \log(1-x+x^2) + \frac{1}{8}(2d-f+h) \log(1+x+x^2)$$

[Out] 1/6\*x\*(d+f-2\*h-(d-2\*f+h)\*x^2)/(x^4+x^2+1)+1/6\*(e-2\*g+i+(2\*e-g-i)\*x^2)/(x^4+x^2+1)-1/8\*(2\*d-f+h)\*ln(x^2-x+1)+1/8\*(2\*d-f+h)\*ln(x^2+x+1)-1/36\*(4\*d+f+h)\*arctan(1/3\*(1-2\*x)\*3^(1/2))\*3^(1/2)+1/36\*(4\*d+f+h)\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)+1/9\*(2\*e-g+2\*i)\*arctan(1/3\*(2\*x^2+1)\*3^(1/2))\*3^(1/2)

**Rubi [A] (verified)**

Time = 0.14 (sec) , antiderivative size = 194, normalized size of antiderivative = 1.00, number of steps used = 16, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.278$ , Rules used = {1687, 1692, 1183, 648, 632, 210, 642, 1677, 1674, 12}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^2} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(4d + f + h)}{12\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(4d + f + h)}{12\sqrt{3}} + \frac{\arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)(2e - g + 2i)}{3\sqrt{3}} - \frac{1}{8} \log(x^2 - x + 1)(2d - f + h) + \frac{1}{8} \log(x^2 + x + 1)(2d - f + h) + \frac{x(-x^2(d - 2f + h) + d + f - 2h)}{6(x^4 + x^2 + 1)} + \frac{x^2(2e - g - i) + e - 2g + i}{6(x^4 + x^2 + 1)}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(1 + x^2 + x^4)^2,x]

[Out] (x\*(d + f - 2\*h - (d - 2\*f + h)\*x^2))/(6\*(1 + x^2 + x^4)) + (e - 2\*g + i + (2\*e - g - i)\*x^2)/(6\*(1 + x^2 + x^4)) - ((4\*d + f + h)\*ArcTan[(1 - 2\*x)/Sqrt[3]])/(12\*Sqrt[3]) + ((4\*d + f + h)\*ArcTan[(1 + 2\*x)/Sqrt[3]])/(12\*Sqrt[3]) + ((2\*e - g + 2\*i)\*ArcTan[(1 + 2\*x^2)/Sqrt[3]])/(3\*Sqrt[3]) - ((2\*d - f + h)\*Log[1 - x + x^2])/8 + ((2\*d - f + h)\*Log[1 + x + x^2])/8

Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_) /; FreeQ[b, x]]

Rule 210

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-(Rt[-a, 2]\*Rt[-b, 2])^(-1))\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c},

$x] \&\& \text{NeQ}[b^2 - 4*a*c, 0]$

#### Rule 642

$\text{Int}[\frac{(d_.) + (e_.)*(x_.)}{(a_.) + (b_.)*(x_.) + (c_.)*(x_.)^2}, x\_Symbol] \rightarrow \text{Simp}[d*(\text{Log}[\text{RemoveContent}[a + b*x + c*x^2, x]]/b), x] /; \text{FreeQ}[\{a, b, c, d, e\}, x] \&\& \text{EqQ}[2*c*d - b*e, 0]$

#### Rule 648

$\text{Int}[\frac{(d_.) + (e_.)*(x_.)}{(a_.) + (b_.)*(x_.) + (c_.)*(x_.)^2}, x\_Symbol] \rightarrow \text{Dist}[(2*c*d - b*e)/(2*c), \text{Int}[1/(a + b*x + c*x^2), x], x] + \text{Dist}[e/(2*c), \text{Int}[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; \text{FreeQ}[\{a, b, c, d, e\}, x] \&\& \text{NeQ}[2*c*d - b*e, 0] \&\& \text{NeQ}[b^2 - 4*a*c, 0] \&\& \text{!NiceSqrtQ}[b^2 - 4*a*c]$

#### Rule 1183

$\text{Int}[\frac{(d_.) + (e_.)*(x_.)^2}{(a_.) + (b_.)*(x_.)^2 + (c_.)*(x_.)^4}, x\_Symbol] \rightarrow \text{With}[\{q = \text{Rt}[a/c, 2]\}, \text{With}[\{r = \text{Rt}[2*q - b/c, 2]\}, \text{Dist}[1/(2*c*q*r), \text{Int}[(d*r - (d - e*q)*x)/(q - r*x + x^2), x], x] + \text{Dist}[1/(2*c*q*r), \text{Int}[(d*r + (d - e*q)*x)/(q + r*x + x^2), x], x]]] /; \text{FreeQ}[\{a, b, c, d, e\}, x] \&\& \text{NeQ}[b^2 - 4*a*c, 0] \&\& \text{NeQ}[c*d^2 - b*d*e + a*e^2, 0] \&\& \text{NegQ}[b^2 - 4*a*c]$

#### Rule 1674

$\text{Int}[(Pq_)*((a_.) + (b_.)*(x_.) + (c_.)*(x_.)^2)^{(p_.)}, x\_Symbol] \rightarrow \text{With}[\{Q = \text{PolynomialQuotient}[Pq, a + b*x + c*x^2, x], f = \text{Coeff}[\text{PolynomialRemainder}[Pq, a + b*x + c*x^2, x], x, 0], g = \text{Coeff}[\text{PolynomialRemainder}[Pq, a + b*x + c*x^2, x], x, 1]\}, \text{Simp}[(b*f - 2*a*g + (2*c*f - b*g)*x)*((a + b*x + c*x^2)^{(p+1})/((p+1)*(b^2 - 4*a*c))), x] + \text{Dist}[1/((p+1)*(b^2 - 4*a*c)), \text{Int}[(a + b*x + c*x^2)^{(p+1)}*\text{ExpandToSum}[(p+1)*(b^2 - 4*a*c)*Q - (2*p+3)*(2*c*f - b*g), x], x], x]] /; \text{FreeQ}[\{a, b, c\}, x] \&\& \text{PolyQ}[Pq, x] \&\& \text{NeQ}[b^2 - 4*a*c, 0] \&\& \text{LtQ}[p, -1]$

#### Rule 1677

$\text{Int}[(Pq_)*(x_.)^{(m_.)}*((a_.) + (b_.)*(x_.)^2 + (c_.)*(x_.)^4)^{(p_.)}, x\_Symbol] \rightarrow \text{Dist}[1/2, \text{Subst}[\text{Int}[x^{((m-1)/2)*\text{SubstFor}[x^2, Pq, x]}*(a + b*x + c*x^2)^p, x], x, x^2], x] /; \text{FreeQ}[\{a, b, c, p\}, x] \&\& \text{PolyQ}[Pq, x^2] \&\& \text{IntegerQ}[(m-1)/2]$

#### Rule 1687

$\text{Int}[(Pq_)*((a_.) + (b_.)*(x_.)^2 + (c_.)*(x_.)^4)^{(p_.)}, x\_Symbol] \rightarrow \text{Module}[\{q = \text{Expon}[Pq, x], k\}, \text{Int}[\text{Sum}[\text{Coeff}[Pq, x, 2*k]*x^{(2*k)}, \{k, 0, q/2\}]*((a + b*x^2 + c*x^4)^p, x] + \text{Int}[x*\text{Sum}[\text{Coeff}[Pq, x, 2*k+1]*x^{(2*k)}, \{k, 0, (q -$



1)/2}\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]  
 && !PolyQ[Pq, x^2]

### Rule 1692

Int[(Pq\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_), x\_Symbol] := With[{d =  
 Coeff[PolynomialRemainder[Pq, a + b\*x^2 + c\*x^4, x], x, 0], e = Coeff[PolynomialRemainder[Pq, a + b\*x^2 + c\*x^4, x], x, 2]}, Simp[x\*(a + b\*x^2 + c\*x^4)^(p + 1)\*((a\*b\*e - d\*(b^2 - 2\*a\*c) - c\*(b\*d - 2\*a\*e)\*x^2)/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[(a + b\*x^2 + c\*x^4)^(p + 1)\*ExpandToSum[2\*a\*(p + 1)\*(b^2 - 4\*a\*c)\*PolynomialQuotient[Pq, a + b\*x^2 + c\*x^4, x] + b^2\*d\*(2\*p + 3) - 2\*a\*c\*d\*(4\*p + 5) - a\*b\*e + c\*(4\*p + 7)\*(b\*d - 2\*a\*e)\*x^2, x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1]

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + fx^2 + hx^4}{(1 + x^2 + x^4)^2} dx + \int \frac{x(e + gx^2 + ix^4)}{(1 + x^2 + x^4)^2} dx \\
 &= \frac{x(d + f - 2h - (d - 2f + h)x^2)}{6(1 + x^2 + x^4)} + \frac{1}{6} \int \frac{5d - f + 2h + (-d + 2f - h)x^2}{1 + x^2 + x^4} dx \\
 &\quad + \frac{1}{2} \text{Subst}\left(\int \frac{e + gx + ix^2}{(1 + x + x^2)^2} dx, x, x^2\right) \\
 &= \frac{x(d + f - 2h - (d - 2f + h)x^2)}{6(1 + x^2 + x^4)} + \frac{e - 2g + i + (2e - g - i)x^2}{6(1 + x^2 + x^4)} \\
 &\quad + \frac{1}{12} \int \frac{5d - f + 2h - (6d - 3f + 3h)x}{1 - x + x^2} dx \\
 &\quad + \frac{1}{12} \int \frac{5d - f + 2h + (6d - 3f + 3h)x}{1 + x + x^2} dx + \frac{1}{6} \text{Subst}\left(\int \frac{2e - g + 2i}{1 + x + x^2} dx, x, x^2\right) \\
 &= \frac{x(d + f - 2h - (d - 2f + h)x^2)}{6(1 + x^2 + x^4)} + \frac{e - 2g + i + (2e - g - i)x^2}{6(1 + x^2 + x^4)} \\
 &\quad + \frac{1}{8}(-2d + f - h) \int \frac{-1 + 2x}{1 - x + x^2} dx + \frac{1}{8}(2d - f + h) \int \frac{1 + 2x}{1 + x + x^2} dx \\
 &\quad + \frac{1}{24}(4d + f + h) \int \frac{1}{1 - x + x^2} dx + \frac{1}{24}(4d + f + h) \int \frac{1}{1 + x + x^2} dx \\
 &\quad + \frac{1}{6}(2e - g + 2i) \text{Subst}\left(\int \frac{1}{1 + x + x^2} dx, x, x^2\right)
 \end{aligned}$$

$$\begin{aligned}
&= \frac{x(d+f-2h-(d-2f+h)x^2)}{6(1+x^2+x^4)} + \frac{e-2g+i+(2e-g-i)x^2}{6(1+x^2+x^4)} \\
&\quad - \frac{1}{8}(2d-f+h)\log(1-x+x^2) + \frac{1}{8}(2d-f+h)\log(1+x+x^2) \\
&\quad + \frac{1}{12}(-4d-f-h)\text{Subst}\left(\int \frac{1}{-3-x^2} dx, x, -1+2x\right) \\
&\quad + \frac{1}{12}(-4d-f-h)\text{Subst}\left(\int \frac{1}{-3-x^2} dx, x, 1+2x\right) \\
&\quad + \frac{1}{3}(-2e+g-2i)\text{Subst}\left(\int \frac{1}{-3-x^2} dx, x, 1+2x^2\right) \\
&= \frac{x(d+f-2h-(d-2f+h)x^2)}{6(1+x^2+x^4)} + \frac{e-2g+i+(2e-g-i)x^2}{6(1+x^2+x^4)} \\
&\quad - \frac{(4d+f+h)\tan^{-1}\left(\frac{1-2x}{\sqrt{3}}\right)}{12\sqrt{3}} + \frac{(4d+f+h)\tan^{-1}\left(\frac{1+2x}{\sqrt{3}}\right)}{12\sqrt{3}} \\
&\quad + \frac{(2e-g+2i)\tan^{-1}\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{8}(2d-f+h)\log(1-x+x^2) \\
&\quad + \frac{1}{8}(2d-f+h)\log(1+x+x^2)
\end{aligned}$$

### Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.39 (sec) , antiderivative size = 243, normalized size of antiderivative = 1.25

$$\begin{aligned}
&\int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(1+x^2+x^4)^2} dx \\
&= \frac{1}{36} \left( \frac{6(e+i+dx+fx-2hx+2ex^2-ix^2-dx^3+2fx^3-hx^3-g(2+x^2))}{1+x^2+x^4} \right. \\
&\quad - \frac{((-11i+\sqrt{3})d-2(-2i+\sqrt{3})f+(-5i+\sqrt{3})h)\arctan\left(\frac{1}{2}(-i+\sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1+i\sqrt{3})}} \\
&\quad - \frac{((11i+\sqrt{3})d-2(2i+\sqrt{3})f+(5i+\sqrt{3})h)\arctan\left(\frac{1}{2}(i+\sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1-i\sqrt{3})}} \\
&\quad \left. - 4\sqrt{3}(2e-g+2i)\arctan\left(\frac{\sqrt{3}}{1+2x^2}\right) \right)
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(1 + x^2 + x^4)^2,x]

```
[Out] ((6*(e + i + d*x + f*x - 2*h*x + 2*e*x^2 - i*x^2 - d*x^3 + 2*f*x^3 - h*x^3
- g*(2 + x^2)))/(1 + x^2 + x^4) - (((-11*I + Sqrt[3])*d - 2*(-2*I + Sqrt[3]
)*f + (-5*I + Sqrt[3])*h)*ArcTan[(-I + Sqrt[3])*x/2])/Sqrt[(1 + I*Sqrt[3]
)/6] - (((11*I + Sqrt[3])*d - 2*(2*I + Sqrt[3])*f + (5*I + Sqrt[3])*h)*ArcT
an[((I + Sqrt[3])*x)/2])/Sqrt[(1 - I*Sqrt[3])/6] - 4*Sqrt[3]*(2*e - g + 2*i
)*ArcTan[Sqrt[3]/(1 + 2*x^2)]/36
```

## Maple [A] (verified)

Time = 0.51 (sec) , antiderivative size = 214, normalized size of antiderivative = 1.10

method	result
default	$-\frac{\left(\frac{d}{3}-\frac{e}{3}-\frac{g}{3}+\frac{h}{3}-\frac{2f}{3}+\frac{2i}{3}\right)x-\frac{2d}{3}-\frac{e}{3}+\frac{2g}{3}+\frac{h}{3}+\frac{f}{3}-\frac{i}{3}}{4(x^2-x+1)} - \frac{(6d-3f+3h)\ln(x^2-x+1)}{24} - \frac{(-2d-4e-\frac{f}{2}+2g-\frac{h}{2}-4i)\sqrt{3}\arctan\left(\frac{(2x-1)}{3}\right)}{18}$
risch	Expression too large to display

```
[In] int((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4+x^2+1)^2,x,method=_RETURNVERBOSE)
```

```
[Out] -1/4*((1/3*d-1/3*e-1/3*g+1/3*h-2/3*f+2/3*i)*x-2/3*d-1/3*e+2/3*g+1/3*h+1/3*f
-1/3*i)/(x^2-x+1)-1/24*(6*d-3*f+3*h)*ln(x^2-x+1)-1/18*(-2*d-4*e-1/2*f+2*g-1
/2*h-4*i)*3^(1/2)*arctan(1/3*(2*x-1)*3^(1/2))+1/4*((-1/3*d-1/3*e-1/3*g-1/3*
h+2/3*f+2/3*i)*x-2/3*d+1/3*e-2/3*g+1/3*h+1/3*f+1/3*i)/(x^2+x+1)+1/24*(6*d-3
*f+3*h)*ln(x^2+x+1)+1/18*(2*d-4*e+1/2*f+2*g+1/2*h-4*i)*arctan(1/3*(1+2*x)*3
^(1/2))*3^(1/2)
```

## Fricas [A] (verification not implemented)

none

Time = 4.87 (sec) , antiderivative size = 279, normalized size of antiderivative = 1.44

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^2} dx =$$

$$-\frac{12(d - 2f + h)x^3 - 12(2e - g - i)x^2 - 2\sqrt{3}((4d - 8e + f + 4g + h - 8i)x^4 + (4d - 8e + f + 4g$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4+x^2+1)^2,x, algorithm="fricas")
```

```
[Out] -1/72*(12*(d - 2*f + h)*x^3 - 12*(2*e - g - i)*x^2 - 2*sqrt(3)*((4*d - 8*e
+ f + 4*g + h - 8*i)*x^4 + (4*d - 8*e + f + 4*g + h - 8*i)*x^2 + 4*d - 8*e
+ f + 4*g + h - 8*i)*arctan(1/3*sqrt(3)*(2*x + 1)) - 2*sqrt(3)*((4*d + 8*e
+ f - 4*g + h + 8*i)*x^4 + (4*d + 8*e + f - 4*g + h + 8*i)*x^2 + 4*d + 8*e
+ f - 4*g + h + 8*i)*arctan(1/3*sqrt(3)*(2*x - 1)) - 12*(d + f - 2*h)*x - 9
*((2*d - f + h)*x^4 + (2*d - f + h)*x^2 + 2*d - f + h)*log(x^2 + x + 1) + 9
*((2*d - f + h)*x^4 + (2*d - f + h)*x^2 + 2*d - f + h)*log(x^2 - x + 1) - 1
2*e + 24*g - 12*i)/(x^4 + x^2 + 1)
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^2} dx = \text{Timed out}$$

```
[In] integrate((i*x**5+h*x**4+g*x**3+f*x**2+e*x+d)/(x**4+x**2+1)**2,x)
```

```
[Out] Timed out
```

**Maxima [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 155, normalized size of antiderivative = 0.80

$$\begin{aligned} & \int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^2} dx \\ &= \frac{1}{36} \sqrt{3}(4d - 8e + f + 4g + h - 8i) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) \\ &+ \frac{1}{36} \sqrt{3}(4d + 8e + f - 4g + h + 8i) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) \\ &+ \frac{1}{8}(2d - f + h) \log(x^2 + x + 1) - \frac{1}{8}(2d - f + h) \log(x^2 - x + 1) \\ &- \frac{(d - 2f + h)x^3 - (2e - g - i)x^2 - (d + f - 2h)x - e + 2g - i}{6(x^4 + x^2 + 1)} \end{aligned}$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4+x^2+1)^2,x, algorithm="maxima")
```

```
[Out] 1/36*sqrt(3)*(4*d - 8*e + f + 4*g + h - 8*i)*arctan(1/3*sqrt(3)*(2*x + 1))
+ 1/36*sqrt(3)*(4*d + 8*e + f - 4*g + h + 8*i)*arctan(1/3*sqrt(3)*(2*x - 1))
+ 1/8*(2*d - f + h)*log(x^2 + x + 1) - 1/8*(2*d - f + h)*log(x^2 - x + 1)
- 1/6*((d - 2*f + h)*x^3 - (2*e - g - i)*x^2 - (d + f - 2*h)*x - e + 2*g - i)/(x^4 + x^2 + 1)
```

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 165, normalized size of antiderivative = 0.85

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^2} dx$$

$$= \frac{1}{36} \sqrt{3}(4d - 8e + f + 4g + h - 8i) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right)$$

$$+ \frac{1}{36} \sqrt{3}(4d + 8e + f - 4g + h + 8i) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right)$$

$$+ \frac{1}{8}(2d - f + h) \log(x^2 + x + 1) - \frac{1}{8}(2d - f + h) \log(x^2 - x + 1)$$

$$- \frac{dx^3 - 2fx^3 + hx^3 - 2ex^2 + gx^2 + ix^2 - dx - fx + 2hx - e + 2g - i}{6(x^4 + x^2 + 1)}$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4+x^2+1)^2,x, algorithm="giac")
```

```
[Out] 1/36*sqrt(3)*(4*d - 8*e + f + 4*g + h - 8*i)*arctan(1/3*sqrt(3)*(2*x + 1))
+ 1/36*sqrt(3)*(4*d + 8*e + f - 4*g + h + 8*i)*arctan(1/3*sqrt(3)*(2*x - 1))
+ 1/8*(2*d - f + h)*log(x^2 + x + 1) - 1/8*(2*d - f + h)*log(x^2 - x + 1)
- 1/6*(d*x^3 - 2*f*x^3 + h*x^3 - 2*e*x^2 + g*x^2 + i*x^2 - d*x - f*x + 2*h*x - e + 2*g - i)/(x^4 + x^2 + 1)
```

**Mupad [B] (verification not implemented)**

Time = 13.24 (sec) , antiderivative size = 1894, normalized size of antiderivative = 9.76

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^2} dx = \text{Too large to display}$$

```
[In] int((d + e*x + f*x^2 + g*x^3 + h*x^4 + i*x^5)/(x^2 + x^4 + 1)^2,x)
```

```
[Out] (e/6 - g/3 + i/6 + x*(d/6 + f/6 - h/3) - x^3*(d/6 - f/3 + h/6) - x^2*(g/6 - e/3 + i/6))/(x^2 + x^4 + 1) - log(60*d*g - 153*d*f - 120*d*e + 24*e*f + 13
5*d*h - 120*d*i - 48*e*h - 12*f*g - 81*f*h + 24*f*i + 24*g*h - 48*h*i + 3^(
1/2)*d^2*90i + 3^(1/2)*f^2*9i + 3^(1/2)*h^2*18i - 198*d^2*x - 36*f^2*x - 45
*h^2*x + 126*d^2 + 45*f^2 + 36*h^2 + 3^(1/2)*d*e*56i - 3^(1/2)*d*f*63i - 3^(
1/2)*d*g*28i - 3^(1/2)*e*f*40i + 3^(1/2)*d*h*81i + 3^(1/2)*d*i*56i + 3^(1/
2)*e*h*32i + 3^(1/2)*f*g*20i - 3^(1/2)*f*h*27i - 3^(1/2)*f*i*40i - 3^(1/2)*
g*h*16i + 3^(1/2)*h*i*32i - 24*d*e*x + 171*d*f*x + 12*d*g*x + 48*e*f*x - 18
9*d*h*x - 24*d*i*x - 24*e*h*x - 24*f*g*x + 81*f*h*x + 48*f*i*x + 12*g*h*x -
24*h*i*x + 3^(1/2)*d^2*x*18i + 3^(1/2)*f^2*x*18i + 3^(1/2)*h^2*x*9i - 3^(1
```

$$\begin{aligned}
& /2)*d*f*x*45i + 3^{(1/2)}*d*g*x*44i + 3^{(1/2)}*e*f*x*32i + 3^{(1/2)}*d*h*x*27i - \\
& 3^{(1/2)}*d*i*x*88i - 3^{(1/2)}*e*h*x*40i - 3^{(1/2)}*f*g*x*16i - 3^{(1/2)}*f*h*x* \\
& 27i + 3^{(1/2)}*f*i*x*32i + 3^{(1/2)}*g*h*x*20i - 3^{(1/2)}*h*i*x*40i - 3^{(1/2)}*d \\
& *e*x*88i)*(d/4 - f/8 + h/8 + (3^{(1/2)}*d*1i)/18 + (3^{(1/2)}*e*1i)/9 + (3^{(1/2)} \\
& )*f*1i)/72 - (3^{(1/2)}*g*1i)/18 + (3^{(1/2)}*h*1i)/72 + (3^{(1/2)}*i*1i)/9) - \log \\
& (120*d*e - 153*d*f - 60*d*g - 24*e*f + 135*d*h + 120*d*i + 48*e*h + 12*f*g \\
& - 81*f*h - 24*f*i - 24*g*h + 48*h*i - 3^{(1/2)}*d^2*90i - 3^{(1/2)}*f^2*9i - 3 \\
& ^{(1/2)}*h^2*18i + 198*d^2*x + 36*f^2*x + 45*h^2*x + 126*d^2 + 45*f^2 + 36*h^ \\
& 2 + 3^{(1/2)}*d*e*56i + 3^{(1/2)}*d*f*63i - 3^{(1/2)}*d*g*28i - 3^{(1/2)}*e*f*40i - \\
& 3^{(1/2)}*d*h*81i + 3^{(1/2)}*d*i*56i + 3^{(1/2)}*e*h*32i + 3^{(1/2)}*f*g*20i + 3^{(1/2)} \\
& *f*h*27i - 3^{(1/2)}*f*i*40i - 3^{(1/2)}*g*h*16i + 3^{(1/2)}*h*i*32i - 24*d* \\
& e*x - 171*d*f*x + 12*d*g*x + 48*e*f*x + 189*d*h*x - 24*d*i*x - 24*e*h*x - 2 \\
& 4*f*g*x - 81*f*h*x + 48*f*i*x + 12*g*h*x - 24*h*i*x + 3^{(1/2)}*d^2*x*18i + 3 \\
& ^{(1/2)}*f^2*x*18i + 3^{(1/2)}*h^2*x*9i - 3^{(1/2)}*d*f*x*45i - 3^{(1/2)}*d*g*x*44i \\
& - 3^{(1/2)}*e*f*x*32i + 3^{(1/2)}*d*h*x*27i + 3^{(1/2)}*d*i*x*88i + 3^{(1/2)}*e*h* \\
& x*40i + 3^{(1/2)}*f*g*x*16i - 3^{(1/2)}*f*h*x*27i - 3^{(1/2)}*f*i*x*32i - 3^{(1/2)} \\
& *g*h*x*20i + 3^{(1/2)}*h*i*x*40i + 3^{(1/2)}*d*e*x*88i)*(f/8 - d/4 - h/8 + (3^{(1/2)} \\
& )*d*1i)/18 - (3^{(1/2)}*e*1i)/9 + (3^{(1/2)}*f*1i)/72 + (3^{(1/2)}*g*1i)/18 + \\
& (3^{(1/2)}*h*1i)/72 - (3^{(1/2)}*i*1i)/9) + \log(120*d*e - 153*d*f - 60*d*g - 24 \\
& *e*f + 135*d*h + 120*d*i + 48*e*h + 12*f*g - 81*f*h - 24*f*i - 24*g*h + 48* \\
& h*i + 3^{(1/2)}*d^2*90i + 3^{(1/2)}*f^2*9i + 3^{(1/2)}*h^2*18i + 198*d^2*x + 36*f \\
& ^2*x + 45*h^2*x + 126*d^2 + 45*f^2 + 36*h^2 - 3^{(1/2)}*d*e*56i - 3^{(1/2)}*d*f \\
& *63i + 3^{(1/2)}*d*g*28i + 3^{(1/2)}*e*f*40i + 3^{(1/2)}*d*h*81i - 3^{(1/2)}*d*i*56 \\
& i - 3^{(1/2)}*e*h*32i - 3^{(1/2)}*f*g*20i - 3^{(1/2)}*f*h*27i + 3^{(1/2)}*f*i*40i + \\
& 3^{(1/2)}*g*h*16i - 3^{(1/2)}*h*i*32i - 24*d*e*x - 171*d*f*x + 12*d*g*x + 48*e \\
& *f*x + 189*d*h*x - 24*d*i*x - 24*e*h*x - 24*f*g*x - 81*f*h*x + 48*f*i*x + 1 \\
& 2*g*h*x - 24*h*i*x - 3^{(1/2)}*d^2*x*18i - 3^{(1/2)}*f^2*x*18i - 3^{(1/2)}*h^2*x* \\
& 9i + 3^{(1/2)}*d*f*x*45i + 3^{(1/2)}*d*g*x*44i + 3^{(1/2)}*e*f*x*32i - 3^{(1/2)}*d* \\
& h*x*27i - 3^{(1/2)}*d*i*x*88i - 3^{(1/2)}*e*h*x*40i - 3^{(1/2)}*f*g*x*16i + 3^{(1/2)} \\
& *f*h*x*27i + 3^{(1/2)}*f*i*x*32i + 3^{(1/2)}*g*h*x*20i - 3^{(1/2)}*h*i*x*40i - \\
& 3^{(1/2)}*d*e*x*88i)*(d/4 - f/8 + h/8 + (3^{(1/2)}*d*1i)/18 - (3^{(1/2)}*e*1i)/9 \\
& + (3^{(1/2)}*f*1i)/72 + (3^{(1/2)}*g*1i)/18 + (3^{(1/2)}*h*1i)/72 - (3^{(1/2)}*i*1i \\
& )/9) + \log(120*d*e + 153*d*f - 60*d*g - 24*e*f - 135*d*h + 120*d*i + 48*e*h \\
& + 12*f*g + 81*f*h - 24*f*i - 24*g*h + 48*h*i + 3^{(1/2)}*d^2*90i + 3^{(1/2)}*f \\
& ^2*9i + 3^{(1/2)}*h^2*18i + 198*d^2*x + 36*f^2*x + 45*h^2*x - 126*d^2 - 45*f^ \\
& 2 - 36*h^2 + 3^{(1/2)}*d*e*56i - 3^{(1/2)}*d*f*63i - 3^{(1/2)}*d*g*28i - 3^{(1/2)}* \\
& e*f*40i + 3^{(1/2)}*d*h*81i + 3^{(1/2)}*d*i*56i + 3^{(1/2)}*e*h*32i + 3^{(1/2)}*f*g \\
& *20i - 3^{(1/2)}*f*h*27i - 3^{(1/2)}*f*i*40i - 3^{(1/2)}*g*h*16i + 3^{(1/2)}*h*i*32 \\
& i + 24*d*e*x - 171*d*f*x - 12*d*g*x - 48*e*f*x + 189*d*h*x + 24*d*i*x + 24* \\
& e*h*x + 24*f*g*x - 81*f*h*x - 48*f*i*x - 12*g*h*x + 24*h*i*x + 3^{(1/2)}*d^2* \\
& x*18i + 3^{(1/2)}*f^2*x*18i + 3^{(1/2)}*h^2*x*9i - 3^{(1/2)}*d*f*x*45i + 3^{(1/2)}* \\
& d*g*x*44i + 3^{(1/2)}*e*f*x*32i + 3^{(1/2)}*d*h*x*27i - 3^{(1/2)}*d*i*x*88i - 3^{(1/2)} \\
& *e*h*x*40i - 3^{(1/2)}*f*g*x*16i - 3^{(1/2)}*f*h*x*27i + 3^{(1/2)}*f*i*x*32i \\
& + 3^{(1/2)}*g*h*x*20i - 3^{(1/2)}*h*i*x*40i - 3^{(1/2)}*d*e*x*88i)*(f/8 - d/4 - h \\
& /8 + (3^{(1/2)}*d*1i)/18 + (3^{(1/2)}*e*1i)/9 + (3^{(1/2)}*f*1i)/72 - (3^{(1/2)}*g*
\end{aligned}$$

$$1i)/18 + (3^{1/2} * h * 1i)/72 + (3^{1/2} * i * 1i)/9)$$

### 3.36 $\int \frac{d+ex}{(a+bx^2+cx^4)^2} dx$

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#### Optimal result

Integrand size = 20, antiderivative size = 330

$$\int \frac{d+ex}{(a+bx^2+cx^4)^2} dx = -\frac{e(b+2cx^2)}{2(b^2-4ac)(a+bx^2+cx^4)} + \frac{dx(b^2-2ac+bcx^2)}{2a(b^2-4ac)(a+bx^2+cx^4)}$$

$$+ \frac{\sqrt{c}(b^2-12ac+b\sqrt{b^2-4ac}) d \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a(b^2-4ac)^{3/2}\sqrt{b-\sqrt{b^2-4ac}}}$$

$$- \frac{\sqrt{c}(b^2-12ac-b\sqrt{b^2-4ac}) d \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a(b^2-4ac)^{3/2}\sqrt{b+\sqrt{b^2-4ac}}}$$

$$+ \frac{2ce \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{3/2}}$$

```
[Out] -1/2*e*(2*c*x^2+b)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)+1/2*d*x*(b*c*x^2-2*a*c+b^2)
/a/(-4*a*c+b^2)/(c*x^4+b*x^2+a)+2*c*e*arctanh((2*c*x^2+b)/(-4*a*c+b^2)^(1/2
))/(-4*a*c+b^2)^(3/2)+1/4*d*arctan(x*2^(1/2)*c^(1/2)/(b-(-4*a*c+b^2)^(1/2))
^(1/2))*c^(1/2)*(b^2-12*a*c+b*(-4*a*c+b^2)^(1/2))/a/(-4*a*c+b^2)^(3/2)*2^(1
/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2)-1/4*d*arctan(x*2^(1/2)*c^(1/2)/(b+(-4*a*c+
b^2)^(1/2))^(1/2))*c^(1/2)*(b^2-12*a*c-b*(-4*a*c+b^2)^(1/2))/a/(-4*a*c+b^2)
^(3/2)*2^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2)
```



**Rubi [A] (verified)**

Time = 0.50 (sec) , antiderivative size = 330, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.450$ , Rules used = {1687, 12, 1106, 1180, 211, 1121, 628, 632, 212}

$$\int \frac{d + ex}{(a + bx^2 + cx^4)^2} dx = \frac{\sqrt{cd}(b\sqrt{b^2 - 4ac} - 12ac + b^2) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a(b^2 - 4ac)^{3/2} \sqrt{b - \sqrt{b^2 - 4ac}}} - \frac{\sqrt{cd}(-b\sqrt{b^2 - 4ac} - 12ac + b^2) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2 - 4ac} + b}}\right)}{2\sqrt{2}a(b^2 - 4ac)^{3/2} \sqrt{\sqrt{b^2 - 4ac} + b}} + \frac{2ce \operatorname{arctanh}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{(b^2 - 4ac)^{3/2}} + \frac{dx(-2ac + b^2 + bcx^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} - \frac{e(b + 2cx^2)}{2(b^2 - 4ac)(a + bx^2 + cx^4)}$$

[In] Int[(d + e\*x)/(a + b\*x^2 + c\*x^4)^2,x]

[Out]  $-1/2*(e*(b + 2*c*x^2))/((b^2 - 4*a*c)*(a + b*x^2 + c*x^4)) + (d*x*(b^2 - 2*a*c + b*\sqrt{b^2 - 4*a*c}))/((2*a*(b^2 - 4*a*c)*(a + b*x^2 + c*x^4)) + (\sqrt{c}*(b^2 - 12*a*c + b*\sqrt{b^2 - 4*a*c}))*d*\operatorname{ArcTan}[(\sqrt{2}*\sqrt{c}*x)/\sqrt{b - \sqrt{b^2 - 4*a*c}}])/(2*\sqrt{2}*a*(b^2 - 4*a*c)^{(3/2)}*\sqrt{b - \sqrt{b^2 - 4*a*c}}) - (\sqrt{c}*(b^2 - 12*a*c - b*\sqrt{b^2 - 4*a*c}))*d*\operatorname{ArcTan}[(\sqrt{2}*\sqrt{c}*x)/\sqrt{b + \sqrt{b^2 - 4*a*c}}])/(2*\sqrt{2}*a*(b^2 - 4*a*c)^{(3/2)}*\sqrt{b + \sqrt{b^2 - 4*a*c}}) + (2*c*e*\operatorname{ArcTanh}[(b + 2*c*x^2)/\sqrt{b^2 - 4*a*c}])/(b^2 - 4*a*c)^{(3/2)}$

Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

Rule 211

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

Rule 212

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

Rule 628

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := Simp[(b + 2*c*x)
*((a + b*x + c*x^2)^(p + 1)/((p + 1)*(b^2 - 4*a*c))), x] - Dist[2*c*((2*p +
3)/((p + 1)*(b^2 - 4*a*c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; Free
Q[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && Int
egerQ[4*p]
```

### Rule 632

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] := Dist[-2, Subst[In
t[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]
```

### Rule 1106

```
Int[((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Simp[(-x)*(b^2
- 2*a*c + b*c*x^2)*((a + b*x^2 + c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c)
), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(b^2 - 2*a*c + 2*(p + 1)*(b
^2 - 4*a*c) + b*c*(4*p + 7)*x^2)*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; Fre
eQ[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && IntegerQ[2*p]
```

### Rule 1121

```
Int[(x_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol] := Dist[1/2,
Subst[Int[(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]
```

### Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

### Rubi steps

$$\text{integral} = \int \frac{d}{(a + bx^2 + cx^4)^2} dx + \int \frac{ex}{(a + bx^2 + cx^4)^2} dx$$

$$\begin{aligned}
&= d \int \frac{1}{(a + bx^2 + cx^4)^2} dx + e \int \frac{x}{(a + bx^2 + cx^4)^2} dx \\
&= \frac{dx(b^2 - 2ac + bcx^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} - \frac{d \int \frac{b^2 - 2ac - 2(b^2 - 4ac) - bcx^2}{a + bx^2 + cx^4} dx}{2a(b^2 - 4ac)} \\
&\quad + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{(a + bx + cx^2)^2} dx, x, x^2 \right) \\
&= -\frac{e(b + 2cx^2)}{2(b^2 - 4ac)(a + bx^2 + cx^4)} + \frac{dx(b^2 - 2ac + bcx^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad - \frac{(c(b^2 - 12ac - b\sqrt{b^2 - 4ac})d) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)^{3/2}} \\
&\quad + \frac{(c(b^2 - 12ac + b\sqrt{b^2 - 4ac})d) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)^{3/2}} \\
&\quad - \frac{(ce) \text{Subst} \left( \int \frac{1}{a + bx + cx^2} dx, x, x^2 \right)}{b^2 - 4ac} \\
&= -\frac{e(b + 2cx^2)}{2(b^2 - 4ac)(a + bx^2 + cx^4)} + \frac{dx(b^2 - 2ac + bcx^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{\sqrt{c}(b^2 - 12ac + b\sqrt{b^2 - 4ac})d \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)^{3/2} \sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad - \frac{\sqrt{c}(b^2 - 12ac - b\sqrt{b^2 - 4ac})d \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)^{3/2} \sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{(2ce) \text{Subst} \left( \int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2 \right)}{b^2 - 4ac} \\
&= -\frac{e(b + 2cx^2)}{2(b^2 - 4ac)(a + bx^2 + cx^4)} + \frac{dx(b^2 - 2ac + bcx^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{\sqrt{c}(b^2 - 12ac + b\sqrt{b^2 - 4ac})d \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)^{3/2} \sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad - \frac{\sqrt{c}(b^2 - 12ac - b\sqrt{b^2 - 4ac})d \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)^{3/2} \sqrt{b + \sqrt{b^2 - 4ac}}} + \frac{2ce \tanh^{-1} \left( \frac{b + 2cx^2}{\sqrt{b^2 - 4ac}} \right)}{(b^2 - 4ac)^{3/2}}
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.50 (sec) , antiderivative size = 341, normalized size of antiderivative = 1.03

$$\int \frac{d + ex}{(a + bx^2 + cx^4)^2} dx = \frac{1}{4} \left( \frac{2abe + 4acx(d + ex) - 2bdx(b + cx^2)}{a(-b^2 + 4ac)(a + bx^2 + cx^4)} \right. \\ + \frac{\sqrt{2}\sqrt{c}(b^2 - 12ac + b\sqrt{b^2 - 4ac}) d \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{a(b^2 - 4ac)^{3/2} \sqrt{b - \sqrt{b^2 - 4ac}}} \\ + \frac{\sqrt{2}\sqrt{c}(-b^2 + 12ac + b\sqrt{b^2 - 4ac}) d \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{a(b^2 - 4ac)^{3/2} \sqrt{b + \sqrt{b^2 - 4ac}}} \\ - \frac{4ce \log(-b + \sqrt{b^2 - 4ac} - 2cx^2)}{(b^2 - 4ac)^{3/2}} \\ \left. + \frac{4ce \log(b + \sqrt{b^2 - 4ac} + 2cx^2)}{(b^2 - 4ac)^{3/2}} \right)$$

[In] Integrate[(d + e\*x)/(a + b\*x^2 + c\*x^4)^2,x]

```
[Out] ((2*a*b*e + 4*a*c*x*(d + e*x) - 2*b*d*x*(b + c*x^2))/(a*(-b^2 + 4*a*c)*(a +
b*x^2 + c*x^4)) + (Sqrt[2]*Sqrt[c]*(b^2 - 12*a*c + b*Sqrt[b^2 - 4*a*c])*d*
ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b - Sqrt[b^2 - 4*a*c]]])/(a*(b^2 - 4*a*c)^(
3/2)*Sqrt[b - Sqrt[b^2 - 4*a*c]]) + (Sqrt[2]*Sqrt[c]*(-b^2 + 12*a*c + b*Sqr
t[b^2 - 4*a*c])*d*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b + Sqrt[b^2 - 4*a*c]]])/(
a*(b^2 - 4*a*c)^(3/2)*Sqrt[b + Sqrt[b^2 - 4*a*c]]) - (4*c*e*Log[-b + Sqrt[
b^2 - 4*a*c] - 2*c*x^2])/(b^2 - 4*a*c)^(3/2) + (4*c*e*Log[b + Sqrt[b^2 - 4*
a*c] + 2*c*x^2])/(b^2 - 4*a*c)^(3/2))/4
```

## Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.25 (sec) , antiderivative size = 209, normalized size of antiderivative = 0.63

method	result
risch	$\frac{-\frac{bcdx^3}{2a(4ac-b^2)} + \frac{cx^2e}{4ac-b^2} + \frac{(2ac-b^2)dx}{2a(4ac-b^2)} + \frac{be}{8ac-2b^2}}{cx^4+bx^2+a} + \frac{\left( \sum_{-R=\text{RootOf}(cZ^4+_Z^2b+a)} \left( -\frac{c}{a(4ac-b^2)} \frac{R^2bd}{4ac-b^2} + \frac{d(6ac-b^2)}{a(4ac-b^2)} \right) \ln(x - R)}{2cR^3 + Rb}}{4}$
default	$16c^2 \left( -\frac{\frac{(4ac\sqrt{-4ac+b^2}-b^2\sqrt{-4ac+b^2}+4abc-b^3)dx}{16ac^2} - \frac{e(4ac-b^2)}{8c^2}}{x^2 + \frac{b}{2c} - \frac{\sqrt{-4ac+b^2}}{2c}} + \frac{2ae\sqrt{-4ac+b^2} \ln(-2cx^2 + \sqrt{-4ac+b^2} - b)}{8ac} + \frac{(-12acd\sqrt{-4ac+b^2}+b^2d\sqrt{-4ac+b^2})}{4(4ac-b^2)^2} \right)$

[In] int((e\*x+d)/(c\*x^4+b\*x^2+a)^2,x,method=\_RETURNVERBOSE)

[Out]  $(-1/2/a*b*c*d/(4*a*c-b^2)*x^3+c/(4*a*c-b^2)*x^2*e+1/2*(2*a*c-b^2)*d/a/(4*a*c-b^2)*x+1/2/(4*a*c-b^2)*b*e)/(c*x^4+b*x^2+a)+1/4*\text{sum}((-c/a/(4*a*c-b^2)*_R^2*b*d+4*c/(4*a*c-b^2)*e*_R+d*(6*a*c-b^2)/a/(4*a*c-b^2))/(2*_R^3*c+_R*b)*\ln(x-_R),_R=\text{RootOf}(_Z^4*c+_Z^2*b+a))$

## Fricas [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 235.03 (sec) , antiderivative size = 1678440, normalized size of antiderivative = 5086.18

$$\int \frac{d+ex}{(a+bx^2+cx^4)^2} dx = \text{Too large to display}$$

[In] integrate((e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="fricas")

[Out] Too large to include

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

[In] integrate((e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a)\*\*2,x)

[Out] Timed out

**Maxima [F]**

$$\int \frac{d + ex}{(a + bx^2 + cx^4)^2} dx = \int \frac{ex + d}{(cx^4 + bx^2 + a)^2} dx$$

[In] integrate((e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="maxima")

[Out] 1/2\*(b\*c\*d\*x^3 - 2\*a\*c\*e\*x^2 - a\*b\*e + (b^2 - 2\*a\*c)\*d\*x)/((a\*b^2\*c - 4\*a^2\*c^2)\*x^4 + a^2\*b^2 - 4\*a^3\*c + (a\*b^3 - 4\*a^2\*b\*c)\*x^2) + 1/2\*integrate((b\*c\*d\*x^2 - 4\*a\*c\*e\*x + (b^2 - 6\*a\*c)\*d)/(c\*x^4 + b\*x^2 + a), x)/(a\*b^2 - 4\*a^2\*c)

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 3426 vs. 2(278) = 556.

Time = 1.34 (sec) , antiderivative size = 3426, normalized size of antiderivative = 10.38

$$\int \frac{d + ex}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

[In] integrate((e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="giac")

[Out] 1/2\*(b\*c\*d\*x^3 - 2\*a\*c\*e\*x^2 + b^2\*d\*x - 2\*a\*c\*d\*x - a\*b\*e)/((c\*x^4 + b\*x^2 + a)\*(a\*b^2 - 4\*a^2\*c)) - 1/16\*((2\*b^3\*c^2 - 8\*a\*b\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^2\*c - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b\*c^2 - 2\*(b^2 - 4\*a\*c)\*b\*c^2)\*(a\*b^2 - 4\*a^2\*c)^2\*d - 2\*(sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^6 - 14\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*b^4\*c - 2\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^5\*c - 2\*a\*b^6\*c + 64\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^3\*b^2\*c^2 + 20\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*b^3\*c^2 + sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^4\*c^2 + 28\*a^2\*b^4\*c^2 - 96\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^4\*c^3 - 48\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^3\*b

$$\begin{aligned}
& *c^3 - 10*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^2*c^3 - 128*a^3*b^2 \\
& *c^3 + 24*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*c^4 + 192*a^4*c^4 + 2 \\
& *(b^2 - 4*a*c)*a*b^4*c - 20*(b^2 - 4*a*c)*a^2*b^2*c^2 + 48*(b^2 - 4*a*c)*a^ \\
& 3*c^3)*d*abs(a*b^2 - 4*a^2*c) + (2*a^2*b^7*c^2 - 40*a^3*b^5*c^3 + 224*a^4*b \\
& ^3*c^4 - 384*a^5*b*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4* \\
& a*c}}*c)*a^2*b^7 + 20*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}} \\
& *c)*a^3*b^5*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c) \\
& *a^2*b^6*c - 112*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)* \\
& a^4*b^3*c^2 - 32*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)* \\
& a^3*b^4*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2 \\
& *b^5*c^2 + 192*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^ \\
& 5*b*c^3 + 96*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4* \\
& b^2*c^3 + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3* \\
& b^3*c^3 - 48*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4* \\
& b*c^4 - 2*(b^2 - 4*a*c)*a^2*b^5*c^2 + 32*(b^2 - 4*a*c)*a^3*b^3*c^3 - 96*(b^ \\
& 2 - 4*a*c)*a^4*b*c^4)*d)*\arctan(2*\sqrt{1/2}*x/\sqrt{(a*b^3 - 4*a^2*b*c + \sqrt{ \\
& t((a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2))})/(a* \\
& b^2*c - 4*a^2*c^2)))/((a^3*b^6 - 12*a^4*b^4*c - 2*a^3*b^5*c + 48*a^5*b^2*c^ \\
& 2 + 16*a^4*b^3*c^2 + a^3*b^4*c^2 - 64*a^6*c^3 - 32*a^5*b*c^3 - 8*a^4*b^2*c^ \\
& 3 + 16*a^5*c^4)*abs(a*b^2 - 4*a^2*c)*abs(c)) - 1/16*((2*b^3*c^2 - 8*a*b*c^3 \\
& - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b^3 + 4*\sqrt{2} \\
& )*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b*c + 2*\sqrt{2}*\sqrt{ \\
& b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b^2*c - \sqrt{2}*\sqrt{b^2 - 4*a \\
& *c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b*c^2 - 2*(b^2 - 4*a*c)*b*c^2)*(a*b^2 - \\
& 4*a^2*c)^2*d - 2*(\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^6 - 14*\sqrt{2} \\
& )*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^ \\
& 2 - 4*a*c}}*c)*a*b^5*c + 2*a*b^6*c + 64*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}} \\
& *c)*a^3*b^2*c^2 + 20*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^2 + \\
& \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^4*c^2 - 28*a^2*b^4*c^2 - 96*\sqrt{ \\
& t(2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*c^3 - 48*\sqrt{2}*\sqrt{b*c - \sqrt{b \\
& ^2 - 4*a*c}}*c)*a^3*b*c^3 - 10*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b \\
& ^2*c^3 + 128*a^3*b^2*c^3 + 24*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*c \\
& ^4 - 192*a^4*c^4 - 2*(b^2 - 4*a*c)*a*b^4*c + 20*(b^2 - 4*a*c)*a^2*b^2*c^2 - \\
& 48*(b^2 - 4*a*c)*a^3*c^3)*d*abs(a*b^2 - 4*a^2*c) + (2*a^2*b^7*c^2 - 40*a^3 \\
& *b^5*c^3 + 224*a^4*b^3*c^4 - 384*a^5*b*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{ \\
& (b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^7 + 20*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c \\
& - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^5*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \\
& \sqrt{b^2 - 4*a*c}}*c)*a^2*b^6*c - 112*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^4*b^3*c^2 - 32*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^3*b^4*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{ \\
& (b^2 - 4*a*c}}*c)*a^2*b^5*c^2 + 192*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^5*b*c^3 + 96*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^4*b^2*c^3 + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^3*b^3*c^3 - 48*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^4*b*c^4 - 2*(b^2 - 4*a*c)*a^2*b^5*c^2 + 32*(b^2 - 4*a*c)*
\end{aligned}$$

```

a^3*b^3*c^3 - 96*(b^2 - 4*a*c)*a^4*b*c^4)*d)*arctan(2*sqrt(1/2)*x/sqrt((a*b
^3 - 4*a^2*b*c - sqrt((a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c
c - 4*a^2*c^2)))/(a*b^2*c - 4*a^2*c^2)))/((a^3*b^6 - 12*a^4*b^4*c - 2*a^3*b
^5*c + 48*a^5*b^2*c^2 + 16*a^4*b^3*c^2 + a^3*b^4*c^2 - 64*a^6*c^3 - 32*a^5*
b*c^3 - 8*a^4*b^2*c^3 + 16*a^5*c^4)*abs(a*b^2 - 4*a^2*c)*abs(c)) - 1/4*((b^
3*c^2 - 4*a*b*c^3 - 2*b^2*c^3 + b*c^4 + (b^2*c^2 - 4*a*c^3 - 2*b*c^3 + c^4)
*sqrt(b^2 - 4*a*c))*e*abs(a*b^2 - 4*a^2*c) - (a*b^5*c^2 - 8*a^2*b^3*c^3 - 2
*a*b^4*c^3 + 16*a^3*b*c^4 + 8*a^2*b^2*c^4 + a*b^3*c^4 - 4*a^2*b*c^5 + (a*b^
4*c^2 - 4*a^2*b^2*c^3 - 2*a*b^3*c^3 + a*b^2*c^4)*sqrt(b^2 - 4*a*c))*e)*log(x
^2 + 1/2*(a*b^3 - 4*a^2*b*c + sqrt((a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*
a^3*c)*(a*b^2*c - 4*a^2*c^2)))/(a*b^2*c - 4*a^2*c^2)))/((a*b^4 - 8*a^2*b^2*c
- 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2*abs(a*
b^2 - 4*a^2*c)) - 1/4*((b^3*c^2 - 4*a*b*c^3 - 2*b^2*c^3 + b*c^4 + (b^2*c^2
- 4*a*c^3 - 2*b*c^3 + c^4)*sqrt(b^2 - 4*a*c))*e*abs(a*b^2 - 4*a^2*c) - (a*b
^5*c^2 - 8*a^2*b^3*c^3 - 2*a*b^4*c^3 + 16*a^3*b*c^4 + 8*a^2*b^2*c^4 + a*b^3
*c^4 - 4*a^2*b*c^5 + (a*b^4*c^2 - 4*a^2*b^2*c^3 - 2*a*b^3*c^3 + a*b^2*c^4)*
sqrt(b^2 - 4*a*c))*e)*log(x^2 + 1/2*(a*b^3 - 4*a^2*b*c - sqrt((a*b^3 - 4*a^
2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2)))/(a*b^2*c - 4*a^2*c
^2)))/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c
^2 - 4*a^2*c^3)*c^2*abs(a*b^2 - 4*a^2*c))

```

## Mupad [B] (verification not implemented)

Time = 8.37 (sec) , antiderivative size = 2382, normalized size of antiderivative = 7.22

$$\int \frac{d + ex}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

```
[In] int((d + e*x)/(a + b*x^2 + c*x^4)^2,x)
```

```

[Out] ((b*e)/(2*(4*a*c - b^2)) + (c*e*x^2)/(4*a*c - b^2) + (d*x*(2*a*c - b^2))/(2
*a*(4*a*c - b^2)) - (b*c*d*x^3)/(2*a*(4*a*c - b^2)))/(a + b*x^2 + c*x^4) +
symsum(log((5*b^3*c^4*d^3 - 96*a^2*c^5*d*e^2 - 36*a*b*c^5*d^3 + 16*a*b^2*c^
4*d*e^2)/(8*(a^2*b^6 - 64*a^5*c^3 - 12*a^3*b^4*c + 48*a^4*b^2*c^2)) - root(
1572864*a^8*b^2*c^5*z^4 - 983040*a^7*b^4*c^4*z^4 + 327680*a^6*b^6*c^3*z^4 -
61440*a^5*b^8*c^2*z^4 + 6144*a^4*b^10*c*z^4 - 1048576*a^9*c^6*z^4 - 256*a^
3*b^12*z^4 + 61440*a^5*b*c^5*d^2*z^2 + 432*a*b^9*c*d^2*z^2 + 24576*a^5*b^2*
c^4*e^2*z^2 - 6144*a^4*b^4*c^3*e^2*z^2 + 512*a^3*b^6*c^2*e^2*z^2 - 61440*a^
4*b^3*c^4*d^2*z^2 + 24064*a^3*b^5*c^3*d^2*z^2 - 4608*a^2*b^7*c^2*d^2*z^2 -
32768*a^6*c^5*e^2*z^2 - 16*b^11*d^2*z^2 - 672*a*b^6*c^2*d^2*e*z - 15872*a^3
*b^2*c^4*d^2*e*z + 4992*a^2*b^4*c^3*d^2*e*z + 18432*a^4*c^5*d^2*e*z + 32*b^
8*c*d^2*e*z - 960*a^2*b*c^4*d^2*e^2 + 240*a*b^3*c^3*d^2*e^2 - 16*b^5*c^2*d^
2*e^2 + 360*a*b^2*c^4*d^4 - 256*a^3*c^4*e^4 - 25*b^4*c^3*d^4 - 1296*a^2*c^5
*d^4, z, k)*(root(1572864*a^8*b^2*c^5*z^4 - 983040*a^7*b^4*c^4*z^4 + 327680
*a^6*b^6*c^3*z^4 - 61440*a^5*b^8*c^2*z^4 + 6144*a^4*b^10*c*z^4 - 1048576*a^

```



$$\begin{aligned}
& 9c^6z^4 - 256a^3b^{12}z^4 + 61440a^5b^3c^5d^2z^2 + 432a^3b^9c^4d^2z^2 \\
& + 24576a^5b^2c^4e^2z^2 - 6144a^4b^4c^3e^2z^2 + 512a^3b^6c^2e^2z^2 - 61440a^4b^3c^4d^2z^2 + 24064a^3b^5c^3d^2z^2 - 4608a^2b^7c^2d^2z^2 \\
& - 32768a^6c^5e^2z^2 - 16b^{11}d^2z^2 - 672a^3b^6c^2d^2e^2z - 15872a^3b^2c^4d^2e^2z + 4992a^2b^4c^3d^2e^2z + 18432a^4c^5d^2e^2z \\
& + 32b^8c^4d^2e^2z - 960a^2b^3c^4d^2e^2 + 240a^3b^3c^3d^2e^2 - 16b^5c^2d^2e^2 + 360a^3b^2c^4d^4 - 256a^3c^4e^4 - 25b^4c^3d^4 \\
& - 1296a^2c^5d^4, z, k) * ((x*(1024a^5c^6e - 16a^2b^6c^3e + 192a^3b^4c^4e - 768a^4b^2c^5e)) / (2*(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2)) - (6144a^5c^6d - 288a^2b^6c^3d + 1920a^3b^4c^4d - 5632a^4b^2c^5d + 16a^3b^8c^2d) / (8*(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2)) + (root(1572864a^8b^2c^5z^4 - 983040a^7b^4c^4z^4 + 327680a^6b^6c^3z^4 - 61440a^5b^8c^2z^4 + 6144a^4b^10c^2z^4 - 1048576a^9c^6z^4 - 256a^3b^12z^4 + 61440a^5b^3c^5d^2z^2 + 432a^3b^9c^4d^2z^2 + 24576a^5b^2c^4e^2z^2 - 6144a^4b^4c^3e^2z^2 + 512a^3b^6c^2e^2z^2 - 61440a^4b^3c^4d^2z^2 + 24064a^3b^5c^3d^2z^2 - 4608a^2b^7c^2d^2z^2 - 32768a^6c^5e^2z^2 - 16b^{11}d^2z^2 - 672a^3b^6c^2d^2e^2z - 15872a^3b^2c^4d^2e^2z + 4992a^2b^4c^3d^2e^2z + 18432a^4c^5d^2e^2z + 32b^8c^4d^2e^2z - 960a^2b^3c^4d^2e^2 + 240a^3b^3c^3d^2e^2 - 16b^5c^2d^2e^2 + 360a^3b^2c^4d^4 - 256a^3c^4e^4 - 25b^4c^3d^4 - 1296a^2c^5d^4, z, k) * x * (4096a^6b^3c^6 + 16a^2b^9c^2 - 256a^3b^7c^3 + 1536a^4b^5c^4 - 4096a^5b^3c^5)) / (2*(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2))) + (32a^3b^5c^3d^2e + 1024a^3b^3c^5d^2e - 384a^2b^3c^4d^2e) / (8*(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2)) - (x*(288a^3c^6d^2 - b^6c^3d^2 + 18a^3b^4c^4d^2 - 64a^3b^3c^5e^2 - 128a^2b^2c^5d^2 + 16a^2b^3c^4e^2)) / (2*(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2))) - (x*(16a^2c^5e^3 - b^3c^4d^2e + 12a^3b^3c^5d^2e)) / (2*(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2))) * root(1572864a^8b^2c^5z^4 - 983040a^7b^4c^4z^4 + 327680a^6b^6c^3z^4 - 61440a^5b^8c^2z^4 + 6144a^4b^10c^2z^4 - 1048576a^9c^6z^4 - 256a^3b^12z^4 + 61440a^5b^3c^5d^2z^2 + 432a^3b^9c^4d^2z^2 + 24576a^5b^2c^4e^2z^2 - 6144a^4b^4c^3e^2z^2 + 512a^3b^6c^2e^2z^2 - 61440a^4b^3c^4d^2z^2 + 24064a^3b^5c^3d^2z^2 - 4608a^2b^7c^2d^2z^2 - 32768a^6c^5e^2z^2 - 16b^{11}d^2z^2 - 672a^3b^6c^2d^2e^2z - 15872a^3b^2c^4d^2e^2z + 4992a^2b^4c^3d^2e^2z + 18432a^4c^5d^2e^2z + 32b^8c^4d^2e^2z - 960a^2b^3c^4d^2e^2 + 240a^3b^3c^3d^2e^2 - 16b^5c^2d^2e^2 + 360a^3b^2c^4d^4 - 256a^3c^4e^4 - 25b^4c^3d^4 - 1296a^2c^5d^4, z, k), k, 1, 4)
\end{aligned}$$

$$3.37 \quad \int \frac{d+ex+fx^2}{(a+bx^2+cx^4)^2} dx$$

Optimal result	346
Rubi [A] (verified)	347
Mathematica [A] (verified)	350
Maple [C] (verified)	351
Fricas [F(-1)]	351
Sympy [F(-1)]	352
Maxima [F]	352
Giac [B] (verification not implemented)	352
Mupad [B] (verification not implemented)	355

### Optimal result

Integrand size = 25, antiderivative size = 368

$$\int \frac{d+ex+fx^2}{(a+bx^2+cx^4)^2} dx = -\frac{e(b+2cx^2)}{2(b^2-4ac)(a+bx^2+cx^4)} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{2a(b^2-4ac)(a+bx^2+cx^4)} + \frac{\sqrt{c}\left(bd-2af+\frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\sqrt{c}\left(bd-2af-\frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b+\sqrt{b^2-4ac}}} + \frac{2ce \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{3/2}}$$

```
[Out] -1/2*e*(2*c*x^2+b)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)+1/2*x*(b^2*d-2*a*c*d-a*b*f+
c*(-2*a*f+b*d)*x^2)/a/(-4*a*c+b^2)/(c*x^4+b*x^2+a)+2*c*e*arctanh((2*c*x^2+b
)/(-4*a*c+b^2)^(1/2))/(-4*a*c+b^2)^(3/2)+1/4*arctan(x^2^(1/2)*c^(1/2)/(b-(-
4*a*c+b^2)^(1/2))^(1/2))*c^(1/2)*(b*d-2*a*f+(4*a*b*f-12*a*c*d+b^2*d)/(-4*a*
c+b^2)^(1/2))/a/(-4*a*c+b^2)*2^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2)+1/4*arcta
n(x^2^(1/2)*c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2))*c^(1/2)*(b*d-2*a*f+(-4*a*
b*f+12*a*c*d-b^2*d)/(-4*a*c+b^2)^(1/2))/a/(-4*a*c+b^2)*2^(1/2)/(b+(-4*a*c+b
^2)^(1/2))^(1/2)
```

**Rubi [A] (verified)**

Time = 0.56 (sec) , antiderivative size = 368, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.360$ , Rules used = {1687, 1192, 1180, 211, 12, 1121, 628, 632, 212}

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^2} dx = \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{4abf-12acd+b^2d}{\sqrt{b^2-4ac}} - 2af + bd\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b^2-4ac+b}}\right) \left(-\frac{4abf-12acd+b^2d}{\sqrt{b^2-4ac}} - 2af + bd\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{\sqrt{b^2-4ac}+b}} + \frac{2ce \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{3/2}} + \frac{x(cx^2(bd-2af) - abf - 2acd + b^2d)}{2a(b^2-4ac)(a+bx^2+cx^4)} - \frac{e(b+2cx^2)}{2(b^2-4ac)(a+bx^2+cx^4)}$$

[In] Int[(d + e\*x + f\*x^2)/(a + b\*x^2 + c\*x^4)^2,x]

[Out]  $-1/2*(e*(b + 2*c*x^2))/((b^2 - 4*a*c)*(a + b*x^2 + c*x^4)) + (x*(b^2*d - 2*a*c*d - a*b*f + c*(b*d - 2*a*f)*x^2))/(2*a*(b^2 - 4*a*c)*(a + b*x^2 + c*x^4)) + (\operatorname{Sqrt}[c]*(b*d - 2*a*f + (b^2*d - 12*a*c*d + 4*a*b*f)/\operatorname{Sqrt}[b^2 - 4*a*c])*\operatorname{ArcTan}[(\operatorname{Sqrt}[2]*\operatorname{Sqrt}[c]*x)/\operatorname{Sqrt}[b - \operatorname{Sqrt}[b^2 - 4*a*c]])]/(2*\operatorname{Sqrt}[2]*a*(b^2 - 4*a*c)*\operatorname{Sqrt}[b - \operatorname{Sqrt}[b^2 - 4*a*c]]) + (\operatorname{Sqrt}[c]*(b*d - 2*a*f - (b^2*d - 12*a*c*d + 4*a*b*f)/\operatorname{Sqrt}[b^2 - 4*a*c])*\operatorname{ArcTan}[(\operatorname{Sqrt}[2]*\operatorname{Sqrt}[c]*x)/\operatorname{Sqrt}[b + \operatorname{Sqrt}[b^2 - 4*a*c]])]/(2*\operatorname{Sqrt}[2]*a*(b^2 - 4*a*c)*\operatorname{Sqrt}[b + \operatorname{Sqrt}[b^2 - 4*a*c]]) + (2*c*e*\operatorname{ArcTanh}[(b + 2*c*x^2)/\operatorname{Sqrt}[b^2 - 4*a*c]])/(b^2 - 4*a*c)^{(3/2)}$

Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

Rule 211

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

Rule 212

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

Rule 628

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := Simp[(b + 2*c*x)
*((a + b*x + c*x^2)^(p + 1)/((p + 1)*(b^2 - 4*a*c))), x] - Dist[2*c*((2*p +
3)/((p + 1)*(b^2 - 4*a*c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; Free
Q[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && Int
egerQ[4*p]
```

### Rule 632

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] := Dist[-2, Subst[In
t[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]
```

### Rule 1121

```
Int[(x_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol] := Dist[1/2,
Subst[Int[(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]
```

### Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

### Rule 1192

```
Int[((d_) + (e_.)*(x_)^2)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symb
ol] := Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 +
c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2
- 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{ex}{(a+bx^2+cx^4)^2} dx + \int \frac{d+fx^2}{(a+bx^2+cx^4)^2} dx \\
&= \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{2a(b^2-4ac)(a+bx^2+cx^4)} \\
&\quad - \frac{\int \frac{-b^2d+6acd-abf-c(bd-2af)x^2}{a+bx^2+cx^4} dx}{2a(b^2-4ac)} + e \int \frac{x}{(a+bx^2+cx^4)^2} dx \\
&= \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{2a(b^2-4ac)(a+bx^2+cx^4)} + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{(a+bx+cx^2)^2} dx, x, x^2 \right) \\
&\quad + \frac{\left( c \left( bd-2af - \frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}} \right) \right) \int \frac{1}{\frac{b}{2} + \frac{1}{2} \sqrt{b^2-4ac} + cx^2} dx}{4a(b^2-4ac)} \\
&\quad + \frac{\left( c \left( bd-2af + \frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}} \right) \right) \int \frac{1}{\frac{b}{2} - \frac{1}{2} \sqrt{b^2-4ac} + cx^2} dx}{4a(b^2-4ac)} \\
&= -\frac{e(b+2cx^2)}{2(b^2-4ac)(a+bx^2+cx^4)} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{2a(b^2-4ac)(a+bx^2+cx^4)} \\
&\quad + \frac{\sqrt{c} \left( bd-2af + \frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}} \right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} \\
&\quad + \frac{\sqrt{c} \left( bd-2af - \frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}} \right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b+\sqrt{b^2-4ac}}} \\
&\quad - \frac{(ce) \text{Subst} \left( \int \frac{1}{a+bx+cx^2} dx, x, x^2 \right)}{b^2-4ac} \\
&= -\frac{e(b+2cx^2)}{2(b^2-4ac)(a+bx^2+cx^4)} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{2a(b^2-4ac)(a+bx^2+cx^4)} \\
&\quad + \frac{\sqrt{c} \left( bd-2af + \frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}} \right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} \\
&\quad + \frac{\sqrt{c} \left( bd-2af - \frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}} \right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b+\sqrt{b^2-4ac}}} \\
&\quad + \frac{(2ce) \text{Subst} \left( \int \frac{1}{b^2-4ac-x^2} dx, x, b+2cx^2 \right)}{b^2-4ac}
\end{aligned}$$

$$\begin{aligned}
&= -\frac{e(b+2cx^2)}{2(b^2-4ac)(a+bx^2+cx^4)} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{2a(b^2-4ac)(a+bx^2+cx^4)} \\
&\quad + \frac{\sqrt{c}\left(bd-2af+\frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}}\right)\tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} \\
&\quad + \frac{\sqrt{c}\left(bd-2af-\frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}}\right)\tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b+\sqrt{b^2-4ac}}} + \frac{2ce\tanh^{-1}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{3/2}}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.72 (sec) , antiderivative size = 398, normalized size of antiderivative = 1.08

$$\begin{aligned}
&\int \frac{d+ex+fx^2}{(a+bx^2+cx^4)^2} dx \\
&= \frac{1}{4} \left( \frac{2ab(e+fx) - 2bdx(b+cx^2) + 4acx(d+x(e+fx))}{a(-b^2+4ac)(a+bx^2+cx^4)} \right. \\
&\quad + \frac{\sqrt{2}\sqrt{c}(b^2d+b(\sqrt{b^2-4ac}d+4af) - 2a(6cd+\sqrt{b^2-4ac}f)) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{a(b^2-4ac)^{3/2}\sqrt{b-\sqrt{b^2-4ac}}} \\
&\quad + \frac{\sqrt{2}\sqrt{c}(-b^2d+12acd+b\sqrt{b^2-4ac}d-4abf-2a\sqrt{b^2-4ac}f) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{a(b^2-4ac)^{3/2}\sqrt{b+\sqrt{b^2-4ac}}} \\
&\quad \left. - \frac{4ce \log(-b+\sqrt{b^2-4ac}-2cx^2)}{(b^2-4ac)^{3/2}} + \frac{4ce \log(b+\sqrt{b^2-4ac}+2cx^2)}{(b^2-4ac)^{3/2}} \right)
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2)/(a + b\*x^2 + c\*x^4)^2,x]

[Out] ((2\*a\*b\*(e + f\*x) - 2\*b\*d\*x\*(b + c\*x^2) + 4\*a\*c\*x\*(d + x\*(e + f\*x)))/(a\*(-b^2 + 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + (Sqrt[2]\*Sqrt[c]\*(b^2\*d + b\*(Sqrt[b^2 - 4\*a\*c]\*d + 4\*a\*f) - 2\*a\*(6\*c\*d + Sqrt[b^2 - 4\*a\*c]\*f))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]])/(a\*(b^2 - 4\*a\*c)^(3/2)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + (Sqrt[2]\*Sqrt[c]\*(-b^2\*d) + 12\*a\*c\*d + b\*Sqrt[b^2 - 4\*a\*c]\*d - 4\*a\*b\*f - 2\*a\*Sqrt[b^2 - 4\*a\*c]\*f)\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]])/(a\*(b^2 - 4\*a\*c)^(3/2)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) - (4\*c\*e\*Log[-b + Sqrt[b^2 - 4\*a\*c] - 2\*c\*x^2])/(b^2 - 4\*a\*c)^(3/2) + (4\*c\*e\*Log[b + Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2])/(b^2 - 4\*a\*c)^(3/2))/4

## Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.26 (sec) , antiderivative size = 232, normalized size of antiderivative = 0.63

method	result
risch	$\frac{\frac{c(2af-bd)x^3}{2a(4ac-b^2)} + \frac{cx^2e}{4ac-b^2} + \frac{(abf+2acd-b^2d)x}{2a(4ac-b^2)} + \frac{be}{8ac-2b^2}}{cx^4+bx^2+a} + \frac{\left( \sum_{-R=\text{RootOf}(cZ^4+Z^2b+a)} \left( \frac{c(2af-bd)R^2}{a(4ac-b^2)} + \frac{4ceR}{4ac-b^2} - \frac{abf-6acd+b^2d}{a(4ac-b^2)} \right) \right)}{4(2cR^3+Rb)}$
default	$16c^2 \left( -\frac{\frac{(-4acd\sqrt{-4ac+b^2}+b^2d\sqrt{-4ac+b^2}+8a^2cf-2ab^2f-4abcd+b^3d)x}{16ac} - \frac{e(4ac-b^2)}{8c}}{x^2+\frac{b}{2c}-\frac{\sqrt{-4ac+b^2}}{2c}} + \frac{2ae\sqrt{-4ac+b^2} \ln(-2cx^2+\sqrt{-4ac+b^2}-b)}{4c(4ac-b^2)^2} \right)$

[In] int((f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x,method=\_RETURNVERBOSE)

[Out] (1/2\*c\*(2\*a\*f-b\*d)/a/(4\*a\*c-b^2)\*x^3+c/(4\*a\*c-b^2)\*x^2\*e+1/2\*(a\*b\*f+2\*a\*c\*d-b^2\*d)/a/(4\*a\*c-b^2)\*x+1/2/(4\*a\*c-b^2)\*b\*e)/(c\*x^4+b\*x^2+a)+1/4\*sum((c\*(2\*a\*f-b\*d)/a/(4\*a\*c-b^2)\*\_R^2+4\*c/(4\*a\*c-b^2)\*e\*\_R-(a\*b\*f-6\*a\*c\*d+b^2\*d)/a/(4\*a\*c-b^2))/(2\*\_R^3\*c+\_R\*b)\*ln(x-\_R),\_R=RootOf(\_Z^4\*c+\_Z^2\*b+a))

## Fricas [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

[In] integrate((f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="fricas")

[Out] Timed out

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

[In] integrate((f\*x\*\*2+e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a)\*\*2,x)

[Out] Timed out

**Maxima [F]**

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^2} dx = \int \frac{fx^2 + ex + d}{(cx^4 + bx^2 + a)^2} dx$$

[In] integrate((f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="maxima")

[Out] -1/2\*(2\*a\*c\*e\*x^2 - (b\*c\*d - 2\*a\*c\*f)\*x^3 + a\*b\*e + (a\*b\*f - (b^2 - 2\*a\*c)\*d)\*x)/((a\*b^2\*c - 4\*a^2\*c^2)\*x^4 + a^2\*b^2 - 4\*a^3\*c + (a\*b^3 - 4\*a^2\*b\*c)\*x^2) - 1/2\*integrate((4\*a\*c\*e\*x - a\*b\*f - (b\*c\*d - 2\*a\*c\*f)\*x^2 - (b^2 - 6\*a\*c)\*d)/(c\*x^4 + b\*x^2 + a), x)/(a\*b^2 - 4\*a^2\*c)

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 5156 vs. 2(320) = 640.

Time = 1.74 (sec) , antiderivative size = 5156, normalized size of antiderivative = 14.01

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

[In] integrate((f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="giac")

[Out] 1/2\*(b\*c\*d\*x^3 - 2\*a\*c\*f\*x^3 - 2\*a\*c\*e\*x^2 + b^2\*d\*x - 2\*a\*c\*d\*x - a\*b\*f\*x - a\*b\*e)/((c\*x^4 + b\*x^2 + a)\*(a\*b^2 - 4\*a^2\*c)) + 1/16\*((2\*b^3\*c^2 - 8\*a\*b\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^2\*c - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b\*c^2 - 2\*(b^2 - 4\*a\*c)\*b\*c^2)\*(a\*b^2 - 4\*a^2\*c)^2\*d - 2\*(2\*a\*b^2\*c^2 - 8\*a^2\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b^2 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a^2\*c + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*b\*c - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*a\*c^2 - 2\*(b^2 - 4\*a\*c)\*a\*c^2)\*(a\*b^2 - 4\*a^2\*c)^2\*f + 2\*(sqrt(2)\*



$$\begin{aligned}
& \sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^6 - 14*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c - 2*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^5*c - 2*a \\
& *b^6*c + 64*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^2*c^2 + 20*\sqrt{2} \\
& )*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^2 + \sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^4*c^2 + 28*a^2*b^4*c^2 - 96*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*c^3 - 48*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^3 - \\
& 10*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^2*c^3 - 128*a^3*b^2*c^3 + \\
& 24*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*c^4 + 192*a^4*c^4 + 2*(b^2 - \\
& 4*a*c)*a*b^4*c - 20*(b^2 - 4*a*c)*a^2*b^2*c^2 + 48*(b^2 - 4*a*c)*a^3*c^3)* \\
& d*\text{abs}(a*b^2 - 4*a^2*c) + 2*(\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^5 \\
& - 8*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^3*c - 2*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c - 2*a^2*b^5*c + 16*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b*c^2 + 8*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3 \\
& *b^2*c^2 + \sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^2 + 16*a^3*b^3 \\
& *c^2 - 4*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^3 - 32*a^4*b*c^3 + \\
& 2*(b^2 - 4*a*c)*a^2*b^3*c - 8*(b^2 - 4*a*c)*a^3*b*c^2)*f*\text{abs}(a*b^2 - 4*a^2 \\
& *c) + (2*a^2*b^7*c^2 - 40*a^3*b^5*c^3 + 224*a^4*b^3*c^4 - 384*a^5*b*c^5 - s \\
& \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^7 + 20*\sqrt{2} \\
& )*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^5*c + 2*\sqrt{2})* \\
& \sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^6*c - 112*\sqrt{2})*s \\
& \sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^3*c^2 - 32*\sqrt{2})*s \\
& \sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^4*c^2 - \sqrt{2})*\sqrt{ \\
& (b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^5*c^2 + 192*\sqrt{2})*sqr \\
& t(b^2 - 4*a*c)*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b*c^3 + 96*\sqrt{2})*\sqrt{2} \\
& (b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^2*c^3 + 16*\sqrt{2})*\sqrt{2} \\
& (b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^3*c^3 - 48*\sqrt{2})*\sqrt{2} \\
& (b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b*c^4 - 2*(b^2 - 4*a*c)*a^ \\
& 2*b^5*c^2 + 32*(b^2 - 4*a*c)*a^3*b^3*c^3 - 96*(b^2 - 4*a*c)*a^4*b*c^4)*d + \\
& 4*(2*a^3*b^6*c^2 - 16*a^4*b^4*c^3 + 32*a^5*b^2*c^4 - \sqrt{2})*\sqrt{b^2 - 4*a \\
& *c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^6 + 8*\sqrt{2})*\sqrt{b^2 - 4*a*c})*s \\
& \sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^4*c + 2*\sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{2} \\
& (b*c + \sqrt{b^2 - 4*a*c})*c)*a^3*b^5*c - 16*\sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{2} \\
& (b*c + \sqrt{b^2 - 4*a*c})*c)*a^5*b^2*c^2 - 8*\sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{2} \\
& (b*c + \sqrt{b^2 - 4*a*c})*c)*a^4*b^3*c^2 - \sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{2} \\
& (b*c + \\
& \sqrt{b^2 - 4*a*c})*c)*a^3*b^4*c^2 + 4*\sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{2} \\
& (b*c + \\
& \sqrt{b^2 - 4*a*c})*c)*a^4*b^2*c^3 - 2*(b^2 - 4*a*c)*a^3*b^4*c^2 + 8*(b^2 - 4 \\
& *a*c)*a^4*b^2*c^3)*f)*\arctan(2*\sqrt{1/2})*x/\sqrt{((a*b^3 - 4*a^2*b*c + \sqrt{2} \\
& (a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2)))/(a*b^2 \\
& *c - 4*a^2*c^2)))/((a^3*b^6 - 12*a^4*b^4*c - 2*a^3*b^5*c + 48*a^5*b^2*c^2 + \\
& 16*a^4*b^3*c^2 + a^3*b^4*c^2 - 64*a^6*c^3 - 32*a^5*b*c^3 - 8*a^4*b^2*c^3 + \\
& 16*a^5*c^4)*\text{abs}(a*b^2 - 4*a^2*c)*\text{abs}(c)) - 1/16*((2*b^3*c^2 - 8*a*b*c^3 - \\
& \sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b^3 + 4*\sqrt{2})*s \\
& \sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b*c + 2*\sqrt{2})*\sqrt{b^2 - 4*a*c} \\
& )*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b^2*c - \sqrt{2})*\sqrt{b^2 - 4*a*c} \\
& )*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b*c^2 - 2*(b^2 - 4*a*c)*b*c^2)*(a*b^2 - 4*
\end{aligned}$$

$$\begin{aligned}
& a^2c)^2d - 2*(2*a*b^2*c^2 - 8*a^2*c^3 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a*b^2 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^2*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a*b*c - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a*c^2 - 2*(b^2 - 4*a*c)*a*c^2)*(a*b^2 - 4*a^2*c)^2*f - 2*(\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a*b^6 - 14*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^2*b^4*c - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a*b^5*c + 2*a*b^6*c + 64*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*b^2*c^2 + 20*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^2*b^3*c^2 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a*b^4*c^2 - 28*a^2*b^4*c^2 - 96*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^4*c^3 - 48*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*b*c^3 - 10*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^2*b^2*c^3 + 128*a^3*b^2*c^3 + 24*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*c^4 - 192*a^4*c^4 - 2*(b^2 - 4*a*c)*a*b^4*c + 20*(b^2 - 4*a*c)*a^2*b^2*c^2 - 48*(b^2 - 4*a*c)*a^3*c^3)*d*abs(a*b^2 - 4*a^2*c) - 2*(\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^2*b^5 - 8*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*b^3*c - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^2*b^4*c + 2*a^2*b^5*c + 16*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^4*b*c^2 + 8*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*b^2*c^2 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^2*b^3*c^2 - 16*a^3*b^3*c^2 - 4*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*b*c^3 + 32*a^4*b*c^3 - 2*(b^2 - 4*a*c)*a^2*b^3*c + 8*(b^2 - 4*a*c)*a^3*b*c^2)*f*abs(a*b^2 - 4*a^2*c) + (2*a^2*b^7*c^2 - 40*a^3*b^5*c^3 + 224*a^4*b^3*c^4 - 384*a^5*b*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^2*b^7 + 20*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*b^5*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^2*b^6*c - 112*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^4*b^3*c^2 - 32*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*b^4*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^2*b^5*c^2 + 192*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^5*b*c^3 + 96*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^4*b^2*c^3 + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*b^3*c^3 - 48*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^4*b*c^4 - 2*(b^2 - 4*a*c)*a^2*b^5*c^2 + 32*(b^2 - 4*a*c)*a^3*b^3*c^3 - 96*(b^2 - 4*a*c)*a^4*b*c^4)*d + 4*(2*a^3*b^6*c^2 - 16*a^4*b^4*c^3 + 32*a^5*b^2*c^4 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*b^6 + 8*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^4*b^4*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*b^5*c - 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^5*b^2*c^2 - 8*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^4*b^3*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^3*b^4*c^2 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}*c})*a^4*b^2*c^3 - 2*(b^2 - 4*a*c)*a^3*b^4*c^2 + 8*(b^2 - 4*a*c)*a^4*b^2*c^3)*f)*arctan(2*\sqrt{1/2}*x/\sqrt{(a*b^3 - 4*a^2*b*c - \sqrt{(a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2)})))/(a*b^2*c - 4*a^2*c^2)))/((a^3*b^6 - 12*a^4*b^4*c - 2*a^3*b^5*c + 48*a^5*b^2*c^2 + 16*a^4*b^3*c^2 + a^3*b^4*c^2 - 64*a^6*c^3 - 32*a^5*b*c^3 - 8*a^4*b^2*c^3 + 16*a^5
\end{aligned}$$

```

*c^4)*abs(a*b^2 - 4*a^2*c)*abs(c)) - 1/4*((b^3*c^2 - 4*a*b*c^3 - 2*b^2*c^3
+ b*c^4 + (b^2*c^2 - 4*a*c^3 - 2*b*c^3 + c^4)*sqrt(b^2 - 4*a*c))*e*abs(a*b^
2 - 4*a^2*c) - (a*b^5*c^2 - 8*a^2*b^3*c^3 - 2*a*b^4*c^3 + 16*a^3*b*c^4 + 8*
a^2*b^2*c^4 + a*b^3*c^4 - 4*a^2*b*c^5 + (a*b^4*c^2 - 4*a^2*b^2*c^3 - 2*a*b^
3*c^3 + a*b^2*c^4)*sqrt(b^2 - 4*a*c))*e)*log(x^2 + 1/2*(a*b^3 - 4*a^2*b*c +
sqrt((a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2)))
/(a*b^2*c - 4*a^2*c^2))/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*
a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2*abs(a*b^2 - 4*a^2*c)) - 1/4*((b^3*c^
2 - 4*a*b*c^3 - 2*b^2*c^3 + b*c^4 + (b^2*c^2 - 4*a*c^3 - 2*b*c^3 + c^4)*sqr
t(b^2 - 4*a*c))*e*abs(a*b^2 - 4*a^2*c) - (a*b^5*c^2 - 8*a^2*b^3*c^3 - 2*a*b
^4*c^3 + 16*a^3*b*c^4 + 8*a^2*b^2*c^4 + a*b^3*c^4 - 4*a^2*b*c^5 + (a*b^4*c^
2 - 4*a^2*b^2*c^3 - 2*a*b^3*c^3 + a*b^2*c^4)*sqrt(b^2 - 4*a*c))*e)*log(x^2
+ 1/2*(a*b^3 - 4*a^2*b*c - sqrt((a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*
c)*(a*b^2*c - 4*a^2*c^2)))/(a*b^2*c - 4*a^2*c^2))/((a*b^4 - 8*a^2*b^2*c - 2
*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2*abs(a*b^2
- 4*a^2*c))

```

### Mupad [B] (verification not implemented)

Time = 8.40 (sec) , antiderivative size = 4707, normalized size of antiderivative = 12.79

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2)/(a + b\*x^2 + c\*x^4)^2,x)

```

[Out] symsum(log((5*b^3*c^4*d^3 + 8*a^3*c^4*f^3 - 96*a^2*c^5*d*e^2 + 72*a^2*c^5*d
^2*f - 3*b^4*c^3*d^2*f + 6*a^2*b^2*c^3*f^3 - 36*a*b*c^5*d^3 + 16*a*b^2*c^4*
d*e^2 + 18*a*b^2*c^4*d^2*f + 3*a*b^3*c^3*d*f^2 - 60*a^2*b*c^4*d*f^2 + 16*a^
2*b*c^4*e^2*f)/(8*(a^2*b^6 - 64*a^5*c^3 - 12*a^3*b^4*c + 48*a^4*b^2*c^2)) -
root(1572864*a^8*b^2*c^5*z^4 - 983040*a^7*b^4*c^4*z^4 + 327680*a^6*b^6*c^3
*z^4 - 61440*a^5*b^8*c^2*z^4 + 6144*a^4*b^10*c*z^4 - 1048576*a^9*c^6*z^4 -
256*a^3*b^12*z^4 + 576*a^2*b^8*c*d*f*z^2 + 24576*a^5*b^2*c^4*d*f*z^2 - 3072
*a^3*b^6*c^2*d*f*z^2 + 2048*a^4*b^4*c^3*d*f*z^2 + 12288*a^6*b*c^4*f^2*z^2 +
61440*a^5*b*c^5*d^2*z^2 - 49152*a^6*c^5*d*f*z^2 + 432*a*b^9*c*d^2*z^2 - 81
92*a^5*b^3*c^3*f^2*z^2 + 1536*a^4*b^5*c^2*f^2*z^2 + 24576*a^5*b^2*c^4*e^2*z
^2 - 6144*a^4*b^4*c^3*e^2*z^2 + 512*a^3*b^6*c^2*e^2*z^2 - 61440*a^4*b^3*c^4
*d^2*z^2 + 24064*a^3*b^5*c^3*d^2*z^2 - 4608*a^2*b^7*c^2*d^2*z^2 - 32*a*b^10
*d*f*z^2 - 32768*a^6*c^5*e^2*z^2 - 16*a^2*b^9*f^2*z^2 - 16*b^11*d^2*z^2 - 4
096*a^4*b*c^4*d*e*f*z + 64*a*b^7*c*d*e*f*z + 3072*a^3*b^3*c^3*d*e*f*z - 768
*a^2*b^5*c^2*d*e*f*z + 32*a^2*b^6*c*e*f^2*z - 672*a*b^6*c^2*d^2*e*z + 1536*
a^4*b^2*c^3*e*f^2*z - 384*a^3*b^4*c^2*e*f^2*z - 15872*a^3*b^2*c^4*d^2*e*z +
4992*a^2*b^4*c^3*d^2*e*z - 2048*a^5*c^4*e*f^2*z + 18432*a^4*c^5*d^2*e*z +
32*b^8*c*d^2*e*z - 32*a*b^4*c^2*d*e^2*f + 192*a^2*b^2*c^3*d*e^2*f - 192*a^3
*b*c^3*e^2*f^2 + 198*a*b^4*c^2*d^2*f^2 + 144*a^2*b^3*c^2*d*f^3 - 960*a^2*b*

```



$$\begin{aligned}
& c^4 d^2 e^* z + 4992 a^2 b^4 c^3 d^2 e^* z - 2048 a^5 c^4 e^* f^2 z + 18432 a^4 c^5 d^2 e^* z + 32 b^8 c^* d^2 e^* z - 32 a^* b^4 c^2 d^* e^2 f + 192 a^2 b^2 c^3 d^* e^2 f - 192 a^3 b^* c^3 e^2 f^2 + 198 a^* b^4 c^2 d^2 f^2 + 144 a^2 b^3 c^2 d^* f^3 \\
& - 960 a^2 b^* c^4 d^2 e^2 + 240 a^* b^3 c^3 d^2 e^2 + 768 a^3 c^4 d^* e^2 f + 2016 a^2 b^* c^4 d^3 f - 496 a^* b^3 c^3 d^3 f + 224 a^3 b^* c^3 d^* f^3 - 16 a^2 b^3 c^2 e^2 f^2 - 960 a^2 b^2 c^3 d^2 f^2 - 18 a^* b^5 c^* d^* f^3 - 288 a^3 c^4 d^2 f^2 - 16 b^5 c^2 d^2 e^2 - 24 a^3 b^2 c^2 f^4 + 30 b^5 c^2 d^3 f - 9 b^6 c^* d^2 f^2 - 9 a^2 b^4 c^* f^4 + 360 a^* b^2 c^4 d^4 - 16 a^4 c^3 f^4 - 256 a^3 c^4 e^4 - 25 b^4 c^3 d^4 - 1296 a^2 c^5 d^4, z, k) * x * (4096 a^6 b^* c^6 + 16 a^2 b^9 c^2 - 256 a^3 b^7 c^3 + 1536 a^4 b^5 c^4 - 4096 a^5 b^3 c^5) / (2 * (a^2 b^6 - 64 a^5 c^3 - 12 a^3 b^4 c + 48 a^4 b^2 c^2)) + (x * (b^6 c^3 d^2 - 288 a^3 c^6 d^2 + 32 a^4 c^5 f^2 - 18 a^* b^4 c^4 d^2 + 64 a^3 b^* c^5 e^2 + 128 a^2 b^2 c^5 d^2 - 16 a^2 b^3 c^4 e^2 + 10 a^2 b^4 c^3 f^2 - 48 a^3 b^2 c^4 f^2 + 2 a^* b^5 c^3 d^* f + 160 a^3 b^* c^5 d^* f - 48 a^2 b^3 c^4 d^* f)) / (2 * (a^2 b^6 - 64 a^5 c^3 - 12 a^3 b^4 c + 48 a^4 b^2 c^2)) - (x * (16 a^2 c^5 e^3 - b^3 c^4 d^2 e + 12 a^* b^* c^5 d^2 e - 24 a^2 c^5 d^* e^* f + 8 a^2 b^* c^4 e^* f^2 - 2 a^* b^2 c^4 d^* e^* f)) / (2 * (a^2 b^6 - 64 a^5 c^3 - 12 a^3 b^4 c + 48 a^4 b^2 c^2)) * root(1572864 a^8 b^2 c^5 z^4 - 983040 a^7 b^4 c^4 z^4 + 327680 a^6 b^6 c^3 z^4 - 61440 a^5 b^8 c^2 z^4 + 6144 a^4 b^10 c^* z^4 - 1048576 a^9 c^6 z^4 - 256 a^3 b^12 z^4 + 576 a^2 b^8 c^* d^* f^* z^2 + 24576 a^5 b^2 c^4 d^* f^* z^2 - 3072 a^3 b^6 c^2 d^* f^* z^2 + 2048 a^4 b^4 c^3 d^* f^* z^2 + 12288 a^6 b^* c^4 f^2 z^2 + 61440 a^5 b^* c^5 d^2 z^2 - 49152 a^6 c^5 d^* f^* z^2 + 432 a^* b^9 c^* d^2 z^2 - 8192 a^5 b^3 c^3 f^2 z^2 + 1536 a^4 b^5 c^2 f^2 z^2 + 24576 a^5 b^2 c^4 e^2 z^2 - 6144 a^4 b^4 c^3 e^2 z^2 + 512 a^3 b^6 c^2 e^2 z^2 - 61440 a^4 b^3 c^4 d^2 z^2 + 24064 a^3 b^5 c^3 d^2 z^2 - 4608 a^2 b^7 c^2 d^2 z^2 - 32 a^* b^10 d^* f^* z^2 - 32768 a^6 c^5 e^2 z^2 - 16 a^2 b^9 f^2 z^2 - 16 b^11 d^2 z^2 - 4096 a^4 b^* c^4 d^* e^* f^* z + 64 a^* b^7 c^* d^* e^* f^* z + 3072 a^3 b^3 c^3 d^* e^* f^* z - 768 a^2 b^5 c^2 d^* e^* f^* z + 32 a^2 b^6 c^* e^* f^2 z - 672 a^* b^6 c^2 d^2 e^* z + 1536 a^4 b^2 c^3 e^* f^2 z - 384 a^3 b^4 c^2 e^* f^2 z - 15872 a^3 b^2 c^4 d^2 e^* z + 4992 a^2 b^4 c^3 d^2 e^* z - 2048 a^5 c^4 e^* f^2 z + 18432 a^4 c^5 d^2 e^* z + 32 b^8 c^* d^2 e^* z - 32 a^* b^4 c^2 d^* e^2 f + 192 a^2 b^2 c^3 d^* e^2 f - 192 a^3 b^* c^3 e^2 f^2 + 198 a^* b^4 c^2 d^2 f^2 + 144 a^2 b^3 c^2 d^* f^3 - 960 a^2 b^* c^4 d^2 e^2 + 240 a^* b^3 c^3 d^2 e^2 + 768 a^3 c^4 d^* e^2 f + 2016 a^2 b^* c^4 d^3 f - 496 a^* b^3 c^3 d^3 f + 224 a^3 b^* c^3 d^* f^3 - 16 a^2 b^3 c^2 e^2 f^2 - 960 a^2 b^2 c^3 d^2 f^2 - 18 a^* b^5 c^* d^* f^3 - 288 a^3 c^4 d^2 f^2 - 16 b^5 c^2 d^2 e^2 - 24 a^3 b^2 c^2 f^4 + 30 b^5 c^2 d^3 f - 9 b^6 c^* d^2 f^2 - 9 a^2 b^4 c^* f^4 + 360 a^* b^2 c^4 d^4 - 16 a^4 c^3 f^4 - 256 a^3 c^4 e^4 - 25 b^4 c^3 d^4 - 1296 a^2 c^5 d^4, z, k), k, 1, 4) + ((b e) / (2 * (4 a^* c - b^2))) + (c e^* x^2) / (4 a^* c - b^2) + (x * (2 a^* c d - b^2 d + a^* b f)) / (2 a^* (4 a^* c - b^2)) - (c^* x^3 (b d - 2 a^* f)) / (2 a^* (4 a^* c - b^2)) / (a + b^* x^2 + c^* x^4)
\end{aligned}$$

$$3.38 \quad \int \frac{d+ex+fx^2+gx^3}{(a+bx^2+cx^4)^2} dx$$

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### Optimal result

Integrand size = 30, antiderivative size = 386

$$\int \frac{d+ex+fx^2+gx^3}{(a+bx^2+cx^4)^2} dx = \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{2a(b^2-4ac)(a+bx^2+cx^4)} - \frac{be-2ag+(2ce-bg)x^2}{2(b^2-4ac)(a+bx^2+cx^4)} + \frac{\sqrt{c}\left(bd-2af+\frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\sqrt{c}\left(bd-2af-\frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b+\sqrt{b^2-4ac}}} + \frac{(2ce-bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{3/2}}$$

[Out] 1/2\*x\*(b^2\*d-2\*a\*c\*d-a\*b\*f+c\*(-2\*a\*f+b\*d)\*x^2)/a/(-4\*a\*c+b^2)/(c\*x^4+b\*x^2+a)+1/2\*(-b\*e+2\*a\*g-(-b\*g+2\*c\*e)\*x^2)/(-4\*a\*c+b^2)/(c\*x^4+b\*x^2+a)+(-b\*g+2\*c\*e)\*arctanh((2\*c\*x^2+b)/(-4\*a\*c+b^2)^(1/2))/(-4\*a\*c+b^2)^(3/2)+1/4\*arctan(x\*2^(1/2)\*c^(1/2)/(b-(-4\*a\*c+b^2)^(1/2))^(1/2))\*c^(1/2)\*(b\*d-2\*a\*f+(4\*a\*b\*f-12\*a\*c\*d+b^2\*d)/(-4\*a\*c+b^2)^(1/2))/a/(-4\*a\*c+b^2)\*2^(1/2)/(b-(-4\*a\*c+b^2)^(1/2))^(1/2)+1/4\*arctan(x\*2^(1/2)\*c^(1/2)/(b+(-4\*a\*c+b^2)^(1/2))^(1/2))\*c^(1/2)\*(b\*d-2\*a\*f+(-4\*a\*b\*f+12\*a\*c\*d-b^2\*d)/(-4\*a\*c+b^2)^(1/2))/a/(-4\*a\*c+b^2)\*2^(1/2)/(b+(-4\*a\*c+b^2)^(1/2))^(1/2)

**Rubi [A] (verified)**

Time = 0.26 (sec) , antiderivative size = 386, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.267$ , Rules used = {1687, 1192, 1180, 211, 1261, 652, 632, 212}

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^2} dx = \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{4abf-12acd+b^2d}{\sqrt{b^2-4ac}} - 2af + bd\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left(-\frac{4abf-12acd+b^2d}{\sqrt{b^2-4ac}} - 2af + bd\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{\sqrt{b^2-4ac}+b}} + \frac{(2ce - bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{3/2}} + \frac{x(cx^2(bd-2af) - abf - 2acd + b^2d)}{2a(b^2-4ac)(a+bx^2+cx^4)} - \frac{-2ag + x^2(2ce - bg) + be}{2(b^2-4ac)(a+bx^2+cx^4)}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^2,x]

[Out] (x\*(b^2\*d - 2\*a\*c\*d - a\*b\*f + c\*(b\*d - 2\*a\*f)\*x^2))/(2\*a\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) - (b\*e - 2\*a\*g + (2\*c\*e - b\*g)\*x^2)/(2\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + (Sqrt[c]\*(b\*d - 2\*a\*f + (b^2\*d - 12\*a\*c\*d + 4\*a\*b\*f)/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]]]/(2\*Sqrt[2]\*a\*(b^2 - 4\*a\*c)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + (Sqrt[c]\*(b\*d - 2\*a\*f - (b^2\*d - 12\*a\*c\*d + 4\*a\*b\*f)/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]]]/(2\*Sqrt[2]\*a\*(b^2 - 4\*a\*c)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) + ((2\*c\*e - b\*g)\*ArcTanh[(b + 2\*c\*x^2)/Sqrt[b^2 - 4\*a\*c]])/(b^2 - 4\*a\*c)^(3/2)

**Rule 211**

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

**Rule 212**

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

**Rule 632**

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c},

`x] && NeQ[b^2 - 4*a*c, 0]`

### Rule 652

```
Int[((d_.) + (e_.)*(x_))*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol]
:= Simp[((b*d - 2*a*e + (2*c*d - b*e)*x)/((p + 1)*(b^2 - 4*a*c)))*(a + b*x
+ c*x^2)^(p + 1), x] - Dist[(2*p + 3)*((2*c*d - b*e)/((p + 1)*(b^2 - 4*a*c
))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] &&
NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2]
```

### Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

### Rule 1192

```
Int[((d_) + (e_.)*(x_)^2)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symb
ol] := Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 +
c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2
- 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

### Rule 1261

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(
p_.), x_Symbol] := Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

### Rubi steps

$$\text{integral} = \int \frac{d + fx^2}{(a + bx^2 + cx^4)^2} dx + \int \frac{x(e + gx^2)}{(a + bx^2 + cx^4)^2} dx$$



$$\begin{aligned}
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{(a + bx + cx^2)^2} dx, x, x^2 \right) - \frac{\int \frac{-b^2d + 6acd - abf - c(bd - 2af)x^2}{a + bx^2 + cx^4} dx}{2a(b^2 - 4ac)} \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} - \frac{be - 2ag + (2ce - bg)x^2}{2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{\left( c \left( bd - 2af - \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \right) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)} \\
&\quad + \frac{\left( c \left( bd - 2af + \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \right) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)} \\
&\quad - \frac{(2ce - bg) \text{Subst} \left( \int \frac{1}{a + bx + cx^2} dx, x, x^2 \right)}{2(b^2 - 4ac)} \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} - \frac{be - 2ag + (2ce - bg)x^2}{2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{\sqrt{c} \left( bd - 2af + \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\sqrt{c} \left( bd - 2af - \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{(2ce - bg) \text{Subst} \left( \int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2 \right)}{b^2 - 4ac} \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} - \frac{be - 2ag + (2ce - bg)x^2}{2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{\sqrt{c} \left( bd - 2af + \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\sqrt{c} \left( bd - 2af - \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{(2ce - bg) \tanh^{-1} \left( \frac{b + 2cx^2}{\sqrt{b^2 - 4ac}} \right)}{(b^2 - 4ac)^{3/2}}
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.74 (sec) , antiderivative size = 421, normalized size of antiderivative = 1.09

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^2} dx$$

$$= \frac{1}{4} \left( \frac{-4a^2g - 2bdx(b + cx^2) + 4acx(d + x(e + fx)) + 2ab(e + x(f - gx))}{a(-b^2 + 4ac)(a + bx^2 + cx^4)} \right.$$

$$+ \frac{\sqrt{2}\sqrt{c}(b^2d + b(\sqrt{b^2 - 4acd} + 4af) - 2a(6cd + \sqrt{b^2 - 4acf})) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{a(b^2 - 4ac)^{3/2} \sqrt{b - \sqrt{b^2 - 4ac}}}$$

$$+ \frac{\sqrt{2}\sqrt{c}(-b^2d + 12acd + b\sqrt{b^2 - 4acd} - 4abf - 2a\sqrt{b^2 - 4acf}) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{a(b^2 - 4ac)^{3/2} \sqrt{b + \sqrt{b^2 - 4ac}}}$$

$$+ \frac{2(-2ce + bg) \log(-b + \sqrt{b^2 - 4ac} - 2cx^2)}{(b^2 - 4ac)^{3/2}}$$

$$\left. - \frac{2(-2ce + bg) \log(b + \sqrt{b^2 - 4ac} + 2cx^2)}{(b^2 - 4ac)^{3/2}} \right)$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^2,x]

[Out] ((-4\*a^2\*g - 2\*b\*d\*x\*(b + c\*x^2) + 4\*a\*c\*x\*(d + x\*(e + f\*x)) + 2\*a\*b\*(e + x\*(f - g\*x)))/(a\*(-b^2 + 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + (Sqrt[2]\*Sqrt[c]\*(b^2\*d + b\*(Sqrt[b^2 - 4\*a\*c]\*d + 4\*a\*f) - 2\*a\*(6\*c\*d + Sqrt[b^2 - 4\*a\*c]\*f))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]]]/(a\*(b^2 - 4\*a\*c)^(3/2)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + (Sqrt[2]\*Sqrt[c]\*(-b^2\*d) + 12\*a\*c\*d + b\*Sqrt[b^2 - 4\*a\*c]\*d - 4\*a\*b\*f - 2\*a\*Sqrt[b^2 - 4\*a\*c]\*f)\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]]]/(a\*(b^2 - 4\*a\*c)^(3/2)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) + (2\*(-2\*c\*e + b\*g)\*Log[-b + Sqrt[b^2 - 4\*a\*c] - 2\*c\*x^2])/(b^2 - 4\*a\*c)^(3/2) - (2\*(-2\*c\*e + b\*g)\*Log[b + Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2])/(b^2 - 4\*a\*c)^(3/2))/4

**Maple [C] (verified)**

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.28 (sec) , antiderivative size = 252, normalized size of antiderivative = 0.65

method	result
risch	$\frac{\frac{c(2af-bd)x^3}{2a(4ac-b^2)} - \frac{(bg-2ec)x^2}{2(4ac-b^2)} + \frac{(abf+2acd-b^2d)x}{2a(4ac-b^2)} - \frac{2ag-be}{2(4ac-b^2)}}{cx^4+bx^2+a} + \frac{\left( \sum_{R=\text{RootOf}(cZ^4+Z^2b+a)} \left( \frac{c(2af-bd)}{a(4ac-b^2)} \frac{R^2}{4ac-b^2} - \frac{2(bg-2ec)}{4ac-b^2} \frac{R}{2c} + \frac{abf+2acd-b^2d}{2a(4ac-b^2)} \frac{R}{2c} - \frac{2ag-be}{2(4ac-b^2)} \frac{R}{2c} \right) \right)}{4}$
default	$16c^2 \frac{\frac{(-4acd\sqrt{-4ac+b^2}+b^2d\sqrt{-4ac+b^2}+8a^2cf-2ab^2f-4abcd+b^3d)x - 4\sqrt{-4ac+b^2}acg - \sqrt{-4ac+b^2}b^2g - 4abgc + 8ac^2e + b^3g - 2b^2ce}{16ac}}{x^2 + \frac{b}{2c} - \frac{\sqrt{-4ac+b^2}}{2c}}$

[In] `int((g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^2,x,method=_RETURNVERBOSE)`

[Out]  $(1/2*c*(2*a*f-b*d)/a/(4*a*c-b^2)*x^3-1/2*(b*g-2*c*e)/(4*a*c-b^2)*x^2+1/2*(a*b*f+2*a*c*d-b^2*d)/a/(4*a*c-b^2)*x-1/2*(2*a*g-b*e)/(4*a*c-b^2))/(c*x^4+b*x^2+a)+1/4*\text{sum}((c*(2*a*f-b*d)/a/(4*a*c-b^2)*_R^2-2*(b*g-2*c*e)/(4*a*c-b^2)*_R-(a*b*f-6*a*c*d+b^2*d)/a/(4*a*c-b^2))/(2*_R^3*c+_R*b)*\ln(x-_R),_R=\text{RootOf}(Z^4*c+_Z^2*b+a))$

## Fricas [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

[In] `integrate((g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^2,x, algorithm="fricas")`

[Out] Timed out

## Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

[In] `integrate((g*x**3+f*x**2+e*x+d)/(c*x**4+b*x**2+a)**2,x)`

[Out] Timed out

**Maxima [F]**

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^2} dx = \int \frac{gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^2} dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="maxima")

[Out] 1/2\*((b\*c\*d - 2\*a\*c\*f)\*x^3 - a\*b\*e + 2\*a^2\*g - (2\*a\*c\*e - a\*b\*g)\*x^2 - (a\*b\*f - (b^2 - 2\*a\*c)\*d)\*x)/((a\*b^2\*c - 4\*a^2\*c^2)\*x^4 + a^2\*b^2 - 4\*a^3\*c + (a\*b^3 - 4\*a^2\*b\*c)\*x^2) - 1/2\*integrate(-(a\*b\*f + (b\*c\*d - 2\*a\*c\*f)\*x^2 + (b^2 - 6\*a\*c)\*d - 2\*(2\*a\*c\*e - a\*b\*g)\*x)/(c\*x^4 + b\*x^2 + a), x)/(a\*b^2 - 4\*a^2\*c)

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 5573 vs. 2(338) = 676.

Time = 1.79 (sec) , antiderivative size = 5573, normalized size of antiderivative = 14.44

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="giac")

[Out] 1/2\*(b\*c\*d\*x^3 - 2\*a\*c\*f\*x^3 - 2\*a\*c\*e\*x^2 + a\*b\*g\*x^2 + b^2\*d\*x - 2\*a\*c\*d\*x - a\*b\*f\*x - a\*b\*e + 2\*a^2\*g)/((c\*x^4 + b\*x^2 + a)\*(a\*b^2 - 4\*a^2\*c)) + 1/16\*((2\*b^3\*c^2 - 8\*a\*b\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*b^3 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b\*c + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*b^2\*c - sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*b\*c^2 - 2\*(b^2 - 4\*a\*c)\*b\*c^2)\*(a\*b^2 - 4\*a^2\*c)^2\*d - 2\*(2\*a\*b^2\*c^2 - 8\*a^2\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^2 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*c + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b\*c - sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*c^2 - 2\*(b^2 - 4\*a\*c)\*a\*c^2)\*(a\*b^2 - 4\*a^2\*c)^2\*f + 2\*(sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^6 - 14\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^4\*c - 2\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^5\*c - 2\*a\*b^6\*c + 64\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^3\*b^2\*c^2 + 20\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^3\*c^2 + sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^4\*c^2 + 28\*a^2\*b^4\*c^2 - 96\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^4\*c^3 - 48\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^3\*b\*c^3 - 10\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^2\*c^3 - 128\*a^3\*b^2\*c^3 + 24\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^3\*c^4 + 192\*a^4\*c^4 + 2\*(b^2 - 4\*a\*c)\*a\*b^4\*c - 20\*(b^2 - 4\*a\*c)\*a^2\*b^2\*c^2 + 48\*



$$\begin{aligned}
& (b*c - \sqrt{b^2 - 4*a*c})*c)*a*b^4*c^2 - 28*a^2*b^4*c^2 - 96*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^4*c^3 - 48*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b*c^3 - 10*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^2*b^2*c^3 + 128*a^3*b^2*c^3 + 24*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*c^4 - 192*a^4*c^4 - 2*(b^2 - 4*a*c)*a*b^4*c + 20*(b^2 - 4*a*c)*a^2*b^2*c^2 - 48*(b^2 - 4*a*c)*a^3*c^3)*d*\text{abs}(a*b^2 - 4*a^2*c) + 2*(\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^2*b^5 - 8*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b^3*c - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^2*b^4*c + 2*a^2*b^5*c + 16*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^4*b*c^2 + 8*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b^2*c^2 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^2*b^3*c^2 - 16*a^3*b^3*c^2 - 4*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b*c^3 + 32*a^4*b*c^3 - 2*(b^2 - 4*a*c)*a^2*b^3*c + 8*(b^2 - 4*a*c)*a^3*b*c^2)*f*\text{abs}(a*b^2 - 4*a^2*c) + (2*a^2*b^7*c^2 - 40*a^3*b^5*c^3 + 224*a^4*b^3*c^4 - 384*a^5*b*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^2*b^7 + 20*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b^5*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^2*b^6*c - 112*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^4*b^3*c^2 - 32*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b^4*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^2*b^5*c^2 + 192*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^5*b*c^3 + 96*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^4*b^2*c^3 + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b^3*c^3 - 48*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^4*b*c^4 - 2*(b^2 - 4*a*c)*a^2*b^5*c^2 + 32*(b^2 - 4*a*c)*a^3*b^3*c^3 - 96*(b^2 - 4*a*c)*a^4*b*c^4)*d + 4*(2*a^3*b^6*c^2 - 16*a^4*b^4*c^3 + 32*a^5*b^2*c^4 - \sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b^6 + 8*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^4*b^4*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b^5*c - 16*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^5*b^2*c^2 - 8*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^4*b^3*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b^4*c^2 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^4*b^2*c^3 - 2*(b^2 - 4*a*c)*a^3*b^4*c^2 + 8*(b^2 - 4*a*c)*a^4*b^2*c^3)*f)*\arctan(2*\sqrt{1/2}*x/\sqrt{(a*b^3 - 4*a^2*b*c - \sqrt{(a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2)})))/(a*b^2*c - 4*a^2*c^2)))/((a^3*b^6 - 12*a^4*b^4*c - 2*a^3*b^5*c + 48*a^5*b^2*c^2 + 16*a^4*b^3*c^2 + a^3*b^4*c^2 - 64*a^6*c^3 - 32*a^5*b*c^3 - 8*a^4*b^2*c^3 + 16*a^5*c^4)*\text{abs}(a*b^2 - 4*a^2*c)*\text{abs}(c)) - 1/8*(2*(b^3*c^2 - 4*a*b*c^3 - 2*b^2*c^3 + b*c^4 - (b^2*c^2 - 4*a*c^3 - 2*b*c^3 + c^4)*\sqrt{b^2 - 4*a*c}))*e*\text{abs}(a*b^2 - 4*a^2*c) - (b^4*c - 4*a*b^2*c^2 - 2*b^3*c^2 + b^2*c^3 + (b^3*c - 4*a*b*c^2 - 2*b^2*c^2 + b*c^3)*\sqrt{b^2 - 4*a*c}))*g*\text{abs}(a*b^2 - 4*a^2*c) - 2*(a*b^5*c^2 - 8*a^2*b^3*c^3 - 2*a*b^4*c^3 + 16*a^3*b*c^4 + 8*a^2*b^2*c^4 + a*b^3*c^4 - 4*a^2*b*c^5 + (a*b^4*c^2 - 4*a^2*b^2*c^3 - 2*a*b^3*c^3 + a*b^2*c^4)*\sqrt{b^2 - 4*a*c}))*e + (a*b^6*c - 8*a^2*b^4*c^2 - 2*a*b^5*c^2 + 16*a^3*b^2*c^3 + 8*a^2*b^3*c^3 + a*b^4*c^3 - 4*a^2*b^2*c^4 + (a*b^5*c - 4*a^2*b^3*c^2 - 2*a*b^4*c^2 + a*b^3*c^3)*\sqrt{b^2 - 4*a*c}))*g)*10
\end{aligned}$$

$$g(x^2 + 1/2*(a*b^3 - 4*a^2*b*c + \sqrt{(a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2)}))/(a*b^2*c - 4*a^2*c^2)/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2*\text{abs}(a*b^2 - 4*a^2*c)) - 1/8*(2*(b^3*c^2 - 4*a*b*c^3 - 2*b^2*c^3 + b*c^4 + (b^2*c^2 - 4*a*c^3 - 2*b*c^3 + c^4)*\sqrt{b^2 - 4*a*c}))*e*\text{abs}(a*b^2 - 4*a^2*c) - (b^4*c - 4*a*b^2*c^2 - 2*b^3*c^2 + b^2*c^3 - (b^3*c - 4*a*b*c^2 - 2*b^2*c^2 + b*c^3)*\sqrt{b^2 - 4*a*c})*g*\text{abs}(a*b^2 - 4*a^2*c) + 2*(a*b^5*c^2 - 8*a^2*b^3*c^3 - 2*a*b^4*c^3 + 16*a^3*b*c^4 + 8*a^2*b^2*c^4 + a*b^3*c^4 - 4*a^2*b*c^5 + (a*b^4*c^2 - 4*a^2*b^2*c^3 - 2*a*b^3*c^3 + a*b^2*c^4)*\sqrt{b^2 - 4*a*c}))*e - (a*b^6*c - 8*a^2*b^4*c^2 - 2*a*b^5*c^2 + 16*a^3*b^2*c^3 + 8*a^2*b^3*c^3 + a*b^4*c^3 - 4*a^2*b^2*c^4 - (a*b^5*c - 4*a^2*b^3*c^2 - 2*a*b^4*c^2 + a*b^3*c^3)*\sqrt{b^2 - 4*a*c})*g*\log(x^2 + 1/2*(a*b^3 - 4*a^2*b*c - \sqrt{(a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2)}))/(a*b^2*c - 4*a^2*c^2)/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2*\text{abs}(a*b^2 - 4*a^2*c))$$

## Mupad [B] (verification not implemented)

Time = 8.61 (sec) , antiderivative size = 7373, normalized size of antiderivative = 19.10

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^2,x)

[Out] symsum(log((5\*b^3\*c^4\*d^3 + 8\*a^3\*c^4\*f^3 - 96\*a^2\*c^5\*d\*e^2 + 72\*a^2\*c^5\*d^2\*f - 3\*b^4\*c^3\*d^2\*f + 6\*a^2\*b^2\*c^3\*f^3 - 36\*a\*b\*c^5\*d^3 + 16\*a\*b^2\*c^4\*d\*e^2 + 18\*a\*b^2\*c^4\*d^2\*f + 3\*a\*b^3\*c^3\*d\*f^2 - 60\*a^2\*b\*c^4\*d\*f^2 + 4\*a\*b^4\*c^2\*d\*g^2 + 16\*a^2\*b\*c^4\*e^2\*f - 24\*a^2\*b^2\*c^3\*d\*g^2 + 4\*a^2\*b^3\*c^2\*f\*g^2 - 16\*a\*b^3\*c^3\*d\*e\*g + 96\*a^2\*b\*c^4\*d\*e\*g - 16\*a^2\*b^2\*c^3\*e\*f\*g)/(8\*(a^2\*b^6 - 64\*a^5\*c^3 - 12\*a^3\*b^4\*c + 48\*a^4\*b^2\*c^2)) - root(1572864\*a^8\*b^2\*c^5\*z^4 - 983040\*a^7\*b^4\*c^4\*z^4 + 327680\*a^6\*b^6\*c^3\*z^4 - 61440\*a^5\*b^8\*c^2\*z^4 + 6144\*a^4\*b^10\*c\*z^4 - 1048576\*a^9\*c^6\*z^4 - 256\*a^3\*b^12\*z^4 + 32768\*a^6\*b\*c^4\*e\*g\*z^2 - 512\*a^3\*b^7\*c\*e\*g\*z^2 + 576\*a^2\*b^8\*c\*d\*f\*z^2 - 24576\*a^5\*b^3\*c^3\*e\*g\*z^2 + 6144\*a^4\*b^5\*c^2\*e\*g\*z^2 + 24576\*a^5\*b^2\*c^4\*d\*f\*z^2 - 3072\*a^3\*b^6\*c^2\*d\*f\*z^2 + 2048\*a^4\*b^4\*c^3\*d\*f\*z^2 - 1536\*a^4\*b^6\*c\*g^2\*z^2 + 12288\*a^6\*b\*c^4\*f^2\*z^2 + 61440\*a^5\*b\*c^5\*d^2\*z^2 - 49152\*a^6\*c^5\*d\*f\*z^2 + 432\*a\*b^9\*c\*d^2\*z^2 - 8192\*a^6\*b^2\*c^3\*g^2\*z^2 + 6144\*a^5\*b^4\*c^2\*g^2\*z^2 - 8192\*a^5\*b^3\*c^3\*f^2\*z^2 + 1536\*a^4\*b^5\*c^2\*f^2\*z^2 + 24576\*a^5\*b^2\*c^4\*e^2\*z^2 - 6144\*a^4\*b^4\*c^3\*e^2\*z^2 + 512\*a^3\*b^6\*c^2\*e^2\*z^2 - 61440\*a^4\*b^3\*c^4\*d^2\*z^2 + 24064\*a^3\*b^5\*c^3\*d^2\*z^2 - 4608\*a^2\*b^7\*c^2\*d^2\*z^2 - 32\*a\*b^10\*d\*f\*z^2 + 128\*a^3\*b^8\*g^2\*z^2 - 32768\*a^6\*c^5\*e^2\*z^2 - 16\*a^2\*b^9\*f^2\*z^2 - 16\*b^11\*d^2\*z^2 + 384\*a^2\*b^6\*c\*d\*f\*g\*z - 4096\*a^4\*b\*c^4\*d\*e\*f\*z + 64\*a\*b^7\*c\*d\*e\*f\*z + 2048\*a^4\*b^2\*c^3\*d\*f\*g\*z - 1536\*a^3\*b^4\*c^2\*d\*f\*g\*z + 3072\*a^3\*b^3\*c^3\*d\*e\*f\*z - 768\*a^2\*b^5\*c^2\*d\*e\*f\*z + 1024\*a^5\*b\*c^5

$$\begin{aligned}
& 3f^2gz + 192a^3b^5c^2f^2gz - 9216a^4b^3c^4d^2gz + 32a^2b^6c^2e^2f^2gz - 672a^3b^6c^2d^2e^2gz + 336a^3b^7c^2d^2gz - 768a^4b^3c^2f^2gz \\
& + 7936a^3b^3c^3d^2gz - 2496a^2b^5c^2d^2gz + 1536a^4b^2c^3e^2f^2gz - 384a^3b^4c^2e^2f^2gz - 15872a^3b^2c^4d^2e^2gz + 4992a^2b^4c^3d^2e^2gz \\
& - 32a^3b^8d^2fgz - 16a^2b^7f^2gz - 2048a^5c^4e^2f^2gz + 18432a^4c^5d^2e^2gz + 32b^8c^2d^2e^2gz - 16b^9d^2gz - 768a^3b^3c^3d^2e^2fg \\
& + 32a^3b^5c^2d^2e^2fg - 192a^2b^3c^2d^2e^2fg + 16a^2b^4c^2e^2fg + 48a^2b^4c^2d^2e^2fg - 240a^3b^4c^2d^2e^2fg - 32a^3b^4c^2d^2e^2fg \\
& + 192a^3b^2c^2e^2fg + 192a^3b^2c^2d^2e^2fg + 960a^2b^2c^3d^2e^2fg + 192a^2b^2c^3d^2e^2fg - 48a^3b^3c^2f^2g^2 - 192a^3b^3c^2e^2f^2g^2 \\
& + 198a^3b^4c^2d^2f^2 + 144a^2b^3c^2d^2f^3 - 960a^2b^3c^4d^2e^2 + 240a^3b^3c^3d^2e^2 + 768a^3c^4d^2e^2f + 512a^3b^3c^3e^3g + 128a^3b^3c^3e^3g^3 \\
& + 60a^3b^5c^2d^2g^2 + 2016a^2b^3c^4d^3f - 496a^3b^3c^3d^3f + 224a^3b^3c^3d^3f - 384a^3b^2c^2e^2g^2 - 240a^2b^3c^2d^2g^2 - 16a^2b^3c^2e^2f^2 \\
& - 960a^2b^2c^3d^2f^2 + 16b^6c^2d^2e^2g - 8a^3b^6d^2fg^2 - 18a^3b^5c^2d^2f^3 - 4a^2b^5f^2g^2 - 288a^3c^4d^2f^2 - 16b^5c^2d^2e^2 \\
& - 24a^3b^2c^2f^4 + 30b^5c^2d^3f - 9b^6c^2d^2f^2 - 9a^2b^4c^2f^4 + 360a^3b^2c^4d^4 - 4b^7d^2g^2 - 16a^4c^3f^4 - 16a^3b^4g^4 - 256a^3c^4e^4 \\
& - 25b^4c^3d^4 - 1296a^2c^5d^4, z, k) \cdot (\text{root}(1572864a^8b^2c^5z^4 - 983040a^7b^4c^4z^4 + 327680a^6b^6c^3z^4 - 61440a^5b^8c^2z^4 + 6144a^4b^10c^2z^4 - 1048576a^9c^6z^4 \\
& - 256a^3b^12z^4 + 32768a^6b^3c^4e^2gz^2 - 512a^3b^7c^2e^2gz^2 + 576a^2b^8c^2d^2fz^2 - 24576a^5b^3c^3e^2gz^2 + 6144a^4b^5c^2e^2gz^2 + 24576a^5b^2c^4d^2fz^2 \\
& - 3072a^3b^6c^2d^2fz^2 + 2048a^4b^4c^3d^2fz^2 - 1536a^4b^6c^2gz^2 + 12288a^6b^3c^4f^2z^2 + 61440a^5b^5c^5d^2z^2 - 49152a^6c^5d^2fz^2 + 432a^3b^9c^2d^2z^2 - 8192a^6b^2c^3g^2z^2 \\
& + 6144a^5b^4c^2g^2z^2 - 8192a^5b^3c^3f^2z^2 + 1536a^4b^5c^2f^2z^2 + 24576a^5b^2c^4e^2z^2 - 6144a^4b^4c^3e^2z^2 + 512a^3b^6c^2e^2z^2 - 61440a^4b^3c^4d^2z^2 \\
& + 24064a^3b^5c^3d^2z^2 - 4608a^2b^7c^2d^2z^2 - 32a^3b^10d^2fz^2 + 128a^3b^8g^2z^2 - 32768a^6c^5e^2z^2 - 16a^2b^9f^2z^2 - 16b^11d^2z^2 + 384a^2b^6c^2d^2fgz \\
& - 4096a^4b^3c^4d^2e^2fgz + 64a^3b^7c^2d^2e^2fgz + 2048a^4b^2c^3d^2fgz - 1536a^3b^4c^2d^2e^2fgz + 3072a^3b^3c^3d^2e^2fgz - 768a^2b^5c^2d^2e^2fgz \\
& + 1024a^5b^3c^3f^2gz + 192a^3b^5c^2f^2gz - 9216a^4b^3c^4d^2gz + 32a^2b^6c^2e^2f^2gz - 672a^3b^6c^2d^2e^2gz + 336a^3b^7c^2d^2e^2gz - 768a^4b^3c^2f^2gz \\
& + 7936a^3b^3c^3d^2gz - 2496a^2b^5c^2d^2gz + 1536a^4b^2c^3e^2f^2gz - 384a^3b^4c^2e^2f^2gz - 15872a^3b^2c^4d^2e^2gz + 4992a^2b^4c^3d^2e^2gz - 32a^3b^8d^2fgz \\
& - 16a^2b^7f^2gz - 2048a^5c^4e^2f^2gz + 18432a^4c^5d^2e^2gz + 32b^8c^2d^2e^2gz - 16b^9d^2gz - 768a^3b^3c^3d^2e^2fg + 32a^3b^5c^2d^2e^2fg - 192a^2b^3c^2d^2e^2fg \\
& + 16a^2b^4c^2e^2fg + 48a^2b^4c^2d^2e^2fg - 240a^3b^4c^2d^2e^2fg - 32a^3b^4c^2d^2e^2fg + 192a^3b^2c^2e^2fg + 192a^3b^2c^2d^2e^2fg + 960a^2b^2c^3d^2e^2fg \\
& + 192a^2b^2c^3d^2e^2fg - 48a^3b^3c^2f^2g^2 - 192a^3b^3c^2e^2f^2g^2 + 198a^3b^4c^2d^2f^2 + 144a^2b^3c^2d^2f^3 - 960a^2b^3c^4d^2e^2 + 240a^3b^3c^3d^2e^2 + 768a^3c^4d^2e^2f
\end{aligned}$$



$$\begin{aligned}
& + 512a^3b^3c^3e^3g + 128a^3b^3c^3e^3g^3 + 60a^5b^5c^4d^2g^2 + 2016a^2 \\
& *b^3c^4d^3f - 496a^3b^3c^3d^3f + 224a^3b^3c^3d^3f^3 - 384a^3b^2c^2e^2 \\
& g^2 - 240a^2b^3c^2d^2g^2 - 16a^2b^3c^2e^2f^2 - 960a^2b^2c^3d^2f^2 + 16b^6c^4d^2e^3g \\
& - 8a^5b^6d^3f^2 - 18a^5b^5c^4d^3f^3 - 4a^2b^5f^2g^2 - 288a^3c^4d^2f^2 - 16b^5c^2d^2e^2 \\
& - 24a^3b^2c^2f^4 + 30b^5c^2d^3f - 9b^6c^4d^2f^2 - 9a^2b^4c^3f^4 + 360a^2b^2c^4d^4 \\
& - 4b^7d^2g^2 - 16a^4c^3f^4 - 16a^3b^4g^4 - 256a^3c^4e^4 - 25b^4c^3d^4 - 1296a^2c^5d^4, \\
& z, k) * ((x * (2048a^5c^6e - 32a^2b^6c^3e + 384a^3b^4c^4e - 1536a^4b^2c^5e + 16a^2b^7c^2g \\
& - 192a^3b^5c^3g + 768a^4b^3c^4g - 1024a^5b^3c^5g)) / (4(a^2b^6 - 64a^5c^3 - 12 \\
& a^3b^4c + 48a^4b^2c^2)) - (6144a^5c^6d - 288a^2b^6c^3d + 1920a^3b^4c^4d - 5632a^4b^2c^5d \\
& + 16a^2b^7c^2f - 192a^3b^5c^3f + 768a^4b^3c^4f + 16a^5b^8c^2d - 1024a^5b^3c^5f) / (8(a^2b^6 - 64a^5 \\
& c^3 - 12a^3b^4c + 48a^4b^2c^2)) + (\text{root}(1572864a^8b^2c^5z^4 - 983040a^7b^4c^4z^4 + 327680a^6b^6c^3z^4 \\
& - 61440a^5b^8c^2z^4 + 6144a^4b^10c^2z^4 - 1048576a^9c^6z^4 - 256a^3b^12z^4 + 32768a^6b^6c^4 \\
& e^2g^2z^2 - 512a^3b^7c^5e^2g^2z^2 + 576a^2b^8c^4d^3f^2z^2 - 24576a^5b^3c^3e^2g^2z^2 + 6144a^4b^5c^2e^2g^2z^2 \\
& + 24576a^5b^2c^4d^3f^2z^2 - 3072a^3b^6c^2d^3f^2z^2 + 2048a^4b^4c^3d^3f^2z^2 - 1536a^4b^6c^2g^2z^2 + 122 \\
& 88a^6b^4c^4f^2z^2 + 61440a^5b^3c^5d^2z^2 - 49152a^6c^5d^3f^2z^2 + 432a^2b^9c^4d^2z^2 - 8192a^6b^2c^3g^2z^2 \\
& + 6144a^5b^4c^2g^2z^2 - 8192a^5b^3c^3f^2z^2 + 1536a^4b^5c^2f^2z^2 + 24576a^5b^2c^4e^2z^2 - 6144a^4b^4c^3e^2z^2 \\
& + 512a^3b^6c^2e^2z^2 - 61440a^4b^3c^4d^2z^2 + 24064a^3b^5c^3d^2z^2 - 4608a^2b^7c^2d^2z^2 - 32a^2b^10 \\
& d^3f^2z^2 + 128a^3b^8g^2z^2 - 32768a^6c^5e^2z^2 - 16a^2b^9f^2z^2 - 16b^11d^2z^2 + 384a^2b^6c^4d^3f^2g^2z \\
& - 4096a^4b^3c^4d^3e^2f^2z + 64a^5b^7c^4d^3e^2f^2g^2z + 2048a^4b^2c^3d^3f^2g^2z - 1536a^3b^4c^2d^3f^2g^2z \\
& + 3072a^3b^3c^3d^3e^2f^2g^2z - 768a^2b^5c^2d^3e^2f^2g^2z + 1024a^5b^3c^3f^2g^2z + 192a^3b^5c^3f^2g^2z \\
& - 9216a^4b^3c^4d^2g^2z + 32a^2b^6c^4e^2f^2z - 672a^5b^6c^2d^2e^2z + 336a^5b^7c^4d^2g^2z - 768a^4b^3c^2f^2g^2z \\
& + 7936a^3b^3c^3d^2g^2z - 2496a^2b^5c^2d^2g^2z + 1536a^4b^2c^3e^2f^2z - 384a^3b^4c^2e^2f^2z - 15872a^3b^2c^4d^2e^2z \\
& + 4992a^2b^4c^3d^2e^2z - 32a^2b^8d^3f^2g^2z - 16a^2b^7f^2g^2z - 2048a^5c^4e^2f^2z + 18432a^4c^5d^2e^2z \\
& + 32b^8c^4d^2e^2z - 16b^9d^2g^2z - 768a^3b^3c^3d^3e^2f^2g^2 + 32a^2b^5c^4d^3e^2f^2g^2 + 16a^2b^4c^4e^2f^2g^2 \\
& + 48a^2b^4c^4d^3f^2g^2 - 240a^2b^4c^2d^2e^2g^2 - 32a^2b^4c^2d^2e^2f^2 + 192a^3b^2c^2e^2f^2g^2 + 192a^3b^2c^2d^2f^2g^2 \\
& + 960a^2b^2c^3d^2e^2g^2 + 192a^2b^2c^3d^2e^2f^2 - 48a^3b^3c^3f^2g^2 - 192a^3b^3c^3e^2f^2 + 198a^4b^4c^2d^2f^2 \\
& + 144a^2b^3c^2d^3f^3 - 960a^2b^3c^4d^2e^2 + 240a^2b^3c^3d^2e^2 + 768a^3c^4d^2e^2f^2 + 512a^3b^3c^3e^3g^2 \\
& + 128a^3b^3c^3e^3g^3 + 60a^5b^5c^4d^2g^2 + 2016a^2b^3c^4d^3f^3 - 496a^3b^3c^3d^3f^3 + 224a^3b^3c^3d^3f^3 \\
& - 384a^3b^2c^2e^2g^2 - 240a^2b^3c^2d^2g^2 - 16a^2b^3c^2e^2f^2 - 960a^2b^2c^3d^2f^2 + 16b^6c^4d^2e^3g^2 \\
& - 8a^5b^6d^3f^2 - 18a^5b^5c^4d^3f^3 - 4a^2b^5f^2g^2 - 288a^3c^4d^2f^2 - 16b^5c^2d^2e^2 - 24a^3b^2c^2f^4 \\
& + 30b^5c^2d^3f - 9b^6c^4d^2f^2 - 9
\end{aligned}$$

$$\begin{aligned}
& a^2b^4c^3f^4 + 360a^3b^2c^4d^4 - 4b^7d^2g^2 - 16a^4c^3f^4 - 16a^3 \\
& *b^4g^4 - 256a^3c^4e^4 - 25b^4c^3d^4 - 1296a^2c^5d^4, z, k) * x * (81 \\
& 92a^6b^3c^6 + 32a^2b^9c^2 - 512a^3b^7c^3 + 3072a^4b^5c^4 - 8192a \\
& ^5b^3c^5) / (4(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2)) - \\
& (512a^4c^5e^2f - 32a^3b^5c^3d^2e - 1024a^3b^3c^5d^2e + 16a^3b^6c^2d^2g \\
& - 256a^4b^3c^4f^2g + 384a^2b^3c^4d^2e - 192a^2b^4c^3d^2g - 32a^2b^4 \\
& ^4c^3e^2f + 512a^3b^2c^4d^2g + 16a^2b^5c^2f^2g) / (8(a^2b^6 - 64a^5 \\
& *c^3 - 12a^3b^4c + 48a^4b^2c^2)) + (x*(2b^6c^3d^2 - 576a^3c^6d^2 \\
& ^2 + 64a^4c^5f^2 - 36a^3b^4c^4d^2 + 128a^3b^3c^5e^2 + 256a^2b^2c^5 \\
& *d^2 - 32a^2b^3c^4e^2 + 20a^2b^4c^3f^2 - 96a^3b^2c^4f^2 - 8a^2 \\
& *b^5c^2g^2 + 32a^3b^3c^3g^2 + 4a^3b^5c^3d^2f + 320a^3b^3c^5d^2f - 9 \\
& 6a^2b^3c^4d^2f + 32a^2b^4c^3e^2g - 128a^3b^2c^4e^2g) / (4(a^2b^6 \\
& - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2)) - (x*(32a^2c^5e^3 - 2b^6 \\
& ^3c^4d^2e + b^4c^3d^2g - 4a^2b^3c^2g^3 + 24a^3b^5c^5d^2e - 48a^2 \\
& *c^5d^2e^2f - 12a^3b^2c^4d^2g + 16a^2b^3c^4e^2f^2 - 48a^2b^3c^4e^2g + \\
& 24a^2b^2c^3e^2g^2 - 8a^2b^2c^3f^2g - 4a^3b^2c^4d^2e^2f + 2a^3b^3c^ \\
& ^3d^2f^2g + 24a^2b^3c^4d^2f^2g) / (4(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 4 \\
& 8a^4b^2c^2))) * \text{root}(1572864a^8b^2c^5z^4 - 983040a^7b^4c^4z^4 + 32 \\
& 7680a^6b^6c^3z^4 - 61440a^5b^8c^2z^4 + 6144a^4b^10c^2z^4 - 104857 \\
& 6a^9c^6z^4 - 256a^3b^12z^4 + 32768a^6b^3c^4e^2g^2z^2 - 512a^3b^7c^3 \\
& *e^2g^2z^2 + 576a^2b^8c^3d^2f^2z^2 - 24576a^5b^3c^3e^2g^2z^2 + 6144a^4b^5c^ \\
& ^2e^2g^2z^2 + 24576a^5b^2c^4d^2f^2z^2 - 3072a^3b^6c^2d^2f^2z^2 + 2048a^ \\
& ^4b^4c^3d^2f^2z^2 - 1536a^4b^6c^2g^2z^2 + 12288a^6b^3c^4f^2z^2 + 614 \\
& 40a^5b^3c^5d^2z^2 - 49152a^6c^5d^2f^2z^2 + 432a^3b^9c^3d^2z^2 - 8192a^ \\
& ^6b^2c^3g^2z^2 + 6144a^5b^4c^2g^2z^2 - 8192a^5b^3c^3f^2z^2 + \\
& 1536a^4b^5c^2f^2z^2 + 24576a^5b^2c^4e^2z^2 - 6144a^4b^4c^3e^2 \\
& *z^2 + 512a^3b^6c^2e^2z^2 - 61440a^4b^3c^4d^2z^2 + 24064a^3b^5c^ \\
& ^3d^2z^2 - 4608a^2b^7c^2d^2z^2 - 32a^3b^10d^2f^2z^2 + 128a^3b^8g^ \\
& ^2z^2 - 32768a^6c^5e^2z^2 - 16a^2b^9f^2z^2 - 16b^11d^2z^2 + 384a^ \\
& ^2b^6c^3d^2f^2g^2z - 4096a^4b^3c^4d^2e^2f^2z + 64a^3b^7c^3d^2e^2f^2z + 2048a^4b^ \\
& ^2c^3d^2f^2g^2z - 1536a^3b^4c^2d^2f^2g^2z + 3072a^3b^3c^3d^2e^2f^2z - 768 \\
& *a^2b^5c^2d^2e^2f^2z + 1024a^5b^3c^3f^2g^2z + 192a^3b^5c^3f^2g^2z - 921 \\
& 6a^4b^3c^4d^2g^2z + 32a^2b^6c^3e^2f^2z - 672a^3b^6c^2d^2e^2z + 336a^3b^ \\
& ^7c^3d^2g^2z - 768a^4b^3c^2f^2g^2z + 7936a^3b^3c^3d^2g^2z - 2496a^ \\
& ^2b^5c^2d^2g^2z + 1536a^4b^2c^3e^2f^2z - 384a^3b^4c^2e^2f^2z - 1 \\
& 5872a^3b^2c^4d^2e^2z + 4992a^2b^4c^3d^2e^2z - 32a^3b^8d^2f^2g^2z - 16 \\
& *a^2b^7f^2g^2z - 2048a^5c^4e^2f^2z + 18432a^4c^5d^2e^2z + 32b^8c^ \\
& ^d^2e^2z - 16b^9d^2g^2z - 768a^3b^3c^3d^2e^2f^2g^2 + 32a^3b^5c^3d^2e^2f^2g^2 - 192 \\
& *a^2b^3c^2d^2e^2f^2g^2 + 16a^2b^4c^3e^2f^2g^2 + 48a^2b^4c^3d^2f^2g^2 - 240a^ \\
& ^b^4c^2d^2e^2g^2 - 32a^3b^4c^2d^2e^2f^2 + 192a^3b^2c^2e^2f^2g^2 + 192a^3b^ \\
& ^2c^2d^2f^2g^2 + 960a^2b^2c^3d^2e^2g^2 + 192a^2b^2c^3d^2e^2f^2 - 48a^ \\
& ^3b^3c^3f^2g^2 - 192a^3b^3c^3e^2f^2 + 198a^3b^4c^2d^2f^2 + 144a^2b^ \\
& ^3c^2d^2f^3 - 960a^2b^3c^4d^2e^2 + 240a^3b^3c^3d^2e^2 + 768a^3c^4d^ \\
& ^2e^2f + 512a^3b^3c^3e^3g^2 + 128a^3b^3c^3e^2g^3 + 60a^3b^5c^3d^2g^2 + \\
& 2016a^2b^3c^4d^3f - 496a^3b^3c^3d^3f + 224a^3b^3c^3d^2f^3 - 384a^3b^3
\end{aligned}$$

$$\begin{aligned}
& b^2c^2e^2g^2 - 240a^2b^3c^2d^2g^2 - 16a^2b^3c^2e^2f^2 - 960a^2b^2c^3d^2f^2 + 16b^6cd^2e^2g - 8ab^6d^2fg^2 - 18ab^5cd^2f^3 - \\
& 4a^2b^5f^2g^2 - 288a^3c^4d^2f^2 - 16b^5c^2d^2e^2 - 24a^3b^2c^2f^4 + 30b^5c^2d^3f - 9b^6cd^2f^2 - 9a^2b^4c^2f^4 + 360ab^2c^4d^4 - \\
& 4b^7d^2g^2 - 16a^4c^3f^4 - 16a^3b^4g^4 - 256a^3c^4e^4 - 25b^4c^3d^4 - 1296a^2c^5d^4, z, k), k, 1, 4) + ((b*e - 2*a*g)/(2*(4*a*c - b^2)) + (x^2*(2*c*e - b*g))/(2*(4*a*c - b^2)) + (x*(2*a*c*d - b^2*d + a*b*f))/(2*a*(4*a*c - b^2)) - (c*x^3*(b*d - 2*a*f))/(2*a*(4*a*c - b^2))) / (a + b*x^2 + c*x^4)
\end{aligned}$$

$$3.39 \quad \int \frac{d+ex+fx^2+gx^3+hx^4}{(a+bx^2+cx^4)^2} dx$$

Optimal result	372
Rubi [A] (verified)	373
Mathematica [A] (verified)	376
Maple [C] (verified)	377
Fricas [F(-1)]	377
Sympy [F(-1)]	378
Maxima [F]	378
Giac [B] (verification not implemented)	378
Mupad [B] (verification not implemented)	382

### Optimal result

Integrand size = 35, antiderivative size = 439

$$\begin{aligned} & \int \frac{d+ex+fx^2+gx^3+hx^4}{(a+bx^2+cx^4)^2} dx \\ &= -\frac{be-2ag+(2ce-bg)x^2}{2(b^2-4ac)(a+bx^2+cx^4)} + \frac{x(b^2d-abf-2a(cd-ah)+(bcd-2acf+abh)x^2)}{2a(b^2-4ac)(a+bx^2+cx^4)} \\ &+ \frac{\left(bcd-2acf+abh + \frac{4abcf+b^2(cd-ah)-4ac(3cd+ah)}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} \\ &+ \frac{\left(bcd-2acf+abh - \frac{4abcf+b^2(cd-ah)-4ac(3cd+ah)}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2-4ac)\sqrt{b+\sqrt{b^2-4ac}}} \\ &+ \frac{(2ce-bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{3/2}} \end{aligned}$$

```
[Out] 1/2*(-b*e+2*a*g-(-b*g+2*c*e)*x^2)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)+1/2*x*(b^2*d
-a*b*f-2*a*(-a*h+c*d)+(a*b*h-2*a*c*f+b*c*d)*x^2)/a/(-4*a*c+b^2)/(c*x^4+b*x^
2+a)+(-b*g+2*c*e)*arctanh((2*c*x^2+b)/(-4*a*c+b^2)^(1/2))/(-4*a*c+b^2)^(3/2
)+1/4*arctan(x*2^(1/2)*c^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2))*(b*c*d-2*a*c*f
+a*b*h+(4*a*b*c*f+b^2*(-a*h+c*d)-4*a*c*(a*h+3*c*d))/(-4*a*c+b^2)^(1/2))/a/(
-4*a*c+b^2)*2^(1/2)/c^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2)+1/4*arctan(x*2^(1/
2)*c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2))*(b*c*d-2*a*c*f+a*b*h+(-4*a*b*c*f-b
^2*(-a*h+c*d)+4*a*c*(a*h+3*c*d))/(-4*a*c+b^2)^(1/2))/a/(-4*a*c+b^2)*2^(1/2)
/c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2)
```

**Rubi [A] (verified)**

Time = 1.22 (sec) , antiderivative size = 439, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.229$ , Rules used = {1687, 1692, 1180, 211, 1261, 652, 632, 212}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^2} dx$$

$$= \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{b^2(cd-ah)+4abcf-4ac(ah+3cd)}{\sqrt{b^2-4ac}} + abh - 2acf + bcd\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}}$$

$$+ \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left(-\frac{b^2(cd-ah)+4abcf-4ac(ah+3cd)}{\sqrt{b^2-4ac}} + abh - 2acf + bcd\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{\sqrt{b^2 - 4ac} + b}}$$

$$+ \frac{(2ce - bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2 - 4ac)^{3/2}}$$

$$+ \frac{x(x^2(abh - 2acf + bcd) - abf - 2a(cd - ah) + b^2d)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} - \frac{-2ag + x^2(2ce - bg) + be}{2(b^2 - 4ac)(a + bx^2 + cx^4)}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(a + b\*x^2 + c\*x^4)^2,x]

[Out] -1/2\*(b\*e - 2\*a\*g + (2\*c\*e - b\*g)\*x^2)/((b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + (x\*(b^2\*d - a\*b\*f - 2\*a\*(c\*d - a\*h) + (b\*c\*d - 2\*a\*c\*f + a\*b\*h)\*x^2))/(2\*a\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + ((b\*c\*d - 2\*a\*c\*f + a\*b\*h + (4\*a\*b\*c\*f + b^2\*(c\*d - a\*h) - 4\*a\*c\*(3\*c\*d + a\*h))/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]]]/(2\*Sqrt[2]\*a\*Sqrt[c]\*(b^2 - 4\*a\*c)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + ((b\*c\*d - 2\*a\*c\*f + a\*b\*h - (4\*a\*b\*c\*f + b^2\*(c\*d - a\*h) - 4\*a\*c\*(3\*c\*d + a\*h))/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]]]/(2\*Sqrt[2]\*a\*Sqrt[c]\*(b^2 - 4\*a\*c)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) + ((2\*c\*e - b\*g)\*ArcTanh[(b + 2\*c\*x^2)/Sqrt[b^2 - 4\*a\*c]])/(b^2 - 4\*a\*c)^(3/2)

**Rule 211**

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

**Rule 212**

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

**Rule 632**

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0]
```

### Rule 652

```
Int[((d_.) + (e_.)*(x_))*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := Simp[((b*d - 2*a*e + (2*c*d - b*e)*x)/((p + 1)*(b^2 - 4*a*c)))*(a + b*x + c*x^2)^(p + 1), x] - Dist[(2*p + 3)*((2*c*d - b*e)/((p + 1)*(b^2 - 4*a*c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2]
```

### Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] := With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2 - q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2 + c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

### Rule 1261

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol] := Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]
```

### Rule 1692

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := With[{d = Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b^2 - 4*a*c)), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a + b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p + 7)*(b*d - 2*a*e)*x^2, x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{x(e + gx^2)}{(a + bx^2 + cx^4)^2} dx + \int \frac{d + fx^2 + hx^4}{(a + bx^2 + cx^4)^2} dx \\
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{1}{2} \text{Subst}\left(\int \frac{e + gx}{(a + bx + cx^2)^2} dx, x, x^2\right) \\
&\quad - \frac{\int \frac{-b^2d - abf + 2a(3cd + ah) + (-bcd + 2acf - abh)x^2}{a + bx^2 + cx^4} dx}{2a(b^2 - 4ac)} \\
&= -\frac{be - 2ag + (2ce - bg)x^2}{2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad - \frac{(2ce - bg)\text{Subst}\left(\int \frac{1}{a + bx + cx^2} dx, x, x^2\right)}{2(b^2 - 4ac)} \\
&\quad + \frac{\left(bcd - 2acf + abh - \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)} \\
&\quad + \frac{\left(bcd - 2acf + abh + \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)} \\
&= -\frac{be - 2ag + (2ce - bg)x^2}{2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{\left(bcd - 2acf + abh + \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\left(bcd - 2acf + abh - \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{(2ce - bg)\text{Subst}\left(\int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2\right)}{b^2 - 4ac}
\end{aligned}$$

$$\begin{aligned}
&= -\frac{be - 2ag + (2ce - bg)x^2}{2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&+ \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&+ \frac{\left(bcd - 2acf + abh + \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&+ \frac{\left(bcd - 2acf + abh - \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&+ \frac{(2ce - bg) \tanh^{-1}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{(b^2 - 4ac)^{3/2}}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 1.09 (sec) , antiderivative size = 489, normalized size of antiderivative = 1.11

$$\begin{aligned}
&\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^2} dx \\
&= \frac{1}{4} \left( \frac{-4a^2(g + hx) - 2bdx(b + cx^2) + 4acx(d + x(e + fx)) + 2ab(e + x(f - x(g + hx)))}{a(-b^2 + 4ac)(a + bx^2 + cx^4)} \right. \\
&+ \frac{\sqrt{2}(b^2(cd - ah) - 2ac(6cd + \sqrt{b^2 - 4ac}f + 2ah) + b(c\sqrt{b^2 - 4ac}d + 4acf + a\sqrt{b^2 - 4ac}h)) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{a\sqrt{c}(b^2 - 4ac)^{3/2}\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&+ \frac{\sqrt{2}(b^2(-cd + ah) + 2ac(6cd - \sqrt{b^2 - 4ac}f + 2ah) + b(c\sqrt{b^2 - 4ac}d - 4acf + a\sqrt{b^2 - 4ac}h)) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{a\sqrt{c}(b^2 - 4ac)^{3/2}\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\left. + \frac{2(-2ce + bg) \log(-b + \sqrt{b^2 - 4ac} + 2cx^2)}{(b^2 - 4ac)^{3/2}} - \frac{2(-2ce + bg) \log(b + \sqrt{b^2 - 4ac} + 2cx^2)}{(b^2 - 4ac)^{3/2}} \right)
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(a + b\*x^2 + c\*x^4)^2,x]

[Out] ((-4\*a^2\*(g + h\*x) - 2\*b\*d\*x\*(b + c\*x^2) + 4\*a\*c\*x\*(d + x\*(e + f\*x)) + 2\*a\*b\*(e + x\*(f - x\*(g + h\*x))))/(a\*(-b^2 + 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + (Sqrt[2]\*(b^2\*(c\*d - a\*h) - 2\*a\*c\*(6\*c\*d + Sqrt[b^2 - 4\*a\*c]\*f + 2\*a\*h) + b\*(c\*Sqrt[b^2 - 4\*a\*c]\*d + 4\*a\*c\*f + a\*Sqrt[b^2 - 4\*a\*c]\*h))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]]]/(a\*Sqrt[c]\*(b^2 - 4\*a\*c)^(3/2)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + (Sqrt[2]\*(b^2\*(-c\*d) + a\*h) + 2\*a\*c\*(6\*c\*d - Sqrt[b^2 - 4\*a\*c]\*f + 2\*a\*h) + b\*(c\*Sqrt[b^2 - 4\*a\*c]\*d - 4\*a\*c\*f + a\*Sqrt[b^2 -



$$4*a*c*h)) * \text{ArcTan}[(\text{Sqrt}[2] * \text{Sqrt}[c] * x) / \text{Sqrt}[b + \text{Sqrt}[b^2 - 4*a*c]]] / (a * \text{Sqrt}[c] * (b^2 - 4*a*c)^{(3/2)} * \text{Sqrt}[b + \text{Sqrt}[b^2 - 4*a*c]]) + (2 * (-2*c*e + b*g) * \text{Log}[-b + \text{Sqrt}[b^2 - 4*a*c] - 2*c*x^2]) / (b^2 - 4*a*c)^{(3/2)} - (2 * (-2*c*e + b*g) * \text{Log}[b + \text{Sqrt}[b^2 - 4*a*c] + 2*c*x^2]) / (b^2 - 4*a*c)^{(3/2)}) / 4$$

### Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.15 (sec) , antiderivative size = 274, normalized size of antiderivative = 0.62

method	result
risch	$\frac{-\frac{(abh-2acf+bcd)x^3}{2a(4ac-b^2)} - \frac{(bg-2ec)x^2}{2(4ac-b^2)} - \frac{(2a^2h-abf-2acd+b^2d)x}{2a(4ac-b^2)} - \frac{2ag-be}{2(4ac-b^2)}}{cx^4+bx^2+a} + \left( \frac{\sum_{R=\text{RootOf}(cZ^4+_Z^2b+a)} \left( -\frac{(abh-2acf+bcd)R^2}{a(4ac-b^2)} \right)}{2c} \right)$
default	$\frac{-\frac{(abh-2acf+bcd)x^3}{2a(4ac-b^2)} - \frac{(bg-2ec)x^2}{2(4ac-b^2)} - \frac{(2a^2h-abf-2acd+b^2d)x}{2a(4ac-b^2)} - \frac{2ag-be}{2(4ac-b^2)}}{cx^4+bx^2+a} + \left( \frac{(-4\sqrt{-4ac+b^2}abcg+8\sqrt{-4ac+b^2}ac^2e) \ln(2cx^2+\sqrt{-4ac+b^2})}{4c} \right)$

```
[In] int((h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^2,x,method=_RETURNVERBOSE)
```

```
[Out] (-1/2/a*(a*b*h-2*a*c*f+b*c*d)/(4*a*c-b^2)*x^3-1/2*(b*g-2*c*e)/(4*a*c-b^2)*x^2-1/2*(2*a^2*h-a*b*f-2*a*c*d+b^2*d)/a/(4*a*c-b^2)*x-1/2*(2*a*g-b*e)/(4*a*c-b^2))/(c*x^4+b*x^2+a)+1/4*sum((-1/a*(a*b*h-2*a*c*f+b*c*d)/(4*a*c-b^2)*_R^2-2*(b*g-2*c*e)/(4*a*c-b^2)*_R+(2*a^2*h-a*b*f+6*a*c*d-b^2*d)/a/(4*a*c-b^2))/(2*_R^3*c+_R*b)*ln(x-_R),_R=RootOf(_Z^4*c+_Z^2*b+a))
```

### Fricas [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

```
[In] integrate((h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^2,x, algorithm="fricas")
```

```
[Out] Timed out
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

[In] integrate((h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a)\*\*2,x)

[Out] Timed out

**Maxima [F]**

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^2} dx = \int \frac{hx^4 + gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^2} dx$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="maxima")

[Out] 1/2\*((b\*c\*d - 2\*a\*c\*f + a\*b\*h)\*x^3 - a\*b\*e + 2\*a^2\*g - (2\*a\*c\*e - a\*b\*g)\*x^2 - (a\*b\*f - 2\*a^2\*h - (b^2 - 2\*a\*c)\*d)\*x)/((a\*b^2\*c - 4\*a^2\*c^2)\*x^4 + a^2\*b^2 - 4\*a^3\*c + (a\*b^3 - 4\*a^2\*b\*c)\*x^2) + 1/2\*integrate((a\*b\*f - 2\*a^2\*h + (b\*c\*d - 2\*a\*c\*f + a\*b\*h)\*x^2 + (b^2 - 6\*a\*c)\*d - 2\*(2\*a\*c\*e - a\*b\*g)\*x)/(c\*x^4 + b\*x^2 + a), x)/(a\*b^2 - 4\*a^2\*c)

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 7495 vs. 2(391) = 782.

Time = 1.73 (sec) , antiderivative size = 7495, normalized size of antiderivative = 17.07

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="giac")

[Out] 1/2\*(b\*c\*d\*x^3 - 2\*a\*c\*f\*x^3 + a\*b\*h\*x^3 - 2\*a\*c\*e\*x^2 + a\*b\*g\*x^2 + b^2\*d\*x - 2\*a\*c\*d\*x - a\*b\*f\*x + 2\*a^2\*h\*x - a\*b\*e + 2\*a^2\*g)/((c\*x^4 + b\*x^2 + a)\*(a\*b^2 - 4\*a^2\*c)) + 1/16\*((2\*b^3\*c^3 - 8\*a\*b\*c^4 - sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^3\*c + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b\*c^2 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^2\*c^2 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b\*c^3 - 2\*(b^2 - 4\*a\*c)\*b\*c^3)\*(a\*b^2 - 4\*a^2\*c)^2\*d - 2\*(2\*a\*b^2\*c^3 - 8\*a^2\*c^4 - sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^2\*c + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))

$$\begin{aligned}
& *c) *a^2 *c^2 + 2 * \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a \\
& * b * c^2 - \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a * c^3 - \\
& 2 * (b^2 - 4 * a * c) * a * c^3 * (a * b^2 - 4 * a^2 * c)^2 * f + (2 * a * b^3 * c^2 - 8 * a^2 * b * c^3 - \\
& \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a * b^3 + 4 * \text{sqrt}(2) \\
& ) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^2 * b * c + 2 * \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a * b^2 * c - \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a * b * c^2 - 2 * (b^2 - 4 * a * c) * a * b * c^2 * (a * b^2 - 4 * a^2 * c)^2 * h + 2 * (\text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a * b^6 * c - 14 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^2 * b^4 * c^2 - 2 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a * b^5 * c^2 - 2 * a * b^6 * c^2 + 64 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b^2 * c^3 + 20 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^2 * b^3 * c^3 + \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a * b^4 * c^3 + 28 * a^2 * b^4 * c^3 - 96 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^4 * c^4 - 48 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b * c^4 - 10 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^2 * b^2 * c^4 - 128 * a^3 * b^2 * c^4 + 24 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * c^5 + 192 * a^4 * c^5 + 2 * (b^2 - 4 * a * c) * a * b^4 * c^2 - 20 * (b^2 - 4 * a * c) * a^2 * b^2 * c^3 + 48 * (b^2 - 4 * a * c) * a^3 * c^4) * d * \text{abs}(a * b^2 - 4 * a^2 * c) + 2 * (\text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^2 * b^5 * c - 8 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b^3 * c^2 - 2 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^2 * b^4 * c^2 - 2 * a^2 * b^5 * c^2 + 16 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^4 * b * c^3 + 8 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b^2 * c^3 + \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^2 * b^3 * c^3 + 16 * a^3 * b^3 * c^3 - 4 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b * c^4 - 32 * a^4 * b * c^4 + 2 * (b^2 - 4 * a * c) * a^2 * b^3 * c^2 - 8 * (b^2 - 4 * a * c) * a^3 * b * c^3) * f * \text{abs}(a * b^2 - 4 * a^2 * c) - 4 * (\text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b^4 * c - 8 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^4 * b^2 * c^2 - 2 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b^3 * c^2 - 2 * a^3 * b^4 * c^2 + 16 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^5 * c^3 + 8 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^4 * b * c^3 + \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b^2 * c^3 + 16 * a^4 * b^2 * c^3 - 4 * \text{sqrt}(2) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^4 * c^4 - 32 * a^5 * c^4 + 2 * (b^2 - 4 * a * c) * a^3 * b^2 * c^2 - 8 * (b^2 - 4 * a * c) * a^4 * c^3) * h * \text{abs}(a * b^2 - 4 * a^2 * c) + (2 * a^2 * b^7 * c^3 - 40 * a^3 * b^5 * c^4 + 224 * a^4 * b^3 * c^5 - 384 * a^5 * b * c^6 - \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^2 * b^7 * c + 20 * \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b^5 * c^2 + 2 * \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^2 * b^6 * c^2 - 112 * \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^4 * b^3 * c^3 - 32 * \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b^4 * c^3 - \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^2 * b^5 * c^3 + 192 * \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^5 * b * c^4 + 96 * \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^4 * b^2 * c^4 + 16 * \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b^3 * c^4 - 48 * \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^4 * b * c^5 - 2 * (b^2 - 4 * a * c) * a^2 * b^5 * c^3 + 32 * (b^2 - 4 * a * c) * a^3 * b^3 * c^4 - 96 * (b^2 - 4 * a * c) * a^4 * b * c^5) * d + 4 * (2 * a^3 * b^6 * c^3 - 16 * a^4 * b^4 * c^4 + 32 * a^5 * b^2 * c^5 - \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) * a^3 * b^6 * c + 8 * \text{sqrt}(2) * \text{sqrt}(b^2 - 4 * a * c) * \text{sqrt}(b * c + \text{sqrt}(b^2 - 4 * a * c) * c) *
\end{aligned}$$



$$\begin{aligned}
& \sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c^2 + 2*a^2*b^5*c^2 + 16*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b*c^3 + 8*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^2*c^3 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^3 \\
& - 16*a^3*b^3*c^3 - 4*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^4 + 32*a^4*b*c^4 - 2*(b^2 - 4*a*c)*a^2*b^3*c^2 + 8*(b^2 - 4*a*c)*a^3*b*c^3)*f*abs(a*b^2 - 4*a^2*c) + 4*(\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^4*c - 8*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b^2*c^2 - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^3*c^2 + 2*a^3*b^4*c^2 + 16*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*c^3 + 8*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b*c^3 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^2*c^3 - 16*a^4*b^2*c^3 - 4*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*c^4 + 32*a^5*c^4 - 2*(b^2 - 4*a*c)*a^3*b^2*c^2 + 8*(b^2 - 4*a*c)*a^4*c^3)*h*abs(a*b^2 - 4*a^2*c) + (2*a^2*b^7*c^3 - 40*a^3*b^5*c^4 + 224*a^4*b^3*c^5 - 384*a^5*b*c^6 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^7*c + 20*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^5*c^2 + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^6*c^2 - 112*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b^3*c^3 - 32*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^4*c^3 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^5*c^3 + 192*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*b*c^4 + 96*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b^2*c^4 + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^3*c^4 - 48*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b*c^5 - 2*(b^2 - 4*a*c)*a^2*b^5*c^3 + 32*(b^2 - 4*a*c)*a^3*b^3*c^4 - 96*(b^2 - 4*a*c)*a^4*b*c^5)*d + 4*(2*a^3*b^6*c^3 - 16*a^4*b^4*c^4 + 32*a^5*b^2*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^6*c + 8*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b^4*c^2 + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^5*c^2 - 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*b^2*c^3 - 8*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b^3*c^3 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^4*c^3 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b^2*c^4 - 2*(b^2 - 4*a*c)*a^3*b^4*c^3 + 8*(b^2 - 4*a*c)*a^4*b^2*c^4)*f - (2*a^3*b^7*c^2 - 8*a^4*b^5*c^3 - 32*a^5*b^3*c^4 + 128*a^6*b*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^7 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b^5*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^6*c + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*b^3*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^5*c^2 - 64*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^6*b*c^3 - 32*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*b^2*c^3 + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*b*c^4 - 2*(b^2 - 4*a*c)*a^3*b^5*c^2 + 32*(b^2 - 4*a*c)*a^5*b*c^4)*h)*arctan(2*\sqrt{1/2}*x/\sqrt{((a*b^3 - 4*a^2*b*c - \sqrt{((a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2)))/(a*b^2*c - 4*a^2*c^2)))/((a^3*b^6*c - 12*a^4*b^4*c^2 - 2*a^3*b^5*c^2 + 48*a^5*b^2*c^3 + 16*a^4*b^3*c^3 + a^3*b^4*c^3
\end{aligned}$$



$$\begin{aligned}
& *c^2*f*g^2 - 5*a^2*b^3*c^2*f^2*h + 18*a^3*b^2*c^2*f*h^2 - 8*a^3*b^2*c^2*g^2 \\
& *h - 16*a*b^3*c^3*d*e*g + 96*a^2*b*c^4*d*e*g - 4*a*b^4*c^2*d*f*h + 32*a^3*b \\
& *c^3*e*g*h + 52*a^2*b^2*c^3*d*f*h - 16*a^2*b^2*c^3*e*f*g)/(8*(a^2*b^6 - 64* \\
& a^5*c^3 - 12*a^3*b^4*c + 48*a^4*b^2*c^2)) - \text{root}(1572864*a^8*b^2*c^6*z^4 - \\
& 983040*a^7*b^4*c^5*z^4 + 327680*a^6*b^6*c^4*z^4 - 61440*a^5*b^8*c^3*z^4 + 6 \\
& 144*a^4*b^10*c^2*z^4 - 256*a^3*b^12*c*z^4 - 1048576*a^9*c^7*z^4 + 192*a^3*b \\
& ^8*c*f*h*z^2 + 57344*a^6*b*c^5*d*h*z^2 + 32768*a^6*b*c^5*e*g*z^2 + 96*a^2*b \\
& ^9*c*d*h*z^2 - 32*a*b^10*c*d*f*z^2 + 6144*a^5*b^4*c^3*f*h*z^2 - 2048*a^4*b^ \\
& 6*c^2*f*h*z^2 - 49152*a^5*b^3*c^4*d*h*z^2 - 24576*a^5*b^3*c^4*e*g*z^2 + 153 \\
& 60*a^4*b^5*c^3*d*h*z^2 + 6144*a^4*b^5*c^3*e*g*z^2 - 2048*a^3*b^7*c^2*d*h*z^ \\
& 2 - 512*a^3*b^7*c^2*e*g*z^2 + 24576*a^5*b^2*c^5*d*f*z^2 - 3072*a^3*b^6*c^3* \\
& d*f*z^2 + 2048*a^4*b^4*c^4*d*f*z^2 + 576*a^2*b^8*c^2*d*f*z^2 + 12288*a^7*b* \\
& c^4*h^2*z^2 + 128*a^3*b^8*c*g^2*z^2 + 12288*a^6*b*c^5*f^2*z^2 - 16*a^2*b^9* \\
& c*f^2*z^2 + 61440*a^5*b*c^6*d^2*z^2 + 432*a*b^9*c^2*d^2*z^2 - 16384*a^7*c^5 \\
& *f*h*z^2 - 49152*a^6*c^6*d*f*z^2 - 8192*a^6*b^3*c^3*h^2*z^2 + 1536*a^5*b^5* \\
& c^2*h^2*z^2 - 8192*a^6*b^2*c^4*g^2*z^2 + 6144*a^5*b^4*c^3*g^2*z^2 - 1536*a^ \\
& 4*b^6*c^2*g^2*z^2 - 8192*a^5*b^3*c^4*f^2*z^2 + 1536*a^4*b^5*c^3*f^2*z^2 + 2 \\
& 4576*a^5*b^2*c^5*e^2*z^2 - 6144*a^4*b^4*c^4*e^2*z^2 + 512*a^3*b^6*c^3*e^2*z \\
& ^2 - 61440*a^4*b^3*c^5*d^2*z^2 + 24064*a^3*b^5*c^4*d^2*z^2 - 4608*a^2*b^7*c \\
& ^3*d^2*z^2 - 16*a^3*b^9*h^2*z^2 - 32768*a^6*c^6*e^2*z^2 - 16*b^11*c*d^2*z^2 \\
& - 6144*a^5*b*c^4*d*g*h*z + 96*a^2*b^7*c*d*g*h*z - 4096*a^4*b*c^5*d*e*f*z + \\
& 64*a*b^7*c^2*d*e*f*z - 32*a*b^8*c*d*f*g*z + 4608*a^4*b^3*c^3*d*g*h*z - 115 \\
& 2*a^3*b^5*c^2*d*g*h*z - 9216*a^4*b^2*c^4*d*e*h*z + 2304*a^3*b^4*c^3*d*e*h*z \\
& + 2048*a^4*b^2*c^4*d*f*g*z - 1536*a^3*b^4*c^3*d*f*g*z + 384*a^2*b^6*c^2*d* \\
& f*g*z - 192*a^2*b^6*c^2*d*e*h*z + 3072*a^3*b^3*c^4*d*e*f*z - 768*a^2*b^5*c^ \\
& 3*d*e*f*z - 1024*a^6*b*c^3*g*h^2*z - 192*a^4*b^5*c*g*h^2*z + 1024*a^5*b*c^4 \\
& *f^2*g*z - 32*a^3*b^6*c*e*h^2*z - 16*a^2*b^7*c*f^2*g*z - 9216*a^4*b*c^5*d^2 \\
& *g*z + 336*a*b^7*c^2*d^2*g*z - 672*a*b^6*c^3*d^2*e*z + 12288*a^5*c^5*d*e*h* \\
& z + 768*a^5*b^3*c^2*g*h^2*z - 1536*a^5*b^2*c^3*e*h^2*z - 768*a^4*b^3*c^3*f^ \\
& 2*g*z + 384*a^4*b^4*c^2*e*h^2*z + 192*a^3*b^5*c^2*f^2*g*z + 7936*a^3*b^3*c^ \\
& 4*d^2*g*z - 2496*a^2*b^5*c^3*d^2*g*z + 1536*a^4*b^2*c^4*e*f^2*z - 384*a^3*b \\
& ^4*c^3*e*f^2*z + 32*a^2*b^6*c^2*e*f^2*z - 15872*a^3*b^2*c^5*d^2*e*z + 4992* \\
& a^2*b^4*c^4*d^2*e*z + 16*a^3*b^7*g*h^2*z + 2048*a^6*c^4*e*h^2*z - 2048*a^5* \\
& c^5*e*f^2*z + 32*b^8*c^2*d^2*e*z + 18432*a^4*c^6*d^2*e*z - 16*b^9*c*d^2*g*z \\
& - 256*a^4*b*c^3*e*f*g*h - 768*a^3*b*c^4*d*e*f*g + 32*a*b^5*c^2*d*e*f*g - 1 \\
& 92*a^3*b^3*c^2*e*f*g*h + 896*a^3*b^2*c^3*d*e*g*h - 96*a^2*b^4*c^2*d*e*g*h - \\
& 192*a^2*b^3*c^3*d*e*f*g + 48*a^3*b^4*c*f*g^2*h + 16*a^3*b^4*c*e*g*h^2 + 24 \\
& *a^2*b^5*c*d*g^2*h + 2208*a^3*b*c^4*d^2*f*h + 800*a^4*b*c^3*d*f*h^2 - 102*a \\
& *b^5*c^2*d^2*f*h - 30*a^2*b^5*c*d*f*h^2 - 896*a^3*b*c^4*d*e^2*h - 240*a*b^4 \\
& *c^3*d^2*e*g - 32*a*b^4*c^3*d*e^2*f + 12*a*b^6*c*d*f^2*h - 8*a*b^6*c*d*f*g^ \\
& 2 + 64*a^4*b^2*c^2*f*g^2*h + 192*a^4*b^2*c^2*e*g*h^2 - 224*a^3*b^3*c^2*d*g^ \\
& 2*h + 192*a^3*b^2*c^3*e^2*f*h - 864*a^3*b^2*c^3*d*f^2*h + 336*a^3*b^3*c^2*d \\
& *f*h^2 + 192*a^3*b^2*c^3*e*f^2*g + 144*a^2*b^3*c^3*d^2*f*h + 16*a^2*b^4*c^2 \\
& *e*f^2*g - 12*a^2*b^4*c^2*d*f^2*h + 192*a^3*b^2*c^3*d*f*g^2 + 96*a^2*b^3*c^ \\
& 3*d*e^2*h + 48*a^2*b^4*c^2*d*f*g^2 + 960*a^2*b^2*c^4*d^2*e*g + 192*a^2*b^2*
\end{aligned}$$

$$\begin{aligned}
& c^4*d^2*f - 48*a^4*b^3*c*g^2*h^2 + 80*a^3*b^3*c^2*f^3*h - 42*a^3*b^4*c*f^2*h^2 - 192*a^4*b*c^3*e^2*h^2 - 4*a^2*b^5*c*f^2*g^2 - 192*a^4*b^2*c^2*d*h^3 \\
& - 192*a^2*b^2*c^4*d^3*h + 128*a^3*b^3*c^2*e*g^3 - 192*a^3*b*c^4*e^2*f^2 + 60*a*b^5*c^2*d^2*g^2 + 198*a*b^4*c^3*d^2*f^2 + 144*a^2*b^3*c^3*d*f^3 - 960*a^2*b*c^5*d^2*e^2 \\
& + 240*a*b^3*c^4*d^2*e^2 + 256*a^4*c^4*e^2*f*h - 192*a^4*c^4*d*f^2*h + 16*b^6*c^2*d^2*e*g + 96*a^5*b*c^2*f*h^3 + 96*a^4*b*c^3*f^3*h + 80*a^4*b^3*c*f*h^3 \\
& + 6*a^2*b^5*c*f^3*h + 768*a^3*c^5*d*e^2*f + 512*a^3*b*c^4*e^3*g + 132*a*b^4*c^3*d^3*h - 28*a^3*b^4*c*d*h^3 + 12*a*b^6*c*d^2*h^2 + 2016*a^2*b*c^5*d^3*f \\
& - 496*a*b^3*c^4*d^3*f + 224*a^3*b*c^4*d*f^3 - 18*a*b^5*c^2*d*f^3 - 192*a^4*b^2*c^2*f^2*h^2 - 48*a^3*b^3*c^2*f^2*g^2 - 16*a^3*b^3*c^2*e^2*h^2 \\
& - 464*a^3*b^2*c^3*d^2*h^2 - 384*a^3*b^2*c^3*e^2*g^2 + 42*a^2*b^4*c^2*d^2*h^2 - 240*a^2*b^3*c^3*d^2*g^2 - 16*a^2*b^3*c^3*e^2*f^2 - 960*a^2*b^2*c^4*d^2*f^2 \\
& + 6*b^7*c*d^2*f*h - 2*a*b^7*d*f*h^2 - 32*a^5*c^3*f^2*h^2 - 4*a^3*b^5*g^2*h^2 - 864*a^4*c^4*d^2*h^2 - 9*b^6*c^2*d^2*f^2 - 288*a^3*c^5*d^2*f^2 \\
& - 16*b^5*c^3*d^2*e^2 - 24*a^3*b^2*c^3*f^4 - 9*a^2*b^4*c^2*f^4 - 10*b^6*c^2*d^3*h + 6*a^3*b^5*f*h^3 - 1728*a^3*c^5*d^3*h - 192*a^5*c^3*d*h^3 - 4*b^7*c*d^2*g^2 \\
& + 30*b^5*c^3*d^3*f + 6*a^2*b^6*d*h^3 - 24*a^5*b^2*c*h^4 - 16*a^3*b^4*c*g^4 + 360*a*b^2*c^5*d^4 - 16*a^6*c^2*h^4 - 9*a^4*b^4*h^4 - 16*a^4*c^4*f^4 \\
& - 256*a^3*c^5*e^4 - 25*b^4*c^4*d^4 - 1296*a^2*c^6*d^4 - a^2*b^6*f^2*h^2 - b^8*d^2*h^2, z, k) * (\text{root}(1572864*a^8*b^2*c^6*z^4 - 983040*a^7*b^4*c^5*z^4 \\
& + 327680*a^6*b^6*c^4*z^4 - 61440*a^5*b^8*c^3*z^4 + 6144*a^4*b^10*c^2*z^4 - 256*a^3*b^12*c*z^4 - 1048576*a^9*c^7*z^4 + 192*a^3*b^8*c*f*h*z^2 + 57344*a^6*b*c^5*d*h*z^2 \\
& + 32768*a^6*b*c^5*e*g*z^2 + 96*a^2*b^9*c*d*h*z^2 - 32*a*b^10*c*d*f*z^2 + 6144*a^5*b^4*c^3*f*h*z^2 - 2048*a^4*b^6*c^2*f*h*z^2 - 49152*a^5*b^3*c^4*d*h*z^2 \\
& - 24576*a^5*b^3*c^4*e*g*z^2 + 15360*a^4*b^5*c^3*d*h*z^2 + 6144*a^4*b^5*c^3*e*g*z^2 - 2048*a^3*b^7*c^2*d*h*z^2 - 512*a^3*b^7*c^2*e*g*z^2 \\
& + 24576*a^5*b^2*c^5*d*f*z^2 - 3072*a^3*b^6*c^3*d*f*z^2 + 2048*a^4*b^4*c^4*d*f*z^2 + 576*a^2*b^8*c^2*d*f*z^2 + 12288*a^7*b*c^4*h^2*z^2 + 128*a^3*b^8*c*g^2*z^2 \\
& + 12288*a^6*b*c^5*f^2*z^2 - 16*a^2*b^9*c*f^2*z^2 + 6140*a^5*b*c^6*d^2*z^2 + 432*a*b^9*c^2*d^2*z^2 - 16384*a^7*c^5*f*h*z^2 - 49152*a^6*c^6*d*f*z^2 \\
& - 8192*a^6*b^3*c^3*h^2*z^2 + 1536*a^5*b^5*c^2*h^2*z^2 - 8192*a^6*b^2*c^4*g^2*z^2 + 6144*a^5*b^4*c^3*g^2*z^2 - 1536*a^4*b^6*c^2*g^2*z^2 \\
& - 8192*a^5*b^3*c^4*f^2*z^2 + 1536*a^4*b^5*c^3*f^2*z^2 + 24576*a^5*b^2*c^5*e^2*z^2 - 6144*a^4*b^4*c^4*e^2*z^2 + 512*a^3*b^6*c^3*e^2*z^2 - 61440*a^4*b^3*c^5*d^2*z^2 \\
& + 24064*a^3*b^5*c^4*d^2*z^2 - 4608*a^2*b^7*c^3*d^2*z^2 - 16*a^3*b^9*h^2*z^2 - 32768*a^6*c^6*e^2*z^2 - 16*b^11*c*d^2*z^2 - 6144*a^5*b*c^4*d*g*h*z \\
& + 96*a^2*b^7*c*d*g*h*z - 4096*a^4*b*c^5*d*e*f*z + 64*a*b^7*c^2*d*e*f*z - 32*a*b^8*c*d*f*g*z + 4608*a^4*b^3*c^3*d*g*h*z - 1152*a^3*b^5*c^2*d*g*h*z \\
& - 9216*a^4*b^2*c^4*d*e*h*z + 2304*a^3*b^4*c^3*d*e*h*z + 2048*a^4*b^2*c^4*d*f*g*z - 1536*a^3*b^4*c^3*d*f*g*z + 384*a^2*b^6*c^2*d*f*g*z - 192*a^2*b^6*c^2*d*e*h*z \\
& + 3072*a^3*b^3*c^4*d*e*f*z - 768*a^2*b^5*c^3*d*e*f*z - 1024*a^6*b*c^3*g*h^2*z - 192*a^4*b^5*c*g*h^2*z + 1024*a^5*b*c^4*f^2*g*z - 32*a^3*b^6*c*e*h^2*z \\
& - 16*a^2*b^7*c*f^2*g*z - 9216*a^4*b*c^5*d^2*g*z + 336*a*b^7*c^2*d^2*g*z - 672*a*b^6*c^3*d^2*e*z + 12288*a^5*c^5*d*e*h*z + 768*a^5*b^3*c^2*g*h^2*z \\
& - 1536*a^5*b^2*c^3*e*h^2*z - 768*a^4*b^3*c^3*f^2*g*z + 384*a^4
\end{aligned}$$



$$\begin{aligned}
& b^4 c^2 e h^2 z + 192 a^3 b^5 c^2 f^2 g^2 z + 7936 a^3 b^3 c^4 d^2 g^2 z - 249 \\
& 6 a^2 b^5 c^3 d^2 g^2 z + 1536 a^4 b^2 c^4 e f^2 z - 384 a^3 b^4 c^3 e f^2 z \\
& + 32 a^2 b^6 c^2 e f^2 z - 15872 a^3 b^2 c^5 d^2 e z + 4992 a^2 b^4 c^4 d^2 \\
& e z + 16 a^3 b^7 g^2 h^2 z + 2048 a^6 c^4 e h^2 z - 2048 a^5 c^5 e f^2 z + 3 \\
& 2 b^8 c^2 d^2 e z + 18432 a^4 c^6 d^2 e z - 16 b^9 c^2 d^2 g^2 z - 256 a^4 b^3 c^3 \\
& e f g h - 768 a^3 b^3 c^4 d e f g + 32 a^2 b^5 c^2 d e f g - 192 a^3 b^3 c^2 e \\
& f g h + 896 a^3 b^2 c^3 d e g h - 96 a^2 b^4 c^2 d e g h - 192 a^2 b^3 c^3 d \\
& e f g + 48 a^3 b^4 c^2 f g^2 h + 16 a^3 b^4 c^2 e g h^2 + 24 a^2 b^5 c^2 d g^2 \\
& h + 2208 a^3 b^3 c^4 d^2 f h + 800 a^4 b^3 c^3 d f h^2 - 102 a^2 b^5 c^2 d^2 f h \\
& - 30 a^2 b^5 c^2 d f h^2 - 896 a^3 b^3 c^4 d e^2 h - 240 a^2 b^4 c^3 d^2 e g - \\
& 32 a^2 b^4 c^3 d e^2 f + 12 a^2 b^6 c^2 d f^2 h - 8 a^2 b^6 c^2 d f g^2 + 64 a^4 b^2 c^2 \\
& f g^2 h + 192 a^4 b^2 c^2 e g h^2 - 224 a^3 b^3 c^2 d g^2 h + 192 a^3 b^2 \\
& c^3 e^2 f h - 864 a^3 b^2 c^3 d f^2 h + 336 a^3 b^3 c^2 d f h^2 + 192 a^3 b^2 \\
& c^3 e f^2 g + 144 a^2 b^3 c^3 d^2 f h + 16 a^2 b^4 c^2 e f^2 g - 12 a^2 b^4 c^2 \\
& d f^2 h + 192 a^3 b^2 c^3 d f g^2 + 96 a^2 b^3 c^3 d e^2 h + 48 a^2 b^4 c^2 d f g^2 \\
& + 960 a^2 b^2 c^4 d^2 e g + 192 a^2 b^2 c^4 d e^2 f - 4 \\
& 8 a^4 b^3 c^2 g^2 h^2 + 80 a^3 b^3 c^2 f^3 h - 42 a^3 b^4 c^2 f^2 h^2 - 192 a^4 \\
& b^3 c^3 e^2 h^2 - 4 a^2 b^5 c^2 f^2 g^2 - 192 a^4 b^2 c^2 d h^3 - 192 a^2 b^2 c^4 \\
& d^3 h + 128 a^3 b^3 c^2 e g^3 - 192 a^3 b^3 c^4 e^2 f^2 + 60 a^2 b^5 c^2 d^2 \\
& g^2 + 198 a^2 b^4 c^3 d^2 f^2 + 144 a^2 b^3 c^3 d f^3 - 960 a^2 b^3 c^5 d^2 e \\
& ^2 + 240 a^2 b^3 c^4 d^2 e^2 + 256 a^4 c^4 e^2 f h - 192 a^4 c^4 d f^2 h + 16 \\
& b^6 c^2 d^2 e g + 96 a^5 b^3 c^2 f h^3 + 96 a^4 b^3 c^3 f^3 h + 80 a^4 b^3 c^2 f \\
& h^3 + 6 a^2 b^5 c^2 f^3 h + 768 a^3 c^5 d e^2 f + 512 a^3 b^3 c^4 e^3 g + 132 a^2 \\
& b^4 c^3 d^3 h - 28 a^3 b^4 c^2 d h^3 + 12 a^2 b^6 c^2 d^2 h^2 + 2016 a^2 b^3 c^5 \\
& d^3 f - 496 a^2 b^3 c^4 d^3 f + 224 a^3 b^3 c^4 d f^3 - 18 a^2 b^5 c^2 d f^3 - 19 \\
& 2 a^4 b^2 c^2 f^2 h^2 - 48 a^3 b^3 c^2 f^2 g^2 - 16 a^3 b^3 c^2 e^2 h^2 - 4 \\
& 64 a^3 b^2 c^3 d^2 h^2 - 384 a^3 b^2 c^3 e^2 g^2 + 42 a^2 b^4 c^2 d^2 h^2 - \\
& 240 a^2 b^3 c^3 d^2 g^2 - 16 a^2 b^3 c^3 e^2 f^2 - 960 a^2 b^2 c^4 d^2 f^2 \\
& + 6 b^7 c^2 d^2 f h - 2 a^2 b^7 d f h^2 - 32 a^5 c^3 f^2 h^2 - 4 a^3 b^5 g^2 h \\
& ^2 - 864 a^4 c^4 d^2 h^2 - 9 b^6 c^2 d^2 f^2 - 288 a^3 c^5 d^2 f^2 - 16 b^5 \\
& c^3 d^2 e^2 - 24 a^3 b^2 c^3 f^4 - 9 a^2 b^4 c^2 f^4 - 10 b^6 c^2 d^3 h + \\
& 6 a^3 b^5 f h^3 - 1728 a^3 c^5 d^3 h - 192 a^5 c^3 d h^3 - 4 b^7 c^2 d^2 g^2 \\
& + 30 b^5 c^3 d^3 f + 6 a^2 b^6 d h^3 - 24 a^5 b^2 c^2 h^4 - 16 a^3 b^4 c^2 g^4 \\
& + 360 a^2 b^2 c^5 d^4 - 16 a^6 c^2 h^4 - 9 a^4 b^4 h^4 - 16 a^4 c^4 f^4 - 256 \\
& a^3 c^5 e^4 - 25 b^4 c^4 d^4 - 1296 a^2 c^6 d^4 - a^2 b^6 f^2 h^2 - b^8 d^2 \\
& h^2, z, k) * ((x * (2048 a^5 c^6 e - 32 a^2 b^6 c^3 e + 384 a^3 b^4 c^4 e - 1 \\
& 536 a^4 b^2 c^5 e + 16 a^2 b^7 c^2 g - 192 a^3 b^5 c^3 g + 768 a^4 b^3 c^4 g \\
& - 1024 a^5 b^3 c^5 g)) / (4 * (a^2 b^6 - 64 a^5 c^3 - 12 a^3 b^4 c + 48 a^4 b^2 \\
& c^2)) - (6144 a^5 c^6 d + 2048 a^6 c^5 h - 288 a^2 b^6 c^3 d + 1920 a^3 b^4 \\
& c^4 d - 5632 a^4 b^2 c^5 d + 16 a^2 b^7 c^2 f - 192 a^3 b^5 c^3 f + 768 a^4 \\
& b^3 c^4 f - 32 a^3 b^6 c^2 h + 384 a^4 b^4 c^3 h - 1536 a^5 b^2 c^4 h + \\
& 16 a^2 b^8 c^2 d - 1024 a^5 b^3 c^5 f) / (8 * (a^2 b^6 - 64 a^5 c^3 - 12 a^3 b^4 c \\
& + 48 a^4 b^2 c^2)) + (\text{root}(1572864 a^8 b^2 c^6 z^4 - 983040 a^7 b^4 c^5 z^4 \\
& + 327680 a^6 b^6 c^4 z^4 - 61440 a^5 b^8 c^3 z^4 + 6144 a^4 b^{10} c^2 z^4 - \\
& 256 a^3 b^{12} c z^4 - 1048576 a^9 c^7 z^4 + 192 a^3 b^8 c^2 f h z^2 + 57344 a
\end{aligned}$$

$$\begin{aligned}
& ^6*b*c^5*d*h*z^2 + 32768*a^6*b*c^5*e*g*z^2 + 96*a^2*b^9*c*d*h*z^2 - 32*a*b^10*c*d*f*z^2 + 6144*a^5*b^4*c^3*f*h*z^2 - 2048*a^4*b^6*c^2*f*h*z^2 - 49152*a^5*b^3*c^4*d*h*z^2 - 24576*a^5*b^3*c^4*e*g*z^2 + 15360*a^4*b^5*c^3*d*h*z^2 \\
& + 6144*a^4*b^5*c^3*e*g*z^2 - 2048*a^3*b^7*c^2*d*h*z^2 - 512*a^3*b^7*c^2*e*g*z^2 + 24576*a^5*b^2*c^5*d*f*z^2 - 3072*a^3*b^6*c^3*d*f*z^2 + 2048*a^4*b^4*c^4*d*f*z^2 + 576*a^2*b^8*c^2*d*f*z^2 + 12288*a^7*b*c^4*h^2*z^2 + 128*a^3*b^8*c*g^2*z^2 + 12288*a^6*b*c^5*f^2*z^2 - 16*a^2*b^9*c*f^2*z^2 + 61440*a^5*b*c^6*d^2*z^2 + 432*a*b^9*c^2*d^2*z^2 - 16384*a^7*c^5*f*h*z^2 - 49152*a^6*c^6*d*f*z^2 - 8192*a^6*b^3*c^3*h^2*z^2 + 1536*a^5*b^5*c^2*h^2*z^2 - 8192*a^6*b^2*c^4*g^2*z^2 + 6144*a^5*b^4*c^3*g^2*z^2 - 1536*a^4*b^6*c^2*g^2*z^2 - 8192*a^5*b^3*c^4*f^2*z^2 + 1536*a^4*b^5*c^3*f^2*z^2 + 24576*a^5*b^2*c^5*e^2*z^2 - 6144*a^4*b^4*c^4*e^2*z^2 + 512*a^3*b^6*c^3*e^2*z^2 - 61440*a^4*b^3*c^5*d^2*z^2 + 24064*a^3*b^5*c^4*d^2*z^2 - 4608*a^2*b^7*c^3*d^2*z^2 - 16*a^3*b^9*h^2*z^2 - 32768*a^6*c^6*e^2*z^2 - 16*b^11*c*d^2*z^2 - 6144*a^5*b*c^4*d*g*h*z + 96*a^2*b^7*c*d*g*h*z - 4096*a^4*b*c^5*d*e*f*z + 64*a*b^7*c^2*d*e*f*z - 32*a*b^8*c*d*f*g*z + 4608*a^4*b^3*c^3*d*g*h*z - 1152*a^3*b^5*c^2*d*g*h*z - 9216*a^4*b^2*c^4*d*e*h*z + 2304*a^3*b^4*c^3*d*e*h*z + 2048*a^4*b^2*c^4*d*f*g*z - 1536*a^3*b^4*c^3*d*f*g*z + 384*a^2*b^6*c^2*d*f*g*z - 192*a^2*b^6*c^2*d*e*h*z + 3072*a^3*b^3*c^4*d*e*f*z - 768*a^2*b^5*c^3*d*e*f*z - 1024*a^6*b*c^3*g*h^2*z - 192*a^4*b^5*c*g*h^2*z + 1024*a^5*b*c^4*f^2*g*z - 32*a^3*b^6*c*e*h^2*z - 16*a^2*b^7*c*f^2*g*z - 9216*a^4*b*c^5*d^2*g*z + 336*a*b^7*c^2*d^2*g*z - 672*a*b^6*c^3*d^2*e*z + 12288*a^5*c^5*d*e*h*z + 768*a^5*b^3*c^2*g*h^2*z - 1536*a^5*b^2*c^3*e*h^2*z - 768*a^4*b^3*c^3*f^2*g*z + 384*a^4*b^4*c^2*e*h^2*z + 192*a^3*b^5*c^2*f^2*g*z + 7936*a^3*b^3*c^4*d^2*g*z - 2496*a^2*b^5*c^3*d^2*g*z + 1536*a^4*b^2*c^4*e*f^2*z - 384*a^3*b^4*c^3*e*f^2*z + 32*a^2*b^6*c^2*e*f^2*z - 15872*a^3*b^2*c^5*d^2*e*z + 4992*a^2*b^4*c^4*d^2*e*z + 16*a^3*b^7*g*h^2*z + 2048*a^6*c^4*e*h^2*z - 2048*a^5*c^5*e*f^2*z + 32*b^8*c^2*d^2*e*z + 18432*a^4*c^6*d^2*e*z - 16*b^9*c*d^2*g*z - 256*a^4*b*c^3*e*f*g*h - 768*a^3*b*c^4*d*e*f*g + 32*a*b^5*c^2*d*e*f*g - 192*a^3*b^3*c^2*e*f*g*h + 896*a^3*b^2*c^3*d*e*g*h - 96*a^2*b^4*c^2*d*e*g*h - 192*a^2*b^3*c^3*d*e*f*g + 48*a^3*b^4*c*f*g^2*h + 16*a^3*b^4*c*e*g*h^2 + 24*a^2*b^5*c*d*g^2*h + 208*a^3*b*c^4*d^2*f*h + 800*a^4*b*c^3*d*f*h^2 - 102*a*b^5*c^2*d^2*f*h - 30*a^2*b^5*c*d*f*h^2 - 896*a^3*b*c^4*d*e^2*h - 240*a*b^4*c^3*d^2*e*g - 32*a*b^4*c^3*d*e^2*f + 12*a*b^6*c*d*f^2*h - 8*a*b^6*c*d*f*g^2 + 64*a^4*b^2*c^2*f*g^2*h + 192*a^4*b^2*c^2*e*g*h^2 - 224*a^3*b^3*c^2*d*g^2*h + 192*a^3*b^2*c^3*e^2*f*h - 864*a^3*b^2*c^3*d*f^2*h + 336*a^3*b^3*c^2*d*f*h^2 + 192*a^3*b^2*c^3*e*f^2*g + 144*a^2*b^3*c^3*d^2*f*h + 16*a^2*b^4*c^2*e*f^2*g - 12*a^2*b^4*c^2*d*f^2*h + 192*a^3*b^2*c^3*d*f*g^2 + 96*a^2*b^3*c^3*d*e^2*h + 48*a^2*b^4*c^2*d*f*g^2 + 960*a^2*b^2*c^4*d^2*e*g + 192*a^2*b^2*c^4*d*e^2*f - 48*a^4*b^3*c*g^2*h^2 + 80*a^3*b^3*c^2*f^3*h - 42*a^3*b^4*c*f^2*h^2 - 192*a^4*b*c^3*e^2*h^2 - 4*a^2*b^5*c*f^2*g^2 - 192*a^4*b^2*c^2*d*h^3 - 192*a^2*b^2*c^4*d^3*h + 128*a^3*b^3*c^2*e*g^3 - 192*a^3*b*c^4*e^2*f^2 + 60*a*b^5*c^2*d^2*g^2 + 198*a*b^4*c^3*d^2*f^2 + 144*a^2*b^3*c^3*d*f^3 - 960*a^2*b*c^5*d^2*e^2 + 240*a*b^3*c^4*d^2*e^2 + 256*a^4*c^4*e^2*f*h - 192*a^4*c^4*d*f^2*h + 16*b^6*c^2*d^2*e*g + 96*a^5*b*c^2*f*h^3 + 96*a^4*b*c^3*f^3*h + 80*a^4*b^3*c*f*h^3 +
\end{aligned}$$

$$\begin{aligned}
&6a^2b^5c^3f^3h + 768a^3c^5d^2e^2f + 512a^3b^4c^4e^3g + 132a^2b^4c^3d^3h - 28a^3b^4c^4d^3h^3 + 12a^2b^6c^4d^2h^2 + 2016a^2b^4c^5d^3f - \\
&496a^2b^3c^4d^3f + 224a^3b^4c^4d^3f^3 - 18a^2b^5c^2d^3f^3 - 192a^4b^2c^2f^2h^2 - 48a^3b^3c^2f^2g^2 - 16a^3b^3c^2e^2h^2 - 464a^3b^2c^3d^2h^2 - 384a^3b^2c^3e^2g^2 + 42a^2b^4c^2d^2h^2 - 240a^2b^3c^3d^2g^2 - 16a^2b^3c^3e^2f^2 - 960a^2b^2c^4d^2f^2 + 6b^7c^4d^2f^3h - 2a^2b^7d^3f^3h^2 - 32a^5c^3f^2h^2 - 4a^3b^5g^2h^2 - 864a^4c^4d^2h^2 - 9b^6c^2d^2f^2 - 288a^3c^5d^2f^2 - 16b^5c^3d^2e^2 - 24a^3b^2c^3f^4 - 9a^2b^4c^2f^4 - 10b^6c^2d^3h + 6a^3b^5f^3h^3 - 1728a^3c^5d^3h - 192a^5c^3d^3h^3 - 4b^7c^4d^2g^2 + 30b^5c^3d^3f + 6a^2b^6d^3h^3 - 24a^5b^2c^4h^4 - 16a^3b^4c^4g^4 + 360a^2b^2c^5d^4 - 16a^6c^2h^4 - 9a^4b^4h^4 - 16a^4c^4f^4 - 256a^3c^5e^4 - 25b^4c^4d^4 - 1296a^2c^6d^4 - a^2b^6f^2h^2 - b^8d^2h^2, \\
&z, k) \times (8192a^6b^6c^6 + 32a^2b^9c^2 - 512a^3b^7c^3 + 3072a^4b^5c^4 - 8192a^5b^3c^5) / (4(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2)) - (512a^4c^5e^2f - 32a^2b^5c^3d^2e - 1024a^3b^4c^5d^2e + 16a^2b^6c^2d^2g - 512a^4b^6c^4e^2h - 256a^4b^6c^4f^2g + 384a^2b^3c^4d^2e - 192a^2b^4c^3d^2g - 32a^2b^4c^3e^2f + 512a^3b^2c^4d^2g + 16a^2b^5c^2f^2g + 128a^3b^3c^3e^2h - 64a^3b^4c^2g^2h + 256a^4b^2c^3g^2h) / (8(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2)) + (x(2b^6c^3d^2 - 576a^3c^6d^2 + 64a^4c^5f^2 - 64a^5c^4h^2 - 36a^2b^4c^4d^2 + 128a^3b^4c^5e^2 + 2a^2b^6c^4h^2 + 256a^2b^2c^5d^2 - 32a^2b^3c^4e^2 + 20a^2b^4c^3f^2 - 96a^3b^2c^4f^2 - 8a^2b^5c^2g^2 + 32a^3b^3c^3g^2 - 4a^3b^4c^2h^2 - 384a^4c^5d^2h + 4a^2b^5c^3d^2f + 320a^3b^4c^5d^2f + 64a^4b^4c^4f^2h - 96a^2b^3c^4d^2f + 8a^2b^4c^3d^2h + 32a^2b^4c^3e^2g + 64a^3b^2c^4d^2h - 128a^3b^2c^4e^2g - 12a^2b^5c^2f^2h + 32a^3b^3c^3f^2h) / (4(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2))) - (x(32a^2c^5e^3 - 2b^3c^4d^2e + b^4c^3d^2g - 4a^2b^3c^2g^3 + 24a^2b^3c^5d^2e - 48a^2c^5d^2e^2f - 16a^3c^4e^2f^2h - 12a^2b^2c^4d^2g + 16a^2b^2c^4e^2f^2 - 48a^2b^2c^4e^2g + 8a^3b^2c^3e^2h^2 - a^2b^4c^4g^2h^2 + 24a^2b^2c^3e^2g^2 - 8a^2b^2c^3f^2g + 2a^2b^3c^2e^2h^2 - 4a^3b^2c^2g^2h^2 - 4a^2b^2c^4d^2e^2f + 2a^2b^3c^3d^2f^2g + 32a^2b^2c^4d^2e^2h + 24a^2b^2c^4d^2f^2g + 8a^3b^2c^3f^2g^2h - 16a^2b^2c^3d^2g^2h - 12a^2b^2c^3e^2f^2h + 6a^2b^3c^2f^2g^2h) / (4(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2))) * \text{root}(1572864a^8b^2c^6z^4 - 983040a^7b^4c^5z^4 + 327680a^6b^6c^4z^4 - 61440a^5b^8c^3z^4 + 6144a^4b^10c^2z^4 - 256a^3b^12c^2z^4 - 1048576a^9c^7z^4 + 192a^3b^8c^4f^2h^2z^2 + 57344a^6b^6c^5d^2h^2z^2 + 32768a^6b^6c^5e^2g^2z^2 + 96a^2b^9c^4d^2h^2z^2 - 32a^2b^10c^4d^2f^2z^2 + 6144a^5b^4c^3f^2h^2z^2 - 2048a^4b^6c^2f^2h^2z^2 - 49152a^5b^3c^4d^2h^2z^2 - 24576a^5b^3c^4e^2g^2z^2 + 15360a^4b^5c^3d^2h^2z^2 + 6144a^4b^5c^3e^2g^2z^2 - 2048a^3b^7c^2d^2h^2z^2 - 512a^3b^7c^2e^2g^2z^2 + 24576a^5b^2c^5d^2f^2z^2 - 3072a^3b^6c^3d^2f^2z^2 + 2048a^4b^4c^4d^2f^2z^2 + 576a^2b^8c^2d^2f^2z^2 + 12288a^7b^6c^4h^2z^2 + 128a^3b^8c^4g^2z^2 + 12288a^6b^6c^5f^2z^2 - 16a^2b^9c^4f^2z^2 + 61440a^5b^6c^6d^2z^2 + 432a^2b^9c^2d^2z^2 - 16384a^7
\end{aligned}$$

$$\begin{aligned}
& *c^5*f*h*z^2 - 49152*a^6*c^6*d*f*z^2 - 8192*a^6*b^3*c^3*h^2*z^2 + 1536*a^5*b^5*c^2*h^2*z^2 - 8192*a^6*b^2*c^4*g^2*z^2 + 6144*a^5*b^4*c^3*g^2*z^2 - 1536*a^4*b^6*c^2*g^2*z^2 - 8192*a^5*b^3*c^4*f^2*z^2 + 1536*a^4*b^5*c^3*f^2*z^2 \\
& + 24576*a^5*b^2*c^5*e^2*z^2 - 6144*a^4*b^4*c^4*e^2*z^2 + 512*a^3*b^6*c^3*e^2*z^2 - 61440*a^4*b^3*c^5*d^2*z^2 + 24064*a^3*b^5*c^4*d^2*z^2 - 4608*a^2*b^7*c^3*d^2*z^2 - 16*a^3*b^9*h^2*z^2 - 32768*a^6*c^6*e^2*z^2 - 16*b^11*c*d^2*z^2 - 6144*a^5*b*c^4*d*g*h*z + 96*a^2*b^7*c*d*g*h*z - 4096*a^4*b*c^5*d*e*f*z + 64*a*b^7*c^2*d*e*f*z - 32*a*b^8*c*d*f*g*z + 4608*a^4*b^3*c^3*d*g*h*z - 1152*a^3*b^5*c^2*d*g*h*z - 9216*a^4*b^2*c^4*d*e*h*z + 2304*a^3*b^4*c^3*d*e*h*z + 2048*a^4*b^2*c^4*d*f*g*z - 1536*a^3*b^4*c^3*d*f*g*z + 384*a^2*b^6*c^2*d*f*g*z - 192*a^2*b^6*c^2*d*e*h*z + 3072*a^3*b^3*c^4*d*e*f*z - 768*a^2*b^5*c^3*d*e*f*z - 1024*a^6*b*c^3*g*h^2*z - 192*a^4*b^5*c*g*h^2*z + 1024*a^5*b*c^4*f^2*g*z - 32*a^3*b^6*c*e*h^2*z - 16*a^2*b^7*c*f^2*g*z - 9216*a^4*b*c^5*d^2*g*z + 336*a*b^7*c^2*d^2*g*z - 672*a*b^6*c^3*d^2*e*z + 12288*a^5*c^5*d*e*h*z + 768*a^5*b^3*c^2*g*h^2*z - 1536*a^5*b^2*c^3*e*h^2*z - 768*a^4*b^3*c^3*f^2*g*z + 384*a^4*b^4*c^2*e*h^2*z + 192*a^3*b^5*c^2*f^2*g*z + 7936*a^3*b^3*c^4*d^2*g*z - 2496*a^2*b^5*c^3*d^2*g*z + 1536*a^4*b^2*c^4*e*f^2*z - 384*a^3*b^4*c^3*e*f^2*z + 32*a^2*b^6*c^2*e*f^2*z - 15872*a^3*b^2*c^5*d^2*e*z + 4992*a^2*b^4*c^4*d^2*e*z + 16*a^3*b^7*g*h^2*z + 2048*a^6*c^4*e*h^2*z - 2048*a^5*c^5*e*f^2*z + 32*b^8*c^2*d^2*e*z + 18432*a^4*c^6*d^2*e*z - 16*b^9*c*d^2*g*z - 256*a^4*b*c^3*e*f*g*h - 768*a^3*b*c^4*d*e*f*g + 32*a*b^5*c^2*d*e*f*g - 192*a^3*b^3*c^2*e*f*g*h + 896*a^3*b^2*c^3*d*e*g*h - 96*a^2*b^4*c^2*d*e*g*h - 192*a^2*b^3*c^3*d*e*f*g + 48*a^3*b^4*c*f*g^2*h + 16*a^3*b^4*c*e*g*h^2 + 24*a^2*b^5*c*d*g^2*h + 2208*a^3*b*c^4*d^2*f*h + 800*a^4*b*c^3*d*f*h^2 - 102*a*b^5*c^2*d^2*f*h - 30*a^2*b^5*c*d*f*h^2 - 896*a^3*b*c^4*d*e^2*h - 240*a*b^4*c^3*d^2*e*g - 32*a*b^4*c^3*d*e^2*f + 12*a*b^6*c*d*f^2*h - 8*a*b^6*c*d*f*g^2 + 64*a^4*b^2*c^2*f*g^2*h + 192*a^4*b^2*c^2*e*g*h^2 - 224*a^3*b^3*c^2*d*g^2*h + 192*a^3*b^2*c^3*e^2*f*h - 864*a^3*b^2*c^3*d*f^2*h + 336*a^3*b^3*c^2*d*f*h^2 + 192*a^3*b^2*c^3*e*f^2*g + 144*a^2*b^3*c^3*d^2*f*h + 16*a^2*b^4*c^2*e*f^2*g - 12*a^2*b^4*c^2*d*f^2*h + 192*a^3*b^2*c^3*d*f*g^2 + 96*a^2*b^3*c^3*d*e^2*h + 48*a^2*b^4*c^2*d*f*g^2 + 960*a^2*b^2*c^4*d^2*e*g + 192*a^2*b^2*c^4*d*e^2*f - 48*a^4*b^3*c*g^2*h^2 + 80*a^3*b^3*c^2*f^3*h - 42*a^3*b^4*c*f^2*h^2 - 192*a^4*b*c^3*e^2*h^2 - 4*a^2*b^5*c*f^2*g^2 - 192*a^4*b^2*c^2*d*h^3 - 192*a^2*b^2*c^4*d^3*h + 128*a^3*b^3*c^2*e*g^3 - 192*a^3*b*c^4*e^2*f^2 + 60*a*b^5*c^2*d^2*g^2 + 198*a*b^4*c^3*d^2*f^2 + 144*a^2*b^3*c^3*d*f^3 - 960*a^2*b*c^5*d^2*e^2 + 240*a*b^3*c^4*d^2*e^2 + 256*a^4*c^4*e^2*f*h - 192*a^4*c^4*d*f^2*h + 16*b^6*c^2*d^2*e*g + 96*a^5*b*c^2*f*h^3 + 96*a^4*b*c^3*f^3*h + 80*a^4*b^3*c*f*h^3 + 6*a^2*b^5*c*f^3*h + 768*a^3*c^5*d*e^2*f + 512*a^3*b*c^4*e^3*g + 132*a*b^4*c^3*d^3*h - 28*a^3*b^4*c*d*h^3 + 12*a*b^6*c*d^2*h^2 + 2016*a^2*b*c^5*d^3*f - 496*a*b^3*c^4*d^3*f + 224*a^3*b*c^4*d*f^3 - 18*a*b^5*c^2*d*f^3 - 192*a^4*b^2*c^2*f^2*h^2 - 48*a^3*b^3*c^2*f^2*g^2 - 16*a^3*b^3*c^2*e^2*h^2 - 464*a^3*b^2*c^3*d^2*h^2 - 384*a^3*b^2*c^3*e^2*g^2 + 42*a^2*b^4*c^2*d^2*h^2 - 240*a^2*b^3*c^3*d^2*g^2 - 16*a^2*b^3*c^3*e^2*f^2 - 960*a^2*b^2*c^4*d^2*f^2 + 6*b^7*c*d^2*f*h - 2*a*b^7*d*f*h^2 - 32*a^5*c^3*f^2*h^2 - 4*a^3*b^5*g^2*h^2 - 864*a^4*c^4*d^2*h^2 - 9*b^6*c^2*d^2*f^2 - 288*a^3*c
\end{aligned}$$

$$\begin{aligned}
& ^5d^2f^2 - 16b^5c^3d^2e^2 - 24a^3b^2c^3f^4 - 9a^2b^4c^2f^4 - \\
& 10b^6c^2d^3h + 6a^3b^5f^3h^3 - 1728a^3c^5d^3h - 192a^5c^3d^3h^3 \\
& - 4b^7c^2d^2g^2 + 30b^5c^3d^3f + 6a^2b^6d^3h^3 - 24a^5b^2c^3h^4 \\
& - 16a^3b^4c^3g^4 + 360a^2b^2c^5d^4 - 16a^6c^2h^4 - 9a^4b^4h^4 - 1 \\
& 6a^4c^4f^4 - 256a^3c^5e^4 - 25b^4c^4d^4 - 1296a^2c^6d^4 - a^2b \\
& ^6f^2h^2 - b^8d^2h^2, z, k), k, 1, 4)
\end{aligned}$$

$$3.40 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(a+bx^2+cx^4)^2} dx$$

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### Optimal result

Integrand size = 40, antiderivative size = 468

$$\begin{aligned} & \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(a+bx^2+cx^4)^2} dx \\ &= \frac{x(b^2d-abf-2a(cd-ah)+(bcd-2acf+abh)x^2)}{2a(b^2-4ac)(a+bx^2+cx^4)} \\ &+ \frac{2acg-b(ce+ai)-(2c^2e-bcg+b^2i-2aci)x^2}{2c(b^2-4ac)(a+bx^2+cx^4)} \\ &+ \frac{\left(bcd-2acf+abh+\frac{4abcf+b^2(cd-ah)-4ac(3cd+ah)}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} \\ &+ \frac{\left(bcd-2acf+abh-\frac{4abcf+b^2(cd-ah)-4ac(3cd+ah)}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2-4ac)\sqrt{b+\sqrt{b^2-4ac}}} \\ &+ \frac{(2ce-bg+2ai)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{3/2}} \end{aligned}$$

```
[Out] 1/2*x*(b^2*d-a*b*f-2*a*(-a*h+c*d)+(a*b*h-2*a*c*f+b*c*d)*x^2)/a/(-4*a*c+b^2)
/(c*x^4+b*x^2+a)+1/2*(2*a*c*g-b*(a*i+c*e)-(-2*a*c*i+b^2*i-b*c*g+2*c^2*e)*x^
2)/c/(-4*a*c+b^2)/(c*x^4+b*x^2+a)+(2*a*i-b*g+2*c*e)*arctanh((2*c*x^2+b)/(-4
*a*c+b^2)^(1/2))/(-4*a*c+b^2)^(3/2)+1/4*arctan(x*2^(1/2)*c^(1/2)/(b-(-4*a*c
+b^2)^(1/2))^(1/2))*(b*c*d-2*a*c*f+a*b*h+(4*a*b*c*f+b^2*(-a*h+c*d)-4*a*c*(a
*h+3*c*d))/(-4*a*c+b^2)^(1/2))/a/(-4*a*c+b^2)*2^(1/2)/c^(1/2)/(b-(-4*a*c+b
^2)^(1/2))^(1/2)+1/4*arctan(x*2^(1/2)*c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2))*
(b*c*d-2*a*c*f+a*b*h+(-4*a*b*c*f-b^2*(-a*h+c*d)+4*a*c*(a*h+3*c*d))/(-4*a*c+
b^2)^(1/2))/a/(-4*a*c+b^2)*2^(1/2)/c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2)
```

**Rubi [A] (verified)**

Time = 0.67 (sec) , antiderivative size = 468, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.225$ , Rules used = {1687, 1692, 1180, 211, 1677, 1674, 12, 632, 212}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^2} dx$$

$$= \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{b^2(cd-ah)+4abcf-4ac(ah+3cd)}{\sqrt{b^2-4ac}} + abh - 2acf + bcd\right)}{2\sqrt{2}a\sqrt{c}(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}}$$

$$+ \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left(-\frac{b^2(cd-ah)+4abcf-4ac(ah+3cd)}{\sqrt{b^2-4ac}} + abh - 2acf + bcd\right)}{2\sqrt{2}a\sqrt{c}(b^2-4ac)\sqrt{\sqrt{b^2-4ac}+b}}$$

$$+ \frac{\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right) (2ai - bg + 2ce)}{(b^2-4ac)^{3/2}}$$

$$+ \frac{-(x^2(-2aci + b^2i - bcg + 2c^2e)) - b(ai + ce) + 2acg}{2c(b^2-4ac)(a + bx^2 + cx^4)}$$

$$+ \frac{x(x^2(abh - 2acf + bcd) - abf - 2a(cd - ah) + b^2d)}{2a(b^2-4ac)(a + bx^2 + cx^4)}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(a + b\*x^2 + c\*x^4)^2,x]

[Out] (x\*(b^2\*d - a\*b\*f - 2\*a\*(c\*d - a\*h) + (b\*c\*d - 2\*a\*c\*f + a\*b\*h)\*x^2))/(2\*a\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + (2\*a\*c\*g - b\*(c\*e + a\*i) - (2\*c^2\*e - b\*c\*g + b^2\*i - 2\*a\*c\*i)\*x^2)/(2\*c\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + ((b\*c\*d - 2\*a\*c\*f + a\*b\*h + (4\*a\*b\*c\*f + b^2\*(c\*d - a\*h) - 4\*a\*c\*(3\*c\*d + a\*h))/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]])/(2\*Sqrt[2]\*a\*Sqrt[c]\*(b^2 - 4\*a\*c)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + ((b\*c\*d - 2\*a\*c\*f + a\*b\*h - (4\*a\*b\*c\*f + b^2\*(c\*d - a\*h) - 4\*a\*c\*(3\*c\*d + a\*h))/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]])/(2\*Sqrt[2]\*a\*Sqrt[c]\*(b^2 - 4\*a\*c)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) + ((2\*c\*e - b\*g + 2\*a\*i)\*ArcTanh[(b + 2\*c\*x^2)/Sqrt[b^2 - 4\*a\*c]])/(b^2 - 4\*a\*c)^(3/2)

Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

Rule 211

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

Rule 212

```
Int[((a_) + (b_)*(x_)^2)^(-1), x_Symbol] := Simp[(1/(Rt[a, 2]*Rt[-b, 2]))*
ArcTanh[Rt[-b, 2]*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

#### Rule 632

```
Int[((a_) + (b_)*(x_) + (c_)*(x_)^2)^(-1), x_Symbol] := Dist[-2, Subst[In
t[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]
```

#### Rule 1180

```
Int[((d_) + (e_)*(x_)^2)/((a_) + (b_)*(x_)^2 + (c_)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

#### Rule 1674

```
Int[(Pq)*((a_) + (b_)*(x_) + (c_)*(x_)^2)^(p_), x_Symbol] := With[{Q =
PolynomialQuotient[Pq, a + b*x + c*x^2, x], f = Coeff[PolynomialRemainder[P
q, a + b*x + c*x^2, x], x, 0], g = Coeff[PolynomialRemainder[Pq, a + b*x +
c*x^2, x], x, 1]}, Simp[(b*f - 2*a*g + (2*c*f - b*g)*x)*((a + b*x + c*x^2)^(
p + 1)/((p + 1)*(b^2 - 4*a*c))), x] + Dist[1/((p + 1)*(b^2 - 4*a*c)), Int[
(a + b*x + c*x^2)^(p + 1)*ExpandToSum[(p + 1)*(b^2 - 4*a*c)*Q - (2*p + 3)*(
2*c*f - b*g), x], x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && NeQ[b^2
- 4*a*c, 0] && LtQ[p, -1]
```

#### Rule 1677

```
Int[(Pq)*(x_)^(m_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] :
> Dist[1/2, Subst[Int[x^((m - 1)/2)*SubstFor[x^2, Pq, x]*(a + b*x + c*x^2)^(
p, x)], x, x^2], x] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x^2] && IntegerQ[
(m - 1)/2]
```

#### Rule 1687

```
Int[(Pq)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

#### Rule 1692



```

Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := With[{d =
  Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a + b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p + 7)*(b*d - 2*a*e)*x^2, x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1]

```

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d + fx^2 + hx^4}{(a + bx^2 + cx^4)^2} dx + \int \frac{x(e + gx^2 + ix^4)}{(a + bx^2 + cx^4)^2} dx \\
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{1}{2} \text{Subst}\left(\int \frac{e + gx + ix^2}{(a + bx + cx^2)^2} dx, x, x^2\right) \\
&\quad - \frac{\int \frac{-b^2d - abf + 2a(3cd + ah) + (-bcd + 2acf - abh)x^2}{a + bx^2 + cx^4} dx}{2a(b^2 - 4ac)} \\
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{2acg - b(ce + ai) - (2c^2e - bcg + b^2i - 2aci)x^2}{2c(b^2 - 4ac)(a + bx^2 + cx^4)} - \frac{\text{Subst}\left(\int \frac{2ce - bg + 2ai}{a + bx + cx^2} dx, x, x^2\right)}{2(b^2 - 4ac)} \\
&\quad + \frac{\left(bcd - 2acf + abh - \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)} \\
&\quad + \frac{\left(bcd - 2acf + abh + \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)} \\
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{2acg - b(ce + ai) - (2c^2e - bcg + b^2i - 2aci)x^2}{2c(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{\left(bcd - 2acf + abh + \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\left(bcd - 2acf + abh - \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad - \frac{(2ce - bg + 2ai)\text{Subst}\left(\int \frac{1}{a + bx + cx^2} dx, x, x^2\right)}{2(b^2 - 4ac)}
\end{aligned}$$

$$\begin{aligned}
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&+ \frac{2acg - b(ce + ai) - (2c^2e - bcg + b^2i - 2aci)x^2}{2c(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&+ \frac{\left(bcd - 2acf + abh + \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&+ \frac{\left(bcd - 2acf + abh - \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&+ \frac{(2ce - bg + 2ai)\text{Subst}\left(\int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2\right)}{b^2 - 4ac} \\
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&+ \frac{2acg - b(ce + ai) - (2c^2e - bcg + b^2i - 2aci)x^2}{2c(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&+ \frac{\left(bcd - 2acf + abh + \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&+ \frac{\left(bcd - 2acf + abh - \frac{4abcf + b^2(cd - ah) - 4ac(3cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&+ \frac{(2ce - bg + 2ai) \tanh^{-1}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{(b^2 - 4ac)^{3/2}}
\end{aligned}$$

## Mathematica [A] (verified)

Time = 1.21 (sec) , antiderivative size = 524, normalized size of antiderivative = 1.12

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^2} dx$$

$$= \frac{1}{4} \left( \frac{2(-bcdx(b + cx^2) + a^2(bi - 2c(g + x(h + ix)))) + a(b^2ix^2 + 2c^2x(d + x(e + fx)) + bc(e + x(f - x(g + hx^2) + ix^3)))}{ac(-b^2 + 4ac)(a + bx^2 + cx^4)} \right.$$

$$+ \frac{\sqrt{2}(b^2(cd - ah) - 2ac(6cd + \sqrt{b^2 - 4ac}f + 2ah) + b(c\sqrt{b^2 - 4ac}d + 4acf + a\sqrt{b^2 - 4ac}h)) \arctan\left(\frac{\sqrt{b^2 - 4ac}x}{b - \sqrt{b^2 - 4ac}}\right)}{a\sqrt{c}(b^2 - 4ac)^{3/2}\sqrt{b - \sqrt{b^2 - 4ac}}}$$

$$+ \frac{\sqrt{2}(b^2(-cd + ah) + 2ac(6cd - \sqrt{b^2 - 4ac}f + 2ah) + b(c\sqrt{b^2 - 4ac}d - 4acf + a\sqrt{b^2 - 4ac}h)) \arctan\left(\frac{\sqrt{b^2 - 4ac}x}{b + \sqrt{b^2 - 4ac}}\right)}{a\sqrt{c}(b^2 - 4ac)^{3/2}\sqrt{b + \sqrt{b^2 - 4ac}}}$$

$$+ \frac{2(-2ce + bg - 2ai) \log(-b + \sqrt{b^2 - 4ac} - 2cx^2)}{(b^2 - 4ac)^{3/2}}$$

$$\left. + \frac{2(2ce - bg + 2ai) \log(b + \sqrt{b^2 - 4ac} + 2cx^2)}{(b^2 - 4ac)^{3/2}} \right)$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(a + b\*x^2 + c\*x^4)^2,x  
]

[Out] ((2\*(-(b\*c\*d\*x\*(b + c\*x^2)) + a^2\*(b\*i - 2\*c\*(g + x\*(h + i\*x))) + a\*(b^2\*i\*x^2 + 2\*c^2\*x\*(d + x\*(e + f\*x)) + b\*c\*(e + x\*(f - x\*(g + h\*x)))))/(a\*c\*(-b^2 + 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + (Sqrt[2]\*(b^2\*(c\*d - a\*h) - 2\*a\*c\*(6\*c\*d + Sqrt[b^2 - 4\*a\*c]\*f + 2\*a\*h) + b\*(c\*Sqrt[b^2 - 4\*a\*c]\*d + 4\*a\*c\*f + a\*Sqrt[b^2 - 4\*a\*c]\*h))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]])/(a\*Sqrt[c]\*(b^2 - 4\*a\*c)^(3/2)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + (Sqrt[2]\*(b^2\*(-(c\*d) + a\*h) + 2\*a\*c\*(6\*c\*d - Sqrt[b^2 - 4\*a\*c]\*f + 2\*a\*h) + b\*(c\*Sqrt[b^2 - 4\*a\*c]\*d - 4\*a\*c\*f + a\*Sqrt[b^2 - 4\*a\*c]\*h))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]])/(a\*Sqrt[c]\*(b^2 - 4\*a\*c)^(3/2)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) + (2\*(-2\*c\*e + b\*g - 2\*a\*i)\*Log[-b + Sqrt[b^2 - 4\*a\*c] - 2\*c\*x^2])/(b^2 - 4\*a\*c)^(3/2) + (2\*(2\*c\*e - b\*g + 2\*a\*i)\*Log[b + Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2])/(b^2 - 4\*a\*c)^(3/2))/4

**Maple [C] (verified)**

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.15 (sec) , antiderivative size = 304, normalized size of antiderivative = 0.65

method	result
risch	$\frac{-\frac{(abh-2acf+bcd)x^3}{2a(4ac-b^2)} - \frac{(2aci-b^2i+gbc-2e c^2)x^2}{2c(4ac-b^2)} - \frac{(2a^2h-abf-2acd+b^2d)x}{2a(4ac-b^2)} + \frac{abi-2acg+ebc}{2c(4ac-b^2)}}{cx^4+bx^2+a} + \left( \frac{\sum_{-R=\text{RootOf}(cZ^4+_Z^2b+a)} \left( -\frac{(abh-2acf+bcd)x^3}{2a(4ac-b^2)} - \frac{(2aci-b^2i+gbc-2e c^2)x^2}{2c(4ac-b^2)} - \frac{(2a^2h-abf-2acd+b^2d)x}{2a(4ac-b^2)} + \frac{abi-2acg+ebc}{2c(4ac-b^2)} \right)}{2c} \right)$
default	$\frac{-\frac{(abh-2acf+bcd)x^3}{2a(4ac-b^2)} - \frac{(2aci-b^2i+gbc-2e c^2)x^2}{2c(4ac-b^2)} - \frac{(2a^2h-abf-2acd+b^2d)x}{2a(4ac-b^2)} + \frac{abi-2acg+ebc}{2c(4ac-b^2)}}{cx^4+bx^2+a} + \left( \frac{(8\sqrt{-4ac+b^2}a^2ci-4\sqrt{-4ac+b^2}abcg+8\sqrt{-4ac+b^2}abcg+8\sqrt{-4ac+b^2}abcg+8\sqrt{-4ac+b^2}abcg)}{2c} \right)$

[In] int((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x,method=\_RETURNVERBOSE)

[Out] (-1/2/a\*(a\*b\*h-2\*a\*c\*f+b\*c\*d)/(4\*a\*c-b^2)\*x^3-1/2\*(2\*a\*c\*i-b^2\*i+b\*c\*g-2\*c^2\*e)/c/(4\*a\*c-b^2)\*x^2-1/2\*(2\*a^2\*h-a\*b\*f-2\*a\*c\*d+b^2\*d)/a/(4\*a\*c-b^2)\*x+1/2/c\*(a\*b\*i-2\*a\*c\*g+b\*c\*e)/(4\*a\*c-b^2))/(c\*x^4+b\*x^2+a)+1/4\*sum((-1/a\*(a\*b\*h-2\*a\*c\*f+b\*c\*d)/(4\*a\*c-b^2)\*\_R^2+2\*(2\*a\*i-b\*g+2\*c\*e)/(4\*a\*c-b^2)\*\_R+(2\*a^2\*h-a\*b\*f+6\*a\*c\*d-b^2\*d)/a/(4\*a\*c-b^2))/(2\*\_R^3\*c+\_R\*b)\*ln(x-\_R),\_R=RootOf(\_Z^4\*c+\_Z^2\*b+a))

**Fricas [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="fricas")

[Out] Timed out

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

```
[In] integrate((i*x**5+h*x**4+g*x**3+f*x**2+e*x+d)/(c*x**4+b*x**2+a)**2,x)
```

```
[Out] Timed out
```

**Maxima [F]**

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^2} dx = \int \frac{ix^5 + hx^4 + gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^2} dx$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^2,x, algorithm="maxima")
```

```
[Out] -1/2*(a*b*c*e - 2*a^2*c*g + a^2*b*i - (b*c^2*d - 2*a*c^2*f + a*b*c*h)*x^3 +
(2*a*c^2*e - a*b*c*g + (a*b^2 - 2*a^2*c)*i)*x^2 + (a*b*c*f - 2*a^2*c*h -
(b^2*c - 2*a*c^2)*d)*x)/(a^2*b^2*c - 4*a^3*c^2 + (a*b^2*c^2 - 4*a^2*c^3)*x^4
+ (a*b^3*c - 4*a^2*b*c^2)*x^2) + 1/2*integrate((a*b*f - 2*a^2*h + (b*c*d -
2*a*c*f + a*b*h)*x^2 + (b^2 - 6*a*c)*d - 2*(2*a*c*e - a*b*g + 2*a^2*i)*x)/
(c*x^4 + b*x^2 + a), x)/(a*b^2 - 4*a^2*c)
```

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 7962 vs. 2(420) = 840.

Time = 1.91 (sec) , antiderivative size = 7962, normalized size of antiderivative = 17.01

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^2,x, algorithm="giac")
```

```
[Out] 1/2*(b*c^2*d*x^3 - 2*a*c^2*f*x^3 + a*b*c*h*x^3 - 2*a*c^2*e*x^2 + a*b*c*g*x^
2 - a*b^2*i*x^2 + 2*a^2*c*i*x^2 + b^2*c*d*x - 2*a*c^2*d*x - a*b*c*f*x + 2*a
^2*c*h*x - a*b*c*e + 2*a^2*c*g - a^2*b*i)/((c*x^4 + b*x^2 + a)*(a*b^2*c - 4
*a^2*c^2)) + 1/16*((2*b^3*c^3 - 8*a*b*c^4 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(
b*c + sqrt(b^2 - 4*a*c)*c)*b^3*c + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + s
qrt(b^2 - 4*a*c)*c)*a*b*c^2 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b
^2 - 4*a*c)*c)*b^2*c^2 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*
```

$$\begin{aligned}
& a^2c^2 * b^3c^3 - 2*(b^2 - 4ac) * b^3c^3 * (ab^2 - 4a^2c)^2d - 2*(2ab^2c^3 - 8a^2c^4 - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c) * \\
& ab^2c^3 + 4\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^2c^3 \\
& + 2\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * ab^2c^2 - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^2c^3 - 2*(b^2 - \\
& 4ac) * a^2c^3 * (ab^2 - 4a^2c)^2f + (2ab^3c^2 - 8a^2b^3c^3 - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c) * ab^3 + 4\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^2b^3c^2 + 2\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * ab^2c^2 - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * ab^2c^2 - 2*(b^2 - 4ac) * ab^2c^2 * (ab^2 - 4a^2c)^2h + 2*(\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c) * ab^6c - 14\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^2b^4c^2 - 2\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^2b^5c^2 - 2ab^6c^2 + 64\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^3b^2c^3 + 20\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^2b^3c^3 + \sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * ab^4c^3 + 28a^2b^4c^3 - 96\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^4c^4 - 48\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^3b^2c^4 - 10\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^2b^2c^4 - 128a^3b^2c^4 + 24\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^3c^5 + 192a^4c^5 + 2*(b^2 - 4ac) * ab^4c^2 - 20*(b^2 - 4ac) * a^2b^2c^3 + 48*(b^2 - 4ac) * a^3c^4) * d * \text{abs}(ab^2 - 4a^2c) + 2*(\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c) * a^2b^5c - 8\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^3b^3c^2 - 2\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^2b^4c^2 - 2a^2b^5c^2 + 16\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^4b^3c^3 + 8\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^3b^2c^3 + \sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^2b^3c^3 + 16a^3b^3c^3 - 4\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^3b^2c^4 - 32a^4b^2c^4 + 2*(b^2 - 4ac) * a^2b^3c^2 - 8*(b^2 - 4ac) * a^3b^2c^3) * f * \text{abs}(ab^2 - 4a^2c) - 4*(\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c) * a^3b^4c - 8\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^4b^2c^2 - 2\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^3b^3c^2 - 2a^3b^4c^2 + 16\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^5c^3 + 8\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^4b^2c^3 + \sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^3b^2c^3 + 16a^4b^2c^3 - 4\sqrt{2} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^4c^4 - 32a^5c^4 + 2*(b^2 - 4ac) * a^3b^2c^2 - 8*(b^2 - 4ac) * a^4c^3) * h * \text{abs}(ab^2 - 4a^2c) + (2a^2b^7c^3 - 40a^3b^5c^4 + 224a^4b^3c^5 - 384a^5b^2c^6 - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c) * a^2b^7c + 20\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^3b^5c^2 + 2\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^2b^6c^2 - 112\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^4b^3c^3 - 32\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^3b^4c^3 - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^2b^5c^3 + 192\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^5b^2c^4 + 96\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^4b^2c^4 + 16\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^3b^3c^4 - 48\sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc + \sqrt{b^2 - 4ac}} * c * a^4b^2c^5 - 2*(b^2 - 4ac) * a^2b^5c^3 + 32*(b^2 - 4ac) * a^3b^3c^4 -
\end{aligned}$$

$$\begin{aligned}
& 96*(b^2 - 4*a*c)*a^4*b*c^5*d + 4*(2*a^3*b^6*c^3 - 16*a^4*b^4*c^4 + 32*a^5*b^2*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^6*c + 8*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^4*c^2 + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^5*c^2 - 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^2*c^3 - 8*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^3*c^3 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^4*c^3 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^2*c^4 - 2*(b^2 - 4*a*c)*a^3*b^4*c^3 + 8*(b^2 - 4*a*c)*a^4*b^2*c^4)*f - (2*a^3*b^7*c^2 - 8*a^4*b^5*c^3 - 32*a^5*b^3*c^4 + 128*a^6*b*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^7 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^5*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^6*c + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^3*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^5*c^2 - 64*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^6*b*c^3 - 32*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^2*c^3 + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b*c^4 - 2*(b^2 - 4*a*c)*a^3*b^5*c^2 + 32*(b^2 - 4*a*c)*a^5*b*c^4)*h)*\arctan(2*\sqrt{1/2}*x/\sqrt{(a*b^3 - 4*a^2*b*c + \sqrt{(a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2)})))/(a*b^2*c - 4*a^2*c^2)))/((a^3*b^6*c - 12*a^4*b^4*c^2 - 2*a^3*b^5*c^2 + 48*a^5*b^2*c^3 + 16*a^4*b^3*c^3 + a^3*b^4*c^3 - 64*a^6*c^4 - 32*a^5*b*c^4 - 8*a^4*b^2*c^4 + 16*a^5*c^5)*abs(a*b^2 - 4*a^2*c)*abs(c)) - 1/16*((2*b^3*c^3 - 8*a*b*c^4 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b^3*c + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b*c^2 + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b^2*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b*c^3 - 2*(b^2 - 4*a*c)*b*c^3)*(a*b^2 - 4*a^2*c)^2*d - 2*(2*a*b^2*c^3 - 8*a^2*c^4 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^2*c + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*c^2 + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*c^3 - 2*(b^2 - 4*a*c)*a*c^3)*(a*b^2 - 4*a^2*c)^2*f + (2*a*b^3*c^2 - 8*a^2*b*c^3 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^3 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^2*c - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b*c^2 - 2*(b^2 - 4*a*c)*a*b*c^2)*(a*b^2 - 4*a^2*c)^2*h - 2*(\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^6*c - 14*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c^2 - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^5*c^2 + 2*a*b^6*c^2 + 64*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^2*c^3 + 20*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^3 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^4*c^3 - 28*a^2*b^4*c^3 - 96*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*c^4 - 48*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^4 - 10*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^2*c^4 + 128*a^3*b^2*c^4 + 24*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*c^5 - 192*a^4*c^5 - 2*(b^2 - 4*a*c)
\end{aligned}$$

$$\begin{aligned}
& *a*b^4*c^2 + 20*(b^2 - 4*a*c)*a^2*b^2*c^3 - 48*(b^2 - 4*a*c)*a^3*c^4)*d*abs \\
& (a*b^2 - 4*a^2*c) - 2*(sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^5*c - \\
& 8*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b^3*c^2 - 2*sqrt(2)*sqrt(b*c - \\
& sqrt(b^2 - 4*a*c))*c)*a^2*b^4*c^2 + 2*a^2*b^5*c^2 + 16*sqrt(2)*sqrt(b*c - \\
& sqrt(b^2 - 4*a*c))*c)*a^4*b*c^3 + 8*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)* \\
& a^3*b^2*c^3 + sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^3*c^3 - 16*a^3* \\
& b^3*c^3 - 4*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b*c^4 + 32*a^4*b*c^4 \\
& - 2*(b^2 - 4*a*c)*a^2*b^3*c^2 + 8*(b^2 - 4*a*c)*a^3*b*c^3)*f*abs(a*b^2 - \\
& 4*a^2*c) + 4*(sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b^4*c - 8*sqrt(2) \\
& *sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^4*b^2*c^2 - 2*sqrt(2)*sqrt(b*c - sqrt(b^2 \\
& - 4*a*c))*c)*a^3*b^3*c^2 + 2*a^3*b^4*c^2 + 16*sqrt(2)*sqrt(b*c - sqrt(b^2 \\
& - 4*a*c))*c)*a^5*c^3 + 8*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^4*b*c^3 + \\
& sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b^2*c^3 - 16*a^4*b^2*c^3 - 4*s \\
& qrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^4*c^4 + 32*a^5*c^4 - 2*(b^2 - 4*a* \\
& c)*a^3*b^2*c^2 + 8*(b^2 - 4*a*c)*a^4*c^3)*h*abs(a*b^2 - 4*a^2*c) + (2*a^2*b \\
& ^7*c^3 - 40*a^3*b^5*c^4 + 224*a^4*b^3*c^5 - 384*a^5*b*c^6 - sqrt(2)*sqrt(b^ \\
& 2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^7*c + 20*sqrt(2)*sqrt(b^2 \\
& - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b^5*c^2 + 2*sqrt(2)*sqrt(b^2 - \\
& 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^6*c^2 - 112*sqrt(2)*sqrt(b^2 \\
& - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^4*b^3*c^3 - 32*sqrt(2)*sqrt(b^2 \\
& - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b^4*c^3 - sqrt(2)*sqrt(b^2 - 4 \\
& *a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^5*c^3 + 192*sqrt(2)*sqrt(b^2 - \\
& 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^5*b*c^4 + 96*sqrt(2)*sqrt(b^2 - 4* \\
& a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^4*b^2*c^4 + 16*sqrt(2)*sqrt(b^2 - 4* \\
& a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b^3*c^4 - 48*sqrt(2)*sqrt(b^2 - 4* \\
& a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^4*b*c^5 - 2*(b^2 - 4*a*c)*a^2*b^5*c^ \\
& 3 + 32*(b^2 - 4*a*c)*a^3*b^3*c^4 - 96*(b^2 - 4*a*c)*a^4*b*c^5)*d + 4*(2*a^3 \\
& *b^6*c^3 - 16*a^4*b^4*c^4 + 32*a^5*b^2*c^5 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt \\
& (b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b^6*c + 8*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b* \\
& c - sqrt(b^2 - 4*a*c))*c)*a^4*b^4*c^2 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c \\
& - sqrt(b^2 - 4*a*c))*c)*a^3*b^5*c^2 - 16*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c \\
& - sqrt(b^2 - 4*a*c))*c)*a^5*b^2*c^3 - 8*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c \\
& - sqrt(b^2 - 4*a*c))*c)*a^4*b^3*c^3 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - s \\
& qrt(b^2 - 4*a*c))*c)*a^3*b^4*c^3 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sq \\
& rt(b^2 - 4*a*c))*c)*a^4*b^2*c^4 - 2*(b^2 - 4*a*c)*a^3*b^4*c^3 + 8*(b^2 - 4*a \\
& *c)*a^4*b^2*c^4)*f - (2*a^3*b^7*c^2 - 8*a^4*b^5*c^3 - 32*a^5*b^3*c^4 + 128* \\
& a^6*b*c^5 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b \\
& ^7 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^4*b^5*c \\
& + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b^6*c + 1 \\
& 6*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^5*b^3*c^2 - s \\
& qrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b^5*c^2 - 64*s \\
& qrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^6*b*c^3 - 32*sq \\
& rt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^5*b^2*c^3 + 16*sq \\
& rt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^5*b*c^4 - 2*(b^2 - \\
& 4*a*c)*a^3*b^5*c^2 + 32*(b^2 - 4*a*c)*a^5*b*c^4)*h)*arctan(2*sqrt(1/2)*x/s
\end{aligned}$$



$$\begin{aligned} & \text{qrt}((a*b^3 - 4*a^2*b*c - \text{sqrt}((a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c) \\ & * (a*b^2*c - 4*a^2*c^2)))/(a*b^2*c - 4*a^2*c^2)))/((a^3*b^6*c - 12*a^4*b^4*c \\ & ^2 - 2*a^3*b^5*c^2 + 48*a^5*b^2*c^3 + 16*a^4*b^3*c^3 + a^3*b^4*c^3 - 64*a^6 \\ & *c^4 - 32*a^5*b*c^4 - 8*a^4*b^2*c^4 + 16*a^5*c^5)*\text{abs}(a*b^2 - 4*a^2*c)*\text{abs}( \\ & c)) - 1/8*(2*(b^3*c^2 - 4*a*b*c^3 - 2*b^2*c^3 + b*c^4 + (b^2*c^2 - 4*a*c^3 \\ & - 2*b*c^3 + c^4)*\text{sqrt}(b^2 - 4*a*c))*e*\text{abs}(a*b^2 - 4*a^2*c) - (b^4*c - 4*a*b \\ & ^2*c^2 - 2*b^3*c^2 + b^2*c^3 + (b^3*c - 4*a*b*c^2 - 2*b^2*c^2 + b*c^3)*\text{sqrt} \\ & (b^2 - 4*a*c))*g*\text{abs}(a*b^2 - 4*a^2*c) + 2*(a*b^3*c - 4*a^2*b*c^2 - 2*a*b^2* \\ & c^2 + a*b*c^3 + (a*b^2*c - 4*a^2*c^2 - 2*a*b*c^2 + a*c^3)*\text{sqrt}(b^2 - 4*a*c) \\ & )*i*\text{abs}(a*b^2 - 4*a^2*c) - 2*(a*b^5*c^2 - 8*a^2*b^3*c^3 - 2*a*b^4*c^3 + 16* \\ & a^3*b*c^4 + 8*a^2*b^2*c^4 + a*b^3*c^4 - 4*a^2*b*c^5 + (a*b^4*c^2 - 4*a^2*b^ \\ & 2*c^3 - 2*a*b^3*c^3 + a*b^2*c^4)*\text{sqrt}(b^2 - 4*a*c))*e + (a*b^6*c - 8*a^2*b^ \\ & 4*c^2 - 2*a*b^5*c^2 + 16*a^3*b^2*c^3 + 8*a^2*b^3*c^3 + a*b^4*c^3 - 4*a^2*b^ \\ & 2*c^4 - (a*b^5*c - 4*a^2*b^3*c^2 - 2*a*b^4*c^2 + a*b^3*c^3)*\text{sqrt}(b^2 - 4*a* \\ & c))*g - 2*(a^2*b^5*c - 8*a^3*b^3*c^2 - 2*a^2*b^4*c^2 + 16*a^4*b*c^3 + 8*a^3 \\ & *b^2*c^3 + a^2*b^3*c^3 - 4*a^3*b*c^4 + (a^2*b^4*c - 4*a^3*b^2*c^2 - 2*a^2*b \\ & ^3*c^2 + a^2*b^2*c^3)*\text{sqrt}(b^2 - 4*a*c))*i)*\log(x^2 + 1/2*(a*b^3 - 4*a^2*b* \\ & c + \text{sqrt}((a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2 \\ & )))/(a*b^2*c - 4*a^2*c^2)))/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + \\ & 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2*\text{abs}(a*b^2 - 4*a^2*c)) - 1/8*(2*(b \\ & ^3*c^2 - 4*a*b*c^3 - 2*b^2*c^3 + b*c^4 + (b^2*c^2 - 4*a*c^3 - 2*b*c^3 + c^4 \\ & )*\text{sqrt}(b^2 - 4*a*c))*e*\text{abs}(a*b^2 - 4*a^2*c) - (b^4*c - 4*a*b^2*c^2 - 2*b^3* \\ & c^2 + b^2*c^3 - (b^3*c - 4*a*b*c^2 - 2*b^2*c^2 + b*c^3)*\text{sqrt}(b^2 - 4*a*c))* \\ & g*\text{abs}(a*b^2 - 4*a^2*c) + 2*(a*b^3*c - 4*a^2*b*c^2 - 2*a*b^2*c^2 + a*b*c^3 - \\ & (a*b^2*c - 4*a^2*c^2 - 2*a*b*c^2 + a*c^3)*\text{sqrt}(b^2 - 4*a*c))*i*\text{abs}(a*b^2 - \\ & 4*a^2*c) - 2*(a*b^5*c^2 - 8*a^2*b^3*c^3 - 2*a*b^4*c^3 + 16*a^3*b*c^4 + 8*a \\ & ^2*b^2*c^4 + a*b^3*c^4 - 4*a^2*b*c^5 + (a*b^4*c^2 - 4*a^2*b^2*c^3 - 2*a*b^3 \\ & *c^3 + a*b^2*c^4)*\text{sqrt}(b^2 - 4*a*c))*e + (a*b^6*c - 8*a^2*b^4*c^2 - 2*a*b^5 \\ & *c^2 + 16*a^3*b^2*c^3 + 8*a^2*b^3*c^3 + a*b^4*c^3 - 4*a^2*b^2*c^4 - (a*b^5* \\ & c - 4*a^2*b^3*c^2 - 2*a*b^4*c^2 + a*b^3*c^3)*\text{sqrt}(b^2 - 4*a*c))*g - 2*(a^2* \\ & b^5*c - 8*a^3*b^3*c^2 - 2*a^2*b^4*c^2 + 16*a^4*b*c^3 + 8*a^3*b^2*c^3 + a^2* \\ & b^3*c^3 - 4*a^3*b*c^4 - (a^2*b^4*c - 4*a^3*b^2*c^2 - 2*a^2*b^3*c^2 + a^2*b^ \\ & 2*c^3)*\text{sqrt}(b^2 - 4*a*c))*i)*\log(x^2 + 1/2*(a*b^3 - 4*a^2*b*c - \text{sqrt}((a*b^3 \\ & - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2)))/(a*b^2*c - \\ & 4*a^2*c^2)))/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + \\ & a*b^2*c^2 - 4*a^2*c^3)*c^2*\text{abs}(a*b^2 - 4*a^2*c)) \end{aligned}$$

## Mupad [B] (verification not implemented)

Time = 9.41 (sec) , antiderivative size = 18449, normalized size of antiderivative = 39.42

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(a + b\*x^2 + c\*x^4)^2,x)

[Out] ((b\*c\*e - 2\*a\*c\*g + a\*b\*i)/(2\*c\*(4\*a\*c - b^2)) - (x\*(b^2\*d + 2\*a^2\*h - 2\*a\*c\*d - a\*b\*f))/(2\*a\*(4\*a\*c - b^2)) + (x^2\*(2\*c^2\*e + b^2\*i - b\*c\*g - 2\*a\*c\*i))/(2\*c\*(4\*a\*c - b^2)) - (x^3\*(b\*c\*d - 2\*a\*c\*f + a\*b\*h))/(2\*a\*(4\*a\*c - b^2)))/(a + b\*x^2 + c\*x^4) + symsum(log((5\*b^3\*c^4\*d^3 + 8\*a^3\*c^4\*f^3 - 96\*a^2\*c^5\*d^2\*e^2 + 72\*a^2\*c^5\*d^2\*f - 3\*a^3\*b^3\*c^4\*h^3 - 4\*a^4\*b\*c^2\*h^3 - 3\*b^4\*c^3\*d^2\*f - 32\*a^3\*c^4\*e^2\*h - 96\*a^4\*c^3\*d\*i^2 + b^5\*c^2\*d^2\*h + 8\*a^4\*c^3\*f\*h^2 - 32\*a^5\*c^2\*h\*i^2 + 6\*a^2\*b^2\*c^3\*f^3 - 36\*a\*b\*c^5\*d^3 + a\*b^5\*c\*d\*h^2 - 192\*a^3\*c^4\*d\*e\*i + 48\*a^3\*c^4\*d\*f\*h - 64\*a^4\*c^3\*e\*h\*i + 16\*a\*b^2\*c^4\*d\*e^2 + 18\*a\*b^2\*c^4\*d^2\*f + 3\*a\*b^3\*c^3\*d\*f^2 - 60\*a^2\*b\*c^4\*d\*f^2 + 4\*a\*b^4\*c^2\*d\*g^2 + 16\*a^2\*b\*c^4\*e^2\*f - a\*b^3\*c^3\*d^2\*h - 60\*a^2\*b\*c^4\*d^2\*h - 28\*a^3\*b\*c^3\*d\*h^2 + a^2\*b^4\*c\*f\*h^2 - 28\*a^3\*b\*c^3\*f^2\*h + 16\*a^4\*b\*c^2\*f\*i^2 - 24\*a^2\*b^2\*c^3\*d\*g^2 - 9\*a^2\*b^3\*c^2\*d\*h^2 + 4\*a^2\*b^3\*c^2\*f\*g^2 + 16\*a^3\*b^2\*c^2\*d\*i^2 - 5\*a^2\*b^3\*c^2\*f^2\*h + 18\*a^3\*b^2\*c^2\*f\*h^2 - 8\*a^3\*b^2\*c^2\*g^2\*h - 16\*a\*b^3\*c^3\*d\*e\*g + 96\*a^2\*b\*c^4\*d\*e\*g - 4\*a\*b^4\*c^2\*d\*f\*h + 96\*a^3\*b\*c^3\*d\*g\*i + 32\*a^3\*b\*c^3\*e\*f\*i + 32\*a^3\*b\*c^3\*e\*g\*h + 32\*a^4\*b\*c^2\*g\*h\*i + 32\*a^2\*b^2\*c^3\*d\*e\*i + 52\*a^2\*b^2\*c^3\*d\*f\*h - 16\*a^2\*b^2\*c^3\*e\*f\*g - 16\*a^2\*b^3\*c^2\*d\*g\*i - 16\*a^3\*b^2\*c^2\*f\*g\*i)/(8\*(a^2\*b^6 - 64\*a^5\*c^3 - 12\*a^3\*b^4\*c + 48\*a^4\*b^2\*c^2)) - root(1572864\*a^8\*b^2\*c^6\*z^4 - 983040\*a^7\*b^4\*c^5\*z^4 + 327680\*a^6\*b^6\*c^4\*z^4 - 61440\*a^5\*b^8\*c^3\*z^4 + 6144\*a^4\*b^10\*c^2\*z^4 - 256\*a^3\*b^12\*c\*z^4 - 1048576\*a^9\*c^7\*z^4 + 32768\*a^7\*b\*c^4\*g\*i\*z^2 - 512\*a^4\*b^7\*c\*g\*i\*z^2 + 192\*a^3\*b^8\*c\*f\*h\*z^2 + 57344\*a^6\*b\*c^5\*d\*h\*z^2 + 32768\*a^6\*b\*c^5\*e\*g\*z^2 + 96\*a^2\*b^9\*c\*d\*h\*z^2 - 32\*a\*b^10\*c\*d\*f\*z^2 - 24576\*a^6\*b^3\*c^3\*g\*i\*z^2 + 6144\*a^5\*b^5\*c^2\*g\*i\*z^2 + 49152\*a^6\*b^2\*c^4\*e\*i\*z^2 - 12288\*a^5\*b^4\*c^3\*e\*i\*z^2 + 6144\*a^5\*b^4\*c^3\*f\*h\*z^2 - 2048\*a^4\*b^6\*c^2\*f\*h\*z^2 + 1024\*a^4\*b^6\*c^2\*e\*i\*z^2 - 49152\*a^5\*b^3\*c^4\*d\*h\*z^2 - 24576\*a^5\*b^3\*c^4\*e\*g\*z^2 + 15360\*a^4\*b^5\*c^3\*d\*h\*z^2 + 6144\*a^4\*b^5\*c^3\*e\*g\*z^2 - 2048\*a^3\*b^7\*c^2\*d\*h\*z^2 - 512\*a^3\*b^7\*c^2\*e\*g\*z^2 + 24576\*a^5\*b^2\*c^5\*d\*f\*z^2 - 3072\*a^3\*b^6\*c^3\*d\*f\*z^2 + 2048\*a^4\*b^4\*c^4\*d\*f\*z^2 + 576\*a^2\*b^8\*c^2\*d\*f\*z^2 + 512\*a^5\*b^6\*c\*i^2\*z^2 + 12288\*a^7\*b\*c^4\*h^2\*z^2 + 128\*a^3\*b^8\*c\*g^2\*z^2 + 12288\*a^6\*b\*c^5\*f^2\*z^2 - 16\*a^2\*b^9\*c\*f^2\*z^2 + 61440\*a^5\*b\*c^6\*d^2\*z^2 + 432\*a\*b^9\*c^2\*d^2\*z^2 - 65536\*a^7\*c^5\*e\*i\*z^2 - 16384\*a^7\*c^5\*f\*h\*z^2 - 49152\*a^6\*c^6\*d\*f\*z^2 + 24576\*a^7\*b^2\*c^3\*i^2\*z^2 - 6144\*a^6\*b^4\*c^2\*i^2\*z^2 - 8192\*a^6\*b^3\*c^3\*h^2\*z^2 + 1536\*a^5\*b^5\*c^2\*h^2\*z^2 - 8192\*a^6\*b^2\*c^4\*g^2\*z^2 + 6144\*a^5\*b^4\*c^3\*g^2\*z^2 - 1536\*a^4\*b^6\*c^2\*g^2\*z^2 - 8192\*a^5\*b^3\*c^4\*f^2\*z^2 + 1536\*a^4\*b^5\*c^3\*f^2\*z^2 + 24576\*a^5\*b^2\*c^5\*e^2\*z^2 - 6144\*a^4\*b^4\*c^4\*e^2\*z^2 + 512\*a^3\*b^6\*c^3\*e^2\*z^2 - 61440\*a^4\*b^3

$$\begin{aligned}
& *c^5*d^2*z^2 + 24064*a^3*b^5*c^4*d^2*z^2 - 4608*a^2*b^7*c^3*d^2*z^2 - 32768 \\
& *a^8*c^4*i^2*z^2 - 16*a^3*b^9*h^2*z^2 - 32768*a^6*c^6*e^2*z^2 - 16*b^11*c*d \\
& ^2*z^2 - 192*a^3*b^6*c*d*h*i*z - 6144*a^5*b*c^4*d*g*h*z - 4096*a^5*b*c^4*d* \\
& f*i*z + 96*a^2*b^7*c*d*g*h*z + 64*a^2*b^7*c*d*f*i*z - 4096*a^4*b*c^5*d*e*f* \\
& z + 64*a*b^7*c^2*d*e*f*z - 32*a*b^8*c*d*f*g*z - 9216*a^5*b^2*c^3*d*h*i*z + \\
& 2304*a^4*b^4*c^2*d*h*i*z + 4608*a^4*b^3*c^3*d*g*h*z + 3072*a^4*b^3*c^3*d*f* \\
& i*z - 1152*a^3*b^5*c^2*d*g*h*z - 768*a^3*b^5*c^2*d*f*i*z - 9216*a^4*b^2*c^4 \\
& *d*e*h*z + 2304*a^3*b^4*c^3*d*e*h*z + 2048*a^4*b^2*c^4*d*f*g*z - 1536*a^3*b \\
& ^4*c^3*d*f*g*z + 384*a^2*b^6*c^2*d*f*g*z - 192*a^2*b^6*c^2*d*e*h*z + 3072*a \\
& ^3*b^3*c^4*d*e*f*z - 768*a^2*b^5*c^3*d*e*f*z + 384*a^5*b^4*c*h^2*i*z - 1024 \\
& *a^6*b*c^3*g*h^2*z - 192*a^4*b^5*c*g*h^2*z + 32*a^3*b^6*c*f^2*i*z + 1024*a^ \\
& 5*b*c^4*f^2*g*z - 32*a^3*b^6*c*e*h^2*z - 16*a^2*b^7*c*f^2*g*z - 9216*a^4*b* \\
& c^5*d^2*g*z + 336*a*b^7*c^2*d^2*g*z - 672*a*b^6*c^3*d^2*e*z + 12288*a^6*c^4 \\
& *d*h*i*z + 12288*a^5*c^5*d*e*h*z + 32*a*b^8*c*d^2*i*z - 1536*a^6*b^2*c^2*h^ \\
& 2*i*z + 1536*a^5*b^2*c^3*f^2*i*z + 768*a^5*b^3*c^2*g*h^2*z - 384*a^4*b^4*c^ \\
& 2*f^2*i*z - 15872*a^4*b^2*c^4*d^2*i*z + 4992*a^3*b^4*c^3*d^2*i*z - 1536*a^5 \\
& *b^2*c^3*e*h^2*z - 768*a^4*b^3*c^3*f^2*g*z - 672*a^2*b^6*c^2*d^2*i*z + 384* \\
& a^4*b^4*c^2*e*h^2*z + 192*a^3*b^5*c^2*f^2*g*z + 7936*a^3*b^3*c^4*d^2*g*z - \\
& 2496*a^2*b^5*c^3*d^2*g*z + 1536*a^4*b^2*c^4*e*f^2*z - 384*a^3*b^4*c^3*e*f^2 \\
& *z + 32*a^2*b^6*c^2*e*f^2*z - 15872*a^3*b^2*c^5*d^2*e*z + 4992*a^2*b^4*c^4* \\
& d^2*e*z + 2048*a^7*c^3*h^2*i*z - 32*a^4*b^6*h^2*i*z - 2048*a^6*c^4*f^2*i*z \\
& + 16*a^3*b^7*g*h^2*z + 18432*a^5*c^5*d^2*i*z + 2048*a^6*c^4*e*h^2*z - 2048* \\
& a^5*c^5*e*f^2*z + 32*b^8*c^2*d^2*e*z + 18432*a^4*c^6*d^2*e*z - 16*b^9*c*d^2 \\
& *g*z - 256*a^5*b*c^2*f*g*h*i - 192*a^4*b^3*c*f*g*h*i - 96*a^3*b^4*c*d*g*h*i \\
& - 1792*a^4*b*c^3*d*e*h*i - 768*a^4*b*c^3*d*f*g*i - 256*a^4*b*c^3*e*f*g*h + \\
& 32*a^2*b^5*c*d*f*g*i - 768*a^3*b*c^4*d*e*f*g + 32*a*b^5*c^2*d*e*f*g + 896* \\
& a^4*b^2*c^2*d*g*h*i + 384*a^4*b^2*c^2*e*f*h*i - 192*a^3*b^3*c^2*e*f*g*h - 1 \\
& 92*a^3*b^3*c^2*d*f*g*i + 192*a^3*b^3*c^2*d*e*h*i + 896*a^3*b^2*c^3*d*e*g*h \\
& + 384*a^3*b^2*c^3*d*e*f*i - 96*a^2*b^4*c^2*d*e*g*h - 64*a^2*b^4*c^2*d*e*f*i \\
& - 192*a^2*b^3*c^3*d*e*f*g + 192*a^5*b^2*c*g*h^2*i + 192*a^5*b^2*c*f*h*i^2 \\
& - 384*a^5*b*c^2*e*h^2*i - 32*a^4*b^3*c*e*h^2*i + 16*a^3*b^4*c*f^2*g*i + 153 \\
& 6*a^5*b*c^2*e*g*i^2 + 1536*a^4*b*c^3*e^2*g*i - 896*a^5*b*c^2*d*h*i^2 + 96*a \\
& ^4*b^3*c*d*h*i^2 + 48*a^3*b^4*c*f*g^2*h - 384*a^4*b*c^3*e*f^2*i + 16*a^3*b^ \\
& 4*c*e*g*h^2 - 32*a^3*b^4*c*d*f*i^2 + 24*a^2*b^5*c*d*g^2*h + 2208*a^3*b*c^4* \\
& d^2*f*h - 1920*a^3*b*c^4*d^2*e*i + 800*a^4*b*c^3*d*f*h^2 - 102*a*b^5*c^2*d^ \\
& 2*f*h - 32*a*b^5*c^2*d^2*e*i - 30*a^2*b^5*c*d*f*h^2 - 896*a^3*b*c^4*d*e^2*h \\
& - 240*a*b^4*c^3*d^2*e*g - 32*a*b^4*c^3*d*e^2*f + 512*a^5*c^3*e*f*h*i + 153 \\
& 6*a^4*c^4*d*e*f*i + 16*a*b^6*c*d^2*g*i + 12*a*b^6*c*d*f^2*h - 8*a*b^6*c*d*f \\
& *g^2 + 192*a^4*b^2*c^2*f^2*g*i - 768*a^4*b^2*c^2*e*g^2*i + 64*a^4*b^2*c^2*f \\
& *g^2*h + 960*a^3*b^2*c^3*d^2*g*i - 240*a^2*b^4*c^2*d^2*g*i + 192*a^4*b^2*c^ \\
& 2*e*g*h^2 - 32*a^3*b^3*c^2*e*f^2*i - 224*a^3*b^3*c^2*d*g^2*h + 192*a^4*b^2* \\
& c^2*d*f*i^2 + 192*a^3*b^2*c^3*e^2*f*h - 864*a^3*b^2*c^3*d*f^2*h + 480*a^2*b \\
& ^3*c^3*d^2*e*i + 336*a^3*b^3*c^2*d*f*h^2 + 192*a^3*b^2*c^3*e*f^2*g + 144*a^ \\
& 2*b^3*c^3*d^2*f*h + 16*a^2*b^4*c^2*e*f^2*g - 12*a^2*b^4*c^2*d*f^2*h + 192*a \\
& ^3*b^2*c^3*d*f*g^2 + 96*a^2*b^3*c^3*d*e^2*h + 48*a^2*b^4*c^2*d*f*g^2 + 960*
\end{aligned}$$

$$\begin{aligned}
& a^2b^2c^4d^2e^2g + 192a^2b^2c^4d^2e^2f - 384a^5b^2c^2g^2i^2 - 192 \\
& a^5b^2c^2f^2i^2 - 48a^4b^3c^2g^2h^2 - 16a^4b^3c^2f^2i^2 + 80a^3b^3 \\
& c^2f^3h - 42a^3b^4c^2f^2h^2 - 960a^4b^3c^3d^2i^2 - 192a^4b^3c^3 \\
& e^2h^2 - 16a^2b^5c^2d^2i^2 - 4a^2b^5c^2f^2g^2 - 192a^4b^2c^2d^3h \\
& ^3 - 192a^2b^2c^4d^3h + 128a^3b^3c^2e^2g^3 - 192a^3b^3c^4e^2f^2 \\
& + 60a^2b^5c^2d^2g^2 + 198a^2b^4c^3d^2f^2 + 144a^2b^3c^3d^2f^3 - 96 \\
& 0a^2b^3c^5d^2e^2 + 240a^2b^3c^4d^2e^2 + 256a^6c^2f^2h^2i^2 + 16a^4b^4 \\
& b^4g^2h^2i + 768a^5c^3d^2f^2i^2 + 256a^4c^4e^2f^2h - 192a^6b^3c^2h^2i \\
& ^2 - 192a^4c^4d^2f^2h + 128a^4b^3c^2g^3i + 16b^6c^2d^2e^2g + 96a^5 \\
& 5b^3c^2f^2h^3 + 96a^4b^3c^3f^3h + 80a^4b^3c^2f^2h^3 + 6a^2b^5c^2f^3h \\
& + 768a^3c^5d^2e^2f + 512a^3b^3c^4e^3g + 132a^2b^4c^3d^3h - 28a^3 \\
& b^4c^2d^3h^3 + 12a^2b^6c^2d^2h^2 + 2016a^2b^3c^5d^3f - 496a^2b^3c^4d^3 \\
& 3f + 224a^3b^3c^4d^2f^3 - 18a^2b^5c^2d^2f^3 - 192a^4b^2c^2f^2h^2 + \\
& 240a^3b^3c^2d^2i^2 - 48a^3b^3c^2f^2g^2 - 16a^3b^3c^2e^2h^2 - \\
& 464a^3b^2c^3d^2h^2 - 384a^3b^2c^3e^2g^2 + 42a^2b^4c^2d^2h^2 \\
& - 240a^2b^3c^3d^2g^2 - 16a^2b^3c^3e^2f^2 - 960a^2b^2c^4d^2f \\
& ^2 + 6b^7c^2d^2f^2h + 512a^6b^3c^2g^2i^3 - 2a^2b^7d^2f^2h^2 - 16a^5b^3h^2 \\
& i^2 - 1536a^5c^3e^2i^2 - 32a^5c^3f^2h^2 - 4a^3b^5g^2h^2 - 864a^4 \\
& c^4d^2h^2 - 9b^6c^2d^2f^2 - 288a^3c^5d^2f^2 - 16b^5c^3d^2e^2 \\
& e^2 - 24a^3b^2c^3f^4 - 9a^2b^4c^2f^4 - 1024a^6c^2e^2i^3 - 1024a^4 \\
& c^4e^3i - 10b^6c^2d^3h + 6a^3b^5f^2h^3 - 1728a^3c^5d^3h - 192 \\
& a^5c^3d^2h^3 - 4b^7c^2d^2g^2 + 30b^5c^3d^3f + 6a^2b^6d^2h^3 - 24a^5 \\
& b^2c^2h^4 - 16a^3b^4c^2g^4 + 360a^2b^2c^5d^4 - 16a^6c^2h^4 - 9a^4 \\
& b^4h^4 - 16a^4c^4f^4 - 256a^3c^5e^4 - 25b^4c^4d^4 - 1296a^2c^6 \\
& d^4 - a^2b^6f^2h^2 - 256a^7c^2i^4 - b^8d^2h^2, z, 1) * ((32a^2b^5c^3 \\
& 3d^2e - 512a^5c^4f^2i - 512a^4c^5e^2f + 1024a^3b^3c^5d^2e - 16a^2b^6c^2 \\
& d^2g + 1024a^4b^3c^4d^2i + 512a^4b^3c^4e^2h + 256a^4b^3c^4f^2g + 512a^5 \\
& b^3c^3h^2i - 384a^2b^3c^4d^2e + 192a^2b^4c^3d^2g + 32a^2b^4c^3e^2 \\
& f - 512a^3b^2c^4d^2g + 32a^2b^5c^2d^2i - 16a^2b^5c^2f^2g - 384a^3 \\
& b^3c^3d^2i - 128a^3b^3c^3e^2h + 32a^3b^4c^2f^2i + 64a^3b^4c^2g^2 \\
& h - 256a^4b^2c^3g^2h - 128a^4b^3c^2h^2i) / (8(a^2b^6 - 64a^5c^3 - \\
& 12a^3b^4c + 48a^4b^2c^2)) + \text{root}(1572864a^8b^2c^6z^4 - 983040a^7 \\
& b^4c^5z^4 + 327680a^6b^6c^4z^4 - 61440a^5b^8c^3z^4 + 6144a^4b^10 \\
& c^2z^4 - 256a^3b^12c^2z^4 - 1048576a^9c^7z^4 + 32768a^7b^3c^4g^2i \\
& z^2 - 512a^4b^7c^2g^2i^2 + 192a^3b^8c^2f^2h^2z^2 + 57344a^6b^3c^5d^2h^2 \\
& z^2 + 32768a^6b^3c^5e^2g^2z^2 + 96a^2b^9c^2d^2h^2z^2 - 32a^2b^10c^2d^2f^2z^2 \\
& - 24576a^6b^3c^3g^2i^2z^2 + 6144a^5b^5c^2g^2i^2z^2 + 49152a^6b^2c^4e^2 \\
& e^2i^2z^2 - 12288a^5b^4c^3e^2i^2z^2 + 6144a^5b^4c^3f^2h^2z^2 - 2048a^4b^6 \\
& c^2f^2h^2z^2 + 1024a^4b^6c^2e^2i^2z^2 - 49152a^5b^3c^4d^2h^2z^2 - 245 \\
& 76a^5b^3c^4e^2g^2z^2 + 15360a^4b^5c^3d^2h^2z^2 + 6144a^4b^5c^3e^2g^2z^2 \\
& - 2048a^3b^7c^2d^2h^2z^2 - 512a^3b^7c^2e^2g^2z^2 + 24576a^5b^2c^5 \\
& d^2f^2z^2 - 3072a^3b^6c^3d^2f^2z^2 + 2048a^4b^4c^4d^2f^2z^2 + 576a^2b^8 \\
& c^2d^2f^2z^2 + 512a^5b^6c^2i^2z^2 + 12288a^7b^3c^4h^2z^2 + 128a^3b^8 \\
& c^2g^2z^2 + 12288a^6b^3c^5f^2z^2 - 16a^2b^9c^2f^2z^2 + 61440a^5b^6 \\
& c^6d^2z^2 + 432a^2b^9c^2d^2z^2 - 65536a^7c^5e^2i^2z^2 - 16384a^7c^6
\end{aligned}$$

$$\begin{aligned}
& 5*f*h*z^2 - 49152*a^6*c^6*d*f*z^2 + 24576*a^7*b^2*c^3*i^2*z^2 - 6144*a^6*b^4*c^2*i^2*z^2 - 8192*a^6*b^3*c^3*h^2*z^2 + 1536*a^5*b^5*c^2*h^2*z^2 - 8192*a^6*b^2*c^4*g^2*z^2 + 6144*a^5*b^4*c^3*g^2*z^2 - 1536*a^4*b^6*c^2*g^2*z^2 - \\
& 8192*a^5*b^3*c^4*f^2*z^2 + 1536*a^4*b^5*c^3*f^2*z^2 + 24576*a^5*b^2*c^5*e^2*z^2 - 6144*a^4*b^4*c^4*e^2*z^2 + 512*a^3*b^6*c^3*e^2*z^2 - 61440*a^4*b^3*c^5*d^2*z^2 + 24064*a^3*b^5*c^4*d^2*z^2 - 4608*a^2*b^7*c^3*d^2*z^2 - 32768*a^8*c^4*i^2*z^2 - 16*a^3*b^9*h^2*z^2 - 32768*a^6*c^6*e^2*z^2 - 16*b^11*c*d^2*z^2 - 192*a^3*b^6*c*d*h*i*z - 6144*a^5*b*c^4*d*g*h*z - 4096*a^5*b*c^4*d*f*i*z + 96*a^2*b^7*c*d*g*h*z + 64*a^2*b^7*c*d*f*i*z - 4096*a^4*b*c^5*d*e*f*z + 64*a*b^7*c^2*d*e*f*z - 32*a*b^8*c*d*f*g*z - 9216*a^5*b^2*c^3*d*h*i*z + 2304*a^4*b^4*c^2*d*h*i*z + 4608*a^4*b^3*c^3*d*g*h*z + 3072*a^4*b^3*c^3*d*f*i*z - 1152*a^3*b^5*c^2*d*g*h*z - 768*a^3*b^5*c^2*d*f*i*z - 9216*a^4*b^2*c^4*d*e*h*z + 2304*a^3*b^4*c^3*d*e*h*z + 2048*a^4*b^2*c^4*d*f*g*z - 1536*a^3*b^4*c^3*d*f*g*z + 384*a^2*b^6*c^2*d*f*g*z - 192*a^2*b^6*c^2*d*e*h*z + 3072*a^3*b^3*c^4*d*e*f*z - 768*a^2*b^5*c^3*d*e*f*z + 384*a^5*b^4*c*h^2*i*z - 1024*a^6*b*c^3*g*h^2*z - 192*a^4*b^5*c*g*h^2*z + 32*a^3*b^6*c*f^2*i*z + 1024*a^5*b*c^4*f^2*g*z - 32*a^3*b^6*c*e*h^2*z - 16*a^2*b^7*c*f^2*g*z - 9216*a^4*b*c^5*d^2*g*z + 336*a*b^7*c^2*d^2*g*z - 672*a*b^6*c^3*d^2*e*z + 12288*a^6*c^4*d*h*i*z + 12288*a^5*c^5*d*e*h*z + 32*a*b^8*c*d^2*i*z - 1536*a^6*b^2*c^2*h^2*i*z + 1536*a^5*b^2*c^3*f^2*i*z + 768*a^5*b^3*c^2*g*h^2*z - 384*a^4*b^4*c^2*f^2*i*z - 15872*a^4*b^2*c^4*d^2*i*z + 4992*a^3*b^4*c^3*d^2*i*z - 1536*a^5*b^2*c^3*e*h^2*z - 768*a^4*b^3*c^3*f^2*g*z - 672*a^2*b^6*c^2*d^2*i*z + 384*a^4*b^4*c^2*e*h^2*z + 192*a^3*b^5*c^2*f^2*g*z + 7936*a^3*b^3*c^4*d^2*g*z - 2496*a^2*b^5*c^3*d^2*g*z + 1536*a^4*b^2*c^4*e*f^2*z - 384*a^3*b^4*c^3*e*f^2*z + 32*a^2*b^6*c^2*e*f^2*z - 15872*a^3*b^2*c^5*d^2*e*z + 4992*a^2*b^4*c^4*d^2*e*z + 2048*a^7*c^3*h^2*i*z - 32*a^4*b^6*h^2*i*z - 2048*a^6*c^4*f^2*i*z + 16*a^3*b^7*g*h^2*z + 18432*a^5*c^5*d^2*i*z + 2048*a^6*c^4*e*h^2*z - 2048*a^5*c^5*e*f^2*z + 32*b^8*c^2*d^2*e*z + 18432*a^4*c^6*d^2*e*z - 16*b^9*c*d^2*g*z - 256*a^5*b*c^2*f*g*h*i - 192*a^4*b^3*c*f*g*h*i - 96*a^3*b^4*c*d*g*h*i - 1792*a^4*b*c^3*d*e*h*i - 768*a^4*b*c^3*d*f*g*i - 256*a^4*b*c^3*e*f*g*h + 32*a^2*b^5*c*d*f*g*i - 768*a^3*b*c^4*d*e*f*g + 32*a*b^5*c^2*d*e*f*g + 896*a^4*b^2*c^2*d*g*h*i + 384*a^4*b^2*c^2*e*f*h*i - 192*a^3*b^3*c^2*e*f*g*h - 192*a^3*b^3*c^2*d*f*g*i + 192*a^3*b^3*c^2*d*e*h*i + 896*a^3*b^2*c^3*d*e*g*h + 384*a^3*b^2*c^3*d*e*f*i - 96*a^2*b^4*c^2*d*e*g*h - 64*a^2*b^4*c^2*d*e*f*i - 192*a^2*b^3*c^3*d*e*f*g + 192*a^5*b^2*c*g*h^2*i + 192*a^5*b^2*c*f*h^2*i - 384*a^5*b*c^2*e*h^2*i - 32*a^4*b^3*c*e*h^2*i + 16*a^3*b^4*c*f^2*g*i + 1536*a^5*b*c^2*e*g*i^2 + 1536*a^4*b*c^3*e^2*g*i - 896*a^5*b*c^2*d*h*i^2 + 96*a^4*b^3*c*d*h*i^2 + 48*a^3*b^4*c*f*g^2*h - 384*a^4*b*c^3*e*f^2*i + 16*a^3*b^4*c*e*g*h^2 - 32*a^3*b^4*c*d*f*i^2 + 24*a^2*b^5*c*d*g^2*h + 2208*a^3*b*c^4*d^2*f*h - 1920*a^3*b*c^4*d^2*e*i + 800*a^4*b*c^3*d*f*h^2 - 102*a*b^5*c^2*d^2*f*h - 32*a*b^5*c^2*d^2*e*i - 30*a^2*b^5*c*d*f*h^2 - 896*a^3*b*c^4*d*e^2*h - 240*a*b^4*c^3*d^2*e*g - 32*a*b^4*c^3*d*e^2*f + 512*a^5*c^3*e*f*h^2*i + 1536*a^4*c^4*d*e*f*i + 16*a*b^6*c*d^2*g*i + 12*a*b^6*c*d*f^2*h - 8*a*b^6*c*d*f*g^2 + 192*a^4*b^2*c^2*f^2*g*i - 768*a^4*b^2*c^2*e*g^2*i + 64*a^4*b^2*c^2*f*g^2*h + 960*a^3*b^2*c^3*d^2*g*i - 240*a^2*b^4*c^2*d^2*g*i + 192*a^4*b^2*c^2
\end{aligned}$$

$$\begin{aligned}
& *e*g*h^2 - 32*a^3*b^3*c^2*e*f^2*i - 224*a^3*b^3*c^2*d*g^2*h + 192*a^4*b^2*c^2*d*f*i^2 + 192*a^3*b^2*c^3*e^2*f*h - 864*a^3*b^2*c^3*d*f^2*h + 480*a^2*b^3*c^3*d^2*e*i + 336*a^3*b^3*c^2*d*f*h^2 + 192*a^3*b^2*c^3*e*f^2*g + 144*a^2*b^3*c^3*d^2*f*h + 16*a^2*b^4*c^2*e*f^2*g - 12*a^2*b^4*c^2*d*f^2*h + 192*a^3*b^2*c^3*d*f*g^2 + 96*a^2*b^3*c^3*d*e^2*h + 48*a^2*b^4*c^2*d*f*g^2 + 960*a^2*b^2*c^4*d^2*e*g + 192*a^2*b^2*c^4*d*e^2*f - 384*a^5*b^2*c*g^2*i^2 - 192*a^5*b*c^2*f^2*i^2 - 48*a^4*b^3*c*g^2*h^2 - 16*a^4*b^3*c*f^2*i^2 + 80*a^3*b^3*c^2*f^3*h - 42*a^3*b^4*c*f^2*h^2 - 960*a^4*b*c^3*d^2*i^2 - 192*a^4*b*c^3*e^2*h^2 - 16*a^2*b^5*c*d^2*i^2 - 4*a^2*b^5*c*f^2*g^2 - 192*a^4*b^2*c^2*d*h^3 - 192*a^2*b^2*c^4*d^3*h + 128*a^3*b^3*c^2*e*g^3 - 192*a^3*b*c^4*e^2*f^2 + 60*a*b^5*c^2*d^2*g^2 + 198*a*b^4*c^3*d^2*f^2 + 144*a^2*b^3*c^3*d*f^3 - 960*a^2*b*c^5*d^2*e^2 + 240*a*b^3*c^4*d^2*e^2 + 256*a^6*c^2*f*h*i^2 + 16*a^4*b^4*g*h^2*i + 768*a^5*c^3*d*f*i^2 + 256*a^4*c^4*e^2*f*h - 192*a^6*b*c*h^2*i^2 - 192*a^4*c^4*d*f^2*h + 128*a^4*b^3*c*g^3*i + 16*b^6*c^2*d^2*e*g + 96*a^5*b*c^2*f*h^3 + 96*a^4*b*c^3*f^3*h + 80*a^4*b^3*c*f*h^3 + 6*a^2*b^5*c*f^3*h + 768*a^3*c^5*d*e^2*f + 512*a^3*b*c^4*e^3*g + 132*a*b^4*c^3*d^3*h - 28*a^3*b^4*c*d*h^3 + 12*a*b^6*c*d^2*h^2 + 2016*a^2*b*c^5*d^3*f - 496*a*b^3*c^4*d^3*f + 224*a^3*b*c^4*d*f^3 - 18*a*b^5*c^2*d*f^3 - 192*a^4*b^2*c^2*f^2*h^2 + 240*a^3*b^3*c^2*d^2*i^2 - 48*a^3*b^3*c^2*f^2*g^2 - 16*a^3*b^3*c^2*e^2*h^2 - 464*a^3*b^2*c^3*d^2*h^2 - 384*a^3*b^2*c^3*e^2*g^2 + 42*a^2*b^4*c^2*d^2*h^2 - 240*a^2*b^3*c^3*d^2*g^2 - 16*a^2*b^3*c^3*e^2*f^2 - 960*a^2*b^2*c^4*d^2*f^2 + 6*b^7*c*d^2*f*h + 512*a^6*b*c*g*i^3 - 2*a*b^7*d*f*h^2 - 16*a^5*b^3*h^2*i^2 - 1536*a^5*c^3*e^2*i^2 - 32*a^5*c^3*f^2*h^2 - 4*a^3*b^5*g^2*h^2 - 864*a^4*c^4*d^2*h^2 - 9*b^6*c^2*d^2*f^2 - 288*a^3*c^5*d^2*f^2 - 16*b^5*c^3*d^2*e^2 - 24*a^3*b^2*c^3*f^4 - 9*a^2*b^4*c^2*f^4 - 1024*a^6*c^2*e*i^3 - 1024*a^4*c^4*e^3*i - 10*b^6*c^2*d^3*h + 6*a^3*b^5*f*h^3 - 1728*a^3*c^5*d^3*h - 192*a^5*c^3*d*h^3 - 4*b^7*c*d^2*g^2 + 30*b^5*c^3*d^3*f + 6*a^2*b^6*d*h^3 - 24*a^5*b^2*c*h^4 - 16*a^3*b^4*c*g^4 + 360*a*b^2*c^5*d^4 - 16*a^6*c^2*h^4 - 9*a^4*b^4*h^4 - 16*a^4*c^4*f^4 - 256*a^3*c^5*e^4 - 25*b^4*c^4*d^4 - 1296*a^2*c^6*d^4 - a^2*b^6*f^2*h^2 - 256*a^7*c*i^4 - b^8*d^2*h^2, z, 1)*((x*(2048*a^5*c^6*e + 2048*a^6*c^5*i - 32*a^2*b^6*c^3*e + 384*a^3*b^4*c^4*e - 1536*a^4*b^2*c^5*e + 16*a^2*b^7*c^2*g - 192*a^3*b^5*c^3*g + 768*a^4*b^3*c^4*g - 32*a^3*b^6*c^2*i + 384*a^4*b^4*c^3*i - 1536*a^5*b^2*c^4*i - 1024*a^5*b*c^5*g))/(4*(a^2*b^6 - 64*a^5*c^3 - 12*a^3*b^4*c + 48*a^4*b^2*c^2)) - (6144*a^5*c^6*d + 2048*a^6*c^5*h - 288*a^2*b^6*c^3*d + 1920*a^3*b^4*c^4*d - 5632*a^4*b^2*c^5*d + 16*a^2*b^7*c^2*f - 192*a^3*b^5*c^3*f + 768*a^4*b^3*c^4*f - 32*a^3*b^6*c^2*h + 384*a^4*b^4*c^3*h - 1536*a^5*b^2*c^4*h + 16*a*b^8*c^2*d - 1024*a^5*b*c^5*f)/(8*(a^2*b^6 - 64*a^5*c^3 - 12*a^3*b^4*c + 48*a^4*b^2*c^2)) + (root(1572864*a^8*b^2*c^6*z^4 - 983040*a^7*b^4*c^5*z^4 + 327680*a^6*b^6*c^4*z^4 - 61440*a^5*b^8*c^3*z^4 + 6144*a^4*b^10*c^2*z^4 - 256*a^3*b^12*c*z^4 - 1048576*a^9*c^7*z^4 + 32768*a^7*b*c^4*g*i*z^2 - 512*a^4*b^7*c*g*i*z^2 + 192*a^3*b^8*c*f*h*z^2 + 57344*a^6*b*c^5*d*h*z^2 + 32768*a^6*b*c^5*e*g*z^2 + 96*a^2*b^9*c*d*h*z^2 - 32*a*b^10*c*d*f*z^2 - 24576*a^6*b^3*c^3*g*i*z^2 + 6144*a^5*b^5*c^2*g*i*z^2 + 49152*a^6*b^2*c^4*e*i*z^2 - 12288*a^5*b^4*c^3*e*i*z^2 + 6144*a^5*b^4*c^3*f*h*z^2 - 2048*a^4*b^6*c^2*f*h*z^2 + 1024*a^4*b^6*c^2*e*i
\end{aligned}$$

$$\begin{aligned}
& *z^2 - 49152*a^5*b^3*c^4*d*h*z^2 - 24576*a^5*b^3*c^4*e*g*z^2 + 15360*a^4*b^5*c^3*d*h*z^2 + 6144*a^4*b^5*c^3*e*g*z^2 - 2048*a^3*b^7*c^2*d*h*z^2 - 512*a^3*b^7*c^2*e*g*z^2 + 24576*a^5*b^2*c^5*d*f*z^2 - 3072*a^3*b^6*c^3*d*f*z^2 + \\
& 2048*a^4*b^4*c^4*d*f*z^2 + 576*a^2*b^8*c^2*d*f*z^2 + 512*a^5*b^6*c^3*i^2*z^2 + 12288*a^7*b*c^4*h^2*z^2 + 128*a^3*b^8*c^2*g^2*z^2 + 12288*a^6*b*c^5*f^2*z^2 - \\
& 16*a^2*b^9*c*f^2*z^2 + 61440*a^5*b*c^6*d^2*z^2 + 432*a*b^9*c^2*d^2*z^2 - 65536*a^7*c^5*e*i*z^2 - 16384*a^7*c^5*f*h*z^2 - 49152*a^6*c^6*d*f*z^2 + 2 \\
& 4576*a^7*b^2*c^3*i^2*z^2 - 6144*a^6*b^4*c^2*i^2*z^2 - 8192*a^6*b^3*c^3*h^2*z^2 + 1536*a^5*b^5*c^2*h^2*z^2 - 8192*a^6*b^2*c^4*g^2*z^2 + 6144*a^5*b^4*c^3*g^2*z^2 - \\
& 1536*a^4*b^6*c^2*g^2*z^2 - 8192*a^5*b^3*c^4*f^2*z^2 + 1536*a^4*b^5*c^3*f^2*z^2 + 24576*a^5*b^2*c^5*e^2*z^2 - 6144*a^4*b^4*c^4*e^2*z^2 + 512*a^3*b^6*c^3*e^2*z^2 - \\
& 61440*a^4*b^3*c^5*d^2*z^2 + 24064*a^3*b^5*c^4*d^2*z^2 - 4608*a^2*b^7*c^3*d^2*z^2 - 32768*a^8*c^4*i^2*z^2 - 16*a^3*b^9*h^2*z^2 - 32768*a^6*c^6*e^2*z^2 - \\
& 16*b^11*c*d^2*z^2 - 192*a^3*b^6*c*d*h*i*z - 6144*a^5*b*c^4*d*g*h*z - 4096*a^5*b*c^4*d*f*i*z + 96*a^2*b^7*c*d*g*h*z + 64*a^2*b^7*c*d*f*i*z - 4096*a^4*b*c^5*d*e*f*z + \\
& 64*a*b^7*c^2*d*e*f*z - 32*a*b^8*c*d*f*g*z - 9216*a^5*b^2*c^3*d*h*i*z + 2304*a^4*b^4*c^2*d*h*i*z + 4608*a^4*b^3*c^3*d*g*h*z + 3072*a^4*b^3*c^3*d*f*i*z - 1152*a^3*b^5*c^2*d*g*h*z - \\
& 768*a^3*b^5*c^2*d*f*i*z - 9216*a^4*b^2*c^4*d*e*h*z + 2304*a^3*b^4*c^3*d*e*h*z + 2048*a^4*b^2*c^4*d*f*g*z - 1536*a^3*b^4*c^3*d*f*g*z + 384*a^2*b^6*c^2*d*f*g*z - \\
& 192*a^2*b^6*c^2*d*e*h*z + 3072*a^3*b^3*c^4*d*e*f*z - 768*a^2*b^5*c^3*d*e*f*z + 384*a^5*b^4*c^3*h^2*i*z - 1024*a^6*b*c^3*g*h^2*z - 192*a^4*b^5*c*g*h^2*z + \\
& 32*a^3*b^6*c*f^2*i*z + 1024*a^5*b*c^4*f^2*g*z - 32*a^3*b^6*c*e*h^2*z - 16*a^2*b^7*c*f^2*g*z - 9216*a^4*b*c^5*d^2*g*z + 336*a*b^7*c^2*d^2*g*z - 672*a*b^6*c^3*d^2*e*z + \\
& 12288*a^6*c^4*d*h*i*z + 12288*a^5*c^5*d*e*h*z + 32*a*b^8*c*d^2*i*z - 1536*a^6*b^2*c^2*h^2*i*z + 1536*a^5*b^2*c^3*f^2*i*z + 768*a^5*b^3*c^2*g*h^2*z - 384*a^4*b^4*c^2*f^2*i*z - \\
& 15872*a^4*b^2*c^4*d^2*i*z + 4992*a^3*b^4*c^3*d^2*i*z - 1536*a^5*b^2*c^3*e*h^2*z - 768*a^4*b^3*c^3*f^2*g*z - 672*a^2*b^6*c^2*d^2*i*z + 384*a^4*b^4*c^2*e*h^2*z + 192*a^3*b^5*c^2*f^2*g*z + \\
& 7936*a^3*b^3*c^4*d^2*g*z - 2496*a^2*b^5*c^3*d^2*g*z + 1536*a^4*b^2*c^4*e*f^2*z - 384*a^3*b^4*c^3*e*f^2*z + 32*a^2*b^6*c^2*e*f^2*z - 15872*a^3*b^2*c^5*d^2*e*z + \\
& 4992*a^2*b^4*c^4*d^2*e*z + 2048*a^7*c^3*h^2*i*z - 32*a^4*b^6*h^2*i*z - 2048*a^6*c^4*f^2*i*z + 16*a^3*b^7*g*h^2*z + 18432*a^5*c^5*d^2*i*z + 2048*a^6*c^4*e*h^2*z - 2048*a^5*c^5*e*f^2*z + \\
& 32*b^8*c^2*d^2*e*z + 18432*a^4*c^6*d^2*e*z - 16*b^9*c*d^2*g*z - 256*a^5*b*c^2*f*g*h*i - 192*a^4*b^3*c*f*g*h*i - 96*a^3*b^4*c*d*g*h*i - 1792*a^4*b*c^3*d*e*h*i - 768*a^4*b*c^3*d*f*g*i - \\
& 256*a^4*b*c^3*e*f*g*h + 32*a^2*b^5*c*d*f*g*i - 768*a^3*b*c^4*d*e*f*g + 32*a*b^5*c^2*d*e*f*g + 896*a^4*b^2*c^2*d*g*h*i + 384*a^4*b^2*c^2*e*f*h*i - 192*a^3*b^3*c^2*e*f*g*h - 192*a^3*b^3*c^2*d*f*g*i + \\
& 192*a^3*b^3*c^2*d*e*h*i + 896*a^3*b^2*c^3*d*e*g*h + 384*a^3*b^2*c^3*d*e*f*i - 96*a^2*b^4*c^2*d*e*g*h - 64*a^2*b^4*c^2*d*e*f*i - 192*a^2*b^3*c^3*d*e*f*g + 192*a^5*b^2*c^3*g*h^2*i + 192*a^5*b^2*c^3*f*h^2*i - 384*a^5*b*c^2*e*h^2*i - 32*a^4*b^3*c^3*e*h^2*i + 16*a^3*b^4*c^3*f^2*g*i + 1536*a^5*b*c^2*e*g*i^2 + 1536*a^4*b*c^3*e^2*g*i - 896*a^5*b*c^2*d*h^2*i + 96*a^4*b^3*c^2*d*h^2*i + 48*a^3*b^4*c^2*f*g^2*h - 384*a^4*b*c^3*e*f^2*i + 16*a^3*b^4*c^2*e*g*h^2 - 32*a^3*b^4*c^2*d*f^2*i + 2
\end{aligned}$$

$$\begin{aligned}
& 4a^2b^5c^2d^2g^2h + 2208a^3b^4c^2d^2f^2h - 1920a^3b^4c^2d^2e^2i + 800 \\
& a^4b^3c^2d^2f^2h^2 - 102a^4b^5c^2d^2f^2h - 32a^4b^5c^2d^2e^2i - 30a^2b^5c^2d^2f^2h^2 - 896a^3b^4c^2d^2e^2h - 240a^4b^4c^3d^2e^2g - 32a^4b^4c^3d^2e^2f + 512a^5c^3e^2f^2h^2i + 1536a^4c^4d^2e^2f^2i + 16a^4b^6c^2d^2g^2i \\
& + 12a^4b^6c^2d^2f^2h - 8a^4b^6c^2d^2f^2g^2 + 192a^4b^2c^2f^2g^2i - 768a^4b^2c^2e^2g^2i + 64a^4b^2c^2f^2g^2h + 960a^3b^2c^3d^2g^2i - 240 \\
& a^2b^4c^2d^2g^2i + 192a^4b^2c^2e^2g^2h^2 - 32a^3b^3c^2e^2f^2i - 24a^3b^3c^2d^2g^2h + 192a^4b^2c^2d^2f^2i^2 + 192a^3b^2c^3e^2f^2h \\
& - 864a^3b^2c^3d^2f^2h + 480a^2b^3c^3d^2e^2i + 336a^3b^3c^2d^2f^2h^2 + 192a^3b^2c^3e^2f^2g + 144a^2b^3c^3d^2f^2h + 16a^2b^4c^2e^2f^2g - 12a^2b^4c^2d^2f^2h + 192a^3b^2c^3d^2f^2g^2 + 96a^2b^3c^3d^2e^2h + 48a^2b^4c^2d^2f^2g^2 + 960a^2b^2c^4d^2e^2g + 192a^2b^2c^4d^2e^2f - 384a^5b^2c^2g^2i^2 - 192a^5b^2c^2f^2i^2 - 48a^4b^3c^2g^2h^2 - 16a^4b^3c^2f^2i^2 + 80a^3b^3c^2f^2h^3 - 42a^3b^4c^2f^2h^2 - 960a^4b^3c^3d^2i^2 - 192a^4b^3c^3e^2h^2 - 16a^2b^5c^2d^2i^2 - 4a^2b^5c^2f^2g^2 - 192a^4b^2c^2d^2h^3 - 192a^2b^2c^4d^3h + 128a^3b^3c^2e^2g^3 - 192a^3b^3c^4e^2f^2 + 60a^4b^5c^2d^2g^2 + 198a^4b^4c^3d^2f^2 + 144a^2b^3c^3d^2f^3 - 960a^2b^3c^5d^2e^2 + 240a^4b^3c^4d^2e^2 + 256a^6c^2f^2h^2i^2 + 16a^4b^4g^2h^2i + 768a^5c^3d^2f^2i^2 + 256a^4c^4e^2f^2h - 192a^6b^2c^2h^2i^2 - 192a^4c^4d^2f^2h + 128a^4b^3c^2g^3i + 16b^6c^2d^2e^2g + 96a^5b^2c^2f^2h^3 + 96a^4b^3c^3f^2h + 80a^4b^3c^3f^2h^3 + 6a^2b^5c^2f^3h + 768a^3c^5d^2e^2f + 512a^3b^4c^4e^3g + 132a^4b^4c^3d^3h - 28a^3b^4c^2d^3h + 12a^4b^6c^2d^2h^2 + 2016a^2b^3c^5d^3f - 496a^4b^3c^4d^3f + 224a^3b^3c^4d^2f^3 - 18a^4b^5c^2d^2f^3 - 192a^4b^2c^2f^2h^2 + 240a^3b^3c^2d^2i^2 - 48a^3b^3c^2f^2g^2 - 16a^3b^3c^2e^2h^2 - 464a^3b^2c^3d^2h^2 - 384a^3b^2c^3e^2g^2 + 42a^2b^4c^2d^2h^2 - 240a^2b^3c^3d^2g^2 - 16a^2b^3c^3e^2f^2 - 960a^2b^2c^4d^2f^2 + 6b^7c^2d^2f^2h + 512a^6b^2c^2g^2i^3 - 2a^4b^7d^2f^2h^2 - 16a^5b^3h^2i^2 - 1536a^5c^3e^2i^2 - 32a^5c^3f^2h^2 - 4a^3b^5g^2h^2 - 864a^4c^4d^2h^2 - 9b^6c^2d^2f^2 - 288a^3c^5d^2f^2 - 16b^5c^3d^2e^2 - 24a^3b^2c^3f^4 - 9a^2b^4c^2f^4 - 1024a^6c^2e^2i^3 - 1024a^4c^4e^3i - 10b^6c^2d^3h + 6a^3b^5f^2h^3 - 1728a^3c^5d^3h - 192a^5c^3d^2h^3 - 4b^7c^2d^2g^2 + 30b^5c^3d^3f + 6a^2b^6d^2h^3 - 24a^5b^2c^2h^4 - 16a^3b^4c^2g^4 + 360a^4b^2c^5d^4 - 16a^6c^2h^4 - 9a^4b^4h^4 - 16a^4c^4f^4 - 256a^3c^5e^4 - 25b^4c^4d^4 - 1296a^2c^6d^4 - a^2b^6f^2h^2 - 256a^7c^2i^4 - b^8d^2h^2, z, 1) * x * (8192a^6b^2c^6 + 32a^2b^9c^2 - 512a^3b^7c^3 + 3072a^4b^5c^4 - 8192a^5b^3c^5) / (4(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2)) + (x * (2b^6c^3d^2 - 576a^3c^6d^2 + 64a^4c^5f^2 - 64a^5c^4h^2 - 36a^4b^4c^4d^2 + 128a^3b^3c^5e^2 + 2a^2b^6c^2h^2 + 128a^5b^3c^3i^2 + 256a^2b^2c^5d^2 - 32a^2b^3c^4e^2 + 20a^2b^4c^3f^2 - 96a^3b^2c^4f^2 - 8a^2b^5c^2g^2 + 32a^3b^3c^3g^2 - 4a^3b^4c^2h^2 - 32a^4b^3c^2i^2 - 384a^4c^5d^2h + 4a^4b^5c^3d^2f + 320a^3b^3c^5d^2f + 256a^4b^3c^4e^2i + 64a^4b^3c^4f^2h - 96a^2b^3c^4d^2f + 8a^2b^4c^3d^2h + 32a^2b^4c^3e^2g + 64a^3b^2c^4d^2h - 12
\end{aligned}$$



$$\begin{aligned}
& 8a^3b^2c^4e*g - 12a^2b^5c^2*f*h - 64a^3b^3c^3*e*i + 32a^3b^3c^3*f*h + 32a^3b^4c^2*g*i - 128a^4b^2c^3*g*i) / (4*(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2)) - (x*(32a^2c^5e^3 + 32a^5c^2i^3 - 2b^3c^4d^2e + b^4c^3d^2g + 96a^3c^4e^2i + 96a^4c^3e*i^2 - 4a^2b^3c^2g^3 + 24a*b*c^5d^2e - 48a^2c^5d*e*f - 48a^3c^4d*f*i - 16a^3c^4e*f*h - 16a^4c^3f*h*i - 12a*b^2c^4d^2g + 16a^2b*c^4e*f^2 - 48a^2b*c^4e^2g - 2a*b^3c^3d^2i + 24a^2b*c^4d^2i + 8a^3b*c^3e*h^2 - a^2b^4c*g*h^2 + 16a^3b*c^3f^2i - 48a^4b*c^2g*i^2 + 2a^3b^3c*h^2i + 8a^4b*c^2h^2i + 24a^2b^2c^3e*g^2 - 8a^2b^2c^3f^2g + 2a^2b^3c^2e*h^2 - 4a^3b^2c^2g*h^2 + 24a^3b^2c^2g^2i - 4a*b^2c^4d*e*f + 2a*b^3c^3d*f*g + 32a^2b*c^4d*e*h + 24a^2b*c^4d*f*g + 32a^3b*c^3d*h*i - 96a^3b*c^3e*g*i + 8a^3b*c^3f*g*h - 4a^2b^2c^3d*f*i - 16a^2b^2c^3d*g*h - 12a^2b^2c^3e*f*h + 6a^2b^3c^2f*g*h - 12a^3b^2c^2f*h*i) / (4*(a^2b^6 - 64a^5c^3 - 12a^3b^4c + 48a^4b^2c^2)) * root(1572864a^8b^2c^6z^4 - 983040a^7b^4c^5z^4 + 327680a^6b^6c^4z^4 - 61440a^5b^8c^3z^4 + 6144a^4b^10c^2z^4 - 256a^3b^12c*z^4 - 1048576a^9c^7z^4 + 32768a^7b*c^4g*i*z^2 - 512a^4b^7*c*g*i*z^2 + 192a^3b^8*c*f*h*z^2 + 57344a^6b*c^5d*h*z^2 + 32768a^6b*c^5e*g*z^2 + 96a^2b^9*c*d*h*z^2 - 32a*b^10*c*d*f*z^2 - 24576a^6b^3c^3g*i*z^2 + 6144a^5b^5c^2g*i*z^2 + 49152a^6b^2c^4e*i*z^2 - 12288a^5b^4c^3e*i*z^2 + 6144a^5b^4c^3f*h*z^2 - 2048a^4b^6c^2f*h*z^2 + 1024a^4b^6c^2e*i*z^2 - 49152a^5b^3c^4d*h*z^2 - 24576a^5b^3c^4e*g*z^2 + 15360a^4b^5c^3d*h*z^2 + 6144a^4b^5c^3e*g*z^2 - 2048a^3b^7c^2d*h*z^2 - 512a^3b^7c^2e*g*z^2 + 24576a^5b^2c^5d*f*z^2 - 3072a^3b^6c^3d*f*z^2 + 2048a^4b^4c^4d*f*z^2 + 576a^2b^8c^2d*f*z^2 + 512a^5b^6c*i^2z^2 + 12288a^7b*c^4h^2z^2 + 128a^3b^8c*g^2z^2 + 12288a^6b*c^5f^2z^2 - 16a^2b^9c*f^2z^2 + 61440a^5b*c^6d^2z^2 + 432a*b^9c^2d^2z^2 - 65536a^7c^5e*i*z^2 - 16384a^7c^5f*h*z^2 - 49152a^6c^6d*f*z^2 + 24576a^7b^2c^3i^2z^2 - 6144a^6b^4c^2i^2z^2 - 8192a^6b^3c^3h^2z^2 + 1536a^5b^5c^2h^2z^2 - 8192a^6b^2c^4g^2z^2 + 6144a^5b^4c^3g^2z^2 - 1536a^4b^6c^2g^2z^2 - 8192a^5b^3c^4f^2z^2 + 1536a^4b^5c^3f^2z^2 + 24576a^5b^2c^5e^2z^2 - 6144a^4b^4c^4e^2z^2 + 512a^3b^6c^3e^2z^2 - 61440a^4b^3c^5d^2z^2 + 24064a^3b^5c^4d^2z^2 - 4608a^2b^7c^3d^2z^2 - 32768a^8c^4i^2z^2 - 16a^3b^9h^2z^2 - 32768a^6c^6e^2z^2 - 16b^11c*d^2z^2 - 192a^3b^6c*d*h*i*z - 6144a^5b*c^4d*g*h*z - 4096a^5b*c^4d*f*i*z + 96a^2b^7c*d*g*h*z + 64a^2b^7c*d*f*i*z - 4096a^4b*c^5d*e*f*z + 64a*b^7c^2d*e*f*z - 32a*b^8c*d*f*g*z - 9216a^5b^2c^3d*h*i*z + 2304a^4b^4c^2d*h*i*z + 4608a^4b^3c^3d*g*h*z + 3072a^4b^3c^3d*f*i*z - 1152a^3b^5c^2d*g*h*z - 768a^3b^5c^2d*f*i*z - 9216a^4b^2c^4d*e*h*z + 2304a^3b^4c^3d*e*h*z + 2048a^4b^2c^4d*f*g*z - 1536a^3b^4c^3d*f*g*z + 384a^2b^6c^2d*f*g*z - 192a^2b^6c^2d*e*h*z + 3072a^3b^3c^4d*e*f*z - 768a^2b^5c^3d*e*f*z + 384a^5b^4c*h^2i*z - 1024a^6b*c^3g*h^2z - 192a^4b^5c*g*h^2z + 32a^3b^6c*f^2i*z + 1024a^5b*c^4f^2g*z - 32a^3b^6c*e*h^2z - 16a^2b^7c*f^2g*z - 9216a^4b*c^5d^2g*z + 336a
\end{aligned}$$

$$\begin{aligned}
& *b^7*c^2*d^2*g*z - 672*a*b^6*c^3*d^2*e*z + 12288*a^6*c^4*d*h*i*z + 12288*a^5*c^5*d*e*h*z + 32*a*b^8*c*d^2*i*z - 1536*a^6*b^2*c^2*h^2*i*z + 1536*a^5*b^2*c^3*f^2*i*z + 768*a^5*b^3*c^2*g*h^2*z - 384*a^4*b^4*c^2*f^2*i*z - 15872*a^4*b^2*c^4*d^2*i*z + 4992*a^3*b^4*c^3*d^2*i*z - 1536*a^5*b^2*c^3*e*h^2*z - 768*a^4*b^3*c^3*f^2*g*z - 672*a^2*b^6*c^2*d^2*i*z + 384*a^4*b^4*c^2*e*h^2*z + 192*a^3*b^5*c^2*f^2*g*z + 7936*a^3*b^3*c^4*d^2*g*z - 2496*a^2*b^5*c^3*d^2*g*z + 1536*a^4*b^2*c^4*e*f^2*z - 384*a^3*b^4*c^3*e*f^2*z + 32*a^2*b^6*c^2*e*f^2*z - 15872*a^3*b^2*c^5*d^2*e*z + 4992*a^2*b^4*c^4*d^2*e*z + 2048*a^7*c^3*h^2*i*z - 32*a^4*b^6*h^2*i*z - 2048*a^6*c^4*f^2*i*z + 16*a^3*b^7*g*h^2*z + 18432*a^5*c^5*d^2*i*z + 2048*a^6*c^4*e*h^2*z - 2048*a^5*c^5*e*f^2*z + 32*b^8*c^2*d^2*e*z + 18432*a^4*c^6*d^2*e*z - 16*b^9*c*d^2*g*z - 256*a^5*b*c^2*f*g*h*i - 192*a^4*b^3*c*f*g*h*i - 96*a^3*b^4*c*d*g*h*i - 1792*a^4*b*c^3*d*e*h*i - 768*a^4*b*c^3*d*f*g*i - 256*a^4*b*c^3*e*f*g*h + 32*a^2*b^5*c*d*f*g*i - 768*a^3*b*c^4*d*e*f*g + 32*a*b^5*c^2*d*e*f*g + 896*a^4*b^2*c^2*d*g*h*i + 384*a^4*b^2*c^2*e*f*h*i - 192*a^3*b^3*c^2*e*f*g*h - 192*a^3*b^3*c^2*d*f*g*i + 192*a^3*b^3*c^2*d*e*h*i + 896*a^3*b^2*c^3*d*e*g*h + 384*a^3*b^2*c^3*d*e*f*i - 96*a^2*b^4*c^2*d*e*g*h - 64*a^2*b^4*c^2*d*e*f*i - 192*a^2*b^3*c^3*d*e*f*g + 192*a^5*b^2*c*g*h^2*i + 192*a^5*b^2*c*f*h^2*i - 384*a^5*b*c^2*e*h^2*i - 32*a^4*b^3*c*e*h^2*i + 16*a^3*b^4*c*f^2*g*i + 1536*a^5*b*c^2*e*g*i^2 + 1536*a^4*b*c^3*e^2*g*i - 896*a^5*b*c^2*d*h^2*i + 96*a^4*b^3*c*d*h^2*i + 48*a^3*b^4*c*f*g^2*h - 384*a^4*b*c^3*e*f^2*i + 16*a^3*b^4*c*e*g*h^2 - 32*a^3*b^4*c*d*f*i^2 + 24*a^2*b^5*c*d*g^2*h + 2208*a^3*b*c^4*d^2*f*h - 1920*a^3*b*c^4*d^2*e*i + 800*a^4*b*c^3*d*f*h^2 - 102*a*b^5*c^2*d^2*f*h - 32*a*b^5*c^2*d^2*e*i - 30*a^2*b^5*c*d*f*h^2 - 896*a^3*b*c^4*d*e^2*h - 240*a*b^4*c^3*d^2*e*g - 32*a*b^4*c^3*d*e^2*f + 512*a^5*c^3*e*f*h^2*i + 1536*a^4*c^4*d*e*f*i + 16*a*b^6*c*d^2*g*i + 12*a*b^6*c*d*f^2*h - 8*a*b^6*c*d*f*g^2 + 192*a^4*b^2*c^2*f^2*g*i - 768*a^4*b^2*c^2*e*g^2*i + 64*a^4*b^2*c^2*f*g^2*h + 960*a^3*b^2*c^3*d^2*g*i - 240*a^2*b^4*c^2*d^2*g*i + 192*a^4*b^2*c^2*e*g*h^2 - 32*a^3*b^3*c^2*e*f^2*i - 224*a^3*b^3*c^2*d*g^2*h + 192*a^4*b^2*c^2*d*f*i^2 + 192*a^3*b^2*c^3*e^2*f*h - 864*a^3*b^2*c^3*d*f^2*h + 480*a^2*b^3*c^3*d^2*e*i + 336*a^3*b^3*c^2*d*f*h^2 + 192*a^3*b^2*c^3*e*f^2*g + 144*a^2*b^3*c^3*d^2*f*h + 16*a^2*b^4*c^2*e*f^2*g - 12*a^2*b^4*c^2*d*f^2*h + 192*a^3*b^2*c^3*d*f*g^2 + 96*a^2*b^3*c^3*d*e^2*h + 48*a^2*b^4*c^2*d*f*g^2 + 960*a^2*b^2*c^4*d^2*e*g + 192*a^2*b^2*c^4*d*e^2*f - 384*a^5*b^2*c*g^2*i^2 - 192*a^5*b*c^2*f^2*i^2 - 48*a^4*b^3*c*g^2*h^2 - 16*a^4*b^3*c*f^2*i^2 + 80*a^3*b^3*c^2*f^3*h - 42*a^3*b^4*c*f^2*h^2 - 960*a^4*b*c^3*d^2*i^2 - 192*a^4*b*c^3*e^2*h^2 - 16*a^2*b^5*c*d^2*i^2 - 4*a^2*b^5*c*f^2*g^2 - 192*a^4*b^2*c^2*d*h^3 - 192*a^2*b^2*c^4*d^3*h + 128*a^3*b^3*c^2*e*g^3 - 192*a^3*b*c^4*e^2*f^2 + 60*a*b^5*c^2*d^2*g^2 + 198*a*b^4*c^3*d^2*f^2 + 144*a^2*b^3*c^3*d*f^3 - 960*a^2*b*c^5*d^2*e^2 + 240*a*b^3*c^4*d^2*e^2 + 256*a^6*c^2*f*h^2*i + 16*a^4*b^4*g*h^2*i + 768*a^5*c^3*d*f*i^2 + 256*a^4*c^4*e^2*f*h - 192*a^6*b*c*h^2*i^2 - 192*a^4*c^4*d*f^2*h + 128*a^4*b^3*c*g^3*i + 16*b^6*c^2*d^2*e*g + 96*a^5*b*c^2*f*h^3 + 96*a^4*b*c^3*f^3*h + 80*a^4*b^3*c*f*h^3 + 6*a^2*b^5*c*f^3*h + 768*a^3*c^5*d*e^2*f + 512*a^3*b*c^4*e^3*g + 132*a*b^4*c^3*d^3*h - 28*a^3*b^4*c*d*h^3 + 12*a*b^6*c*d^2*h^2 + 2016*a^2*b*c^5*d^3*f - 496*a*b^3*c^4*d^3*f + 224*a^3*b*c^4
\end{aligned}$$

$$\begin{aligned}
& *d*f^3 - 18*a*b^5*c^2*d*f^3 - 192*a^4*b^2*c^2*f^2*h^2 + 240*a^3*b^3*c^2*d^2 \\
& *i^2 - 48*a^3*b^3*c^2*f^2*g^2 - 16*a^3*b^3*c^2*e^2*h^2 - 464*a^3*b^2*c^3*d^2 \\
& *h^2 - 384*a^3*b^2*c^3*e^2*g^2 + 42*a^2*b^4*c^2*d^2*h^2 - 240*a^2*b^3*c^3* \\
& d^2*g^2 - 16*a^2*b^3*c^3*e^2*f^2 - 960*a^2*b^2*c^4*d^2*f^2 + 6*b^7*c*d^2*f* \\
& h + 512*a^6*b*c*g*i^3 - 2*a*b^7*d*f*h^2 - 16*a^5*b^3*h^2*i^2 - 1536*a^5*c^3 \\
& *e^2*i^2 - 32*a^5*c^3*f^2*h^2 - 4*a^3*b^5*g^2*h^2 - 864*a^4*c^4*d^2*h^2 - 9 \\
& *b^6*c^2*d^2*f^2 - 288*a^3*c^5*d^2*f^2 - 16*b^5*c^3*d^2*e^2 - 24*a^3*b^2*c^ \\
& 3*f^4 - 9*a^2*b^4*c^2*f^4 - 1024*a^6*c^2*e*i^3 - 1024*a^4*c^4*e^3*i - 10*b^ \\
& 6*c^2*d^3*h + 6*a^3*b^5*f*h^3 - 1728*a^3*c^5*d^3*h - 192*a^5*c^3*d*h^3 - 4* \\
& b^7*c*d^2*g^2 + 30*b^5*c^3*d^3*f + 6*a^2*b^6*d*h^3 - 24*a^5*b^2*c*h^4 - 16* \\
& a^3*b^4*c*g^4 + 360*a*b^2*c^5*d^4 - 16*a^6*c^2*h^4 - 9*a^4*b^4*h^4 - 16*a^4 \\
& *c^4*f^4 - 256*a^3*c^5*e^4 - 25*b^4*c^4*d^4 - 1296*a^2*c^6*d^4 - a^2*b^6*f^ \\
& 2*h^2 - 256*a^7*c*i^4 - b^8*d^2*h^2, z, 1), 1, 1, 4)
\end{aligned}$$

$$3.41 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+jx^5+kx^6+lx^7+mx^8}{(a+bx^2+cx^4)^2} dx$$

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### Optimal result

Integrand size = 55, antiderivative size = 770

$$\begin{aligned} & \int \frac{d+ex+fx^2+gx^3+hx^4+jx^5+kx^6+lx^7+mx^8}{(a+bx^2+cx^4)^2} dx \\ &= \frac{mx}{c^2} - \frac{bc(ce+aj) - ab^2l - 2ac(cg-al) + (2c^3e - c^2(bg+2aj) - b^3l + bc(bj+3al))x^2}{2c^2(b^2-4ac)(a+bx^2+cx^4)} \\ & \quad - \frac{x(abc(cf+ak) - b^2(c^2d+a^2m) + 2ac(c^2d-ach+a^2m) + (ab^2ck + 2ac^2(cf-ak) - ab^3m - bc(c^2d + \\ & \quad - \frac{(ab^2ck - 2ac^2(cf+3ak) - 3ab^3m + bc(c^2d+ach+13a^2m) - \frac{ab^3ck-4abc^2(cf+2ak)-3ab^4m-b^2c(c^2d-ach-19a^2m)}{\sqrt{b^2-4ac}}}{2ac^2(b^2-4ac)(a+bx^2+cx^4)} \\ & \quad + \frac{(ab^2ck - 2ac^2(cf+3ak) - 3ab^3m + bc(c^2d+ach+13a^2m) - \frac{ab^3ck-4abc^2(cf+2ak)-3ab^4m-b^2c(c^2d-ach-19a^2m)}{\sqrt{b^2-4ac}}}{2\sqrt{2}ac^{5/2}(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} \\ & \quad + \frac{(ab^2ck - 2ac^2(cf+3ak) - 3ab^3m + bc(c^2d+ach+13a^2m) + \frac{ab^3ck-4abc^2(cf+2ak)-3ab^4m-b^2c(c^2d-ach-19a^2m)}{\sqrt{b^2-4ac}}}{2\sqrt{2}ac^{5/2}(b^2-4ac)\sqrt{b+\sqrt{b^2-4ac}}} \\ & \quad + \frac{(4c^3e - c^2(2bg-4aj) + b^3l - 6abcl) \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{2c^2(b^2-4ac)^{3/2}} + \frac{l \log(a+bx^2+cx^4)}{4c^2} \end{aligned}$$

```
[Out] m*x/c^2+1/2*(-b*c*(a*j+c*e)+a*b^2*l+2*a*c*(-a*l+c*g)-(2*c^3*e-c^2*(2*a*j+b*
g)-b^3*l+b*c*(3*a*l+b*j))*x^2)/c^2/(-4*a*c+b^2)/(c*x^4+b*x^2+a)-1/2*x*(a*b*
c*(a*k+c*f)-b^2*(a^2*m+c^2*d)+2*a*c*(a^2*m-a*c*h+c^2*d)+(a*b^2*c*k+2*a*c^2*
(-a*k+c*f)-a*b^3*m-b*c*(-3*a^2*m+a*c*h+c^2*d))*x^2)/a/c^2/(-4*a*c+b^2)/(c*x
^4+b*x^2+a)+1/2*(4*c^3*e-c^2*(-4*a*j+2*b*g)+b^3*l-6*a*b*c*l)*arctanh((2*c*x
^2+b)/(-4*a*c+b^2)^(1/2))/c^2/(-4*a*c+b^2)^(3/2)+1/4*l*ln(c*x^4+b*x^2+a)/c^
2+1/4*arctan(x^2^(1/2)*c^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2))*(a*b^2*c*k-2*a
*c^2*(3*a*k+c*f)-3*a*b^3*m+b*c*(13*a^2*m+a*c*h+c^2*d)+(-a*b^3*c*k+4*a*b*c^2
*(2*a*k+c*f)+3*a*b^4*m+b^2*c*(-19*a^2*m-a*c*h+c^2*d)-4*a*c^2*(-5*a^2*m+a*c*
h+3*c^2*d))/(-4*a*c+b^2)^(1/2))/a/c^(5/2)/(-4*a*c+b^2)*2^(1/2)/(b-(-4*a*c+b
```

$$\begin{aligned} & \left( \frac{d+ex+fx^2+gx^3+hx^4+jx^5+kx^6+lx^7+mx^8}{(a+bx^2+cx^4)^2} \right) dx \\ & = \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left( \frac{-b^2c(-19a^2m-ach+c^2d)+4ac^2(-5a^2m+ach+3c^2d)-3ab^4m+ab^3ck-4abc^2(2ak+cf)}{\sqrt{b^2-4ac}} \right) + bc(13a^2m+ac^2d)}{2\sqrt{2}ac^{5/2}(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} \\ & + \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left( \frac{-b^2c(-19a^2m-ach+c^2d)+4ac^2(-5a^2m+ach+3c^2d)-3ab^4m+ab^3ck-4abc^2(2ak+cf)}{\sqrt{b^2-4ac}} \right) + bc(13a^2m+ac^2d)}{2\sqrt{2}ac^{5/2}(b^2-4ac)\sqrt{\sqrt{b^2-4ac}+b}} \\ & - \frac{x(-(b^2(a^2m+c^2d))+x^2(-bc(-3a^2m+ach+c^2d)-ab^3m+ab^2ck+2ac^2(cf-ak))+2ac(a^2m-ac^2d))}{2ac^2(b^2-4ac)(a+bx^2+cx^4)} \\ & + \frac{\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right) (-c^2(2bg-4aj)-6abcl+b^3l+4c^3e)}{2c^2(b^2-4ac)^{3/2}} \\ & - \frac{x^2(-c^2(2aj+bg)+bc(3al+bj)+b^3(-l)+2c^3e)-ab^2l+bc(aj+ce)-2ac(CG-al)}{2c^2(b^2-4ac)(a+bx^2+cx^4)} \\ & + \frac{l \log(a+bx^2+cx^4)}{4c^2} + \frac{mx}{c^2} \end{aligned}$$

## Rubi [A] (verified)

Time = 4.43 (sec) , antiderivative size = 770, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 11,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$ , Rules used = {1687, 1692, 1690, 1180, 211, 1677, 1674, 648, 632, 212, 642}

$$\begin{aligned} & \int \frac{d+ex+fx^2+gx^3+hx^4+jx^5+kx^6+lx^7+mx^8}{(a+bx^2+cx^4)^2} dx \\ & = \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left( \frac{-b^2c(-19a^2m-ach+c^2d)+4ac^2(-5a^2m+ach+3c^2d)-3ab^4m+ab^3ck-4abc^2(2ak+cf)}{\sqrt{b^2-4ac}} \right) + bc(13a^2m+ac^2d)}{2\sqrt{2}ac^{5/2}(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} \\ & + \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left( \frac{-b^2c(-19a^2m-ach+c^2d)+4ac^2(-5a^2m+ach+3c^2d)-3ab^4m+ab^3ck-4abc^2(2ak+cf)}{\sqrt{b^2-4ac}} \right) + bc(13a^2m+ac^2d)}{2\sqrt{2}ac^{5/2}(b^2-4ac)\sqrt{\sqrt{b^2-4ac}+b}} \\ & - \frac{x(-(b^2(a^2m+c^2d))+x^2(-bc(-3a^2m+ach+c^2d)-ab^3m+ab^2ck+2ac^2(cf-ak))+2ac(a^2m-ac^2d))}{2ac^2(b^2-4ac)(a+bx^2+cx^4)} \\ & + \frac{\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right) (-c^2(2bg-4aj)-6abcl+b^3l+4c^3e)}{2c^2(b^2-4ac)^{3/2}} \\ & - \frac{x^2(-c^2(2aj+bg)+bc(3al+bj)+b^3(-l)+2c^3e)-ab^2l+bc(aj+ce)-2ac(CG-al)}{2c^2(b^2-4ac)(a+bx^2+cx^4)} \\ & + \frac{l \log(a+bx^2+cx^4)}{4c^2} + \frac{mx}{c^2} \end{aligned}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + j\*x^5 + k\*x^6 + l\*x^7 + m\*x^8)/(a + b\*x^2 + c\*x^4)^2, x]

[Out] (m\*x)/c^2 - (b\*c\*(c\*e + a\*j) - a\*b^2\*l - 2\*a\*c\*(c\*g - a\*l) + (2\*c^3\*e - c^2\*(b\*g + 2\*a\*j) - b^3\*l + b\*c\*(b\*j + 3\*a\*l))\*x^2)/(2\*c^2\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) - (x\*(a\*b\*c\*(c\*f + a\*k) - b^2\*(c^2\*d + a^2\*m) + 2\*a\*c\*(c^2\*d - a\*c\*h + a^2\*m) + (a\*b^2\*c\*k + 2\*a\*c^2\*(c\*f - a\*k) - a\*b^3\*m - b\*c\*(c^2\*d + a\*c\*h - 3\*a^2\*m))\*x^2)/(2\*a\*c^2\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + ((a\*b^2\*c\*k - 2\*a\*c^2\*(c\*f + 3\*a\*k) - 3\*a\*b^3\*m + b\*c\*(c^2\*d + a\*c\*h + 13\*a^2\*m) - (a\*b^3\*c\*k - 4\*a\*b\*c^2\*(c\*f + 2\*a\*k) - 3\*a\*b^4\*m - b^2\*c\*(c^2\*d - a\*c\*h - 19\*a^2\*m) + 4\*a\*c^2\*(3\*c^2\*d + a\*c\*h - 5\*a^2\*m))/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]]]/(2\*Sqrt[2]\*a\*c^(5/2)\*(b^2 - 4\*a\*c)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + ((a\*b^2\*c\*k - 2\*a\*c^2\*(c\*f + 3\*a\*k) - 3\*a\*b^3\*m + b\*c\*(c^2\*d + a\*c\*h + 13\*a^2\*m) + (a\*b^3\*c\*k - 4\*a\*b\*c^2\*(c\*f + 2\*a\*k) - 3\*a\*b^4\*m - b^2\*c\*(c^2\*d - a\*c\*h - 19\*a^2\*m) + 4\*a\*c^2\*(3\*c^2\*d + a\*c\*h - 5\*a^2\*m))/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]]]/(2\*Sqrt[2]\*a\*c^(5/2)\*(b^2 - 4\*a\*c)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + (l\*log(a + b\*x^2 + c\*x^4))/4/c^2 + m\*x/c^2

$$\begin{aligned} &^2*(c*f + 2*a*k) - 3*a*b^4*m - b^2*c*(c^2*d - a*c*h - 19*a^2*m) + 4*a*c^2*( \\ &3*c^2*d + a*c*h - 5*a^2*m)/\text{Sqrt}[b^2 - 4*a*c]*\text{ArcTan}[(\text{Sqrt}[2]*\text{Sqrt}[c]*x)/\text{S} \\ &\text{qrt}[b + \text{Sqrt}[b^2 - 4*a*c]])/(2*\text{Sqrt}[2]*a*c^{(5/2)}*(b^2 - 4*a*c)*\text{Sqrt}[b + \text{S} \\ &\text{qrt}[b^2 - 4*a*c]]) + ((4*c^3*e - c^2*(2*b*g - 4*a*j) + b^3*1 - 6*a*b*c*1)*\text{Ar} \\ &\text{cTanh}[(b + 2*c*x^2)/\text{Sqrt}[b^2 - 4*a*c]])/(2*c^2*(b^2 - 4*a*c)^{(3/2)}) + (1*\text{Lo} \\ &\text{g}[a + b*x^2 + c*x^4])/(4*c^2) \end{aligned}$$
Rule 211

$$\text{Int}[(a_) + (b_)*(x_)^2)^{-1}, x\_Symbol] \rightarrow \text{Simp}[(\text{Rt}[a/b, 2]/a)*\text{ArcTan}[x/\text{R} \\ \text{t}[a/b, 2]], x] \text{ ; FreeQ}\{a, b\}, x \ \&\& \ \text{PosQ}[a/b]$$
Rule 212

$$\text{Int}[(a_) + (b_)*(x_)^2)^{-1}, x\_Symbol] \rightarrow \text{Simp}[(1/(\text{Rt}[a, 2]*\text{Rt}[-b, 2]))* \\ \text{ArcTanh}[\text{Rt}[-b, 2]*(x/\text{Rt}[a, 2])], x] \text{ ; FreeQ}\{a, b\}, x \ \&\& \ \text{NegQ}[a/b] \ \&\& \ (\text{Gt} \\ \text{Q}[a, 0] \ || \ \text{LtQ}[b, 0])$$
Rule 632

$$\text{Int}[(a_) + (b_)*(x_) + (c_)*(x_)^2)^{-1}, x\_Symbol] \rightarrow \text{Dist}[-2, \text{Subst}[\text{I} \\ \text{nt}[1/\text{Simp}[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] \text{ ; FreeQ}\{a, b, c\}, \\ x \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0]$$
Rule 642

$$\text{Int}[(d_) + (e_)*(x_)]/((a_) + (b_)*(x_) + (c_)*(x_)^2), x\_Symbol] \rightarrow \text{S} \\ \text{imp}[d*(\text{Log}[\text{RemoveContent}[a + b*x + c*x^2, x]]/b), x] \text{ ; FreeQ}\{a, b, c, d, \\ e\}, x \ \&\& \ \text{EqQ}[2*c*d - b*e, 0]$$
Rule 648

$$\text{Int}[(d_) + (e_)*(x_)]/((a_) + (b_)*(x_) + (c_)*(x_)^2), x\_Symbol] \rightarrow \text{D} \\ \text{ist}[(2*c*d - b*e)/(2*c), \text{Int}[1/(a + b*x + c*x^2), x], x] + \text{Dist}[e/(2*c), \text{In} \\ \text{t}[(b + 2*c*x)/(a + b*x + c*x^2), x], x] \text{ ; FreeQ}\{a, b, c, d, e\}, x \ \&\& \ \text{NeQ} \\ [2*c*d - b*e, 0] \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0] \ \&\& \ \text{!NiceSqrtQ}[b^2 - 4*a*c]$$
Rule 1180

$$\text{Int}[(d_) + (e_)*(x_)^2]/((a_) + (b_)*(x_)^2 + (c_)*(x_)^4), x\_Symbol] \text{ ;} \\ \text{With}\{q = \text{Rt}[b^2 - 4*a*c, 2]\}, \text{Dist}[e/2 + (2*c*d - b*e)/(2*q), \text{Int}[1/(b/2 \\ - q/2 + c*x^2), x], x] + \text{Dist}[e/2 - (2*c*d - b*e)/(2*q), \text{Int}[1/(b/2 + q/2 \\ + c*x^2), x], x]] \text{ ; FreeQ}\{a, b, c, d, e\}, x \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0] \ \&\& \ \text{Ne} \\ \text{Q}[c*d^2 - a*e^2, 0] \ \&\& \ \text{PosQ}[b^2 - 4*a*c]$$
Rule 1674

```

Int[(Pq_)*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := With[{Q =
PolynomialQuotient[Pq, a + b*x + c*x^2, x], f = Coeff[PolynomialRemainder[P
q, a + b*x + c*x^2, x], x, 0], g = Coeff[PolynomialRemainder[Pq, a + b*x +
c*x^2, x], x, 1]}, Simp[(b*f - 2*a*g + (2*c*f - b*g)*x)*((a + b*x + c*x^2)^(
p + 1)/((p + 1)*(b^2 - 4*a*c))), x] + Dist[1/((p + 1)*(b^2 - 4*a*c)), Int[
(a + b*x + c*x^2)^(p + 1)*ExpandToSum[(p + 1)*(b^2 - 4*a*c)*Q - (2*p + 3)*(
2*c*f - b*g), x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && NeQ[b^2
- 4*a*c, 0] && LtQ[p, -1]

```

#### Rule 1677

```

Int[(Pq_)*(x_)^(m_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] :
> Dist[1/2, Subst[Int[x^((m - 1)/2)*SubstFor[x^2, Pq, x]*(a + b*x + c*x^2)^(
p, x)], x, x^2], x] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x^2] && IntegerQ[
(m - 1)/2]

```

#### Rule 1687

```

Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]

```

#### Rule 1690

```

Int[(Pq_/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] := Int[ExpandInte
grand[Pq/(a + b*x^2 + c*x^4), x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^
2] && Expon[Pq, x^2] > 1

```

#### Rule 1692

```

Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := With[{d =
Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[Poly
nomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^
4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b
^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*
x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a
+ b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p
+ 7)*(b*d - 2*a*e)*x^2, x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^
2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1]

```

#### Rubi steps

$$\text{integral} = \int \frac{x(e + gx^2 + jx^4 + lx^6)}{(a + bx^2 + cx^4)^2} dx + \int \frac{d + fx^2 + hx^4 + kx^6 + mx^8}{(a + bx^2 + cx^4)^2} dx$$

$$\begin{aligned}
&= \frac{x(abc(cf + ak) - b^2(c^2d + a^2m) + 2ac(c^2d - ach + a^2m) + (ab^2ck + 2ac^2(cf - ak) - ab^3m - b)}{2ac^2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&+ \frac{1}{2} \text{Subst} \left( \int \frac{e + gx + jx^2 + lx^3}{(a + bx + cx^2)^2} dx, x, x^2 \right) \\
&- \frac{\int \frac{\frac{abc(cf+ak)+b^2(c^2d-a^2m)-2ac(3c^2d+ach-a^2m)}{c^2} - \frac{(ab^2ck-2ac^2(cf+3ak)-ab^3m+bc(c^2d+ach+5a^2m))x^2}{c^2} + 2a\left(4a-\frac{b^2}{c}\right)mx^4}{a+bx^2+cx^4} dx}{2a(b^2 - 4ac)} \\
&= \frac{bc(ce + aj) - ab^2l - 2ac(cg - al) + (2c^3e - c^2(bg + 2aj) - b^3l + bc(bj + 3al))x^2}{2c^2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&- \frac{x(abc(cf + ak) - b^2(c^2d + a^2m) + 2ac(c^2d - ach + a^2m) + (ab^2ck + 2ac^2(cf - ak) - ab^3m - b)}{2ac^2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&- \frac{\text{Subst} \left( \int \frac{2ce - bg + 2aj - \frac{abl}{c} + \left(4a - \frac{b^2}{c}\right)lx}{a + bx + cx^2} dx, x, x^2 \right)}{2(b^2 - 4ac)} \\
&- \frac{\int \left( -\frac{2a(b^2 - 4ac)m}{c^2} - \frac{abc(cf+ak) - 2ac(3c^2d+ach-5a^2m) + b^2(c^2d-3a^2m) + (ab^2ck-2ac^2(cf+3ak) - 3ab^3m + bc(c^2d+ach+13a^2m))x^2}{c^2(a+bx^2+cx^4)} \right)}{2a(b^2 - 4ac)} \\
&= \frac{mx}{c^2} \\
&- \frac{bc(ce + aj) - ab^2l - 2ac(cg - al) + (2c^3e - c^2(bg + 2aj) - b^3l + bc(bj + 3al))x^2}{2c^2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&- \frac{x(abc(cf + ak) - b^2(c^2d + a^2m) + 2ac(c^2d - ach + a^2m) + (ab^2ck + 2ac^2(cf - ak) - ab^3m - b)}{2ac^2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&+ \frac{\int \frac{abc(cf+ak) - 2ac(3c^2d+ach-5a^2m) + b^2(c^2d-3a^2m) + (ab^2ck-2ac^2(cf+3ak) - 3ab^3m + bc(c^2d+ach+13a^2m))x^2}{a+bx^2+cx^4} dx}{2ac^2(b^2 - 4ac)} \\
&+ \frac{l \text{Subst} \left( \int \frac{b+2cx}{a+bx+cx^2} dx, x, x^2 \right)}{4c^2} \\
&- \frac{(4c^3e - c^2(2bg - 4aj) + b^3l - 6abcl) \text{Subst} \left( \int \frac{1}{a+bx+cx^2} dx, x, x^2 \right)}{4c^2(b^2 - 4ac)}
\end{aligned}$$



$$\begin{aligned}
&= \frac{mx}{c^2} \\
&\quad - \frac{bc(ce + aj) - ab^2l - 2ac(CG - al) + (2c^3e - c^2(bg + 2aj) - b^3l + bc(bj + 3al)) x^2}{2c^2 (b^2 - 4ac) (a + bx^2 + cx^4)} \\
&\quad - \frac{x(abc(cf + ak) - b^2(c^2d + a^2m) + 2ac(c^2d - ach + a^2m) + (ab^2ck + 2ac^2(cf - ak) - ab^3m - 2ac^2l))}{2ac^2 (b^2 - 4ac) (a + bx^2 + cx^4)} \\
&\quad + \frac{l \log(a + bx^2 + cx^4)}{4c^2} \\
&\quad + \frac{(4c^3e - c^2(2bg - 4aj) + b^3l - 6abcl) \text{Subst}\left(\int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2\right)}{2c^2 (b^2 - 4ac)} \\
&\quad + \frac{\left(ab^2ck - 2ac^2(cf + 3ak) - 3ab^3m + bc(c^2d + ach + 13a^2m) - \frac{ab^3ck - 4abc^2(cf + 2ak) - 3ab^4m - b^2c(c^2d - ach + a^2m)}{\sqrt{b^2 - 4ac}}\right)}{4ac^2 (b^2 - 4ac)} \\
&\quad + \frac{\left(ab^2ck - 2ac^2(cf + 3ak) - 3ab^3m + bc(c^2d + ach + 13a^2m) + \frac{ab^3ck - 4abc^2(cf + 2ak) - 3ab^4m - b^2c(c^2d - ach + a^2m)}{\sqrt{b^2 - 4ac}}\right)}{4ac^2 (b^2 - 4ac)} \\
&= \frac{mx}{c^2} - \frac{bc(ce + aj) - ab^2l - 2ac(CG - al) + (2c^3e - c^2(bg + 2aj) - b^3l + bc(bj + 3al)) x^2}{2c^2 (b^2 - 4ac) (a + bx^2 + cx^4)} \\
&\quad - \frac{x(abc(cf + ak) - b^2(c^2d + a^2m) + 2ac(c^2d - ach + a^2m) + (ab^2ck + 2ac^2(cf - ak) - ab^3m - 2ac^2l))}{2ac^2 (b^2 - 4ac) (a + bx^2 + cx^4)} \\
&\quad + \frac{\left(ab^2ck - 2ac^2(cf + 3ak) - 3ab^3m + bc(c^2d + ach + 13a^2m) - \frac{ab^3ck - 4abc^2(cf + 2ak) - 3ab^4m - b^2c(c^2d - ach + a^2m)}{\sqrt{b^2 - 4ac}}\right)}{2\sqrt{2}ac^{5/2} (b^2 - 4ac) \sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\left(ab^2ck - 2ac^2(cf + 3ak) - 3ab^3m + bc(c^2d + ach + 13a^2m) + \frac{ab^3ck - 4abc^2(cf + 2ak) - 3ab^4m - b^2c(c^2d - ach + a^2m)}{\sqrt{b^2 - 4ac}}\right)}{2\sqrt{2}ac^{5/2} (b^2 - 4ac) \sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{(4c^3e - c^2(2bg - 4aj) + b^3l - 6abcl) \tanh^{-1}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right) + \frac{l \log(a + bx^2 + cx^4)}{4c^2}}{2c^2 (b^2 - 4ac)^{3/2}}
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 3.22 (sec) , antiderivative size = 935, normalized size of antiderivative = 1.21

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^2} dx$$

$$= \frac{4\sqrt{c}mx + \frac{2\sqrt{c}(2a^3c(l+mx) - bc^2dx(b+cx^2) + a(b^2cx^2(j+kx) - b^3x^2(l+mx) + 2c^3x(d+x(e+fx)) + bc^2(e+x(f-x(g+hx)))) - a^2(b^2(l+mx) + 2ac^2l))}{a(-b^2+4ac)(a+bx^2+cx^4)}}{1}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + j\*x^5 + k\*x^6 + l\*x^7 + m\*x^8)/(a + b\*x^2 + c\*x^4)^2,x]

```
[Out] (4*Sqrt[c]*m*x + (2*Sqrt[c]*(2*a^3*c*(1 + m*x) - b*c^2*d*x*(b + c*x^2) + a*(b^2*c*x^2*(j + k*x) - b^3*x^2*(1 + m*x) + 2*c^3*x*(d + x*(e + f*x)) + b*c^2*(e + x*(f - x*(g + h*x)))) - a^2*(b^2*(1 + m*x) + 2*c^2*(g + x*(h + x*(j + k*x))) - b*c*(j + x*(k + 3*x*(1 + m*x)))))/(a*(-b^2 + 4*a*c)*(a + b*x^2 + c*x^4) - (Sqrt[2]*(-3*a*b^4*m + 2*a*c^2*(6*c^2*d + c*Sqrt[b^2 - 4*a*c]*f + 2*a*c*h + 3*a*Sqrt[b^2 - 4*a*c]*k - 10*a^2*m) + a*b^3*(c*k + 3*Sqrt[b^2 - 4*a*c]*m) - b*c*(c^2*(Sqrt[b^2 - 4*a*c]*d + 4*a*f) + a*c*(Sqrt[b^2 - 4*a*c]*h + 8*a*k) + 13*a^2*Sqrt[b^2 - 4*a*c]*m) + b^2*c*(-(c^2*d) + a*c*h + a*(-(Sqrt[b^2 - 4*a*c]*k) + 19*a*m)))*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b - Sqrt[b^2 - 4*a*c]])/(a*(b^2 - 4*a*c)^(3/2)*Sqrt[b - Sqrt[b^2 - 4*a*c]]) - (Sqrt[2]*(3*a*b^4*m + 2*a*c^2*(-6*c^2*d + c*Sqrt[b^2 - 4*a*c]*f - 2*a*c*h + 3*a*Sqrt[b^2 - 4*a*c]*k + 10*a^2*m) + a*b^3*(-(c*k) + 3*Sqrt[b^2 - 4*a*c]*m) - b*c*(c^2*(Sqrt[b^2 - 4*a*c]*d - 4*a*f) + a*c*(Sqrt[b^2 - 4*a*c]*h - 8*a*k) + 13*a^2*Sqrt[b^2 - 4*a*c]*m) + b^2*c*(c^2*d - a*c*h - a*(Sqrt[b^2 - 4*a*c]*k + 19*a*m)))*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b + Sqrt[b^2 - 4*a*c]])/(a*(b^2 - 4*a*c)^(3/2)*Sqrt[b + Sqrt[b^2 - 4*a*c]]) + (Sqrt[c]*(-4*c^3*e + 2*c^2*(b*g - 2*a*j) + b^2*(-b + Sqrt[b^2 - 4*a*c])*1 + a*c*(6*b*1 - 4*Sqrt[b^2 - 4*a*c]*1))*Log[-b + Sqrt[b^2 - 4*a*c] - 2*c*x^2])/(b^2 - 4*a*c)^(3/2) + (Sqrt[c]*(4*c^3*e + c^2*(-2*b*g + 4*a*j) + b^2*(b + Sqrt[b^2 - 4*a*c])*1 - 2*a*c*(3*b + 2*Sqrt[b^2 - 4*a*c])*1)*Log[b + Sqrt[b^2 - 4*a*c] + 2*c*x^2])/(b^2 - 4*a*c)^(3/2))/(4*c^(5/2))
```

## Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 1.01 (sec) , antiderivative size = 506, normalized size of antiderivative = 0.66

method	result
risch	$\frac{mx}{c^2} + \frac{(3a^2bcm - 2a^2c^2k - ab^3m + ab^2ck - ab^2c^2h + 2ac^3f - b^3c^3d)x^3}{2a(4ac - b^2)} + \frac{(3abcl - 2ac^2j - b^3l + b^2cj - b^2c^2g + 2c^3e)x^2}{8ac - 2b^2} + \frac{(2a^3cm - a^2b^2m + a^2bck - 2a^2c^2d)x}{2a(4ac - b^2)}$
default	Expression too large to display

```
[In] int((m*x^8+1*x^7+k*x^6+j*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^2,x,m
method=_RETURNVERBOSE)
```

```
[Out] m*x/c^2+(1/2/a*(3*a^2*b*c*m-2*a^2*c^2*k-a*b^3*m+a*b^2*c*k-a*b*c^2*h+2*a*c^3*f-b*c^3*d)/(4*a*c-b^2)*x^3+1/2*(3*a*b*c*1-2*a*c^2*j-b^3*1+b^2*c*j-b*c^2*g+2*c^3*e)/(4*a*c-b^2)*x^2+1/2*(2*a^3*c*m-a^2*b^2*m+a^2*b*c*k-2*a^2*c^2*h+a*b*c^2*f+2*a*c^3*d-b^2*c^2*d)/a/(4*a*c-b^2)*x+1/2*(2*a^2*c*1-a*b^2*1+a*b*c*j-2*a*c^2*g+b*c^2*e)/(4*a*c-b^2))/c^2/(c*x^4+b*x^2+a)+1/4/c^2*sum((2*1*c*_R^3-(13*a^2*b*c*m-6*a^2*c^2*k-3*a*b^3*m+a*b^2*c*k+a*b*c^2*h-2*a*c^3*f+b*c^3*d)/a/(4*a*c-b^2)*_R^2-2*c*(a*b*1-2*a*c*j+b*c*g-2*c^2*e)/(4*a*c-b^2)*_R-(10*a^
```

$3*c*m-3*a^2*b^2*m+a^2*b*c*k-2*a^2*c^2*h+a*b*c^2*f-6*a*c^3*d+b^2*c^2*d)/a/(4*a*c-b^2))/(2*_R^3*c+_R*b)*\ln(x-_R), _R=\text{RootOf}(_Z^4*c+_Z^2*b+a)$

### Fricas [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

[In] integrate((m\*x^8+l\*x^7+k\*x^6+j\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="fricas")

[Out] Timed out

### Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

[In] integrate((m\*x\*\*8+l\*x\*\*7+k\*x\*\*6+j\*x\*\*5+h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a)\*\*2,x)

[Out] Timed out

### Maxima [F]

$$\begin{aligned} & \int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^2} dx \\ &= \int \frac{mx^8 + lx^7 + kx^6 + jx^5 + hx^4 + gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^2} dx \end{aligned}$$

[In] integrate((m\*x^8+l\*x^7+k\*x^6+j\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="maxima")

[Out]  $-1/2*(a*b*c^2*e - 2*a^2*c^2*g + a^2*b*c*j - (b*c^3*d - 2*a*c^3*f + a*b*c^2*h - (a*b^2*c - 2*a^2*c^2)*k + (a*b^3 - 3*a^2*b*c)*m)*x^3 + (2*a*c^3*e - a*b*c^2*g + (a*b^2*c - 2*a^2*c^2)*j - (a*b^3 - 3*a^2*b*c)*l)*x^2 - (a^2*b^2 - 2*a^3*c)*l + (a*b*c^2*f - 2*a^2*c^2*h + a^2*b*c*k - (b^2*c^2 - 2*a*c^3)*d - (a^2*b^2 - 2*a^3*c)*m)*x)/(a^2*b^2*c^2 - 4*a^3*c^3 + (a*b^2*c^3 - 4*a^2*c^4)*x^4 + (a*b^3*c^2 - 4*a^2*b*c^3)*x^2) + m*x/c^2 - 1/2*\text{integrate}(-(a*b*c^2$

\*f - 2\*a^2\*c^2\*h + a^2\*b\*c\*k + 2\*(a\*b^2\*c - 4\*a^2\*c^2)\*l\*x^3 + (b\*c^3\*d - 2\*a\*c^3\*f + a\*b\*c^2\*h + (a\*b^2\*c - 6\*a^2\*c^2)\*k - (3\*a\*b^3 - 13\*a^2\*b\*c)\*m)\*x^2 + (b^2\*c^2 - 6\*a\*c^3)\*d - (3\*a^2\*b^2 - 10\*a^3\*c)\*m - 2\*(2\*a\*c^3\*e - a\*b\*c^2\*g + 2\*a^2\*c^2\*j - a^2\*b\*c\*l)\*x)/(c\*x^4 + b\*x^2 + a), x)/(a\*b^2\*c^2 - 4\*a^2\*c^3)

## Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 20159 vs. 2(718) = 1436.

Time = 3.93 (sec) , antiderivative size = 20159, normalized size of antiderivative = 26.18

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

[In] integrate((m\*x^8+l\*x^7+k\*x^6+j\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x, algorithm="giac")

[Out] m\*x/c^2 + 1/4\*l\*log(abs(c\*x^4 + b\*x^2 + a))/c^2 + 1/16\*((a^2\*b^4\*c^5 - 8\*a^3\*b^2\*c^6 + 16\*a^4\*c^7)^2\*(2\*b^3\*c^5 - 8\*a\*b\*c^6 - sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^3\*c^3 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b\*c^4 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^2\*c^4 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b\*c^5 - 2\*(b^2 - 4\*a\*c)\*b\*c^5)\*d - 2\*(a^2\*b^4\*c^5 - 8\*a^3\*b^2\*c^6 + 16\*a^4\*c^7)^2\*(2\*a\*b^2\*c^5 - 8\*a^2\*c^6 - sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^2\*c^3 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*c^4 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b\*c^4 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*c^5 - 2\*(b^2 - 4\*a\*c)\*a\*c^5)\*f + (a^2\*b^4\*c^5 - 8\*a^3\*b^2\*c^6 + 16\*a^4\*c^7)^2\*(2\*a\*b^3\*c^4 - 8\*a^2\*b\*c^5 - sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^3\*c^2 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*b\*c^3 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^2\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b\*c^4 - 2\*(b^2 - 4\*a\*c)\*a\*b\*c^4)\*h + (a^2\*b^4\*c^5 - 8\*a^3\*b^2\*c^6 + 16\*a^4\*c^7)^2\*(2\*a\*b^4\*c^3 - 20\*a^2\*b^2\*c^4 + 48\*a^3\*c^5 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^4\*c + 10\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*b^2\*c^2 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^3\*c^2 - 24\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^3\*c^3 - 12\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*b\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^2\*c^3 + 6\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*c^4 - 2\*(b^2 - 4\*a\*c)\*a\*b^2\*c^3 + 12\*(b^2 - 4\*a\*c)\*a^2\*c^4)\*k - (a^2\*b^4\*c^5 - 8\*a^3\*b^2\*c^6 + 16\*a^4\*c^7)^2\*(6\*a\*b^5\*c^2 - 50\*a^2\*b^3\*c^3 + 104\*a^3\*b\*c^4 - 3\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^5 + 25\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)



$$\begin{aligned}
& 5*b^5*c^9 - 64*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^7*b*c^{10} - 32*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^6*b^2*c^{10} - 8*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^3*c^{10} - 96*a^6*b^3*c^{10} + 16*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^6*b*c^{11} + 128*a^7*b*c^{11} + 2*(b^2 - 4*a*c)*a^4*b^5*c^8 - 16*(b^2 - 4*a*c)*a^5*b^3*c^9 + 32*(b^2 - 4*a*c)*a^6*b*c^{10})*k*abs(a^2*b^4*c^5 - 8*a^3*b^2*c^6 + 16*a^4*c^7) - 2*(3*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^8*c^6 - 46*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^6*c^7 - 6*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^7*c^7 - 6*a^4*b^8*c^7 + 264*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^6*b^4*c^8 + 68*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^5*c^8 + 3*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^6*c^8 + 92*a^5*b^6*c^8 - 672*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^7*b^2*c^9 - 256*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^6*b^3*c^9 - 34*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^4*c^9 - 528*a^6*b^4*c^9 + 640*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^8*c^{10} + 320*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^7*b*c^{10} + 128*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^6*b^2*c^{10} + 1344*a^7*b^2*c^{10} - 160*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^7*c^{11} - 1280*a^8*c^{11} + 6*(b^2 - 4*a*c)*a^4*b^6*c^7 - 68*(b^2 - 4*a*c)*a^5*b^4*c^8 + 256*(b^2 - 4*a*c)*a^6*b^2*c^9 - 320*(b^2 - 4*a*c)*a^7*c^{10})*m*abs(a^2*b^4*c^5 - 8*a^3*b^2*c^6 + 16*a^4*c^7) + (2*a^4*b^{11}*c^{15} - 56*a^5*b^9*c^{16} + 576*a^6*b^7*c^{17} - 2816*a^7*b^5*c^{18} + 6656*a^8*b^3*c^{19} - 6144*a^9*b*c^{20} - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^{11}*c^{13} + 28*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^9*c^{14} + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^{10}*c^{14} - 288*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^6*b^7*c^{15} - 48*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^8*c^{15} - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*b^9*c^{15} + 1408*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^7*b^5*c^{16} + 384*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^6*b^6*c^{16} + 24*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^7*c^{16} - 3328*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^8*b^3*c^{17} - 1280*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^7*b^4*c^{17} - 192*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^6*b^5*c^{17} + 3072*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^9*b*c^{18} + 1536*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^8*b^2*c^{18} + 640*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^7*b^3*c^{18} - 768*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^8*b*c^{19} - 2*(b^2 - 4*a*c)*a^4*b^9*c^{15} + 48*(b^2 - 4*a*c)*a^5*b^7*c^{16} - 384*(b^2 - 4*a*c)*a^6*b^5*c^{17} + 1280*(b^2 - 4*a*c)*a^7*b^3*c^{18} - 1536*(b^2 - 4*a*c)*a^8*b*c^{19})*d + 4*(2*a^5*b^{10}*c^{15} - 32*a^6*b^8*c^{16} + 192*a^7*b^6*c^{17} - 512*a^8*b^4*c^{18} + 512*a^9*b^2*c^{19} - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^{10}*c^{13} + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^6*b^8*c^{14} + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^5*b^9*c^{14} - 96*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^7*b^6*c^{15} - 24*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^
\end{aligned}$$

$$\begin{aligned}
& 6*b^7*c^{15} - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^5* \\
& b^8*c^{15} + 256*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^ \\
& 8*b^4*c^{16} + 96*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a \\
& ^7*b^5*c^{16} + 12*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})* \\
& a^6*b^6*c^{16} - 256*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c} \\
& )*a^9*b^2*c^{17} - 128*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c} \\
& *c})*a^8*b^3*c^{17} - 48*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c} \\
& )*c)*a^7*b^4*c^{17} + 64*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a* \\
& c}*c})*a^8*b^2*c^{18} - 2*(b^2 - 4*a*c)*a^5*b^8*c^{15} + 24*(b^2 - 4*a*c)*a^6*b^ \\
& 6*c^{16} - 96*(b^2 - 4*a*c)*a^7*b^4*c^{17} + 128*(b^2 - 4*a*c)*a^8*b^2*c^{18})*f \\
& - (2*a^5*b^{11}*c^{14} - 24*a^6*b^9*c^{15} + 64*a^7*b^7*c^{16} + 256*a^8*b^5*c^{17} - \\
& 1536*a^9*b^3*c^{18} + 2048*a^{10}*b*c^{19} - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c \\
& + \sqrt{b^2 - 4*a*c}*c})*a^5*b^{11}*c^{12} + 12*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b* \\
& c + \sqrt{b^2 - 4*a*c}*c})*a^6*b^9*c^{13} + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b* \\
& c + \sqrt{b^2 - 4*a*c}*c})*a^5*b^{10}*c^{13} - 32*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{ \\
& b*c + \sqrt{b^2 - 4*a*c}*c})*a^7*b^7*c^{14} - 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{ \\
& (b*c + \sqrt{b^2 - 4*a*c}*c})*a^6*b^8*c^{14} - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b \\
& *c + \sqrt{b^2 - 4*a*c}*c})*a^5*b^9*c^{14} - 128*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{ \\
& (b*c + \sqrt{b^2 - 4*a*c}*c})*a^8*b^5*c^{15} + 8*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{ \\
& (b*c + \sqrt{b^2 - 4*a*c}*c})*a^6*b^7*c^{15} + 768*\sqrt{2}*\sqrt{b^2 - 4*a*c})*sq \\
& rt(b*c + \sqrt{b^2 - 4*a*c}*c})*a^9*b^3*c^{16} + 256*\sqrt{2}*\sqrt{b^2 - 4*a*c})* \\
& sqrt(b*c + \sqrt{b^2 - 4*a*c}*c})*a^8*b^4*c^{16} - 1024*\sqrt{2}*\sqrt{b^2 - 4*a* \\
& c})*sqrt(b*c + \sqrt{b^2 - 4*a*c}*c})*a^{10}*b*c^{17} - 512*\sqrt{2}*\sqrt{b^2 - 4*a \\
& *c})*sqrt(b*c + \sqrt{b^2 - 4*a*c}*c})*a^9*b^2*c^{17} - 128*\sqrt{2}*\sqrt{b^2 - 4 \\
& *a*c})*sqrt(b*c + \sqrt{b^2 - 4*a*c}*c})*a^8*b^3*c^{17} + 256*\sqrt{2}*\sqrt{b^2 - \\
& 4*a*c})*sqrt(b*c + \sqrt{b^2 - 4*a*c}*c})*a^9*b*c^{18} - 2*(b^2 - 4*a*c)*a^5*b^ \\
& 9*c^{14} + 16*(b^2 - 4*a*c)*a^6*b^7*c^{15} - 256*(b^2 - 4*a*c)*a^8*b^3*c^{17} + 5 \\
& 12*(b^2 - 4*a*c)*a^9*b*c^{18})*h - (2*a^5*b^{12}*c^{13} - 48*a^6*b^{10}*c^{14} + 448* \\
& a^7*b^8*c^{15} - 2048*a^8*b^6*c^{16} + 4608*a^9*b^4*c^{17} - 4096*a^{10}*b^2*c^{18} - \\
& \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^5*b^{12}*c^{11} + \\
& 24*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^6*b^{10}*c^{12} \\
& + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^5*b^{11}*c^{12} \\
& - 224*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^7*b^8*c^ \\
& 13 - 40*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^6*b^9*c \\
& ^13 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^5*b^{10}*c^ \\
& 13 + 1024*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^8*b^6 \\
& *c^{14} + 288*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^7*b \\
& ^7*c^{14} + 20*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^6* \\
& b^8*c^{14} - 2304*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a \\
& ^9*b^4*c^{15} - 896*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c} \\
& )*a^8*b^5*c^{15} - 144*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}* \\
& c})*a^7*b^6*c^{15} + 2048*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a* \\
& c}*c})*a^{10}*b^2*c^{16} + 1024*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - \\
& 4*a*c}*c})*a^9*b^3*c^{16} + 448*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 \\
& - 4*a*c}*c})*a^8*b^4*c^{16} - 512*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^
\end{aligned}$$

$$\begin{aligned}
& 2 - 4*a*c)*c)*a^9*b^2*c^17 - 2*(b^2 - 4*a*c)*a^5*b^10*c^13 + 40*(b^2 - 4*a*c) \\
& *a^6*b^8*c^14 - 288*(b^2 - 4*a*c)*a^7*b^6*c^15 + 896*(b^2 - 4*a*c)*a^8*b^4 \\
& *c^16 - 1024*(b^2 - 4*a*c)*a^9*b^2*c^17)*k + (6*a^5*b^13*c^12 - 134*a^6*b^11 \\
& *c^13 + 1224*a^7*b^9*c^14 - 5824*a^8*b^7*c^15 + 15104*a^9*b^5*c^16 - 1996 \\
& 8*a^10*b^3*c^17 + 10240*a^11*b*c^18 - 3*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c \\
& + sqrt(b^2 - 4*a*c)*c)*a^5*b^13*c^10 + 67*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c \\
& + sqrt(b^2 - 4*a*c)*c)*a^6*b^11*c^11 + 6*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c \\
& + sqrt(b^2 - 4*a*c)*c)*a^5*b^12*c^11 - 612*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt \\
& (b*c + sqrt(b^2 - 4*a*c)*c)*a^7*b^9*c^12 - 110*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt \\
& (b*c + sqrt(b^2 - 4*a*c)*c)*a^6*b^10*c^12 - 3*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt \\
& (b*c + sqrt(b^2 - 4*a*c)*c)*a^5*b^11*c^12 + 2912*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^8*b^7*c^13 + 784*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^7*b^8*c^13 + 55*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^6*b^9*c^13 - 7552*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^9*b^5*c^14 - 2688*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^8*b^6*c^14 - 392*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^7*b^7*c^14 + 9984*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^10*b^3*c^15 + 4352*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^9*b^4*c^15 + 1344*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^8*b^5*c^15 - 5120*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^11*b*c^16 - 2560*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^10*b^2*c^16 - 2176*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^9*b^3*c^16 + 1280*sqrt(2)*sqrt(b^2 - 4*a*c) \\
& *sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^10*b*c^17 - 6*(b^2 - 4*a*c)*a^5*b^11*c^12 + 110*(b^2 - 4*a*c) \\
& *a^6*b^9*c^13 - 784*(b^2 - 4*a*c)*a^7*b^7*c^14 + 2688*(b^2 - 4*a*c)*a^8*b^5*c^15 - 4352*(b^2 - 4*a*c) \\
& *a^9*b^3*c^16 + 2560*(b^2 - 4*a*c)*a^10*b*c^17)*m)*arctan(2*sqrt(1/2)*x/sqrt((a^2*b^5*c^5 - 8*a^3*b^3*c^6 + 16*a^4*b*c^7 + sqrt((a^2*b^5*c^5 - 8*a^3*b^3*c^6 + 16*a^4*b*c^7)^2 - 4*(a^3*b^4*c^5 - 8*a^4*b^2*c^6 + 16*a^5*c^7)*(a^2*b^4*c^6 - 8*a^3*b^2*c^7 + 16*a^4*c^8)))/(a^2*b^4*c^6 - 8*a^3*b^2*c^7 + 16*a^4*c^8)))/((a^4*b^8*c^8 - 16*a^5*b^6*c^9 - 2*a^4*b^7*c^9 + 96*a^6*b^4*c^10 + 24*a^5*b^5*c^10 + a^4*b^6*c^10 - 256*a^7*b^2*c^11 - 96*a^6*b^3*c^11 - 12*a^5*b^4*c^11 + 256*a^8*c^12 + 128*a^7*b*c^12 + 48*a^6*b^2*c^12 - 64*a^7*c^13)*abs(a^2*b^4*c^5 - 8*a^3*b^2*c^6 + 16*a^4*c^7)*abs(c)) - 1/16*((a^2*b^4*c^5 - 8*a^3*b^2*c^6 + 16*a^4*c^7)^2*(2*b^3*c^5 - 8*a*b*c^6 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c))*b^3*c^3 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c))*a*b*c^4 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c))*b^2*c^4 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c))*b*c^5 - 2*(b^2 - 4*a*c)*b*c^5)*d - 2*(a^2*b^4*c^5 - 8*a^3*b^2*c^6 + 16*a^4*c^7)^2*(2*a*b^2*c^5 - 8*a^2*c^6 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c))*a*b^2*c^3 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c))*a^2*c^4 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c))*a*b*c^4 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c)*c))*a*c^5 - 2*(b^2 - 4*a*c)*a*c^5)*f + (a^2*b^4*c^5 - 8*a^3*b^2*c^6 + 16*a^4*c^7)^2*(2*a*b^3*c^4 - 8*a^2*b*c^5 - sqrt
\end{aligned}$$



$$\begin{aligned}
& t(2) \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^2 + 4 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^3 + 2 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^2 c^3 - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^2 c^4 - 2(b^2 - 4ac) a^2 b^3 c^4 h + (a^2 b^4 c^5 - 8a^3 b^2 c^6 + 16a^4 c^7)^2 (2a^2 b^4 c^3 - 20a^2 b^2 c^4 + 48a^3 c^5 - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^4 c + 10 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^2 c^2 + 2 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^2 - 24 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^3 - 12 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^3 - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^2 c^3 + 6 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 c^4 - 2(b^2 - 4ac) a^2 b^2 c^3 + 12(b^2 - 4ac) a^2 c^4) k - (a^2 b^4 c^5 - 8a^3 b^2 c^6 + 16a^4 c^7)^2 (6a^2 b^5 c^2 - 50a^2 b^3 c^3 + 104a^3 b^2 c^4 - 3 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^5 + 25 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c + 6 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^4 c - 52 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^2 c^2 - 26 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^2 c^2 - 3 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^2 + 13 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^3 - 6(b^2 - 4ac) a^2 b^3 c^2 + 26(b^2 - 4ac) a^2 b^3 c^3) m - 2(\sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^8 c^8 - 18 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^6 c^9 - 2 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^7 c^9 + 2a^2 b^8 c^9 + 120 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^4 b^4 c^{10} + 28 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^5 c^{10} + \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^6 c^{10} - 36a^3 b^6 c^{10} - 352 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^5 b^2 c^{11} - 128 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^4 b^3 c^{11} - 14 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^4 c^{11} + 240a^4 b^4 c^{11} + 384 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^6 c^{12} + 192 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^5 b^2 c^{12} + 64 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^4 b^2 c^{12} - 704a^5 b^2 c^{12} - 96 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^5 c^{13} + 768a^6 c^{13} - 2(b^2 - 4ac) a^2 b^6 c^9 + 28(b^2 - 4ac) a^3 b^4 c^{10} - 128(b^2 - 4ac) a^4 b^2 c^{11} + 192(b^2 - 4ac) a^5 c^{12}) d \operatorname{abs}(a^2 b^4 c^5 - 8a^3 b^2 c^6 + 16a^4 c^7) - 2(\sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^7 c^8 - 12 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^4 b^5 c^9 - 2 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^6 c^9 + 2a^3 b^7 c^9 + 48 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^5 b^3 c^{10} + 16 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^4 b^4 c^{10} + \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^5 c^{10} - 24a^4 b^5 c^{10} - 64 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^6 b^2 c^{11} - 32 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^5 b^2 c^{11} - 8 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^4 b^3 c^{11} + 96a^5 b^3 c^{11} + 16 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^5 b^3 c^{11} - 128a^6 b^3 c^{11} - 2(b^2 - 4ac) a^3 b^5 c^9 + 16(b^2 - 4ac) a^4 b^3 c^{10} - 32(b^2 - 4ac) a^5 b^3 c^{11}) f \operatorname{abs}(a^2 b^4 c^5 - 8a^3 b^2 c^6
\end{aligned}$$



$$\begin{aligned}
& 2 - 4ac) \sqrt{bc - \sqrt{b^2 - 4ac}}) a^8 b^3 c^{17} - 1280 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^7 b^4 c^{17} - 192 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^6 b^5 c^{17} + 3072 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^9 b^2 c^{18} + 1536 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^8 b^2 c^{18} + 640 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^7 b^3 c^{18} - 768 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^8 b^2 c^{19} - 2(b^2 - 4ac) a^4 b^9 c^{15} + 48(b^2 - 4ac) a^5 b^7 c^{16} - 384(b^2 - 4ac) a^6 b^5 c^{17} + 1280(b^2 - 4ac) a^7 b^3 c^{18} - 1536(b^2 - 4ac) a^8 b^2 c^{19}) d + 4(2a^5 b^{10} c^{15} - 32a^6 b^8 c^{16} + 192a^7 b^6 c^{17} - 512a^8 b^4 c^{18} + 512a^9 b^2 c^{19} - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^5 b^{10} c^{13} + 16 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^6 b^8 c^{14} + 2 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^5 b^9 c^{14} - 96 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^7 b^6 c^{15} - 24 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^6 b^7 c^{15} - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^5 b^8 c^{15} + 256 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^8 b^4 c^{16} + 96 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^7 b^5 c^{16} + 12 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^6 b^6 c^{16} - 256 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^9 b^2 c^{17} - 128 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^8 b^3 c^{17} - 48 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^7 b^4 c^{17} + 64 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^8 b^2 c^{18} - 2(b^2 - 4ac) a^5 b^8 c^{15} + 24(b^2 - 4ac) a^6 b^6 c^{16} - 96(b^2 - 4ac) a^7 b^4 c^{17} + 128(b^2 - 4ac) a^8 b^2 c^{18}) f - (2a^5 b^{11} c^{14} - 24a^6 b^9 c^{15} + 64a^7 b^7 c^{16} + 256a^8 b^5 c^{17} - 1536a^9 b^3 c^{18} + 2048a^{10} b^2 c^{19} - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^5 b^{11} c^{12} + 12 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^6 b^9 c^{13} + 2 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^5 b^{10} c^{13} - 32 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^7 b^7 c^{14} - 16 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^6 b^8 c^{14} - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^5 b^9 c^{14} - 128 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^8 b^5 c^{15} + 8 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^6 b^7 c^{15} + 768 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^9 b^3 c^{16} + 256 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^8 b^4 c^{16} - 1024 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^{10} b^2 c^{17} - 512 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^9 b^2 c^{17} - 128 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^8 b^3 c^{17} + 256 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}}) a^9 b^2 c^{18} - 2(b^2 - 4ac) a^5 b^9 c^{14} + 16(b^2 - 4ac) a^6 b^7 c^{15} - 256(b^2 - 4ac) a^8 b^3 c^{17} + 512(b^2 - 4ac) a^9 b^2 c^{18}) h - (2a^5 b^{12} c^{13} - 48a^6 b^{10} c^{14} + 448a^7 b^8 c^{15} - 2048a^8 b^6 c^{16} + 4608a^9 b^4 c^{17} - 4096a^{10} b^2 c^{18} - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}})
\end{aligned}$$

$$\begin{aligned}
& c) * a^5 * b^{12} * c^{11} + 24 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^6 * b^{10} * c^{12} + 2 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^5 * b^{11} * c^{12} - 224 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^7 * b^8 * c^{13} - 40 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^6 * b^9 * c^{13} - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^5 * b^{10} * c^{13} + 1024 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^8 * b^6 * c^{14} + 288 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^7 * b^7 * c^{14} + 20 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^6 * b^8 * c^{14} - 2304 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^9 * b^4 * c^{15} - 896 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^8 * b^5 * c^{15} - 144 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^7 * b^6 * c^{15} + 2048 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^{10} * b^2 * c^{16} + 1024 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^9 * b^3 * c^{16} + 448 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^8 * b^4 * c^{16} - 512 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^9 * b^2 * c^{17} - 2 * (b^2 - 4 * a * c) * a^5 * b^{10} * c^{13} \\
& + 40 * (b^2 - 4 * a * c) * a^6 * b^8 * c^{14} - 288 * (b^2 - 4 * a * c) * a^7 * b^6 * c^{15} + 896 * \\
& (b^2 - 4 * a * c) * a^8 * b^4 * c^{16} - 1024 * (b^2 - 4 * a * c) * a^9 * b^2 * c^{17} * k + (6 * a^5 * b^{13} * c^{12} \\
& - 134 * a^6 * b^{11} * c^{13} + 1224 * a^7 * b^9 * c^{14} - 5824 * a^8 * b^7 * c^{15} + 15104 * a^9 * b^5 * c^{16} \\
& - 19968 * a^{10} * b^3 * c^{17} + 10240 * a^{11} * b * c^{18} - 3 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^5 * b^{13} * c^{10} + 67 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^6 * b^{11} * c^{11} + 6 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^5 * b^{12} * c^{11} - 612 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^7 * b^9 * c^{12} - 110 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^6 * b^{10} * c^{12} - 3 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^5 * b^{11} * c^{12} + 2912 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^8 * b^7 * c^{13} + 784 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^7 * b^8 * c^{13} + 55 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^6 * b^9 * c^{13} - 7552 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^9 * b^5 * c^{14} - 2688 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^8 * b^6 * c^{14} - 392 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^7 * b^7 * c^{14} + 9984 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^{10} * b^3 * c^{15} + 4352 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^9 * b^4 * c^{15} + 1344 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^8 * b^5 * c^{15} - 5120 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^{11} * b * c^{16} - 2560 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^{10} * b^2 * c^{16} - 2176 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^9 * b^3 * c^{16} + 1280 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} \\
& ) * c) * a^{10} * b * c^{17} - 6 * (b^2 - 4 * a * c) * a^5 * b^{11} * c^{12} + 110 * (b^2 - 4 * a * c) \\
& ) * a^6 * b^9 * c^{13} - 784 * (b^2 - 4 * a * c) * a^7 * b^7 * c^{14} + 2688 * (b^2 - 4 * a * c) * a^8 * b^5 * c^{15} \\
& - 4352 * (b^2 - 4 * a * c) * a^9 * b^3 * c^{16} + 2560 * (b^2 - 4 * a * c) * a^{10} * b * c^{17} * m) * \arctan(2 * \sqrt{1/2} * x / \sqrt{(a^2 * b^5 * c^5 - 8 * a^3 * b^3 * c^6 + 16 * a^4 * b * c^7 - \sqrt{2} * \sqrt{(a^2 * b^5 * c^5 - 8 * a^3 * b^3 * c^6 + 16 * a^4 * b * c^7)^2 - 4 * (a^3 * b^4 * c^5 - 8 * a^4 * b^2 * c^6 + 16 * a^5 * c^7) * (a^2 * b^4 * c^6 - 8 * a^3 * b^2 * c^7 + 16 * a^4 * c^8)}) / (a^2 * b
\end{aligned}$$

$$\begin{aligned}
&^4c^6 - 8a^3b^2c^7 + 16a^4c^8)) / ((a^4b^8c^8 - 16a^5b^6c^9 - 2a^4b^7c^9 + 96a^6b^4c^{10} + 24a^5b^5c^{10} + a^4b^6c^{10} - 256a^7b^2c^{11} - 96a^6b^3c^{11} - 12a^5b^4c^{11} + 256a^8c^{12} + 128a^7b^2c^{12} + 48a^6b^2c^{12} - 64a^7c^{13}) * \text{abs}(a^2b^4c^5 - 8a^3b^2c^6 + 16a^4c^7) * \text{abs}(c)) - 1/16 * (4*(b^3c^3 - 4a*b^2c^4 - 2b^2c^4 + b^2c^5 + (b^2c^3 - 4a*c^4 - 2b^2c^4 + c^5) * \text{sqrt}(b^2 - 4a*c)) * \text{abs}(a^2b^4c^5 - 8a^3b^2c^6 + 16a^4c^7) - 2*(b^4c^2 - 4a*b^2c^3 - 2b^3c^3 + b^2c^4 + (b^3c^2 - 4a*b^2c^3 - 2b^2c^3 + b^2c^4) * \text{sqrt}(b^2 - 4a*c)) * \text{g} * \text{abs}(a^2b^4c^5 - 8a^3b^2c^6 + 16a^4c^7) + 4*(a*b^3c^2 - 4a^2b^2c^3 - 2a*b^2c^3 + a*b^2c^4 + (a*b^2c^2 - 4a^2c^3 - 2a*b^2c^3 + a*c^4) * \text{sqrt}(b^2 - 4a*c)) * \text{j} * \text{abs}(a^2b^4c^5 - 8a^3b^2c^6 + 16a^4c^7) + (b^6 - 10a*b^4c - 2b^5c + 24a^2b^2c^2 + 12a*b^3c^2 + b^4c^2 - 6a*b^2c^3 + (b^5 - 10a*b^3c - 2b^4c + 24a^2b^2c^2 + 12a*b^2c^2 + b^3c^2 - 6a*b^2c^3) * \text{sqrt}(b^2 - 4a*c)) * \text{l} * \text{abs}(a^2b^4c^5 - 8a^3b^2c^6 + 16a^4c^7) - 4*(a^2b^7c^8 - 12a^3b^5c^9 - 2a^2b^6c^9 + 48a^4b^3c^{10} + 16a^3b^4c^{10} + a^2b^5c^{10} - 64a^5b^2c^{11} - 32a^4b^2c^{11} - 8a^3b^3c^{11} + 16a^4b^2c^{12} - (a^2b^6c^8 - 8a^3b^4c^9 - 2a^2b^5c^9 + 16a^4b^2c^{10} + 8a^3b^3c^{10} + a^2b^4c^{10} - 4a^3b^2c^{11}) * \text{sqrt}(b^2 - 4a*c)) * \text{e} + 2*(a^2b^8c^7 - 12a^3b^6c^8 - 2a^2b^7c^8 + 48a^4b^4c^9 + 16a^3b^5c^9 + a^2b^6c^9 - 64a^5b^2c^{10} - 32a^4b^3c^{10} - 8a^3b^4c^{10} + 16a^4b^2c^{11} + (a^2b^7c^7 - 8a^3b^5c^8 - 2a^2b^6c^8 + 16a^4b^3c^9 + 8a^3b^4c^9 + a^2b^5c^9 - 4a^3b^3c^{10}) * \text{sqrt}(b^2 - 4a*c)) * \text{g} - 4*(a^3b^7c^7 - 12a^4b^5c^8 - 2a^3b^6c^8 + 48a^5b^3c^9 + 16a^4b^4c^9 + a^3b^5c^9 - 64a^6b^2c^{10} - 32a^5b^2c^{10} - 8a^4b^3c^{10} + 16a^5b^2c^{11} - (a^3b^6c^7 - 8a^4b^4c^8 - 2a^3b^5c^8 + 16a^5b^2c^9 + 8a^4b^3c^9 + a^3b^4c^9 - 4a^4b^2c^{10}) * \text{sqrt}(b^2 - 4a*c)) * \text{j} - (a^2b^{10}c^5 - 18a^3b^8c^6 - 2a^2b^9c^6 + 120a^4b^6c^7 + 28a^3b^7c^7 + a^2b^8c^7 - 352a^5b^4c^8 - 128a^4b^5c^8 - 14a^3b^6c^8 + 384a^6b^2c^9 + 192a^5b^3c^9 + 64a^4b^4c^9 - 96a^5b^2c^{10} - (a^2b^9c^5 - 14a^3b^7c^6 - 2a^2b^8c^6 + 64a^4b^5c^7 + 20a^3b^6c^7 + a^2b^7c^7 - 96a^5b^3c^8 - 48a^4b^4c^8 - 10a^3b^5c^8 + 24a^4b^3c^9) * \text{sqrt}(b^2 - 4a*c)) * \text{l}) * \log(x^2 + 1/2*(a^2b^5c^5 - 8a^3b^3c^6 + 16a^4b^2c^7 + \text{sqrt}((a^2b^5c^5 - 8a^3b^3c^6 + 16a^4b^2c^7)^2 - 4*(a^3b^4c^5 - 8a^4b^2c^6 + 16a^5c^7)*(a^2b^4c^6 - 8a^3b^2c^7 + 16a^4c^8))) / (a^2b^4c^6 - 8a^3b^2c^7 + 16a^4c^8)) / ((a*b^4c - 8a^2b^2c^2 - 2a*b^3c^2 + 16a^3c^3 + 8a^2b^2c^3 + a*b^2c^3 - 4a^2c^4) * c^2 * \text{abs}(a^2b^4c^5 - 8a^3b^2c^6 + 16a^4c^7)) - 1/16 * (4*(b^3c^3 - 4a*b^2c^4 - 2b^2c^4 + b^2c^5 + (b^2c^3 - 4a*c^4 - 2b^2c^4 + c^5) * \text{sqrt}(b^2 - 4a*c)) * \text{abs}(a^2b^4c^5 - 8a^3b^2c^6 + 16a^4c^7) - 2*(b^4c^2 - 4a*b^2c^3 - 2b^3c^3 + b^2c^4 - (b^3c^2 - 4a*b^2c^3 - 2b^2c^3 + b^2c^4) * \text{sqrt}(b^2 - 4a*c)) * \text{g} * \text{abs}(a^2b^4c^5 - 8a^3b^2c^6 + 16a^4c^7) + 4*(a*b^3c^2 - 4a^2b^2c^3 - 2a*b^2c^3 + a*b^2c^4 - (a*b^2c^2 - 4a^2c^3 - 2a*b^2c^3 + a*c^4) * \text{sqrt}(b^2 - 4a*c)) * \text{j} * \text{abs}(a^2b^4c^5 - 8a^3b^2c^6 + 16a^4c^7) + (b^6 - 10a*b^4c - 2b^5c + 24a^2b^2c^2 + 12a*b^3c^2 + b^4c^2 - 6a*b^2c^3 - (b^5 - 10a*b^3c - 2b^4c + 24a^2b^2c^2 + 12a*b^2c^2 + b^3c^2 - 6
\end{aligned}$$

```

a*b*c^3)*sqrt(b^2 - 4*a*c))*1*abs(a^2*b^4*c^5 - 8*a^3*b^2*c^6 + 16*a^4*c^7)
- 4*(a^2*b^7*c^8 - 12*a^3*b^5*c^9 - 2*a^2*b^6*c^9 + 48*a^4*b^3*c^10 + 16*a
^3*b^4*c^10 + a^2*b^5*c^10 - 64*a^5*b*c^11 - 32*a^4*b^2*c^11 - 8*a^3*b^3*c^
11 + 16*a^4*b*c^12 + (a^2*b^6*c^8 - 8*a^3*b^4*c^9 - 2*a^2*b^5*c^9 + 16*a^4*
b^2*c^10 + 8*a^3*b^3*c^10 + a^2*b^4*c^10 - 4*a^3*b^2*c^11)*sqrt(b^2 - 4*a*c
))*e + 2*(a^2*b^8*c^7 - 12*a^3*b^6*c^8 - 2*a^2*b^7*c^8 + 48*a^4*b^4*c^9 + 1
6*a^3*b^5*c^9 + a^2*b^6*c^9 - 64*a^5*b^2*c^10 - 32*a^4*b^3*c^10 - 8*a^3*b^4
*c^10 + 16*a^4*b^2*c^11 - (a^2*b^7*c^7 - 8*a^3*b^5*c^8 - 2*a^2*b^6*c^8 + 16
*a^4*b^3*c^9 + 8*a^3*b^4*c^9 + a^2*b^5*c^9 - 4*a^3*b^3*c^10)*sqrt(b^2 - 4*a
*c))*g - 4*(a^3*b^7*c^7 - 12*a^4*b^5*c^8 - 2*a^3*b^6*c^8 + 48*a^5*b^3*c^9 +
16*a^4*b^4*c^9 + a^3*b^5*c^9 - 64*a^6*b*c^10 - 32*a^5*b^2*c^10 - 8*a^4*b^3
*c^10 + 16*a^5*b*c^11 - (a^3*b^6*c^7 - 8*a^4*b^4*c^8 - 2*a^3*b^5*c^8 + 16*a
^5*b^2*c^9 + 8*a^4*b^3*c^9 + a^3*b^4*c^9 - 4*a^4*b^2*c^10)*sqrt(b^2 - 4*a*c
))*j - (a^2*b^10*c^5 - 18*a^3*b^8*c^6 - 2*a^2*b^9*c^6 + 120*a^4*b^6*c^7 + 2
8*a^3*b^7*c^7 + a^2*b^8*c^7 - 352*a^5*b^4*c^8 - 128*a^4*b^5*c^8 - 14*a^3*b^
6*c^8 + 384*a^6*b^2*c^9 + 192*a^5*b^3*c^9 + 64*a^4*b^4*c^9 - 96*a^5*b^2*c^1
0 - (a^2*b^9*c^5 - 14*a^3*b^7*c^6 - 2*a^2*b^8*c^6 + 64*a^4*b^5*c^7 + 20*a^3
*b^6*c^7 + a^2*b^7*c^7 - 96*a^5*b^3*c^8 - 48*a^4*b^4*c^8 - 10*a^3*b^5*c^8 +
24*a^4*b^3*c^9)*sqrt(b^2 - 4*a*c))*1)*log(x^2 + 1/2*(a^2*b^5*c^5 - 8*a^3*b
^3*c^6 + 16*a^4*b*c^7 - sqrt((a^2*b^5*c^5 - 8*a^3*b^3*c^6 + 16*a^4*b*c^7)^2
- 4*(a^3*b^4*c^5 - 8*a^4*b^2*c^6 + 16*a^5*c^7)*(a^2*b^4*c^6 - 8*a^3*b^2*c^
7 + 16*a^4*c^8)))/(a^2*b^4*c^6 - 8*a^3*b^2*c^7 + 16*a^4*c^8))/((a*b^4*c - 8
*a^2*b^2*c^2 - 2*a*b^3*c^2 + 16*a^3*c^3 + 8*a^2*b*c^3 + a*b^2*c^3 - 4*a^2*c
^4)*c^2*abs(a^2*b^4*c^5 - 8*a^3*b^2*c^6 + 16*a^4*c^7)) - 1/2*(a*b*c^2*e - 2
*a^2*c^2*g + a^2*b*c*j - a^2*b^2*l + 2*a^3*c*l - (b*c^3*d - 2*a*c^3*f + a*b
*c^2*h - a*b^2*c*k + 2*a^2*c^2*k + a*b^3*m - 3*a^2*b*c*m)*x^3 + (2*a*c^3*e
- a*b*c^2*g + a*b^2*c*j - 2*a^2*c^2*j - a*b^3*l + 3*a^2*b*c*l)*x^2 - (b^2*c
^2*d - 2*a*c^3*d - a*b*c^2*f + 2*a^2*c^2*h - a^2*b*c*k + a^2*b^2*m - 2*a^3*
c*m)*x)/((c*x^4 + b*x^2 + a)*(b^2 - 4*a*c)*a*c^2)

```

## Mupad [B] (verification not implemented)

Time = 22.90 (sec) , antiderivative size = 82785, normalized size of antiderivative = 107.51

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + j\*x^5 + k\*x^6 + l\*x^7 + m\*x^8)/(a + b\*x^2 + c\*x^4)^2,x)

[Out] symsum(log(root(1572864\*a^8\*b^2\*c^10\*z^4 - 983040\*a^7\*b^4\*c^9\*z^4 + 327680\*a^6\*b^6\*c^8\*z^4 - 61440\*a^5\*b^8\*c^7\*z^4 + 6144\*a^4\*b^10\*c^6\*z^4 - 256\*a^3\*b^12\*c^5\*z^4 - 1048576\*a^9\*c^11\*z^4 - 1572864\*a^8\*b^2\*c^8\*l\*z^3 + 983040\*a^7\*b^4\*c^7\*l\*z^3 - 327680\*a^6\*b^6\*c^6\*l\*z^3 + 61440\*a^5\*b^8\*c^5\*l\*z^3 - 6144\*a^4\*b^10\*c^4\*l\*z^3 + 256\*a^3\*b^12\*c^3\*l\*z^3 + 1048576\*a^9\*c^9\*l\*z^3 + 96\*a^

$$\begin{aligned}
& 3*b^{12}*k*m*z^2 + 98304*a^8*b*c^7*j*l*z^2 + 24576*a^8*b*c^7*h*m*z^2 + 1556 \\
& 48*a^7*b*c^8*d*m*z^2 + 98304*a^7*b*c^8*e*l*z^2 + 57344*a^7*b*c^8*f*k*z^2 + \\
& 32768*a^7*b*c^8*g*j*z^2 + 57344*a^6*b*c^9*d*h*z^2 + 32768*a^6*b*c^9*e*g*z^2 \\
& - 32*a*b^{10}*c^5*d*f*z^2 - 491520*a^8*b^2*c^6*k*m*z^2 + 358400*a^7*b^4*c^5* \\
& k*m*z^2 - 129024*a^6*b^6*c^4*k*m*z^2 + 24768*a^5*b^8*c^3*k*m*z^2 - 2432*a^4 \\
& *b^{10}*c^2*k*m*z^2 - 90112*a^7*b^3*c^6*j*l*z^2 + 30720*a^6*b^5*c^5*j*l*z^2 - \\
& 4608*a^5*b^7*c^4*j*l*z^2 + 256*a^4*b^9*c^3*j*l*z^2 - 21504*a^6*b^5*c^5*h*m \\
& *z^2 + 9216*a^5*b^7*c^4*h*m*z^2 + 8192*a^7*b^3*c^6*h*m*z^2 - 1568*a^4*b^9*c \\
& ^3*h*m*z^2 + 96*a^3*b^{11}*c^2*h*m*z^2 - 172032*a^7*b^2*c^7*f*m*z^2 + 116736* \\
& a^6*b^4*c^6*f*m*z^2 - 49152*a^7*b^2*c^7*g*l*z^2 + 45056*a^6*b^4*c^6*g*l*z^2 \\
& - 35840*a^5*b^6*c^5*f*m*z^2 + 24576*a^7*b^2*c^7*h*k*z^2 - 15360*a^5*b^6*c^ \\
& 5*g*l*z^2 + 5184*a^4*b^8*c^4*f*m*z^2 - 3072*a^5*b^6*c^5*h*k*z^2 + 2304*a^4* \\
& b^8*c^4*g*l*z^2 + 2048*a^6*b^4*c^6*h*k*z^2 + 576*a^4*b^8*c^4*h*k*z^2 - 288* \\
& a^3*b^{10}*c^3*f*m*z^2 - 128*a^3*b^{10}*c^3*g*l*z^2 - 32*a^3*b^{10}*c^3*h*k*z^2 - \\
& 147456*a^6*b^3*c^7*d*m*z^2 - 90112*a^6*b^3*c^7*e*l*z^2 + 52224*a^5*b^5*c^6 \\
& *d*m*z^2 - 49152*a^6*b^3*c^7*f*k*z^2 + 30720*a^5*b^5*c^6*e*l*z^2 - 24576*a^ \\
& 6*b^3*c^7*g*j*z^2 + 15360*a^5*b^5*c^6*f*k*z^2 - 8192*a^4*b^7*c^5*d*m*z^2 + \\
& 6144*a^5*b^5*c^6*g*j*z^2 - 4608*a^4*b^7*c^5*e*l*z^2 - 2048*a^4*b^7*c^5*f*k* \\
& z^2 - 512*a^4*b^7*c^5*g*j*z^2 + 480*a^3*b^9*c^4*d*m*z^2 + 256*a^3*b^9*c^4*e \\
& *l*z^2 + 96*a^3*b^9*c^4*f*k*z^2 + 131072*a^6*b^2*c^8*d*k*z^2 + 49152*a^6*b^ \\
& 2*c^8*e*j*z^2 - 43008*a^5*b^4*c^7*d*k*z^2 - 12288*a^5*b^4*c^7*e*j*z^2 + 614 \\
& 4*a^4*b^6*c^6*d*k*z^2 + 1024*a^4*b^6*c^6*e*j*z^2 - 320*a^3*b^8*c^5*d*k*z^2 \\
& + 6144*a^5*b^4*c^7*f*h*z^2 - 2048*a^4*b^6*c^6*f*h*z^2 + 192*a^3*b^8*c^5*f*h \\
& *z^2 - 49152*a^5*b^3*c^8*d*h*z^2 - 24576*a^5*b^3*c^8*e*g*z^2 + 15360*a^4*b^ \\
& 5*c^7*d*h*z^2 + 6144*a^4*b^5*c^7*e*g*z^2 - 2048*a^3*b^7*c^6*d*h*z^2 - 512*a \\
& ^3*b^7*c^6*e*g*z^2 + 96*a^2*b^9*c^5*d*h*z^2 + 24576*a^5*b^2*c^9*d*f*z^2 - 3 \\
& 072*a^3*b^6*c^7*d*f*z^2 + 2048*a^4*b^4*c^8*d*f*z^2 + 576*a^2*b^8*c^6*d*f*z^ \\
& 2 - 430080*a^9*b*c^6*m^2*z^2 + 3408*a^4*b^{11}*c*m^2*z^2 - 64*a^3*b^{12}*c*l^2* \\
& z^2 + 61440*a^8*b*c^7*k^2*z^2 + 12288*a^7*b*c^8*h^2*z^2 + 12288*a^6*b*c^9*f \\
& ^2*z^2 + 61440*a^5*b*c^{10}*d^2*z^2 + 432*a*b^9*c^6*d^2*z^2 + 245760*a^9*c^7* \\
& k*m*z^2 + 81920*a^8*c^8*f*m*z^2 - 49152*a^8*c^8*h*k*z^2 - 147456*a^7*c^9*d* \\
& k*z^2 - 65536*a^7*c^9*e*j*z^2 - 16384*a^7*c^9*f*h*z^2 - 49152*a^6*c^{10}*d*f* \\
& z^2 + 716800*a^8*b^3*c^5*m^2*z^2 - 483840*a^7*b^5*c^4*m^2*z^2 + 170496*a^6* \\
& b^7*c^3*m^2*z^2 - 33232*a^5*b^9*c^2*m^2*z^2 + 516096*a^8*b^2*c^6*l^2*z^2 - \\
& 288768*a^7*b^4*c^5*l^2*z^2 + 88576*a^6*b^6*c^4*l^2*z^2 - 15744*a^5*b^8*c^3* \\
& l^2*z^2 + 1536*a^4*b^{10}*c^2*l^2*z^2 - 61440*a^7*b^3*c^6*k^2*z^2 + 24064*a^6 \\
& *b^5*c^5*k^2*z^2 - 4608*a^5*b^7*c^4*k^2*z^2 + 432*a^4*b^9*c^3*k^2*z^2 - 16* \\
& a^3*b^{11}*c^2*k^2*z^2 + 24576*a^7*b^2*c^7*j^2*z^2 - 6144*a^6*b^4*c^6*j^2*z^2 \\
& + 512*a^5*b^6*c^5*j^2*z^2 - 8192*a^6*b^3*c^7*h^2*z^2 + 1536*a^5*b^5*c^6*h^ \\
& 2*z^2 - 16*a^3*b^9*c^4*h^2*z^2 - 8192*a^6*b^2*c^8*g^2*z^2 + 6144*a^5*b^4*c^ \\
& 7*g^2*z^2 - 1536*a^4*b^6*c^6*g^2*z^2 + 128*a^3*b^8*c^5*g^2*z^2 - 8192*a^5*b \\
& ^3*c^8*f^2*z^2 + 1536*a^4*b^5*c^7*f^2*z^2 - 16*a^2*b^9*c^5*f^2*z^2 + 24576* \\
& a^5*b^2*c^9*e^2*z^2 - 6144*a^4*b^4*c^8*e^2*z^2 + 512*a^3*b^6*c^7*e^2*z^2 - \\
& 61440*a^4*b^3*c^9*d^2*z^2 + 24064*a^3*b^5*c^8*d^2*z^2 - 4608*a^2*b^7*c^7*d^ \\
& 2*z^2 - 393216*a^9*c^7*l^2*z^2 - 144*a^3*b^{13}*m^2*z^2 - 32768*a^8*c^8*j^2*z
\end{aligned}$$

$$\begin{aligned}
&^2 - 32768*a^6*c^{10}*e^2*z^2 - 16*b^{11}*c^5*d^2*z^2 + 18432*a^8*b*c^5*h^1*m*z \\
&- 96*a^3*b^{10}*c*g*k*m*z + 90112*a^7*b*c^6*e*k*m*z + 36864*a^7*b*c^6*f*j*m* \\
&z - 16384*a^7*b*c^6*g*j^1*z + 14336*a^7*b*c^6*d^1*m*z - 10240*a^7*b*c^6*f*k \\
&*l*z + 4096*a^7*b*c^6*h*j*k*z + 10240*a^7*b*c^6*g*h*m*z - 47104*a^6*b*c^7*d \\
&*h^1*z + 36864*a^6*b*c^7*e*f*m*z + 30720*a^6*b*c^7*d*g*m*z - 16384*a^6*b*c^ \\
&7*e*g^1*z + 6144*a^6*b*c^7*f*g*k*z + 4096*a^6*b*c^7*e*h*k*z + 32*a*b^{10}*c^3 \\
&*d*f^1*z - 4096*a^5*b*c^8*d*f*j*z - 6144*a^5*b*c^8*d*g*h*z - 32*a*b^8*c^5*d \\
&*f*g*z - 4096*a^4*b*c^9*d*e*f*z + 64*a*b^7*c^6*d*e*f*z + 110592*a^8*b^2*c^4 \\
&*k^1*m*z - 36864*a^7*b^4*c^3*k^1*m*z + 5376*a^6*b^6*c^2*k^1*m*z - 79872*a^7 \\
&*b^3*c^4*j*k*m*z + 26112*a^6*b^5*c^3*j*k*m*z - 3712*a^5*b^7*c^2*j*k*m*z - 1 \\
&3824*a^7*b^3*c^4*h^1*m*z + 3456*a^6*b^5*c^3*h^1*m*z - 288*a^5*b^7*c^2*h^1*m \\
&*z - 45056*a^7*b^2*c^5*g*k*m*z + 39936*a^6*b^4*c^4*g*k*m*z + 30720*a^7*b^2* \\
&c^5*f^1*m*z - 18432*a^7*b^2*c^5*h*k^1*z - 13056*a^5*b^6*c^3*g*k*m*z - 7680* \\
&a^6*b^4*c^4*f^1*m*z + 5376*a^6*b^4*c^4*h*j*m*z + 4608*a^6*b^4*c^4*h*k^1*z + \\
&3072*a^7*b^2*c^5*h*j*m*z - 1984*a^5*b^6*c^3*h*j*m*z + 1856*a^4*b^8*c^2*g*k \\
&*m*z + 640*a^5*b^6*c^3*f^1*m*z - 384*a^5*b^6*c^3*h*k^1*z + 192*a^4*b^8*c^2* \\
&h*j*m*z - 79872*a^6*b^3*c^5*e*k*m*z - 27648*a^6*b^3*c^5*f*j*m*z + 26112*a^5 \\
&*b^5*c^4*e*k*m*z + 12288*a^6*b^3*c^5*g*j^1*z - 10752*a^6*b^3*c^5*d^1*m*z + \\
&7680*a^6*b^3*c^5*f*k^1*z + 6912*a^5*b^5*c^4*f*j*m*z - 3712*a^4*b^7*c^3*e*k* \\
&m*z - 3072*a^6*b^3*c^5*h*j*k*z - 3072*a^5*b^5*c^4*g*j^1*z + 2688*a^5*b^5*c^ \\
&4*d^1*m*z - 1920*a^5*b^5*c^4*f*k^1*z + 768*a^5*b^5*c^4*h*j*k*z - 576*a^4*b^ \\
&7*c^3*f*j*m*z + 256*a^4*b^7*c^3*g*j^1*z - 224*a^4*b^7*c^3*d^1*m*z + 192*a^3 \\
&*b^9*c^2*e*k*m*z + 160*a^4*b^7*c^3*f*k^1*z - 64*a^4*b^7*c^3*h*j*k*z - 2688* \\
&a^5*b^5*c^4*g*h*m*z - 1536*a^6*b^3*c^5*g*h*m*z + 992*a^4*b^7*c^3*g*h*m*z - \\
&96*a^3*b^9*c^2*g*h*m*z - 65536*a^6*b^2*c^6*d*k^1*z + 46080*a^6*b^2*c^6*d*j* \\
&m*z - 24576*a^6*b^2*c^6*e*j^1*z + 21504*a^5*b^4*c^5*d*k^1*z - 11520*a^5*b^4 \\
&*c^5*d*j*m*z + 9216*a^6*b^2*c^6*f*j*k*z + 6144*a^5*b^4*c^5*e*j^1*z - 3072*a \\
&^4*b^6*c^4*d*k^1*z - 2304*a^5*b^4*c^5*f*j*k*z + 960*a^4*b^6*c^4*d*j*m*z - 5 \\
&12*a^4*b^6*c^4*e*j^1*z + 192*a^4*b^6*c^4*f*j*k*z + 160*a^3*b^8*c^3*d*k^1*z \\
&- 18432*a^6*b^2*c^6*f*g*m*z + 13824*a^5*b^4*c^5*f*g*m*z + 5376*a^5*b^4*c^5* \\
&e*h*m*z - 3456*a^4*b^6*c^4*f*g*m*z + 3072*a^6*b^2*c^6*e*h*m*z - 3072*a^5*b^ \\
&4*c^5*f*h^1*z - 2048*a^6*b^2*c^6*g*h*k*z - 1984*a^4*b^6*c^4*e*h*m*z + 1536* \\
&a^5*b^4*c^5*g*h*k*z + 1024*a^4*b^6*c^4*f*h^1*z - 384*a^4*b^6*c^4*g*h*k*z + \\
&288*a^3*b^8*c^3*f*g*m*z + 192*a^3*b^8*c^3*e*h*m*z - 96*a^3*b^8*c^3*f*h^1*z \\
&+ 32*a^3*b^8*c^3*g*h*k*z + 41472*a^5*b^3*c^6*d*h^1*z - 27648*a^5*b^3*c^6*e* \\
&f*m*z - 23040*a^5*b^3*c^6*d*g*m*z - 13440*a^4*b^5*c^5*d*h^1*z + 12288*a^5*b \\
&^3*c^6*e*g^1*z + 6912*a^4*b^5*c^5*e*f*m*z + 5760*a^4*b^5*c^5*d*g*m*z - 4608 \\
&*a^5*b^3*c^6*f*g*k*z - 3072*a^5*b^3*c^6*e*h*k*z - 3072*a^4*b^5*c^5*e*g^1*z \\
&+ 1888*a^3*b^7*c^4*d*h^1*z + 1152*a^4*b^5*c^5*f*g*k*z + 768*a^4*b^5*c^5*e*h \\
&*k*z - 576*a^3*b^7*c^4*e*f*m*z - 480*a^3*b^7*c^4*d*g*m*z + 256*a^3*b^7*c^4* \\
&e*g^1*z - 96*a^3*b^7*c^4*f*g*k*z - 96*a^2*b^9*c^3*d*h^1*z - 64*a^3*b^7*c^4* \\
&e*h*k*z + 46080*a^5*b^2*c^7*d*e*m*z - 11520*a^4*b^4*c^6*d*e*m*z + 9216*a^5* \\
&b^2*c^7*e*f*k*z - 9216*a^5*b^2*c^7*d*h*j*z - 6656*a^4*b^4*c^6*d*f^1*z - 614 \\
&4*a^5*b^2*c^7*d*f^1*z + 3456*a^3*b^6*c^5*d*f^1*z - 2304*a^4*b^4*c^6*e*f*k*z \\
&+ 2304*a^4*b^4*c^6*d*h*j*z + 960*a^3*b^6*c^5*d*e*m*z - 576*a^2*b^8*c^4*d*f
\end{aligned}$$



$$\begin{aligned}
& *1*z + 192*a^3*b^6*c^5*e*f*k*z - 192*a^3*b^6*c^5*d*h*j*z + 3072*a^4*b^3*c^7 \\
& *d*f*j*z - 768*a^3*b^5*c^6*d*f*j*z + 64*a^2*b^7*c^5*d*f*j*z + 4608*a^4*b^3* \\
& c^7*d*g*h*z - 1152*a^3*b^5*c^6*d*g*h*z + 96*a^2*b^7*c^5*d*g*h*z - 9216*a^4* \\
& b^2*c^8*d*e*h*z + 2304*a^3*b^4*c^7*d*e*h*z + 2048*a^4*b^2*c^8*d*f*g*z - 153 \\
& 6*a^3*b^4*c^7*d*f*g*z + 384*a^2*b^6*c^6*d*f*g*z - 192*a^2*b^6*c^6*d*e*h*z + \\
& 3072*a^3*b^3*c^8*d*e*f*z - 768*a^2*b^5*c^7*d*e*f*z - 288*a^5*b^8*c*k*l*m*z \\
& + 90112*a^8*b*c^5*j*k*m*z + 192*a^4*b^9*c*j*k*m*z + 138240*a^9*b*c^4*l*m^2 \\
& *z - 7344*a^6*b^7*c*l*m^2*z + 5088*a^5*b^8*c*j*m^2*z - 3072*a^8*b*c^5*k^2*l \\
& *z - 49152*a^8*b*c^5*j*l^2*z - 128*a^4*b^9*c*j*l^2*z - 25600*a^8*b*c^5*g*m^ \\
& 2*z - 9216*a^7*b*c^6*h^2*l*z - 2544*a^4*b^9*c*g*m^2*z + 64*a^3*b^10*c*g*l^2 \\
& *z + 9216*a^7*b*c^6*g*k^2*z - 3072*a^6*b*c^7*f^2*l*z - 288*a^3*b^10*c*e*m^2 \\
& *z - 49152*a^7*b*c^6*e*l^2*z - 58368*a^5*b*c^8*d^2*l*z - 432*a*b^9*c^4*d^2* \\
& l*z - 1024*a^6*b*c^7*g*h^2*z + 32*a*b^8*c^5*d^2*j*z + 1024*a^5*b*c^8*f^2*g* \\
& z - 9216*a^4*b*c^9*d^2*g*z + 336*a*b^7*c^6*d^2*g*z - 672*a*b^6*c^7*d^2*e*z \\
& - 122880*a^9*c^5*k*l*m*z - 40960*a^8*c^6*f*l*m*z + 24576*a^8*c^6*h*k*l*z - \\
& 20480*a^8*c^6*h*j*m*z + 73728*a^7*c^7*d*k*l*z - 61440*a^7*c^7*d*j*m*z + 327 \\
& 68*a^7*c^7*e*j*l*z - 12288*a^7*c^7*f*j*k*z - 20480*a^7*c^7*e*h*m*z + 8192*a \\
& ^7*c^7*f*h*l*z - 61440*a^6*c^8*d*e*m*z + 24576*a^6*c^8*d*f*l*z - 12288*a^6* \\
& c^8*e*f*k*z + 12288*a^6*c^8*d*h*j*z + 12288*a^5*c^9*d*e*h*z - 131328*a^8*b^ \\
& 3*c^3*l*m^2*z + 46656*a^7*b^5*c^2*l*m^2*z - 142848*a^8*b^2*c^4*j*m^2*z + 10 \\
& 6368*a^7*b^4*c^3*j*m^2*z - 34208*a^6*b^6*c^2*j*m^2*z + 2304*a^7*b^3*c^4*k^2 \\
& *l*z - 576*a^6*b^5*c^3*k^2*l*z + 48*a^5*b^7*c^2*k^2*l*z + 45056*a^7*b^3*c^4 \\
& *j*l^2*z - 15360*a^6*b^5*c^3*j*l^2*z - 12288*a^7*b^2*c^5*j^2*l*z + 3072*a^6 \\
& *b^4*c^4*j^2*l*z + 2304*a^5*b^7*c^2*j*l^2*z - 256*a^5*b^6*c^3*j^2*l*z + 158 \\
& 72*a^7*b^2*c^5*j*k^2*z - 4992*a^6*b^4*c^4*j*k^2*z + 672*a^5*b^6*c^3*j*k^2*z \\
& - 32*a^4*b^8*c^2*j*k^2*z + 71424*a^7*b^3*c^4*g*m^2*z - 53184*a^6*b^5*c^3*g \\
& *m^2*z + 17104*a^5*b^7*c^2*g*m^2*z + 6912*a^6*b^3*c^5*h^2*l*z - 1728*a^5*b^ \\
& 5*c^4*h^2*l*z + 144*a^4*b^7*c^3*h^2*l*z + 24576*a^7*b^2*c^5*g*l^2*z - 22528 \\
& *a^6*b^4*c^4*g*l^2*z + 7680*a^5*b^6*c^3*g*l^2*z + 4096*a^6*b^2*c^6*g^2*l*z \\
& - 3072*a^5*b^4*c^5*g^2*l*z - 1152*a^4*b^8*c^2*g*l^2*z + 768*a^4*b^6*c^4*g^2 \\
& *l*z - 64*a^3*b^8*c^3*g^2*l*z - 142848*a^7*b^2*c^5*e*m^2*z + 106368*a^6*b^4 \\
& *c^4*e*m^2*z - 34208*a^5*b^6*c^3*e*m^2*z - 7936*a^6*b^3*c^5*g*k^2*z + 5088* \\
& a^4*b^8*c^2*e*m^2*z + 2496*a^5*b^5*c^4*g*k^2*z - 1536*a^6*b^2*c^6*h^2*j*z + \\
& 1280*a^5*b^3*c^6*f^2*l*z + 384*a^5*b^4*c^5*h^2*j*z - 336*a^4*b^7*c^3*g*k^2 \\
& *z + 192*a^4*b^5*c^5*f^2*l*z - 144*a^3*b^7*c^4*f^2*l*z - 32*a^4*b^6*c^4*h^2 \\
& *j*z + 16*a^3*b^9*c^2*g*k^2*z + 16*a^2*b^9*c^3*f^2*l*z + 45056*a^6*b^3*c^5* \\
& e*l^2*z - 15360*a^5*b^5*c^4*e*l^2*z - 12288*a^5*b^2*c^7*e^2*l*z + 3072*a^4* \\
& b^4*c^6*e^2*l*z + 2304*a^4*b^7*c^3*e*l^2*z - 256*a^3*b^6*c^5*e^2*l*z - 128* \\
& a^3*b^9*c^2*e*l^2*z + 59136*a^4*b^3*c^7*d^2*l*z - 23488*a^3*b^5*c^6*d^2*l*z \\
& + 15872*a^6*b^2*c^6*e*k^2*z - 4992*a^5*b^4*c^5*e*k^2*z + 4560*a^2*b^7*c^5* \\
& d^2*l*z + 1536*a^5*b^2*c^7*f^2*j*z + 672*a^4*b^6*c^4*e*k^2*z - 384*a^4*b^4* \\
& c^6*f^2*j*z - 32*a^3*b^8*c^3*e*k^2*z + 32*a^3*b^6*c^5*f^2*j*z + 768*a^5*b^3 \\
& *c^6*g*h^2*z - 192*a^4*b^5*c^5*g*h^2*z + 16*a^3*b^7*c^4*g*h^2*z - 15872*a^4 \\
& *b^2*c^8*d^2*j*z + 4992*a^3*b^4*c^7*d^2*j*z - 672*a^2*b^6*c^6*d^2*j*z - 153 \\
& 6*a^5*b^2*c^7*e*h^2*z - 768*a^4*b^3*c^7*f^2*g*z + 384*a^4*b^4*c^6*e*h^2*z +
\end{aligned}$$

$$\begin{aligned}
& 192a^3b^5c^6f^2gz - 32a^3b^6c^5e^h^2z - 16a^2b^7c^5f^2gz \\
& + 7936a^3b^3c^8d^2gz - 2496a^2b^5c^7d^2gz + 1536a^4b^2c^8ef^2z - 384a^3b^4c^7ef^2z + 32a^2b^6c^6ef^2z - 15872a^3b^2c^9d^2ez + 4992a^2b^4c^8d^2ez - 61440a^8b^2c^4l^3z + 21504a^7b^4c^3l^3z - 3328a^6b^6c^2l^3z + 432a^5b^9lm^2z + 51200a^9c^5jm^2z + 16384a^8c^6j^2l^3z - 288a^4b^10jm^2z - 18432a^8c^6jk^2z + 144a^3b^11g^2m^2z + 51200a^8c^6em^2z + 2048a^7c^7h^2jm^2z + 16384a^6c^8e^2l^3z + 16b^11c^3d^2l^3z - 18432a^7c^7ek^2z - 2048a^6c^8f^2jm^2z + 18432a^5c^9d^2jm^2z + 192a^5b^8c^1l^3z + 2048a^6c^8e^h^2z - 16b^9c^5d^2gz - 2048a^5c^9ef^2z + 32b^8c^6d^2ez + 18432a^4c^10d^2ez + 65536a^9c^5l^3z - 11008a^8b^c^3j^2k^1m - 288a^6b^5c^2j^2k^1m + 144a^5b^6c^2g^2k^1m - 11008a^7b^c^4ek^1m - 5376a^7b^c^4f^2j^1m + 3840a^7b^c^4g^2j^1m - 3328a^7b^c^4h^2j^1m - 96a^4b^7c^2g^2j^1m - 2560a^7b^c^4g^2h^1m - 36a^3b^8c^2f^2h^1m - 6912a^6b^c^5d^2j^1m - 7872a^6b^c^5d^2h^1m - 7680a^6b^c^5d^2g^1m - 5376a^6b^c^5ef^1m + 3840a^6b^c^5eg^1m - 3328a^6b^c^5eh^1m - 1536a^6b^c^5fg^1m + 1280a^6b^c^5fg^2m - 768a^6b^c^5g^2h^1m - 768a^6b^c^5f^2h^1m - 768a^6b^c^5eh^2m - 36a^2b^9c^2d^2h^1m - 6912a^5b^c^6d^2ek^1m - 4864a^5b^c^6d^2ej^1m - 2304a^5b^c^6d^2gj^1m - 1792a^5b^c^6ef^2j^1m - 1280a^5b^c^6d^2f^2j^1m - 4544a^5b^c^6d^2f^2h^1m + 1536a^5b^c^6d^2g^2h^1m + 1280a^5b^c^6ef^2g^2m - 768a^5b^c^6eg^2h^1m - 768a^5b^c^6ef^2h^1m - 256a^5b^c^6fg^2h^1m + 12a^2b^9c^2d^2f^2h^1m + 16a^2b^8c^3d^2f^2g^1m - 4a^2b^8c^3d^2f^2h^1m - 2304a^4b^c^7d^2eg^2m - 1792a^4b^c^7d^2eh^2m - 1280a^4b^c^7d^2ef^1m - 768a^4b^c^7d^2fg^2m - 32a^2b^7c^4d^2ef^1m - 256a^4b^c^7ef^2g^2h^1m - 768a^3b^c^8d^2ef^2g^1m + 32a^2b^5c^6d^2ef^2g^1m + 12a^2b^10c^2d^2f^2k^1m + 3648a^7b^3c^2j^2k^1m + 5504a^7b^2c^3g^2k^1m - 1824a^6b^4c^2g^2k^1m + 384a^7b^2c^3h^2j^1m - 288a^6b^4c^2h^2j^1m - 4800a^6b^3c^3g^2j^1m + 3648a^6b^3c^3ek^1m + 1280a^5b^5c^2g^2j^1m + 1088a^6b^3c^3f^2j^1m + 576a^6b^3c^3h^2j^1m - 288a^5b^5c^2ek^1m - 192a^6b^3c^3g^2h^1m + 144a^5b^5c^2g^2h^1m + 9600a^6b^2c^4ef^2j^1m - 4224a^6b^2c^4d^2j^1m - 2560a^5b^4c^3ef^2j^1m + 384a^6b^2c^4f^2j^1m + 224a^5b^4c^3d^2j^1m + 192a^4b^6c^2ef^2j^1m - 160a^5b^4c^3f^2j^1m - 4608a^6b^2c^4f^2h^1m + 2688a^6b^2c^4fg^2m + 1664a^6b^2c^4g^2h^1m - 744a^5b^4c^3f^2h^1m - 544a^5b^4c^3fg^2m + 492a^4b^6c^2f^2h^1m + 416a^5b^4c^3g^2h^1m + 384a^6b^2c^4g^2h^1m + 384a^6b^2c^4eh^1m - 288a^5b^4c^3g^2h^1m - 288a^5b^4c^3eh^1m - 96a^4b^6c^2g^2h^1m + 2112a^5b^3c^4d^2j^1m - 160a^4b^5c^3d^2j^1m + 16992a^5b^3c^4d^2h^1m - 6252a^4b^5c^3d^2h^1m - 4800a^5b^3c^4ef^2g^1m + 2112a^5b^3c^4d^2g^1m - 1728a^5b^3c^4fg^2m + 1280a^4b^5c^3ef^2g^1m + 1088a^5b^3c^4ef^2m - 832a^5b^3c^4eh^2m + 816a^3b^7c^2d^2h^1m + 576a^5b^3c^4eh^2m - 448a^5b^3c^4f^2h^1m + 288a^4b^5c^3fg^2m - 192a^5b^3c^4g^2h^1m - 192a^5b^3c^4fg^2m + 192a^4b^5c^3eh^2m - 112a^4b^5c^3d^2g^1m + 96a^4b^5c^3f^2h^1m - 96a^3b^7c^2ef^2g^1m + 80a^4b^5c^3fg^2m + 32a^4b^5c^3g^2h^1m - 11456a^5b^2c^5d^2f^2k^1m + 4992a^5b^2c^5d^2h^1j^1m - 4
\end{aligned}$$

$$\begin{aligned}
& 608a^5b^2c^5e*g*j*1 - 4224a^5b^2c^5d*e*1*m + 3456a^5b^2c^5e*f*j \\
& *m + 3456a^5b^2c^5d*g*k*1 + 2432a^5b^2c^5d*g*j*m - 1312a^4b^4c^4 \\
& *d*h*j*1 + 1272a^3b^6c^3d*f*k*m - 1056a^4b^4c^4d*g*k*1 + 896a^5b^ \\
& 2c^5f*g*j*k + 768a^4b^4c^4e*g*j*1 - 576a^4b^4c^4e*f*j*m - 480a^4 \\
& *b^4c^4d*g*j*m + 384a^5b^2c^5e*h*j*k + 384a^5b^2c^5e*f*k*1 - 232* \\
& a^2b^8c^2d*f*k*m + 224a^4b^4c^4d*e*1*m - 160a^4b^4c^4e*f*k*1 - 9 \\
& 6a^4b^4c^4f*g*j*k + 96a^3b^6c^3d*h*j*1 + 80a^3b^6c^3d*g*k*1 - 6 \\
& 4a^4b^4c^4e*h*j*k - 24a^4b^4c^4d*f*k*m + 416a^4b^4c^4e*g*h*m + \\
& 384a^5b^2c^5f*g*h*1 + 384a^5b^2c^5e*g*h*m + 224a^4b^4c^4f*g*h*1 \\
& - 96a^3b^6c^3e*g*h*m - 48a^3b^6c^3f*g*h*1 + 2112a^4b^3c^5d*e*k \\
& *1 - 960a^4b^3c^5d*f*j*1 + 960a^4b^3c^5d*e*j*m + 384a^3b^5c^4d*f \\
& *j*1 + 320a^4b^3c^5d*g*j*k + 192a^4b^3c^5e*f*j*k - 160a^3b^5c^4 \\
& *d*e*k*1 - 32a^2b^7c^3d*f*j*1 + 7392a^4b^3c^5d*f*h*m - 2496a^4b^3 \\
& *c^5d*g*h*1 - 1728a^4b^3c^5e*f*g*m - 1500a^3b^5c^4d*f*h*m + 656a^ \\
& 3b^5c^4d*g*h*1 - 448a^4b^3c^5e*f*h*1 + 288a^3b^5c^4e*f*g*m - 192 \\
& *a^4b^3c^5f*g*h*j - 192a^4b^3c^5e*g*h*k + 96a^3b^5c^4e*f*h*1 - 4 \\
& 8a^2b^7c^3d*g*h*1 + 32a^3b^5c^4e*g*h*k - 16a^2b^7c^3d*f*h*m - 6 \\
& 40a^4b^2c^6d*e*j*k + 4992a^4b^2c^6d*e*h*1 - 3584a^4b^2c^6d*f*h* \\
& k + 2432a^4b^2c^6d*e*g*m - 1312a^3b^4c^5d*e*h*1 + 896a^4b^2c^6e \\
& *f*g*k + 896a^4b^2c^6d*g*h*j + 640a^4b^2c^6d*f*g*1 + 600a^3b^4c^ \\
& 5d*f*h*k + 480a^3b^4c^5d*f*g*1 - 480a^3b^4c^5d*e*g*m + 384a^4b^2 \\
& *c^6e*f*h*j - 192a^2b^6c^4d*f*g*1 - 96a^3b^4c^5e*f*g*k - 96a^3b^ \\
& 4c^5d*g*h*j + 96a^2b^6c^4d*e*h*1 + 12a^2b^6c^4d*f*h*k - 960a^3b \\
& ^3c^6d*e*f*1 + 384a^2b^5c^5d*e*f*1 + 320a^3b^3c^6d*e*g*k - 192a^ \\
& 3b^3c^6d*f*g*j + 192a^3b^3c^6d*e*h*j + 32a^2b^5c^5d*f*g*j - 192* \\
& a^3b^3c^6e*f*g*h + 384a^3b^2c^7d*e*f*j - 64a^2b^4c^6d*e*f*j + 89 \\
& 6a^3b^2c^7d*e*g*h - 96a^2b^4c^6d*e*g*h - 192a^2b^3c^7d*e*f*g + \\
& 496a^7b^4c*k*1^2*m - 4752a^7b^4c*j*1*m^2 + 96a^5b^6c*j^2*k*m - 614 \\
& 4a^8b*c^3*h*1^2*m - 168a^6b^5c*h*1^2*m + 6400a^8b*c^3*g*1*m^2 - 2862 \\
& *a^6b^5c*h*k*m^2 + 2376a^6b^5c*g*1*m^2 - 1632a^7b*c^4h^2*k*m - 480* \\
& a^8b*c^3h*k*m^2 - 180a^5b^6c*h*k^2*m + 54a^4b^7c*h^2*k*m - 384a^7* \\
& b*c^4h*j^2*m + 120a^5b^6c*h*k*1^2 + 56a^5b^6c*f*1^2*m + 24a^3b^8c \\
& *g^2*k*m + 4512a^7b*c^4f*k^2*m - 2304a^7b*c^4g*k^2*1 - 1680a^5b^6c \\
& *g*j*m^2 + 1184a^6b*c^5f^2*k*m + 804a^5b^6c*f*k*m^2 + 432a^5b^6c*e \\
& *1*m^2 + 60a^4b^7c*f*k^2*m + 6a^2b^9c*f^2*k*m - 13312a^7b*c^4d*1^2 \\
& *m + 2048a^7b*c^4g*j*1^2 - 1024a^7b*c^4f*k*1^2 + 64a^4b^7c*g*j*1^2 \\
& + 56a^4b^7c*d*1^2*m - 40a^4b^7c*f*k*1^2 + 13440a^7b*c^4e*j*m^2 - \\
& 8928a^5b*c^6d^2*k*m - 6240a^7b*c^4d*k*m^2 + 1614a^4b^7c*d*k*m^2 - \\
& 288a^4b^7c*e*j*m^2 - 170a^b^9c^2d^2*k*m + 60a^3b^8c*d*k^2*m + 4608 \\
& *a^6b*c^5e*j^2*1 + 4608a^5b*c^6e^2*j*1 - 2432a^6b*c^5d*j^2*m + 1440 \\
& *a^7b*c^4f*h*m^2 - 896a^6b*c^5f*j^2*k - 864a^6b*c^5f*h^2*m - 558a^ \\
& 4b^7c*f*h*m^2 + 256a^6b*c^5g*h^2*1 - 40a^3b^8c*d*k*1^2 - 1920a^6b \\
& *c^5e*j*k^2 - 384a^5b*c^6e^2*h*m + 24a^3b^8c*f*h*1^2 - 16a^b^8c^3* \\
& d^2*j*1 + 2208a^6b*c^5f*h*k^2 - 1044a^3b^8c*d*h*m^2 + 800a^5b*c^6f \\
& ^2*h*k - 256a^5b*c^6f^2*g*1 + 144a^3b^8c*e*g*m^2 - 116a^b^8c^3d^2*
\end{aligned}$$

$$\begin{aligned}
& h^m + 8192a^6b^5c^5d^5h^2 + 2048a^6b^5c^5e^5g^2 + 24a^2b^9c^5d^5h^2 \\
& - 5856a^4b^7c^7d^2f^m + 4896a^4b^7c^7d^2h^2k + 2720a^6b^5c^5d^5f^m \\
& + 2304a^4b^7c^7d^2g^2 + 1824a^5b^7c^6d^5h^2k + 438a^7c^4d^2f^m \\
& - 384a^5b^7c^6e^5h^2j + 318a^2b^9c^5d^5f^m - 168a^7c^4d^2g^2 + \\
& 42a^7c^4d^2h^2k - 36a^8c^3d^5f^2m - 2432a^4b^7c^7d^5e^2m + 1536 \\
& a^5b^7c^6e^5g^2j + 1536a^4b^7c^7e^2g^2j - 896a^5b^7c^6d^5h^2j - 896a^4 \\
& b^7c^7e^2f^2k + 4896a^5b^7c^6d^5f^2k + 1824a^4b^7c^7d^5f^2k - 384a^4 \\
& b^7c^7e^2f^2j + 336a^6b^7c^5d^2e^2f^2k + 16a^6b^7c^5d^2g^2j + 12a^6b^7c^4 \\
& d^2f^2k - 2a^6b^9c^2d^5f^2k - 1920a^3b^7c^8d^2e^2j - 32a^6b^5c^6d^2e^2j \\
& + 2208a^3b^7c^8d^2f^2h + 800a^4b^7c^7d^5f^2h^2 - 102a^6b^5c^6d^2f^2h \\
& + 12a^6b^6c^5d^5f^2h - 2a^7c^4d^5f^2h^2 - 896a^3b^7c^8d^5e^2h - 8a^6b^6c^5 \\
& d^5f^2g^2 - 240a^6b^4c^7d^2e^2g - 32a^6b^4c^7d^2e^2f + 5120a^8c^4h^2j^2m \\
& + 15360a^7c^5d^2j^2m - 7680a^7c^5e^2j^2m + 3072a^7c^5f^2j^2m + 5120a^7c^5e^2h^2j^2m \\
& + 1920a^7c^5f^2h^2j^2m + 15360a^6c^6d^2e^2j^2m + 5760a^6c^6d^2f^2k^2m + 3072a^6c^6e^2f^2k^2m \\
& - 3072a^6c^6d^2h^2j^2m - 2560a^6c^6e^2f^2j^2m + 1536a^6c^6e^2h^2j^2k + 4608 \\
& a^5c^7d^2e^2j^2k - 3072a^5c^7d^2e^2h^2j^2k - 1152a^5c^7d^2f^2h^2k + 512a^5c^7 \\
& e^2f^2h^2j + 1536a^4c^8d^2e^2f^2j - 8a^6b^10c^5d^2f^2m - 5568a^8b^2c^2k^2 \\
& l^2m + 15552a^8b^2c^2j^2l^2m + 4800a^7b^2c^3j^2k^2m - 1280a^6b^4c^2j^2k^2m \\
& + 2080a^7b^3c^2h^2l^2m - 1088a^7b^2c^3j^2k^2l + 48a^6b^4c^2j^2k^2l - 8544a^7b^2c^3h^2k^2m \\
& - 7776a^7b^3c^2g^2l^2m + 7632a^7b^3c^2h^2k^2m + 3600a^6b^3c^3h^2k^2m + 2484a^6b^4c^2h^2k^2m \\
& - 918a^5b^5c^2h^2k^2m + 4800a^7b^2c^3h^2k^2l - 1424a^6b^4c^2h^2k^2l^2 + 1200a^5b^4c^3g^2k^2m \\
& - 960a^6b^2c^4g^2k^2m - 528a^6b^4c^2f^2l^2m - 416a^6b^3c^3h^2j^2m - 320a^4b^6c^2g^2k^2m \\
& + 192a^7b^2c^3f^2l^2m + 96a^5b^5c^2h^2j^2m + 15552a^7b^2c^3e^2l^2m - 6720a^7b^2c^3g^2j^2m \\
& + 6160a^6b^4c^2g^2j^2m - 4752a^6b^4c^2e^2l^2m - 2016a^7b^2c^3f^2k^2m - 1164a^6b^4c^2f^2k^2m \\
& + 1104a^5b^3c^4f^2k^2m + 1008a^6b^3c^3f^2k^2m + 960a^6b^2c^4h^2j^2l - 678a^5b^5c^2f^2k^2m \\
& + 544a^6b^3c^3g^2k^2l - 144a^5b^4c^3h^2j^2l - 102a^4b^5c^3f^2k^2m - 62a^3b^7c^2f^2k^2m \\
& - 24a^5b^5c^2g^2k^2l + 6432a^6b^3c^3d^2l^2m + 4800a^5b^2c^5e^2k^2m - 2304a^6b^2c^4g^2j^2l \\
& + 1920a^6b^3c^3g^2j^2l + 1728a^6b^2c^4f^2j^2m - 1280a^4b^4c^4e^2k^2m + 1152a^5b^3c^4g^2j^2l \\
& - 1032a^5b^5c^2d^2l^2m - 864a^6b^3c^3f^2k^2l^2 - 768a^5b^5c^2g^2j^2l + 408a^5b^5c^2f^2k^2l^2 \\
& + 384a^5b^4c^3g^2j^2l - 288a^5b^4c^3f^2j^2m + 192a^6b^2c^4h^2j^2k - 192a^4b^5c^3g^2j^2l \\
& + 96a^3b^6c^3e^2k^2m - 32a^5b^4c^3h^2j^2k - 21120a^6b^2c^4d^2k^2m + 20880a^6b^3c^3d^2k^2m \\
& + 19760a^4b^3c^5d^2k^2m - 12320a^6b^3c^3e^2j^2m - 9750a^5b^5c^2d^2k^2m - 9390a^3b^5c^4d^2k^2m \\
& + 8460a^5b^4c^3d^2k^2m + 3360a^5b^5c^2e^2j^2m + 1860a^2b^7c^3d^2k^2m - 1218a^4b^6c^2d^2k^2m \\
& - 1088a^6b^2c^4e^2k^2l + 960a^6b^2c^4g^2j^2k^2 - 240a^5b^4c^3g^2j^2k^2 + 192a^5b^2c^5f^2j^2l \\
& - 104a^4b^5c^3g^2h^2m - 96a^5b^3c^4g^2h^2m + 48a^5b^4c^3e^2k^2l + 48a^4b^4c^4f^2j^2l \\
& + 24a^3b^7c^2g^2h^2m + 16a^4b^6c^2g^2j^2k^2 - 16a^3b^6c^3f^2j^2l + 13376a^6b^2c^4d^2k^2l^2 \\
& - 5136a^5b^4c^3d^2k^2l^2 - 3840
\end{aligned}$$

$$\begin{aligned}
& *a^6b^2c^4e*j^1^2 + 1536a^5b^4c^3e*j^1^2 + 1392a^5b^3c^4f*h^2m \\
& + 1386a^5b^5c^2f*h^2m - 768a^5b^3c^4e*j^2*1 + 768a^4b^6c^2d*k^1 \\
& 1^2 - 768a^4b^3c^5e^2*j^1 - 588a^4b^4c^4f^2*h^2m - 480a^5b^3c^4g \\
& *h^2*1 + 480a^5b^3c^4d*j^2*m - 480a^5b^2c^5f^2*h^2m - 128a^4b^6c^2 \\
& *e*j^1^2 + 100a^3b^6c^3f^2*h^2m + 96a^5b^3c^4f*j^2*k + 72a^4b^5c^3 \\
& *g*h^2*1 - 54a^4b^5c^3f*h^2m - 48a^6b^3c^3f*h^2m - 36a^3b^7c^2 \\
& *f*h^2m + 6a^2b^8c^2f^2*h^2m + 6848a^4b^2c^6d^2*j^1 - 2448a^3b^4 \\
& *c^5d^2*j^1 + 624a^5b^4c^3f*h^1^2 + 576a^6b^2c^4f*h^1^2 + 480a^5 \\
& *b^3c^4e*j^k^2 + 432a^4b^4c^4f*g^2*m - 416a^4b^3c^5e^2*h^2m + 336a^2 \\
& *b^6c^4d^2*j^1 - 320a^5b^2c^5f*g^2*m - 256a^4b^6c^2f*h^1^2 + 1 \\
& 92a^5b^2c^5g^2*h^2k + 96a^3b^5c^4e^2*h^2m - 72a^3b^6c^3f*g^2*m + \\
& 48a^4b^4c^4g^2*h^2k - 32a^4b^5c^3e*j^k^2 - 8a^3b^6c^3g^2*h^2k + 2 \\
& 4768a^6b^2c^4d*h^2m - 21108a^5b^4c^3d*h^2m - 10048a^4b^2c^6d^2 \\
& *h^2m + 7218a^4b^6c^2d*h^2m - 6720a^6b^2c^4e*g^2m + 6160a^5b^4c^3 \\
& *e*g^2m - 2592a^5b^2c^5d*h^2m - 1680a^4b^6c^2e*g^2m + 1068a^3 \\
& *b^4c^5d^2*h^2m + 960a^5b^2c^5e*h^2*1 - 876a^4b^4c^4d*h^2m - 864 \\
& *a^5b^2c^5f*h^2*k + 546a^2b^6c^4d^2*h^2m + 432a^3b^6c^3d*h^2m + \\
& 336a^4b^3c^5f^2*h^2k - 320a^5b^2c^5d*j^2*k + 192a^5b^2c^5g*h^2*j \\
& + 144a^5b^3c^4f*h^2*k^2 - 144a^4b^4c^4e*h^2*1 - 102a^4b^5c^3f*h^2 \\
& *k^2 - 96a^4b^3c^5f^2*g*1 - 36a^2b^8c^2d*h^2m - 30a^3b^5c^4f^2* \\
& h^2k - 24a^3b^5c^4f^2*g*1 + 16a^4b^4c^4g*h^2*j - 12a^4b^4c^4f*h^2 \\
& *k + 12a^3b^6c^3f*h^2*k + 8a^2b^7c^3f^2*g*1 + 6a^3b^7c^2f*h^2*k^2 \\
& - 2a^2b^7c^3f^2*h^2k - 9312a^5b^3c^4d*h^1^2 + 3288a^4b^5c^3d*h^1 \\
& *1^2 - 2304a^4b^2c^6e^2*g*1 + 1920a^5b^3c^4e*g*1^2 + 1728a^4b^2c^6 \\
& *e^2*f*m + 1152a^4b^3c^5e*g^2*1 - 768a^4b^5c^3e*g*1^2 - 608a^4b^3 \\
& *c^5d*g^2*m - 472a^3b^7c^2d*h^1^2 + 384a^3b^4c^5e^2*g*1 - 288a^3 \\
& *b^4c^5e^2*f*m - 224a^4b^3c^5f*g^2*k + 192a^5b^2c^5f*h^2*j^2 + 192 \\
& *a^4b^2c^6e^2*h^2k - 192a^3b^5c^4e*g^2*1 + 120a^3b^5c^4d*g^2*m + \\
& 64a^3b^7c^2e*g*1^2 - 32a^3b^4c^5e^2*h^2k + 24a^3b^5c^4f*g^2*k + \\
& 9936a^3b^3c^6d^2*f*m + 3786a^4b^5c^3d*f^2m - 3552a^5b^2c^5d*h^2 \\
& *k^2 - 3486a^2b^5c^5d^2*f*m - 3424a^3b^3c^6d^2*g*1 - 1868a^3b^7c^2 \\
& *d*f^2m + 1332a^4b^4c^4d*h^2*k^2 - 1296a^5b^3c^4d*f^2m - 1236a^3 \\
& *b^4c^5d*f^2m + 1224a^2b^5c^5d^2*g*1 - 1152a^4b^2c^6d*f^2m + 960 \\
& *a^5b^2c^5e*g*k^2 - 496a^3b^3c^6d^2*h^2k + 462a^2b^6c^4d*f^2m + \\
& 432a^4b^3c^5d*h^2*k - 240a^4b^4c^4e*g*k^2 - 222a^2b^5c^5d^2*h^2k \\
& + 192a^4b^2c^6f^2*g*j + 192a^4b^2c^6e*f^2*1 - 174a^3b^5c^4d*h^2 \\
& *k - 156a^3b^6c^3d*h^2*k^2 + 48a^3b^4c^5e*f^2*1 - 32a^4b^3c^5e*h^2 \\
& *j + 16a^3b^6c^3e*g*k^2 + 16a^3b^4c^5f^2*g*j - 16a^2b^6c^4e*f^2*1 \\
& + 12a^2b^7c^3d*h^2*k + 6a^2b^8c^2d*h^2*k^2 + 1728a^5b^2c^5d*f^1^2 \\
& + 1392a^4b^4c^4d*f^1^2 - 840a^3b^6c^3d*f^1^2 - 768a^4b^2c^6 \\
& *e*g^2*j + 576a^4b^2c^6d*g^2*k + 480a^3b^3c^6d*e^2*m + 144a^2b^8 \\
& *c^2d*f^1^2 + 96a^4b^3c^5d*h^2*j^2 + 96a^3b^3c^6e^2*f*k - 80a^3b^4 \\
& *c^5d*g^2*k + 6848a^3b^2c^7d^2*e*1 - 3552a^3b^2c^7d^2*f*k - 2448a^2 \\
& *b^4c^6d^2*e*1 + 1332a^2b^4c^6d^2*f*k + 960a^3b^2c^7d^2*g*j - 4 \\
& 96a^4b^3c^5d*f*k^2 + 432a^3b^3c^6d*f^2*k - 240a^2b^4c^6d^2*g*j
\end{aligned}$$

$$\begin{aligned}
& - 222a^3b^5c^4d^2fk^2 - 174a^2b^5c^5d^2fk + 64a^4b^2c^6f^2g^2h \\
& + 48a^3b^4c^5f^2g^2h + 42a^2b^7c^3d^2fk^2 - 32a^3b^3c^6e^2f^2j \\
& - 320a^3b^2c^7d^2e^2k + 192a^4b^2c^6e^2g^2h^2 + 192a^4b^2c^6d^2f^2j^2 \\
& - 32a^3b^4c^5d^2f^2j^2 + 16a^3b^4c^5e^2g^2h^2 + 480a^2b^3c^7d^2e^2j \\
& - 224a^3b^3c^6d^2g^2h + 192a^3b^2c^7e^2f^2h + 24a^2b^5c^5d^2g^2h \\
& - 864a^3b^2c^7d^2f^2h + 336a^3b^3c^6d^2f^2h^2 + 192a^3b^2c^7e^2f^2g \\
& + 144a^2b^3c^7d^2f^2h - 30a^2b^5c^5d^2f^2h^2 + 16a^2b^4c^6e^2f^2g \\
& - 12a^2b^4c^6d^2f^2h + 192a^3b^2c^7d^2f^2g^2 + 96a^2b^3c^7d^2e^2h \\
& + 48a^2b^4c^6d^2f^2g^2 + 960a^2b^2c^8d^2e^2g + 192a^2b^2c^8d^2e^2f \\
& - 7680a^9b^2c^2l^2m^2 + 3152a^8b^3c^2l^2m^2 + 2070a^7b^4c^2k^2m^2 \\
& - 1840a^7b^3c^2k^3m + 6720a^8b^3c^2j^2m^2 - 3072a^8b^3c^2k^2l^2 \\
& + 1680a^6b^5c^2j^2m^2 - 100a^6b^5c^2k^2l^2 - 2176a^7b^3c^2j^2l^3 \\
& - 256a^6b^3c^3j^3l - 64a^5b^6c^2j^2l^2 - 12480a^8b^2c^2h^3m^3 \\
& + 972a^5b^6c^2h^2m^2 - 960a^7b^2c^4j^2k^2 - 252a^5b^4c^3h^3m \\
& - 192a^6b^2c^4h^3m + 54a^4b^6c^2h^3m + 1536a^7b^2c^4h^2l^2 \\
& + 420a^4b^7c^2g^2m^2 - 36a^4b^7c^2h^2l^2 - 3072a^7b^2c^3g^2l^3 \\
& + 2096a^7b^3c^2f^2m^3 + 1088a^6b^4c^2g^2l^3 - 496a^6b^3c^3h^2k^3 \\
& - 192a^4b^4c^4g^3l + 176a^4b^3c^5f^3m + 144a^5b^3c^4h^3k + 78a^3b^8c^2f^2m^2 \\
& + 54a^3b^5c^4f^3m + 32a^3b^6c^3g^3l + 30a^5b^5c^2h^2k^3 - 18a^4b^5c^3h^3k \\
& - 18a^2b^7c^3f^3m - 16a^3b^8c^2g^2l^2 + 6720a^6b^2c^5e^2m^2 - 192a^6b^2c^5h^2j^2 \\
& - 4a^2b^9c^2f^2l^2 - 35040a^7b^2c^3d^2m^3 + 14300a^6b^4c^2d^2m^3 - 12000a^3b^2c^7d^3m \\
& + 4380a^2b^4c^6d^3m - 2176a^6b^3c^3e^2l^3 - 256a^3b^3c^6e^3l - 192a^6b^2c^4f^2k^3 \\
& + 192a^5b^5c^2e^2l^3 - 192a^4b^2c^6f^3k + 132a^5b^4c^3f^2k^3 + 128a^4b^3c^5g^3j \\
& - 28a^3b^4c^5f^3k - 10a^4b^6c^2f^2k^3 + 6a^2b^6c^4f^3k + 10752a^5b^2c^6d^2l^2 \\
& - 960a^5b^2c^6e^2k^2 - 192a^5b^2c^6f^2j^2 + 108a^2b^9c^2d^2l^2 - 1680a^5b^3c^4d^2k^3 \\
& - 1680a^2b^3c^7d^3k + 222a^4b^5c^3d^2k^3 + 30a^2b^8c^3d^2k^2 - 10a^3b^7c^2d^2k^3 \\
& - 960a^4b^2c^7d^2j^2 + 80a^4b^3c^5f^2h^3 + 80a^3b^3c^6f^3h + 6a^3b^5c^4f^2h^3 \\
& + 6a^2b^5c^5f^3h - 192a^4b^2c^7e^2h^2 - 192a^4b^2c^6d^2h^3 - 192a^2b^2c^8d^3h \\
& + 128a^3b^3c^6e^2g^3 - 28a^3b^4c^5d^2h^3 + 12a^2b^6c^5d^2h^2 + 6a^2b^6c^4d^2h^3 \\
& - 192a^3b^2c^8e^2f^2 + 60a^2b^5c^6d^2g^2 + 198a^2b^4c^7d^2f^2 + 144a^2b^3c^7d^2f^3 \\
& - 960a^2b^2c^9d^2e^2 + 240a^2b^3c^8d^2e^2 + 15360a^9c^3k^2l^2m - 12800a^9c^3j^2l^2m^2 \\
& - 3840a^8c^4j^2k^2m + 432a^6b^6j^2l^2m^2 + 4608a^8c^4j^2k^2l + 2880a^8c^4h^2k^2m \\
& + 5120a^8c^4f^2l^2m - 3072a^8c^4h^2k^2l^2 + 270a^5b^7h^2k^2m^2 - 216a^5b^7g^2l^2m^2 \\
& - 12800a^8c^4e^2l^2m^2 - 4800a^8c^4f^2k^2m^2 - 512a^7c^5h^2j^2l - 3840a^6c^6e^2k^2m \\
& - 1280a^7c^5f^2j^2m + 768a^7c^5h^2j^2k + 144a^4b^8g^2j^2m^2 - 90a^4b^8f^2k^2m^2 \\
& + 8640a^7c^5d^2k^2m + 4608a^7c^5e^2k^2l + 512a^6c^6f^2j^2l - 9216a^7c^5d^2k^2l^2 \\
& - 4096a^7c^5e^2j^2l^2 + 320a^6c^6f^2h^2m - 90a^3b^9d^2k^2m^2 + 15200a^9b^2c^2k^2m^3 \\
& - 6192a^8b^3c^2k^2m^3 + 5472a^8b^2c^3k^3m - 4608a^5c^7d^2j^2l - 1024a^7c^5f^2h^2l^2 \\
& + 150a^6b^5c^2k^3m + 54a^3b^9f^2h^2m^2 + 6b^10c^2d^2h^2m - 14400a^7c^5d^2h^2m^2 \\
& + 8640a^5c^7d^2h^2m + 2880a^6c^6d^2h^2m
\end{aligned}$$

$$\begin{aligned}
& + 2304a^6c^6d^2j^2k - 512a^6c^6e^2h^2l - 192a^6c^6f^2h^2k + 6144a^8b^3c^3j^3l^3 + 1536a^7b^3c^4j^3l - 1280a^5c^7e^2f^2m + 768a^5c^7e^2h^2k + 256a^6c^6f^2h^2j^2 + 192a^6b^5c^3j^3l^3 + 54a^2b^10d^2h^2m^2 \\
& - 18b^9c^3d^2f^2m + 8b^9c^3d^2g^2l - 2b^9c^3d^2h^2k + 4068a^7b^4c^3h^2m^3 - 1728a^6c^6d^2h^2k^2 + 960a^5c^7d^2f^2m + 512a^5c^7e^2f^2l \\
& - 3072a^6c^6d^2f^2l^2 - 16b^8c^4d^2e^2l + 6b^8c^4d^2f^2k - 4608a^4c^8d^2e^2l + 2400a^8b^3c^3f^2m^3 + 2016a^7b^3c^4h^2k^3 - 1728a^4c^8d^2f^2k - 1146a^6b^5c^3f^2m^3 + 224a^6b^3c^5h^3k - 96a^5b^6c^3g^2l^3 + 96a^5b^3c^6f^3m + 2304a^4c^8d^2e^2k + 768a^5c^7d^2f^2j^2 + 6144a^7b^3c^4e^2l^3 - 2280a^5b^6c^3d^2m^3 + 1536a^4b^3c^7e^3l - 616a^3b^6c^5d^3m + 512a^6b^3c^5g^2j^3 + 256a^4c^8e^2f^2h + 240a^2b^10c^3d^2m^2 + 6b^7c^5d^2f^2h - 192a^4c^8d^2f^2h + 4320a^6b^3c^5d^2k^3 + 4320a^3b^3c^8d^3k + 222a^2b^5c^6d^3k + 16b^6c^6d^2e^2g + 96a^5b^3c^6f^2h^3 + 96a^4b^3c^7f^3h + 768a^3c^9d^2e^2f + 512a^3b^3c^8e^3g + 132a^2b^4c^7d^3h + 2016a^2b^3c^9d^3f - 496a^2b^3c^8d^3f + 224a^3b^3c^8d^2f^3 - 18a^2b^5c^6d^2f^3 - 3264a^8b^2c^2k^2m^2 - 6160a^7b^3c^2j^2m^2 + 1104a^7b^3c^2k^2l^2 - 1920a^7b^2c^3j^2l^2 + 768a^6b^4c^2j^2l^2 + 3888a^7b^2c^3h^2m^2 - 3510a^6b^4c^2h^2m^2 + 240a^6b^3c^3j^2k^2 - 16a^5b^5c^2j^2k^2 + 1680a^6b^3c^3g^2m^2 - 1648a^6b^3c^3h^2l^2 - 1540a^5b^5c^2g^2m^2 + 444a^5b^5c^2h^2l^2 - 960a^6b^2c^4h^2k^2 - 576a^6b^2c^4f^2m^2 - 512a^6b^2c^4g^2l^2 - 480a^5b^4c^3g^2l^2 + 198a^5b^4c^3h^2k^2 + 192a^4b^6c^2g^2l^2 - 186a^5b^4c^3f^2m^2 - 97a^4b^6c^2f^2m^2 - 9a^4b^6c^2h^2k^2 - 6160a^5b^3c^4e^2m^2 + 1680a^4b^5c^3e^2m^2 - 240a^5b^3c^4g^2k^2 - 240a^5b^3c^4f^2l^2 - 144a^3b^7c^2e^2m^2 + 60a^4b^5c^3g^2k^2 - 36a^4b^5c^3f^2l^2 + 36a^3b^7c^2f^2l^2 - 16a^5b^3c^4h^2j^2 - 4a^3b^7c^2g^2k^2 + 38512a^5b^2c^5d^2m^2 - 32310a^4b^4c^4d^2m^2 + 12720a^3b^6c^3d^2m^2 - 2500a^2b^8c^2d^2m^2 - 1920a^5b^2c^5e^2l^2 + 768a^4b^4c^4e^2l^2 - 464a^5b^2c^5f^2k^2 - 384a^5b^2c^5g^2j^2 - 64a^3b^6c^3e^2l^2 + 42a^4b^4c^4f^2k^2 + 12a^3b^6c^3f^2k^2 - 13104a^4b^3c^5d^2l^2 + 5628a^3b^5c^4d^2l^2 - 1128a^2b^7c^3d^2l^2 + 240a^4b^3c^5e^2k^2 - 16a^4b^3c^5f^2j^2 - 16a^3b^5c^4e^2k^2 - 2880a^4b^2c^6d^2k^2 + 1750a^3b^4c^5d^2k^2 - 345a^2b^6c^4d^2k^2 - 48a^4b^3c^5g^2h^2 - 4a^3b^5c^4g^2h^2 + 240a^3b^3c^6d^2j^2 - 192a^4b^2c^6f^2h^2 - 42a^3b^4c^5f^2h^2 - 16a^2b^5c^5d^2j^2 - 48a^3b^3c^6f^2g^2 - 16a^3b^3c^6e^2h^2 - 4a^2b^5c^5f^2g^2 - 464a^3b^2c^7d^2h^2 - 384a^3b^2c^7e^2g^2 + 42a^2b^4c^6d^2h^2 - 240a^2b^3c^7d^2g^2 - 16a^2b^3c^7e^2f^2 - 960a^2b^2c^8d^2f^2 + 6b^11c^3d^2k^2m - 18a^2b^11d^2f^2m - 7200a^9c^3k^2m^2 - 324a^7b^5l^2m^2 - 225a^6b^6k^2m^2 - 2048a^8c^4j^2l^2 - 144a^5b^7j^2m^2 - 2400a^8c^4h^2m^2 - 81a^4b^8h^2m^2 - 800a^7c^5f^2m^2 - 288a^7c^5h^2k^2 - 36a^3b^9g^2m^2 - 9a^2b^10f^2m^2 - 21600a^6c^6d^2m^2 - 2048a^6c^6e^2l^2 - 864a^6c^6f^2k^2 - 2592a^5c^7d^2k^2 - 1536a^5c^7e^2j^2 + 1536a^8b^2c^2l^4 - 32a^5c^7f^2h^2 + 360a^7b^2c^3k^4 - 25a^6b^4c^2k^4 -
\end{aligned}$$

$$\begin{aligned}
& 864a^4c^8d^2h^2 - 4b^7c^5d^2g^2 - 9b^6c^6d^2f^2 - 288a^3c^9d^2f^2 - 24a^5b^2c^5h^4 - 16b^5c^7d^2e^2 - 9a^4b^4c^4h^4 - 16a^3b^4c^5g^4 - 24a^3b^2c^7f^4 - 9a^2b^4c^6f^4 - a^2b^8c^2f^2k^2 - a^2b^6c^4f^2h^2 + 630a^7b^5k^3 + 8000a^9c^3h^3 + 320a^7c^5h^3m - 378a^6b^6h^3 + 126a^5b^7f^3 + 30b^8c^4d^3m + 2400a^8c^4d^3m + 8640a^4c^8d^3m - 1728a^7c^5f^3k^3 - 192a^5c^7f^3k - 4b^11c^d^2l^2 + 126a^4b^8d^3m - 10b^7c^5d^3k + 4200a^9b^2c^m^4 - 1024a^6c^6e^3j^3 - 1024a^4c^8e^3j - 144a^7b^4c^l^4 - 10b^6c^6d^3h - 1728a^3c^9d^3h - 192a^5c^7d^3h^3 + 30b^5c^7d^3f + 360a^b^2c^9d^4 - 9b^12d^2m^2 - 10000a^10c^2m^4 - 4096a^9c^3l^4 - 441a^8b^4m^4 - 1296a^8c^4k^4 - 256a^7c^5j^4 - 16a^6c^6h^4 - 16a^4c^8f^4 - 256a^3c^9e^4 - 25b^4c^8d^4 - 1296a^2c^10d^4 - b^10c^2d^2k^2 - b^8c^4d^2h^2, z, k1) * ((3072a^5c^7d^1 - 512a^4c^8e^f - 1536a^5c^7e^k - 512a^5c^7f^j + 1024a^6c^6h^1 - 1536a^6c^6j^k - 5120a^7c^5l^m + 32a^b^5c^6d^e + 1024a^3b^c^8d^e - 16a^b^6c^5d^g + 512a^4b^c^7e^h + 256a^4b^c^7f^g + 1024a^4b^c^7d^j + 16a^b^8c^3d^1 + 2048a^5b^c^6e^m + 256a^5b^c^6f^1 + 768a^5b^c^6g^k + 512a^5b^c^6h^j + 2048a^6b^c^5j^m + 1792a^6b^c^5k^1 - 384a^2b^3c^7d^e + 192a^2b^4c^6d^g + 32a^2b^4c^6e^f - 512a^3b^2c^7d^g - 16a^2b^5c^5f^g - 128a^3b^3c^6e^h + 32a^2b^5c^5d^j - 384a^3b^3c^6d^j + 64a^3b^4c^5g^h - 256a^4b^2c^6g^h - 288a^2b^6c^4d^1 + 192a^3b^4c^5d^1 - 32a^3b^4c^5e^k + 32a^3b^4c^5f^j - 4352a^4b^2c^6d^1 + 512a^4b^2c^6e^k + 16a^2b^7c^3f^1 + 96a^3b^5c^4e^m - 144a^3b^5c^4f^1 + 16a^3b^5c^4g^k - 896a^4b^3c^5e^m + 256a^4b^3c^5f^1 - 256a^4b^3c^5g^k - 128a^4b^3c^5h^j - 48a^3b^6c^3g^m - 48a^3b^6c^3h^1 + 448a^4b^4c^4g^m + 512a^4b^4c^4h^1 - 1024a^5b^2c^5g^m - 1536a^5b^2c^5h^1 - 32a^4b^4c^4j^k + 512a^5b^2c^5j^k + 96a^4b^5c^3j^m + 80a^4b^5c^3k^1 - 896a^5b^3c^4j^m - 768a^5b^3c^4k^1 - 256a^5b^4c^3l^m + 2304a^6b^2c^4l^m) / (8 * (64a^5c^6 - a^2b^6c^3 + 12a^3b^4c^4 - 48a^4b^2c^5)) - \text{root}(1572864a^8b^2c^10z^4 - 983040a^7b^4c^9z^4 + 327680a^6b^6c^8z^4 - 61440a^5b^8c^7z^4 + 6144a^4b^10c^6z^4 - 256a^3b^12c^5z^4 - 1048576a^9c^11z^4 - 1572864a^8b^2c^8l^1z^3 + 983040a^7b^4c^7l^1z^3 - 327680a^6b^6c^6l^1z^3 + 61440a^5b^8c^5l^1z^3 - 6144a^4b^10c^4l^1z^3 + 256a^3b^12c^3l^1z^3 + 1048576a^9c^9l^1z^3 + 96a^3b^12c^k^mz^2 + 98304a^8b^c^7j^1z^2 + 24576a^8b^c^7h^mz^2 + 155648a^7b^c^8d^mz^2 + 98304a^7b^c^8e^l^1z^2 + 57344a^7b^c^8f^kz^2 + 32768a^7b^c^8g^jz^2 + 57344a^6b^c^9d^h^1z^2 + 32768a^6b^c^9e^gz^2 - 32a^b^10c^5d^fz^2 - 491520a^8b^2c^6k^mz^2 + 358400a^7b^4c^5k^mz^2 - 129024a^6b^6c^4k^mz^2 + 24768a^5b^8c^3k^mz^2 - 2432a^4b^10c^2k^mz^2 - 90112a^7b^3c^6j^1z^2 + 30720a^6b^5c^5j^1z^2 - 4608a^5b^7c^4j^1z^2 + 256a^4b^9c^3j^1z^2 - 21504a^6b^5c^5h^mz^2 + 9216a^5b^7c^4h^mz^2 + 8192a^7b^3c^6h^mz^2 - 1568a^4b^9c^3h^mz^2 + 96a^3b^11c^2h^mz^2 - 172032a^7b^2c^7f^mz^2 + 116736a^6b^4c^6f^mz^2 - 49152a^7b^2c^7g^1z^2 + 45056a^6b^4c^6g^1z^2 - 35840a^5b^6c^5f^mz^2 + 24
\end{aligned}$$



$$\begin{aligned}
& 576a^7b^2c^7hkkz^2 - 15360a^5b^6c^5g*1z^2 + 5184a^4b^8c^4f*mmz^2 - 3072a^5b^6c^5hkkz^2 + 2304a^4b^8c^4g*1z^2 + 2048a^6b^4c^6hkkz^2 + 576a^4b^8c^4hkkz^2 - 288a^3b^10c^3f*mmz^2 - 128a^3b^10c^3g*1z^2 - 32a^3b^10c^3hkkz^2 - 147456a^6b^3c^7d*mmz^2 - 90112a^6b^3c^7e*1z^2 + 52224a^5b^5c^6d*mmz^2 - 49152a^6b^3c^7f*kkz^2 + 30720a^5b^5c^6e*1z^2 - 24576a^6b^3c^7g*jz^2 + 15360a^5b^5c^6f*kkz^2 - 8192a^4b^7c^5d*mmz^2 + 6144a^5b^5c^6g*jz^2 - 4608a^4b^7c^5e*1z^2 - 2048a^4b^7c^5f*kkz^2 - 512a^4b^7c^5g*jz^2 + 480a^3b^9c^4d*mmz^2 + 256a^3b^9c^4e*1z^2 + 96a^3b^9c^4f*kkz^2 + 131072a^6b^2c^8d*kkz^2 + 49152a^6b^2c^8e*jz^2 - 43008a^5b^4c^7d*kkz^2 - 12288a^5b^4c^7e*jz^2 + 6144a^4b^6c^6d*kkz^2 + 1024a^4b^6c^6e*jz^2 - 320a^3b^8c^5d*kkz^2 + 6144a^5b^4c^7f*hz^2 - 2048a^4b^6c^6f*hz^2 + 192a^3b^8c^5f*hz^2 - 49152a^5b^3c^8d*hz^2 - 24576a^5b^3c^8e*gz^2 + 15360a^4b^5c^7d*hz^2 + 6144a^4b^5c^7e*gz^2 - 2048a^3b^7c^6d*hz^2 - 512a^3b^7c^6e*gz^2 + 96a^2b^9c^5d*hz^2 + 24576a^5b^2c^9d*fz^2 - 3072a^3b^6c^7d*fz^2 + 2048a^4b^4c^8d*fz^2 + 576a^2b^8c^6d*fz^2 - 430080a^9b*c^6m^2z^2 + 3408a^4b^11c*m^2z^2 - 64a^3b^12c*l^2z^2 + 61440a^8b*c^7k^2z^2 + 12288a^7b*c^8h^2z^2 + 12288a^6b*c^9f^2z^2 + 61440a^5b*c^10d^2z^2 + 432a*b^9c^6d^2z^2 + 245760a^9c^7k*mmz^2 + 81920a^8c^8f*mmz^2 - 49152a^8c^8h*kkz^2 - 147456a^7c^9d*kkz^2 - 65536a^7c^9e*jz^2 - 16384a^7c^9f*hz^2 - 49152a^6c^10d*fz^2 + 716800a^8b^3c^5m^2z^2 - 483840a^7b^5c^4m^2z^2 + 170496a^6b^7c^3m^2z^2 - 33232a^5b^9c^2m^2z^2 + 516096a^8b^2c^6l^2z^2 - 288768a^7b^4c^5l^2z^2 + 88576a^6b^6c^4l^2z^2 - 15744a^5b^8c^3l^2z^2 + 1536a^4b^10c^2l^2z^2 - 61440a^7b^3c^6k^2z^2 + 24064a^6b^5c^5k^2z^2 - 4608a^5b^7c^4k^2z^2 + 432a^4b^9c^3k^2z^2 - 16a^3b^11c^2k^2z^2 + 24576a^7b^2c^7j^2z^2 - 6144a^6b^4c^6j^2z^2 + 512a^5b^6c^5j^2z^2 - 8192a^6b^3c^7h^2z^2 + 1536a^5b^5c^6h^2z^2 - 16a^3b^9c^4h^2z^2 - 8192a^6b^2c^8g^2z^2 + 6144a^5b^4c^7g^2z^2 - 1536a^4b^6c^6g^2z^2 + 128a^3b^8c^5g^2z^2 - 8192a^5b^3c^8f^2z^2 + 1536a^4b^5c^7f^2z^2 - 16a^2b^9c^5f^2z^2 + 24576a^5b^2c^9e^2z^2 - 6144a^4b^4c^8e^2z^2 + 512a^3b^6c^7e^2z^2 - 61440a^4b^3c^9d^2z^2 + 24064a^3b^5c^8d^2z^2 - 4608a^2b^7c^7d^2z^2 - 393216a^9c^7l^2z^2 - 144a^3b^13m^2z^2 - 32768a^8c^8j^2z^2 - 32768a^6c^10e^2z^2 - 16b^11c^5d^2z^2 + 18432a^8b*c^5h*1m*z - 96a^3b^10c*g*k*m*z + 90112a^7b*c^6e*k*m*z + 36864a^7b*c^6f*j*m*z - 16384a^7b*c^6g*j*1z + 14336a^7b*c^6d*1m*z - 10240a^7b*c^6f*k*1z + 4096a^7b*c^6h*j*k*z + 10240a^7b*c^6g*h*m*z - 47104a^6b*c^7d*h*1z + 36864a^6b*c^7e*f*m*z + 30720a^6b*c^7d*g*m*z - 16384a^6b*c^7e*g*1z + 6144a^6b*c^7f*g*k*z + 4096a^6b*c^7e*h*k*z + 32a*b^10c^3d*f*1z - 4096a^5b*c^8d*f*jz - 6144a^5b*c^8d*g*h*z - 32a*b^8c^5d*f*g*z - 4096a^4b*c^9d*e*fz + 64a*b^7c^6d*e*fz + 110592a^8b^2c^4k*1m*z - 36864a^7b^4c^3k*1m*z + 5376a^6b^6c^2k*1m*z - 79872a^7b^3c^4j*k*m*z + 26112a^6b^5c^3j*k*m*z - 3712a^5b^7c^2j*k*m*z - 13824a^7b^3c^4h*1m*z + 3456a
\end{aligned}$$

$^6b^5c^3h^1m^*z - 288a^5b^7c^2h^1m^*z - 45056a^7b^2c^5g^*k^*m^*z +$   
 $39936a^6b^4c^4g^*k^*m^*z + 30720a^7b^2c^5f^*l^*m^*z - 18432a^7b^2c^5h$   
 $*k^*l^*z - 13056a^5b^6c^3g^*k^*m^*z - 7680a^6b^4c^4f^*l^*m^*z + 5376a^6b^$   
 $4c^4h^*j^*m^*z + 4608a^6b^4c^4h^*k^*l^*z + 3072a^7b^2c^5h^*j^*m^*z - 1984*$   
 $a^5b^6c^3h^*j^*m^*z + 1856a^4b^8c^2g^*k^*m^*z + 640a^5b^6c^3f^*l^*m^*z -$   
 $384a^5b^6c^3h^*k^*l^*z + 192a^4b^8c^2h^*j^*m^*z - 79872a^6b^3c^5e^*k^*m$   
 $*z - 27648a^6b^3c^5f^*j^*m^*z + 26112a^5b^5c^4e^*k^*m^*z + 12288a^6b^3*$   
 $c^5g^*j^*l^*z - 10752a^6b^3c^5d^*l^*m^*z + 7680a^6b^3c^5f^*k^*l^*z + 6912a$   
 $^5b^5c^4f^*j^*m^*z - 3712a^4b^7c^3e^*k^*m^*z - 3072a^6b^3c^5h^*j^*k^*z -$   
 $3072a^5b^5c^4g^*j^*l^*z + 2688a^5b^5c^4d^*l^*m^*z - 1920a^5b^5c^4f^*k^*$   
 $l^*z + 768a^5b^5c^4h^*j^*k^*z - 576a^4b^7c^3f^*j^*m^*z + 256a^4b^7c^3g$   
 $*j^*l^*z - 224a^4b^7c^3d^*l^*m^*z + 192a^3b^9c^2e^*k^*m^*z + 160a^4b^7c^$   
 $3f^*k^*l^*z - 64a^4b^7c^3h^*j^*k^*z - 2688a^5b^5c^4g^*h^*m^*z - 1536a^6b^$   
 $3c^5g^*h^*m^*z + 992a^4b^7c^3g^*h^*m^*z - 96a^3b^9c^2g^*h^*m^*z - 65536a^$   
 $6b^2c^6d^*k^*l^*z + 46080a^6b^2c^6d^*j^*m^*z - 24576a^6b^2c^6e^*j^*l^*z +$   
 $21504a^5b^4c^5d^*k^*l^*z - 11520a^5b^4c^5d^*j^*m^*z + 9216a^6b^2c^6f$   
 $*j^*k^*z + 6144a^5b^4c^5e^*j^*l^*z - 3072a^4b^6c^4d^*k^*l^*z - 2304a^5b^4$   
 $*c^5f^*j^*k^*z + 960a^4b^6c^4d^*j^*m^*z - 512a^4b^6c^4e^*j^*l^*z + 192a^4*$   
 $b^6c^4f^*j^*k^*z + 160a^3b^8c^3d^*k^*l^*z - 18432a^6b^2c^6f^*g^*m^*z + 138$   
 $24a^5b^4c^5f^*g^*m^*z + 5376a^5b^4c^5e^*h^*m^*z - 3456a^4b^6c^4f^*g^*m^*$   
 $z + 3072a^6b^2c^6e^*h^*m^*z - 3072a^5b^4c^5f^*h^*l^*z - 2048a^6b^2c^6*$   
 $g^*h^*k^*z - 1984a^4b^6c^4e^*h^*m^*z + 1536a^5b^4c^5g^*h^*k^*z + 1024a^4b^$   
 $6c^4f^*h^*l^*z - 384a^4b^6c^4g^*h^*k^*z + 288a^3b^8c^3f^*g^*m^*z + 192a^3$   
 $*b^8c^3e^*h^*m^*z - 96a^3b^8c^3f^*h^*l^*z + 32a^3b^8c^3g^*h^*k^*z + 41472*$   
 $a^5b^3c^6d^*h^*l^*z - 27648a^5b^3c^6e^*f^*m^*z - 23040a^5b^3c^6d^*g^*m^*z$   
 $- 13440a^4b^5c^5d^*h^*l^*z + 12288a^5b^3c^6e^*g^*l^*z + 6912a^4b^5c^5$   
 $*e^*f^*m^*z + 5760a^4b^5c^5d^*g^*m^*z - 4608a^5b^3c^6f^*g^*k^*z - 3072a^5b$   
 $^3c^6e^*h^*k^*z - 3072a^4b^5c^5e^*g^*l^*z + 1888a^3b^7c^4d^*h^*l^*z + 1152$   
 $*a^4b^5c^5f^*g^*k^*z + 768a^4b^5c^5e^*h^*k^*z - 576a^3b^7c^4e^*f^*m^*z -$   
 $480a^3b^7c^4d^*g^*m^*z + 256a^3b^7c^4e^*g^*l^*z - 96a^3b^7c^4f^*g^*k^*z$   
 $- 96a^2b^9c^3d^*h^*l^*z - 64a^3b^7c^4e^*h^*k^*z + 46080a^5b^2c^7d^*e^*m$   
 $*z - 11520a^4b^4c^6d^*e^*m^*z + 9216a^5b^2c^7e^*f^*k^*z - 9216a^5b^2c^$   
 $7d^*h^*j^*z - 6656a^4b^4c^6d^*f^*l^*z - 6144a^5b^2c^7d^*f^*l^*z + 3456a^3*$   
 $b^6c^5d^*f^*l^*z - 2304a^4b^4c^6e^*f^*k^*z + 2304a^4b^4c^6d^*h^*j^*z + 960$   
 $*a^3b^6c^5d^*e^*m^*z - 576a^2b^8c^4d^*f^*l^*z + 192a^3b^6c^5e^*f^*k^*z -$   
 $192a^3b^6c^5d^*h^*j^*z + 3072a^4b^3c^7d^*f^*j^*z - 768a^3b^5c^6d^*f^*j^*$   
 $z + 64a^2b^7c^5d^*f^*j^*z + 4608a^4b^3c^7d^*g^*h^*z - 1152a^3b^5c^6d^*$   
 $g^*h^*z + 96a^2b^7c^5d^*g^*h^*z - 9216a^4b^2c^8d^*e^*h^*z + 2304a^3b^4c^$   
 $7d^*e^*h^*z + 2048a^4b^2c^8d^*f^*g^*z - 1536a^3b^4c^7d^*f^*g^*z + 384a^2b$   
 $^6c^6d^*f^*g^*z - 192a^2b^6c^6d^*e^*h^*z + 3072a^3b^3c^8d^*e^*f^*z - 768a$   
 $^2b^5c^7d^*e^*f^*z - 288a^5b^8c^*k^*l^*m^*z + 90112a^8b^c^5j^*k^*m^*z + 192*$   
 $a^4b^9c^*j^*k^*m^*z + 138240a^9b^c^4l^*m^2z - 7344a^6b^7c^*l^*m^2z + 508$   
 $8a^5b^8c^*j^*m^2z - 3072a^8b^c^5k^2l^*z - 49152a^8b^c^5j^*l^2z - 12$   
 $8a^4b^9c^*j^*l^2z - 25600a^8b^c^5g^*m^2z - 9216a^7b^c^6h^2l^*z - 25$   
 $44a^4b^9c^*g^*m^2z + 64a^3b^10c^*g^*l^2z + 9216a^7b^c^6g^*k^2z - 307$

$2a^6b^7c^7f^2l^2z - 288a^3b^{10}c^7e^2m^2z - 49152a^7b^7c^6e^1l^2z - 58$   
 $368a^5b^7c^8d^2l^2z - 432a^8b^9c^4d^2l^2z - 1024a^6b^7c^7g^2h^2z + 32$   
 $a^8b^8c^5d^2j^2z + 1024a^5b^7c^8f^2g^2z - 9216a^4b^7c^9d^2g^2z + 336$   
 $a^8b^7c^6d^2g^2z - 672a^8b^6c^7d^2e^2z - 122880a^9c^5k^1m^2z - 40960$   
 $a^8c^6f^1m^2z + 24576a^8c^6h^2k^1z - 20480a^8c^6h^2j^1m^2z + 73728a^7$   
 $c^7d^2k^1z - 61440a^7c^7d^2j^1m^2z + 32768a^7c^7e^2j^1z - 12288a^7c^7$   
 $f^2j^1k^2z - 20480a^7c^7e^2h^1m^2z + 8192a^7c^7f^2h^1z - 61440a^6c^8d^2$   
 $e^2m^2z + 24576a^6c^8d^2f^1z - 12288a^6c^8e^2f^1k^2z + 12288a^6c^8d^2h^2j$   
 $^2z + 12288a^5c^9d^2e^2h^2z - 131328a^8b^3c^3l^1m^2z + 46656a^7b^5c^2$   
 $l^1m^2z - 142848a^8b^2c^4j^1m^2z + 106368a^7b^4c^3j^1m^2z - 34208$   
 $a^6b^6c^2j^1m^2z + 2304a^7b^3c^4k^2l^2z - 576a^6b^5c^3k^2l^2z +$   
 $48a^5b^7c^2k^2l^2z + 45056a^7b^3c^4j^1l^2z - 15360a^6b^5c^3j^1l^2$   
 $z - 12288a^7b^2c^5j^2l^2z + 3072a^6b^4c^4j^2l^2z + 2304a^5b^7c^$   
 $^2j^1l^2z - 256a^5b^6c^3j^2l^2z + 15872a^7b^2c^5j^1k^2z - 4992a^6$   
 $b^4c^4j^1k^2z + 672a^5b^6c^3j^1k^2z - 32a^4b^8c^2j^1k^2z + 71424$   
 $a^7b^3c^4g^2m^2z - 53184a^6b^5c^3g^2m^2z + 17104a^5b^7c^2g^2m^2$   
 $z + 6912a^6b^3c^5h^2l^2z - 1728a^5b^5c^4h^2l^2z + 144a^4b^7c^3h^$   
 $^2l^2z + 24576a^7b^2c^5g^1l^2z - 22528a^6b^4c^4g^1l^2z + 7680a^5b^$   
 $^6c^3g^1l^2z + 4096a^6b^2c^6g^2l^2z - 3072a^5b^4c^5g^2l^2z - 1152$   
 $a^4b^8c^2g^1l^2z + 768a^4b^6c^4g^2l^2z - 64a^3b^8c^3g^2l^2z - 1$   
 $42848a^7b^2c^5e^2m^2z + 106368a^6b^4c^4e^2m^2z - 34208a^5b^6c^3$   
 $e^2m^2z - 7936a^6b^3c^5g^2k^2z + 5088a^4b^8c^2e^2m^2z + 2496a^5b^$   
 $5c^4g^2k^2z - 1536a^6b^2c^6h^2j^2z + 1280a^5b^3c^6f^2l^2z + 384a^$   
 $^5b^4c^5h^2j^2z - 336a^4b^7c^3g^2k^2z + 192a^4b^5c^5f^2l^2z - 14$   
 $4a^3b^7c^4f^2l^2z - 32a^4b^6c^4h^2j^2z + 16a^3b^9c^2g^2k^2z + 1$   
 $6a^2b^9c^3f^2l^2z + 45056a^6b^3c^5e^1l^2z - 15360a^5b^5c^4e^1l^2$   
 $z - 12288a^5b^2c^7e^2l^2z + 3072a^4b^4c^6e^2l^2z + 2304a^4b^7c^$   
 $^3e^1l^2z - 256a^3b^6c^5e^2l^2z - 128a^3b^9c^2e^1l^2z + 59136a^4b^$   
 $^3c^7d^2l^2z - 23488a^3b^5c^6d^2l^2z + 15872a^6b^2c^6e^2k^2z - 49$   
 $92a^5b^4c^5e^2k^2z + 4560a^2b^7c^5d^2l^2z + 1536a^5b^2c^7f^2j^2$   
 $z + 672a^4b^6c^4e^2k^2z - 384a^4b^4c^6f^2j^2z - 32a^3b^8c^3e^2k^$   
 $2z + 32a^3b^6c^5f^2j^2z + 768a^5b^3c^6g^2h^2z - 192a^4b^5c^5g^2$   
 $h^2z + 16a^3b^7c^4g^2h^2z - 15872a^4b^2c^8d^2j^2z + 4992a^3b^4c^$   
 $^7d^2j^2z - 672a^2b^6c^6d^2j^2z - 1536a^5b^2c^7e^2h^2z - 768a^4b^$   
 $^3c^7f^2g^2z + 384a^4b^4c^6e^2h^2z + 192a^3b^5c^6f^2g^2z - 32a^3$   
 $b^6c^5e^2h^2z - 16a^2b^7c^5f^2g^2z + 7936a^3b^3c^8d^2g^2z - 2496$   
 $a^2b^5c^7d^2g^2z + 1536a^4b^2c^8e^2f^2z - 384a^3b^4c^7e^2f^2z +$   
 $32a^2b^6c^6e^2f^2z - 15872a^3b^2c^9d^2e^2z + 4992a^2b^4c^8d^2e^$   
 $2z - 61440a^8b^2c^4l^3z + 21504a^7b^4c^3l^3z - 3328a^6b^6c^2$   
 $l^3z + 432a^5b^9l^1m^2z + 51200a^9c^5j^1m^2z + 16384a^8c^6j^2l^2z$   
 $- 288a^4b^{10}j^1m^2z - 18432a^8c^6j^1k^2z + 144a^3b^{11}g^2m^2z + 51$   
 $200a^8c^6e^2m^2z + 2048a^7c^7h^2j^2z + 16384a^6c^8e^2l^2z + 16b^1$   
 $1c^3d^2l^2z - 18432a^7c^7e^2k^2z - 2048a^6c^8f^2j^2z + 18432a^5c^$   
 $9d^2j^2z + 192a^5b^8c^1l^3z + 2048a^6c^8e^2h^2z - 16b^9c^5d^2g^2z$   
 $- 2048a^5c^9e^2f^2z + 32b^8c^6d^2e^2z + 18432a^4c^{10}d^2e^2z + 655$

$$\begin{aligned}
& 36a^9c^5l^3z - 11008a^8b^3c^3j^*k^*l^*m - 288a^6b^5c^3j^*k^*l^*m + 144a^5b^6c^3g^*k^*l^*m - 11008a^7b^3c^4e^*k^*l^*m - 5376a^7b^3c^4f^*j^*l^*m + 3840a^7b^3c^4g^*j^*k^*m - 3328a^7b^3c^4h^*j^*k^*l - 96a^4b^7c^3g^*j^*k^*m - 2560a^7b^3c^4g^*h^*l^*m - 36a^3b^8c^3f^*h^*k^*m - 6912a^6b^3c^5d^*j^*k^*l - 7872a^6b^3c^5d^*h^*k^*m - 7680a^6b^3c^5d^*g^*l^*m - 5376a^6b^3c^5e^*f^*l^*m + 3840a^6b^3c^5e^*g^*k^*m - 3328a^6b^3c^5e^*h^*k^*l - 1536a^6b^3c^5f^*g^*k^*l + 1280a^6b^3c^5f^*g^*j^*m - 768a^6b^3c^5g^*h^*j^*k - 768a^6b^3c^5f^*h^*j^*l - 768a^6b^3c^5e^*h^*j^*m - 36a^2b^9c^3d^*h^*k^*m - 6912a^5b^3c^6d^*e^*k^*l - 4864a^5b^3c^6d^*e^*j^*m - 2304a^5b^3c^6d^*g^*j^*k - 1792a^5b^3c^6e^*e^*f^*j^*k - 1280a^5b^3c^6d^*f^*j^*l - 4544a^5b^3c^6d^*f^*h^*m + 1536a^5b^3c^6d^*g^*h^*l + 1280a^5b^3c^6e^*f^*g^*m - 768a^5b^3c^6e^*g^*h^*k - 768a^5b^3c^6e^*e^*f^*h^*l - 256a^5b^3c^6f^*g^*h^*j + 12a^ab^9c^2d^*f^*h^*m + 16a^ab^8c^3d^*f^*g^*l - 4a^ab^8c^3d^*f^*h^*k - 2304a^4b^3c^7d^*e^*g^*k - 1792a^4b^3c^7d^*e^*h^*j - 1280a^4b^3c^7d^*e^*f^*l - 768a^4b^3c^7d^*f^*g^*j - 32a^ab^7c^4d^*e^*f^*l - 256a^4b^3c^7e^*f^*g^*h - 768a^3b^3c^8d^*e^*f^*g + 32a^ab^5c^6d^*e^*f^*g + 12a^ab^10c^d^*f^*k^*m + 3648a^7b^3c^2j^*k^*l^*m + 5504a^7b^2c^3g^*k^*l^*m - 1824a^6b^4c^2g^*k^*l^*m + 384a^7b^2c^3h^*j^*l^*m - 288a^6b^4c^2h^*j^*l^*m - 4800a^6b^3c^3g^*j^*k^*m + 3648a^6b^3c^3e^*k^*l^*m + 1280a^5b^5c^2g^*j^*k^*m + 1088a^6b^3c^3f^*j^*l^*m + 576a^6b^3c^3h^*j^*k^*l - 288a^5b^5c^2e^*k^*l^*m - 192a^6b^3c^3g^*h^*l^*m + 144a^5b^5c^2g^*h^*l^*m + 9600a^6b^2c^4e^*j^*k^*m - 4224a^6b^2c^4d^*j^*l^*m - 2560a^5b^4c^3e^*j^*k^*m + 384a^6b^2c^4f^*j^*k^*l + 224a^5b^4c^3d^*j^*l^*m + 192a^4b^6c^2e^*j^*k^*m - 160a^5b^4c^3f^*j^*k^*l - 4608a^6b^2c^4f^*h^*k^*m + 2688a^6b^2c^4f^*g^*l^*m + 1664a^6b^2c^4g^*h^*k^*l - 744a^5b^4c^3f^*h^*k^*m - 544a^5b^4c^3f^*g^*l^*m + 492a^4b^6c^2f^*h^*k^*m + 416a^5b^4c^3g^*h^*j^*m + 384a^6b^2c^4g^*h^*j^*m + 384a^6b^2c^4e^*h^*l^*m - 288a^5b^4c^3g^*h^*k^*l - 288a^5b^4c^3e^*h^*l^*m - 96a^4b^6c^2g^*h^*j^*m + 2112a^5b^3c^4d^*j^*k^*l - 160a^4b^5c^3d^*j^*k^*l + 16992a^5b^3c^4d^*h^*k^*m - 6252a^4b^5c^3d^*h^*k^*m - 4800a^5b^3c^4e^*g^*k^*m + 2112a^5b^3c^4d^*g^*l^*m - 1728a^5b^3c^4f^*g^*j^*m + 1280a^4b^5c^3e^*g^*k^*m + 1088a^5b^3c^4e^*f^*l^*m - 832a^5b^3c^4e^*h^*j^*m + 816a^3b^7c^2d^*h^*k^*m + 576a^5b^3c^4e^*h^*k^*l - 448a^5b^3c^4f^*h^*j^*l + 288a^4b^5c^3f^*g^*j^*m - 192a^5b^3c^4g^*h^*j^*k - 192a^5b^3c^4f^*g^*k^*l + 192a^4b^5c^3e^*h^*j^*m - 112a^4b^5c^3d^*g^*l^*m + 96a^4b^5c^3f^*h^*j^*l - 96a^3b^7c^2e^*g^*k^*m + 80a^4b^5c^3f^*g^*k^*l + 32a^4b^5c^3g^*h^*j^*k - 11456a^5b^2c^5d^*f^*k^*m + 4992a^5b^2c^5d^*h^*j^*l - 4608a^5b^2c^5e^*g^*j^*l - 4224a^5b^2c^5d^*e^*l^*m + 3456a^5b^2c^5e^*f^*j^*m + 3456a^5b^2c^5d^*g^*k^*l + 2432a^5b^2c^5d^*g^*j^*m - 1312a^4b^4c^4d^*h^*j^*l + 1272a^3b^6c^3d^*f^*k^*m - 1056a^4b^4c^4d^*g^*k^*l + 896a^5b^2c^5f^*g^*j^*k + 768a^4b^4c^4e^*g^*j^*l - 576a^4b^4c^4e^*f^*j^*m - 480a^4b^4c^4d^*g^*j^*m + 384a^5b^2c^5e^*h^*j^*k + 384a^5b^2c^5e^*f^*k^*l - 232a^2b^8c^2d^*f^*k^*m + 224a^4b^4c^4d^*e^*l^*m - 160a^4b^4c^4e^*f^*k^*l - 96a^4b^4c^4f^*g^*j^*k + 96a^3b^6c^3d^*h^*j^*l + 80a^3b^6c^3d^*g^*k^*l - 64a^4b^4c^4e^*h^*j^*k - 24a^4b^4c^4d^*f^*k^*m + 416a^4b^4c^4e^*g^*h^*m + 384a^5b^2c^5f^*g^*h^*l + 384a^5b^2c^5e^*g^*h^*m + 224a^4b^4c^4f^*g^*h^*l - 96a^3b^6c^3e^*g^*h^*m - 48a^3b^6c^3f^*g^*h^*l + 2112a^4b^3c^5d^*e^*k^*l - 960a^4b^3c^5d^*f^*j^*l + 96
\end{aligned}$$

$$\begin{aligned}
& 0*a^4*b^3*c^5*d*e*j*m + 384*a^3*b^5*c^4*d*f*j*1 + 320*a^4*b^3*c^5*d*g*j*k + \\
& 192*a^4*b^3*c^5*e*f*j*k - 160*a^3*b^5*c^4*d*e*k*1 - 32*a^2*b^7*c^3*d*f*j*1 \\
& + 7392*a^4*b^3*c^5*d*f*h*m - 2496*a^4*b^3*c^5*d*g*h*1 - 1728*a^4*b^3*c^5*e \\
& *f*g*m - 1500*a^3*b^5*c^4*d*f*h*m + 656*a^3*b^5*c^4*d*g*h*1 - 448*a^4*b^3*c \\
& ^5*e*f*h*1 + 288*a^3*b^5*c^4*e*f*g*m - 192*a^4*b^3*c^5*f*g*h*j - 192*a^4*b^ \\
& 3*c^5*e*g*h*k + 96*a^3*b^5*c^4*e*f*h*1 - 48*a^2*b^7*c^3*d*g*h*1 + 32*a^3*b^ \\
& 5*c^4*e*g*h*k - 16*a^2*b^7*c^3*d*f*h*m - 640*a^4*b^2*c^6*d*e*j*k + 4992*a^4 \\
& *b^2*c^6*d*e*h*1 - 3584*a^4*b^2*c^6*d*f*h*k + 2432*a^4*b^2*c^6*d*e*g*m - 13 \\
& 12*a^3*b^4*c^5*d*e*h*1 + 896*a^4*b^2*c^6*e*f*g*k + 896*a^4*b^2*c^6*d*g*h*j \\
& + 640*a^4*b^2*c^6*d*f*g*1 + 600*a^3*b^4*c^5*d*f*h*k + 480*a^3*b^4*c^5*d*f*g \\
& *1 - 480*a^3*b^4*c^5*d*e*g*m + 384*a^4*b^2*c^6*e*f*h*j - 192*a^2*b^6*c^4*d* \\
& f*g*1 - 96*a^3*b^4*c^5*e*f*g*k - 96*a^3*b^4*c^5*d*g*h*j + 96*a^2*b^6*c^4*d* \\
& e*h*1 + 12*a^2*b^6*c^4*d*f*h*k - 960*a^3*b^3*c^6*d*e*f*1 + 384*a^2*b^5*c^5* \\
& d*e*f*1 + 320*a^3*b^3*c^6*d*e*g*k - 192*a^3*b^3*c^6*d*f*g*j + 192*a^3*b^3*c \\
& ^6*d*e*h*j + 32*a^2*b^5*c^5*d*f*g*j - 192*a^3*b^3*c^6*e*f*g*h + 384*a^3*b^2 \\
& *c^7*d*e*f*j - 64*a^2*b^4*c^6*d*e*f*j + 896*a^3*b^2*c^7*d*e*g*h - 96*a^2*b^ \\
& 4*c^6*d*e*g*h - 192*a^2*b^3*c^7*d*e*f*g + 496*a^7*b^4*c*k*1^2*m - 4752*a^7* \\
& b^4*c*j*1*m^2 + 96*a^5*b^6*c*j^2*k*m - 6144*a^8*b*c^3*h*1^2*m - 168*a^6*b^5 \\
& *c*h*1^2*m + 6400*a^8*b*c^3*g*1*m^2 - 2862*a^6*b^5*c*h*k*m^2 + 2376*a^6*b^5 \\
& *c*g*1*m^2 - 1632*a^7*b*c^4*h^2*k*m - 480*a^8*b*c^3*h*k*m^2 - 180*a^5*b^6*c \\
& *h*k^2*m + 54*a^4*b^7*c*h^2*k*m - 384*a^7*b*c^4*h*j^2*m + 120*a^5*b^6*c*h*k \\
& *1^2 + 56*a^5*b^6*c*f*1^2*m + 24*a^3*b^8*c*g^2*k*m + 4512*a^7*b*c^4*f*k^2*m \\
& - 2304*a^7*b*c^4*g*k^2*1 - 1680*a^5*b^6*c*g*j*m^2 + 1184*a^6*b*c^5*f^2*k*m \\
& + 804*a^5*b^6*c*f*k*m^2 + 432*a^5*b^6*c*e*1*m^2 + 60*a^4*b^7*c*f*k^2*m + 6 \\
& *a^2*b^9*c*f^2*k*m - 13312*a^7*b*c^4*d*1^2*m + 2048*a^7*b*c^4*g*j*1^2 - 102 \\
& 4*a^7*b*c^4*f*k*1^2 + 64*a^4*b^7*c*g*j*1^2 + 56*a^4*b^7*c*d*1^2*m - 40*a^4* \\
& b^7*c*f*k*1^2 + 13440*a^7*b*c^4*e*j*m^2 - 8928*a^5*b*c^6*d^2*k*m - 6240*a^7 \\
& *b*c^4*d*k*m^2 + 1614*a^4*b^7*c*d*k*m^2 - 288*a^4*b^7*c*e*j*m^2 - 170*a*b^9 \\
& *c^2*d^2*k*m + 60*a^3*b^8*c*d*k^2*m + 4608*a^6*b*c^5*e*j^2*1 + 4608*a^5*b*c \\
& ^6*e^2*j*1 - 2432*a^6*b*c^5*d*j^2*m + 1440*a^7*b*c^4*f*h*m^2 - 896*a^6*b*c^ \\
& 5*f*j^2*k - 864*a^6*b*c^5*f*h^2*m - 558*a^4*b^7*c*f*h*m^2 + 256*a^6*b*c^5*g \\
& *h^2*1 - 40*a^3*b^8*c*d*k*1^2 - 1920*a^6*b*c^5*e*j*k^2 - 384*a^5*b*c^6*e^2* \\
& h*m + 24*a^3*b^8*c*f*h*1^2 - 16*a*b^8*c^3*d^2*j*1 + 2208*a^6*b*c^5*f*h*k^2 \\
& - 1044*a^3*b^8*c*d*h*m^2 + 800*a^5*b*c^6*f^2*h*k - 256*a^5*b*c^6*f^2*g*1 + \\
& 144*a^3*b^8*c*e*g*m^2 - 116*a*b^8*c^3*d^2*h*m + 8192*a^6*b*c^5*d*h*1^2 + 20 \\
& 48*a^6*b*c^5*e*g*1^2 + 24*a^2*b^9*c*d*h*1^2 - 5856*a^4*b*c^7*d^2*f*m + 4896 \\
& *a^4*b*c^7*d^2*h*k + 2720*a^6*b*c^5*d*f*m^2 + 2304*a^4*b*c^7*d^2*g*1 + 1824 \\
& *a^5*b*c^6*d*h^2*k + 438*a*b^7*c^4*d^2*f*m - 384*a^5*b*c^6*e*h^2*j + 318*a^ \\
& 2*b^9*c*d*f*m^2 - 168*a*b^7*c^4*d^2*g*1 + 42*a*b^7*c^4*d^2*h*k - 36*a*b^8*c \\
& ^3*d*f^2*m - 2432*a^4*b*c^7*d*e^2*m + 1536*a^5*b*c^6*e*g*j^2 + 1536*a^4*b*c \\
& ^7*e^2*g*j - 896*a^5*b*c^6*d*h*j^2 - 896*a^4*b*c^7*e^2*f*k + 4896*a^5*b*c^6 \\
& *d*f*k^2 + 1824*a^4*b*c^7*d*f^2*k - 384*a^4*b*c^7*e*f^2*j + 336*a*b^6*c^5*d \\
& ^2*e*1 - 156*a*b^6*c^5*d^2*f*k + 16*a*b^6*c^5*d^2*g*j + 12*a*b^7*c^4*d*f^2* \\
& k - 2*a*b^9*c^2*d*f*k^2 - 1920*a^3*b*c^8*d^2*e*j - 32*a*b^5*c^6*d^2*e*j + 2 \\
& 208*a^3*b*c^8*d^2*f*h + 800*a^4*b*c^7*d*f*h^2 - 102*a*b^5*c^6*d^2*f*h + 12*
\end{aligned}$$

$$\begin{aligned}
& a^6 b^6 c^5 d^2 f^2 h - 2 a^6 b^7 c^4 d^2 f^2 h^2 - 896 a^3 b^6 c^8 d^2 e^2 h - 8 a^6 b^6 c^5 d^2 f^2 g^2 - 240 a^6 b^4 c^7 d^2 e^2 g - 32 a^6 b^4 c^7 d^2 e^2 f + 5120 a^8 c^4 h^* \\
& j^* l^* m + 15360 a^7 c^5 d^2 j^* l^* m - 7680 a^7 c^5 e^2 j^* k^* m + 3072 a^7 c^5 f^2 j^* k^* l^* + 5120 a^7 c^5 e^2 h^* l^* m + 1920 a^7 c^5 f^2 h^* k^* m + 15360 a^6 c^6 d^2 e^2 l^* m + 57 \\
& 60 a^6 c^6 d^2 f^2 k^* m + 3072 a^6 c^6 e^2 f^2 k^* l^* - 3072 a^6 c^6 d^2 h^* j^* l^* - 2560 a^6 c^6 e^2 f^2 j^* m + 1536 a^6 c^6 e^2 h^* j^* k^* + 4608 a^5 c^7 d^2 e^2 j^* k^* - 3072 a^5 c^7 d^2 e^2 h^* l^* - 1152 a^5 c^7 d^2 f^2 h^* k^* + 512 a^5 c^7 e^2 f^2 h^* j^* + 1536 a^4 c^8 d^2 e^2 f^2 j^* \\
& - 8 a^6 b^{10} c^2 d^2 f^2 l^* - 5568 a^8 b^2 c^2 k^* l^* - 15552 a^8 b^2 c^2 j^* l^* m^2 + 4800 a^7 b^2 c^3 j^2 k^* m - 1280 a^6 b^4 c^2 j^2 k^* m + 2080 a^7 b^3 c^2 h^* l^* m^2 - 1088 a^7 b^2 c^3 j^* k^2 l^* + 48 a^6 b^4 c^2 j^* k^2 l^* - 8544 a^7 b^2 c^3 h^* k^2 m - 7776 a^7 b^3 c^2 g^2 l^* m^2 + 7632 a^7 b^3 c^2 h^* k^2 m^2 + 3600 a^6 b^3 c^3 h^2 k^* m + 2484 a^6 b^4 c^2 h^* k^2 m - 918 a^5 b^5 c^2 h^2 k^* m + 480 \\
& 0 a^7 b^2 c^3 h^* k^2 l^* - 1424 a^6 b^4 c^2 h^* k^2 l^* + 1200 a^5 b^4 c^3 g^2 k^* m - 960 a^6 b^2 c^4 g^2 k^* m - 528 a^6 b^4 c^2 f^2 l^* m^2 - 416 a^6 b^3 c^3 h^* j^2 m - 320 a^4 b^6 c^2 g^2 k^* m + 192 a^7 b^2 c^3 f^2 l^* m^2 + 96 a^5 b^5 c^2 h^* j^2 m + 15552 a^7 b^2 c^3 e^2 l^* m^2 - 6720 a^7 b^2 c^3 g^2 j^* m^2 + 6160 a^6 b^4 c^2 g^2 j^* m^2 - 4752 a^6 b^4 c^2 e^2 l^* m^2 - 2016 a^7 b^2 c^3 f^2 k^* m^2 - 1164 a^6 b^4 c^2 f^2 k^* m^2 + 1104 a^5 b^3 c^4 f^2 k^* m + 1008 a^6 b^3 c^3 f^2 k^* m^2 + 960 a^6 b^2 c^4 h^2 j^* l^* - 678 a^5 b^5 c^2 f^2 k^2 m + 544 a^6 b^3 c^3 g^2 k^2 l^* - 144 a^5 b^4 c^3 h^2 j^* l^* - 102 a^4 b^5 c^3 f^2 k^* m - 62 a^3 b^7 c^2 f^2 k^* m - 24 a^5 b^5 c^2 g^2 k^2 l^* + 6432 a^6 b^3 c^3 d^2 l^* m + 4800 a^5 b^2 c^5 e^2 k^* m - 2304 a^6 b^2 c^4 g^2 j^2 l^* + 1920 a^6 b^3 c^3 g^2 j^2 l^* + 1728 a^6 b^2 c^4 f^2 j^2 m - 1280 a^4 b^4 c^4 e^2 k^* m + 1152 a^5 b^3 c^4 g^2 j^* l^* - 1032 a^5 b^5 c^2 d^2 l^* m - 864 a^6 b^3 c^3 f^2 k^2 l^* - 768 a^5 b^5 c^2 g^2 j^2 l^* + 40 \\
& 8 a^5 b^5 c^2 f^2 k^2 l^* + 384 a^5 b^4 c^3 g^2 j^2 l^* - 288 a^5 b^4 c^3 f^2 j^2 m + 192 a^6 b^2 c^4 h^* j^2 k^* - 192 a^4 b^5 c^3 g^2 j^2 l^* + 96 a^3 b^6 c^3 e^2 k^* m - 32 a^5 b^4 c^3 h^* j^2 k^* - 21120 a^6 b^2 c^4 d^2 k^2 m + 20880 a^6 b^3 c^3 d^2 k^* m^2 + 19760 a^4 b^3 c^5 d^2 k^* m - 12320 a^6 b^3 c^3 e^2 j^* m^2 - 9750 a^5 b^5 c^2 d^2 k^* m^2 - 9390 a^3 b^5 c^4 d^2 k^* m + 8460 a^5 b^4 c^3 d^2 k^2 m + 3360 a^5 b^5 c^2 e^2 j^* m^2 + 1860 a^2 b^7 c^3 d^2 k^* m - 1218 a^4 b^6 c^2 d^2 k^2 m - 1088 a^6 b^2 c^4 e^2 k^2 l^* + 960 a^6 b^2 c^4 g^2 j^2 k^2 - 240 a^5 b^4 c^3 g^2 j^2 k^2 + 192 a^5 b^2 c^5 f^2 j^2 l^* - 104 a^4 b^5 c^3 g^2 h^* m - 96 a^5 b^3 c^4 g^2 h^* m + 48 a^5 b^4 c^3 e^2 k^2 l^* + 48 a^4 b^4 c^4 f^2 j^2 l^* + 24 a^3 b^7 c^2 g^2 h^* m + 16 a^4 b^6 c^2 g^2 j^2 k^2 - 16 a^3 b^6 c^3 f^2 j^2 l^* + 13376 a^6 b^2 c^4 d^2 k^2 l^* - 5136 a^5 b^4 c^3 d^2 k^2 l^* - 3840 a^6 b^2 c^4 e^2 j^2 l^* + 1536 a^5 b^4 c^3 e^2 j^2 l^* + 1392 a^5 b^3 c^4 f^2 h^2 m + 1386 a^5 b^5 c^2 f^2 h^* m^2 - 768 a^5 b^3 c^4 e^2 j^2 l^* + 768 a^4 b^6 c^2 d^2 k^2 l^* - 768 a^4 b^3 c^5 e^2 j^2 l^* - 5 \\
& 88 a^4 b^4 c^4 f^2 h^* m - 480 a^5 b^3 c^4 g^2 h^2 l^* + 480 a^5 b^3 c^4 d^2 j^2 m - 480 a^5 b^2 c^5 f^2 h^* m - 128 a^4 b^6 c^2 e^2 j^2 l^* + 100 a^3 b^6 c^3 f^2 h^* m + 96 a^5 b^3 c^4 f^2 j^2 k^* + 72 a^4 b^5 c^3 g^2 h^2 l^* - 54 a^4 b^5 c^3 f^2 h^2 m - 48 a^6 b^3 c^3 f^2 h^* m^2 - 36 a^3 b^7 c^2 f^2 h^* m + 6 a^2 b^8 c^2 f^2 h^* m + 6848 a^4 b^2 c^6 d^2 j^2 l^* - 2448 a^3 b^4 c^5 d^2 j^2 l^* + 624 a^5 b^4 c^3 f^2 h^2 l^* + 576 a^6 b^2 c^4 f^2 h^2 l^* + 480 a^5 b^3 c^4 e^2 j^2 k^2 + 432 a^4 b^4 c^4 f^2 g^2 m - 416 a^4 b^3 c^5 e^2 h^* m + 336 a^2 b^6 c^4 d^2 j^2 l^* - 320 a^5 b^2 c^5 f^2 g^2 m - 256 a^4 b^6 c^2 f^2 h^2 l^* + 192 a^5 b^2 c^5 g^2 h^* k^* + 96 a^3 b^
\end{aligned}$$

$$\begin{aligned}
&^5c^4e^2h^m - 72a^3b^6c^3fg^2m + 48a^4b^4c^4g^2hk - 32a^4b^5c^3e^jk^2 - 8a^3b^6c^3g^2hk + 24768a^6b^2c^4d^hm^2 - 21108a^5b^4c^3d^hm^2 - 10048a^4b^2c^6d^2hm + 7218a^4b^6c^2d^hm^2 - 6720a^6b^2c^4e^gm^2 + 6160a^5b^4c^3e^gm^2 - 2592a^5b^2c^5d^h^2m - 1680a^4b^6c^2e^gm^2 + 1068a^3b^4c^5d^2hm + 960a^5b^2c^5e^h^2m - 876a^4b^4c^4d^h^2m - 864a^5b^2c^5f^h^2k + 546a^2b^6c^4d^2hm + 432a^3b^6c^3d^h^2m + 336a^4b^3c^5f^2hk - 320a^5b^2c^5d^j^2k + 192a^5b^2c^5g^h^2j + 144a^5b^3c^4f^hk^2 - 144a^4b^4c^4e^h^2m - 102a^4b^5c^3f^hk^2 - 96a^4b^3c^5f^2g^1 - 36a^2b^8c^2d^h^2m - 30a^3b^5c^4f^2hk - 24a^3b^5c^4f^2g^1 + 16a^4b^4c^4g^h^2j - 12a^4b^4c^4f^h^2k + 12a^3b^6c^3f^h^2k + 8a^2b^7c^3f^2g^1 + 6a^3b^7c^2f^hk^2 - 2a^2b^7c^3f^2hk - 9312a^5b^3c^4d^h^1^2 + 3288a^4b^5c^3d^h^1^2 - 2304a^4b^2c^6e^2g^1 + 1920a^5b^3c^4e^g^1^2 + 1728a^4b^2c^6e^2f^m + 1152a^4b^3c^5e^g^2m - 768a^4b^5c^3e^g^1^2 - 608a^4b^3c^5d^g^2m - 472a^3b^7c^2d^h^1^2 + 384a^3b^4c^5e^2g^1 - 288a^3b^4c^5e^2f^m - 224a^4b^3c^5f^g^2k + 192a^5b^2c^5f^h^j^2 + 192a^4b^2c^6e^2hk - 192a^3b^5c^4e^g^2m + 120a^3b^5c^4d^g^2m + 64a^3b^7c^2e^g^1^2 - 32a^3b^4c^5e^2hk + 24a^3b^5c^4f^g^2k + 9936a^3b^3c^6d^2f^m + 3786a^4b^5c^3d^f^m^2 - 3552a^5b^2c^5d^hk^2 - 3486a^2b^5c^5d^2f^m - 3424a^3b^3c^6d^2g^1 - 1868a^3b^7c^2d^f^m^2 + 1332a^4b^4c^4d^hk^2 - 1296a^5b^3c^4d^f^m^2 - 1236a^3b^4c^5d^f^2m + 1224a^2b^5c^5d^2g^1 - 1152a^4b^2c^6d^f^2m + 960a^5b^2c^5e^g^k^2 - 496a^3b^3c^6d^2hk + 462a^2b^6c^4d^f^2m + 432a^4b^3c^5d^h^2k - 240a^4b^4c^4e^g^k^2 - 222a^2b^5c^5d^2hk + 192a^4b^2c^6f^2g^j + 192a^4b^2c^6e^f^2m - 174a^3b^5c^4d^h^2k - 156a^3b^6c^3d^hk^2 + 48a^3b^4c^5e^f^2m - 32a^4b^3c^5e^h^2j + 16a^3b^6c^3e^g^k^2 + 16a^3b^4c^5f^2g^j - 16a^2b^6c^4e^f^2m + 12a^2b^7c^3d^h^2k + 6a^2b^8c^2d^hk^2 + 1728a^5b^2c^5d^f^1^2 + 1392a^4b^4c^4d^f^1^2 - 840a^3b^6c^3d^f^1^2 - 768a^4b^2c^6e^g^2j + 576a^4b^2c^6d^g^2k + 480a^3b^3c^6d^e^2m + 144a^2b^8c^2d^f^1^2 + 96a^4b^3c^5d^h^j^2 + 96a^3b^3c^6e^2fk - 80a^3b^4c^5d^g^2k + 6848a^3b^2c^7d^2e^1 - 3552a^3b^2c^7d^2fk - 2448a^2b^4c^6d^2e^1 + 1332a^2b^4c^6d^2fk + 960a^3b^2c^7d^2g^j - 496a^4b^3c^5d^f^k^2 + 432a^3b^3c^6d^f^2k - 240a^2b^4c^6d^2g^j - 222a^3b^5c^4d^f^k^2 - 174a^2b^5c^5d^f^2k + 64a^4b^2c^6f^g^2h + 48a^3b^4c^5f^g^2h + 42a^2b^7c^3d^f^k^2 - 32a^3b^3c^6e^f^2j - 320a^3b^2c^7d^e^2k + 192a^4b^2c^6e^g^h^2 + 192a^4b^2c^6d^f^j^2 - 32a^3b^4c^5d^f^j^2 + 16a^3b^4c^5e^g^h^2 + 480a^2b^3c^7d^2e^j - 224a^3b^3c^6d^g^2h + 192a^3b^2c^7e^2f^h + 24a^2b^5c^5d^g^2h - 864a^3b^2c^7d^f^2h + 336a^3b^3c^6d^f^h^2 + 192a^3b^2c^7e^f^2g + 144a^2b^3c^7d^2f^h - 30a^2b^5c^5d^f^h^2 + 16a^2b^4c^6e^f^2g - 12a^2b^4c^6d^f^2h + 192a^3b^2c^7d^f^g^2 + 96a^2b^3c^7d^e^2h + 48a^2b^4c^6d^f^g^2 + 960a^2b^2c^8d^2e^g + 192a^2b^2c^8d^e^2f - 7680a^9b^c^2m^2 + 3152a^8b^3c^1^2m^2 + 2070a^7b^4c^k^2m^2 - 1840a^7b^3c^2
\end{aligned}$$

$$\begin{aligned}
& *k^3*m + 6720*a^8*b*c^3*j^2*m^2 - 3072*a^8*b*c^3*k^2*1^2 + 1680*a^6*b^5*c*j \\
& ^2*m^2 - 100*a^6*b^5*c*k^2*1^2 - 2176*a^7*b^3*c^2*j*1^3 - 256*a^6*b^3*c^3*j \\
& ^3*1 - 64*a^5*b^6*c*j^2*1^2 - 12480*a^8*b^2*c^2*h*m^3 + 972*a^5*b^6*c*h^2*m \\
& ^2 - 960*a^7*b*c^4*j^2*k^2 - 252*a^5*b^4*c^3*h^3*m - 192*a^6*b^2*c^4*h^3*m \\
& + 54*a^4*b^6*c^2*h^3*m + 1536*a^7*b*c^4*h^2*1^2 + 420*a^4*b^7*c*g^2*m^2 - 3 \\
& 6*a^4*b^7*c*h^2*1^2 - 3072*a^7*b^2*c^3*g*1^3 + 2096*a^7*b^3*c^2*f*m^3 + 108 \\
& 8*a^6*b^4*c^2*g*1^3 - 496*a^6*b^3*c^3*h*k^3 - 192*a^4*b^4*c^4*g^3*1 + 176*a \\
& ^4*b^3*c^5*f^3*m + 144*a^5*b^3*c^4*h^3*k + 78*a^3*b^8*c*f^2*m^2 + 54*a^3*b^ \\
& 5*c^4*f^3*m + 32*a^3*b^6*c^3*g^3*1 + 30*a^5*b^5*c^2*h*k^3 - 18*a^4*b^5*c^3* \\
& h^3*k - 18*a^2*b^7*c^3*f^3*m - 16*a^3*b^8*c*g^2*1^2 + 6720*a^6*b*c^5*e^2*m^ \\
& 2 - 192*a^6*b*c^5*h^2*j^2 - 4*a^2*b^9*c*f^2*1^2 - 35040*a^7*b^2*c^3*d*m^3 + \\
& 14300*a^6*b^4*c^2*d*m^3 - 12000*a^3*b^2*c^7*d^3*m + 4380*a^2*b^4*c^6*d^3*m \\
& - 2176*a^6*b^3*c^3*e*1^3 - 256*a^3*b^3*c^6*e^3*1 - 192*a^6*b^2*c^4*f*k^3 + \\
& 192*a^5*b^5*c^2*e*1^3 - 192*a^4*b^2*c^6*f^3*k + 132*a^5*b^4*c^3*f*k^3 + 12 \\
& 8*a^4*b^3*c^5*g^3*j - 28*a^3*b^4*c^5*f^3*k - 10*a^4*b^6*c^2*f*k^3 + 6*a^2*b \\
& ^6*c^4*f^3*k + 10752*a^5*b*c^6*d^2*1^2 - 960*a^5*b*c^6*e^2*k^2 - 192*a^5*b* \\
& c^6*f^2*j^2 + 108*a*b^9*c^2*d^2*1^2 - 1680*a^5*b^3*c^4*d*k^3 - 1680*a^2*b^3 \\
& *c^7*d^3*k + 222*a^4*b^5*c^3*d*k^3 + 30*a*b^8*c^3*d^2*k^2 - 10*a^3*b^7*c^2* \\
& d*k^3 - 960*a^4*b*c^7*d^2*j^2 + 80*a^4*b^3*c^5*f*h^3 + 80*a^3*b^3*c^6*f^3*h \\
& + 6*a^3*b^5*c^4*f*h^3 + 6*a^2*b^5*c^5*f^3*h - 192*a^4*b*c^7*e^2*h^2 - 192* \\
& a^4*b^2*c^6*d*h^3 - 192*a^2*b^2*c^8*d^3*h + 128*a^3*b^3*c^6*e*g^3 - 28*a^3* \\
& b^4*c^5*d*h^3 + 12*a*b^6*c^5*d^2*h^2 + 6*a^2*b^6*c^4*d*h^3 - 192*a^3*b*c^8* \\
& e^2*f^2 + 60*a*b^5*c^6*d^2*g^2 + 198*a*b^4*c^7*d^2*f^2 + 144*a^2*b^3*c^7*d* \\
& f^3 - 960*a^2*b*c^9*d^2*e^2 + 240*a*b^3*c^8*d^2*e^2 + 15360*a^9*c^3*k*1^2*m \\
& - 12800*a^9*c^3*j*1*m^2 - 3840*a^8*c^4*j^2*k*m + 432*a^6*b^6*j*1*m^2 + 460 \\
& 8*a^8*c^4*j*k^2*1 + 2880*a^8*c^4*h*k^2*m + 5120*a^8*c^4*f*1^2*m - 3072*a^8* \\
& c^4*h*k*1^2 + 270*a^5*b^7*h*k*m^2 - 216*a^5*b^7*g*1*m^2 - 12800*a^8*c^4*e*1 \\
& *m^2 - 4800*a^8*c^4*f*k*m^2 - 512*a^7*c^5*h^2*j*1 - 3840*a^6*c^6*e^2*k*m - \\
& 1280*a^7*c^5*f*j^2*m + 768*a^7*c^5*h*j^2*k + 144*a^4*b^8*g*j*m^2 - 90*a^4*b \\
& ^8*f*k*m^2 + 8640*a^7*c^5*d*k^2*m + 4608*a^7*c^5*e*k^2*1 + 512*a^6*c^6*f^2* \\
& j*1 - 9216*a^7*c^5*d*k*1^2 - 4096*a^7*c^5*e*j*1^2 + 320*a^6*c^6*f^2*h*m - 9 \\
& 0*a^3*b^9*d*k*m^2 + 15200*a^9*b*c^2*k*m^3 - 6192*a^8*b^3*c*k*m^3 + 5472*a^8 \\
& *b*c^3*k^3*m - 4608*a^5*c^7*d^2*j*1 - 1024*a^7*c^5*f*h*1^2 + 150*a^6*b^5*c* \\
& k^3*m + 54*a^3*b^9*f*h*m^2 + 6*b^10*c^2*d^2*h*m - 14400*a^7*c^5*d*h*m^2 + 8 \\
& 640*a^5*c^7*d^2*h*m + 2880*a^6*c^6*d*h^2*m + 2304*a^6*c^6*d*j^2*k - 512*a^6 \\
& *c^6*e*h^2*1 - 192*a^6*c^6*f*h^2*k + 6144*a^8*b*c^3*j*1^3 + 1536*a^7*b*c^4* \\
& j^3*1 - 1280*a^5*c^7*e^2*f*m + 768*a^5*c^7*e^2*h*k + 256*a^6*c^6*f*h*j^2 + \\
& 192*a^6*b^5*c*j*1^3 + 54*a^2*b^10*d*h*m^2 - 18*b^9*c^3*d^2*f*m + 8*b^9*c^3* \\
& d^2*g*1 - 2*b^9*c^3*d^2*h*k + 4068*a^7*b^4*c*h*m^3 - 1728*a^6*c^6*d*h*k^2 + \\
& 960*a^5*c^7*d*f^2*m + 512*a^5*c^7*e*f^2*1 - 3072*a^6*c^6*d*f*1^2 - 16*b^8* \\
& c^4*d^2*e*1 + 6*b^8*c^4*d^2*f*k - 4608*a^4*c^8*d^2*e*1 + 2400*a^8*b*c^3*f*m \\
& ^3 + 2016*a^7*b*c^4*h*k^3 - 1728*a^4*c^8*d^2*f*k - 1146*a^6*b^5*c*f*m^3 + 2 \\
& 24*a^6*b*c^5*h^3*k - 96*a^5*b^6*c*g*1^3 + 96*a^5*b*c^6*f^3*m + 2304*a^4*c^8 \\
& *d*e^2*k + 768*a^5*c^7*d*f*j^2 + 6144*a^7*b*c^4*e*1^3 - 2280*a^5*b^6*c*d*m^ \\
& 3 + 1536*a^4*b*c^7*e^3*1 - 616*a*b^6*c^5*d^3*m + 512*a^6*b*c^5*g*j^3 + 256*
\end{aligned}$$



$$\begin{aligned}
& a^4c^8e^2f^*h + 240ab^{10}cd^2m^2 + 6b^7c^5d^2f^*h - 192a^4c^8d^* \\
& f^2h + 4320a^6b^*c^5d^*k^3 + 4320a^3b^*c^8d^3k + 222ab^5c^6d^3k + \\
& 16b^6c^6d^2e^*g + 96a^5b^*c^6f^*h^3 + 96a^4b^*c^7f^3h + 768a^3c^9 \\
& *d^e^2f + 512a^3b^*c^8e^3g + 132ab^4c^7d^3h + 2016a^2b^*c^9d^3f \\
& - 496ab^3c^8d^3f + 224a^3b^*c^8d^*f^3 - 18ab^5c^6d^*f^3 - 3264a^ \\
& 8b^2c^2k^2m^2 - 6160a^7b^3c^2j^2m^2 + 1104a^7b^3c^2k^2l^2 - 1 \\
& 920a^7b^2c^3j^2l^2 + 768a^6b^4c^2j^2l^2 + 3888a^7b^2c^3h^2m^2 \\
& 2 - 3510a^6b^4c^2h^2m^2 + 240a^6b^3c^3j^2k^2 - 16a^5b^5c^2j^2 \\
& *k^2 + 1680a^6b^3c^3g^2m^2 - 1648a^6b^3c^3h^2l^2 - 1540a^5b^5c^ \\
& ^2g^2m^2 + 444a^5b^5c^2h^2l^2 - 960a^6b^2c^4h^2k^2 - 576a^6b^ \\
& 2c^4f^2m^2 - 512a^6b^2c^4g^2l^2 - 480a^5b^4c^3g^2l^2 + 198a^5 \\
& *b^4c^3h^2k^2 + 192a^4b^6c^2g^2l^2 - 186a^5b^4c^3f^2m^2 - 97a^ \\
& ^4b^6c^2f^2m^2 - 9a^4b^6c^2h^2k^2 - 6160a^5b^3c^4e^2m^2 + 168 \\
& 0a^4b^5c^3e^2m^2 - 240a^5b^3c^4g^2k^2 - 240a^5b^3c^4f^2l^2 - \\
& 144a^3b^7c^2e^2m^2 + 60a^4b^5c^3g^2k^2 - 36a^4b^5c^3f^2l^2 \\
& + 36a^3b^7c^2f^2l^2 - 16a^5b^3c^4h^2j^2 - 4a^3b^7c^2g^2k^2 + \\
& 38512a^5b^2c^5d^2m^2 - 32310a^4b^4c^4d^2m^2 + 12720a^3b^6c^3 \\
& d^2m^2 - 2500a^2b^8c^2d^2m^2 - 1920a^5b^2c^5e^2l^2 + 768a^4b^4 \\
& *c^4e^2l^2 - 464a^5b^2c^5f^2k^2 - 384a^5b^2c^5g^2j^2 - 64a^3b^ \\
& ^6c^3e^2l^2 + 42a^4b^4c^4f^2k^2 + 12a^3b^6c^3f^2k^2 - 13104a^ \\
& 4b^3c^5d^2l^2 + 5628a^3b^5c^4d^2l^2 - 1128a^2b^7c^3d^2l^2 + 2 \\
& 40a^4b^3c^5e^2k^2 - 16a^4b^3c^5f^2j^2 - 16a^3b^5c^4e^2k^2 - \\
& 2880a^4b^2c^6d^2k^2 + 1750a^3b^4c^5d^2k^2 - 345a^2b^6c^4d^2k^ \\
& ^2 - 48a^4b^3c^5g^2h^2 - 4a^3b^5c^4g^2h^2 + 240a^3b^3c^6d^2j^ \\
& ^2 - 192a^4b^2c^6f^2h^2 - 42a^3b^4c^5f^2h^2 - 16a^2b^5c^5d^2* \\
& j^2 - 48a^3b^3c^6f^2g^2 - 16a^3b^3c^6e^2h^2 - 4a^2b^5c^5f^2g^ \\
& ^2 - 464a^3b^2c^7d^2h^2 - 384a^3b^2c^7e^2g^2 + 42a^2b^4c^6d^2 \\
& *h^2 - 240a^2b^3c^7d^2g^2 - 16a^2b^3c^7e^2f^2 - 960a^2b^2c^8d^ \\
& ^2f^2 + 6b^{11}c^d^2k^*m - 18ab^{11}d^*f^*m^2 - 7200a^9c^3k^2m^2 - 324* \\
& a^7b^5l^2m^2 - 225a^6b^6k^2m^2 - 2048a^8c^4j^2l^2 - 144a^5b^7* \\
& j^2m^2 - 2400a^8c^4h^2m^2 - 81a^4b^8h^2m^2 - 800a^7c^5f^2m^2 - \\
& 288a^7c^5h^2k^2 - 36a^3b^9g^2m^2 - 9a^2b^{10}f^2m^2 - 21600a^6* \\
& c^6d^2m^2 - 2048a^6c^6e^2l^2 - 864a^6c^6f^2k^2 - 2592a^5c^7d^2 \\
& *k^2 - 1536a^5c^7e^2j^2 + 1536a^8b^2c^2l^4 - 32a^5c^7f^2h^2 + 3 \\
& 60a^7b^2c^3k^4 - 25a^6b^4c^2k^4 - 864a^4c^8d^2h^2 - 4b^7c^5d^ \\
& ^2g^2 - 9b^6c^6d^2f^2 - 288a^3c^9d^2f^2 - 24a^5b^2c^5h^4 - 16* \\
& b^5c^7d^2e^2 - 9a^4b^4c^4h^4 - 16a^3b^4c^5g^4 - 24a^3b^2c^7f^ \\
& ^4 - 9a^2b^4c^6f^4 - a^2b^8c^2f^2k^2 - a^2b^6c^4f^2h^2 + 630a^ \\
& 7b^5k^*m^3 + 8000a^9c^3h^*m^3 + 320a^7c^5h^3*m - 378a^6b^6h^*m^3 + \\
& 126a^5b^7f^*m^3 + 30b^8c^4d^3*m + 24000a^8c^4d^*m^3 + 8640a^4c^8d^ \\
& ^3*m - 1728a^7c^5f^*k^3 - 192a^5c^7f^3k - 4b^{11}c^d^2l^2 + 126a^4* \\
& b^8d^*m^3 - 10b^7c^5d^3k + 4200a^9b^2c^*m^4 - 1024a^6c^6e^*j^3 - 10 \\
& 24a^4c^8e^3j - 144a^7b^4c^*l^4 - 10b^6c^6d^3h - 1728a^3c^9d^3* \\
& h - 192a^5c^7d^*h^3 + 30b^5c^7d^3f + 360ab^2c^9d^4 - 9b^{12}d^2*m \\
& ^2 - 10000a^{10}c^2m^4 - 4096a^9c^3l^4 - 441a^8b^4m^4 - 1296a^8c^4
\end{aligned}$$

$$\begin{aligned}
& *k^4 - 256*a^7*c^5*j^4 - 16*a^6*c^6*h^4 - 16*a^4*c^8*f^4 - 256*a^3*c^9*e^4 \\
& - 25*b^4*c^8*d^4 - 1296*a^2*c^10*d^4 - b^10*c^2*d^2*k^2 - b^8*c^4*d^2*h^2, \\
& z, k1)*((6144*a^5*c^9*d + 2048*a^6*c^8*h - 10240*a^7*c^7*m - 288*a^2*b^6*c^8 \\
& 6*d + 1920*a^3*b^4*c^7*d - 5632*a^4*b^2*c^8*d + 16*a^2*b^7*c^5*f - 192*a^3* \\
& b^5*c^6*f + 768*a^4*b^3*c^7*f - 32*a^3*b^6*c^5*h + 384*a^4*b^4*c^6*h - 1536 \\
& *a^5*b^2*c^7*h + 16*a^3*b^7*c^4*k - 192*a^4*b^5*c^5*k + 768*a^5*b^3*c^6*k - \\
& 48*a^3*b^8*c^3*m + 736*a^4*b^6*c^4*m - 4224*a^5*b^4*c^5*m + 10752*a^6*b^2* \\
& c^6*m + 16*a*b^8*c^5*d - 1024*a^5*b*c^8*f - 1024*a^6*b*c^7*k)/(8*(64*a^5*c^6 \\
& - a^2*b^6*c^3 + 12*a^3*b^4*c^4 - 48*a^4*b^2*c^5)) + (x*(32*a^2*b^6*c^6*e \\
& - 2048*a^6*c^8*j - 2048*a^5*c^9*e - 384*a^3*b^4*c^7*e + 1536*a^4*b^2*c^8*e \\
& - 16*a^2*b^7*c^5*g + 192*a^3*b^5*c^6*g - 768*a^4*b^3*c^7*g + 32*a^3*b^6*c^5 \\
& *j - 384*a^4*b^4*c^6*j + 1536*a^5*b^2*c^7*j + 32*a^2*b^9*c^3*l - 528*a^3*b^7 \\
& *c^4*l + 3264*a^4*b^5*c^5*l - 8960*a^5*b^3*c^6*l + 1024*a^5*b*c^8*g + 9216 \\
& *a^6*b*c^7*l))/(4*(64*a^5*c^6 - a^2*b^6*c^3 + 12*a^3*b^4*c^4 - 48*a^4*b^2*c^5)) - \\
& (root(1572864*a^8*b^2*c^10*z^4 - 983040*a^7*b^4*c^9*z^4 + 327680*a^6 \\
& *b^6*c^8*z^4 - 61440*a^5*b^8*c^7*z^4 + 6144*a^4*b^10*c^6*z^4 - 256*a^3*b^12 \\
& *c^5*z^4 - 1048576*a^9*c^11*z^4 - 1572864*a^8*b^2*c^8*l*z^3 + 983040*a^7*b^4 \\
& *c^7*l*z^3 - 327680*a^6*b^6*c^6*l*z^3 + 61440*a^5*b^8*c^5*l*z^3 - 6144*a^4 \\
& *b^10*c^4*l*z^3 + 256*a^3*b^12*c^3*l*z^3 + 1048576*a^9*c^9*l*z^3 + 96*a^3*b^ \\
& ^12*c*k*m*z^2 + 98304*a^8*b*c^7*j*l*z^2 + 24576*a^8*b*c^7*h*m*z^2 + 155648* \\
& a^7*b*c^8*d*m*z^2 + 98304*a^7*b*c^8*e*l*z^2 + 57344*a^7*b*c^8*f*k*z^2 + 327 \\
& 68*a^7*b*c^8*g*j*z^2 + 57344*a^6*b*c^9*d*h*z^2 + 32768*a^6*b*c^9*e*g*z^2 - \\
& 32*a*b^10*c^5*d*f*z^2 - 491520*a^8*b^2*c^6*k*m*z^2 + 358400*a^7*b^4*c^5*k*m \\
& *z^2 - 129024*a^6*b^6*c^4*k*m*z^2 + 24768*a^5*b^8*c^3*k*m*z^2 - 2432*a^4*b^ \\
& 10*c^2*k*m*z^2 - 90112*a^7*b^3*c^6*j*l*z^2 + 30720*a^6*b^5*c^5*j*l*z^2 - 46 \\
& 08*a^5*b^7*c^4*j*l*z^2 + 256*a^4*b^9*c^3*j*l*z^2 - 21504*a^6*b^5*c^5*h*m*z^ \\
& 2 + 9216*a^5*b^7*c^4*h*m*z^2 + 8192*a^7*b^3*c^6*h*m*z^2 - 1568*a^4*b^9*c^3* \\
& h*m*z^2 + 96*a^3*b^11*c^2*h*m*z^2 - 172032*a^7*b^2*c^7*f*m*z^2 + 116736*a^6 \\
& *b^4*c^6*f*m*z^2 - 49152*a^7*b^2*c^7*g*l*z^2 + 45056*a^6*b^4*c^6*g*l*z^2 - \\
& 35840*a^5*b^6*c^5*f*m*z^2 + 24576*a^7*b^2*c^7*h*k*z^2 - 15360*a^5*b^6*c^5*g \\
& *l*z^2 + 5184*a^4*b^8*c^4*f*m*z^2 - 3072*a^5*b^6*c^5*h*k*z^2 + 2304*a^4*b^8 \\
& *c^4*g*l*z^2 + 2048*a^6*b^4*c^6*h*k*z^2 + 576*a^4*b^8*c^4*h*k*z^2 - 288*a^3 \\
& *b^10*c^3*f*m*z^2 - 128*a^3*b^10*c^3*g*l*z^2 - 32*a^3*b^10*c^3*h*k*z^2 - 14 \\
& 7456*a^6*b^3*c^7*d*m*z^2 - 90112*a^6*b^3*c^7*e*l*z^2 + 52224*a^5*b^5*c^6*d* \\
& m*z^2 - 49152*a^6*b^3*c^7*f*k*z^2 + 30720*a^5*b^5*c^6*e*l*z^2 - 24576*a^6*b^ \\
& ^3*c^7*g*j*z^2 + 15360*a^5*b^5*c^6*f*k*z^2 - 8192*a^4*b^7*c^5*d*m*z^2 + 614 \\
& 4*a^5*b^5*c^6*g*j*z^2 - 4608*a^4*b^7*c^5*e*l*z^2 - 2048*a^4*b^7*c^5*f*k*z^2 \\
& - 512*a^4*b^7*c^5*g*j*z^2 + 480*a^3*b^9*c^4*d*m*z^2 + 256*a^3*b^9*c^4*e*l* \\
& z^2 + 96*a^3*b^9*c^4*f*k*z^2 + 131072*a^6*b^2*c^8*d*k*z^2 + 49152*a^6*b^2*c^ \\
& ^8*e*j*z^2 - 43008*a^5*b^4*c^7*d*k*z^2 - 12288*a^5*b^4*c^7*e*j*z^2 + 6144*a^ \\
& ^4*b^6*c^6*d*k*z^2 + 1024*a^4*b^6*c^6*e*j*z^2 - 320*a^3*b^8*c^5*d*k*z^2 + 6 \\
& 144*a^5*b^4*c^7*f*h*z^2 - 2048*a^4*b^6*c^6*f*h*z^2 + 192*a^3*b^8*c^5*f*h*z^ \\
& 2 - 49152*a^5*b^3*c^8*d*h*z^2 - 24576*a^5*b^3*c^8*e*g*z^2 + 15360*a^4*b^5*c^ \\
& ^7*d*h*z^2 + 6144*a^4*b^5*c^7*e*g*z^2 - 2048*a^3*b^7*c^6*d*h*z^2 - 512*a^3* \\
& b^7*c^6*e*g*z^2 + 96*a^2*b^9*c^5*d*h*z^2 + 24576*a^5*b^2*c^9*d*f*z^2 - 3072
\end{aligned}$$

$$\begin{aligned}
& a^3 b^6 c^7 d^m f^z^2 + 2048 a^4 b^4 c^8 d^m f^z^2 + 576 a^2 b^8 c^6 d^m f^z^2 - \\
& 430080 a^9 b^6 c^6 m^2 z^2 + 3408 a^4 b^{11} c^m m^2 z^2 - 64 a^3 b^{12} c^1 z^2 + \\
& 61440 a^8 b^6 c^7 k^2 z^2 + 12288 a^7 b^6 c^8 h^2 z^2 + 12288 a^6 b^6 c^9 f^2 z^2 + \\
& 61440 a^5 b^6 c^{10} d^2 z^2 + 432 a^4 b^9 c^6 d^2 z^2 + 245760 a^9 c^7 k^m z^2 + \\
& 81920 a^8 c^8 f^m z^2 - 49152 a^8 c^8 h^m k z^2 - 147456 a^7 c^9 d^m k z^2 - \\
& 65536 a^7 c^9 e^j z^2 - 16384 a^7 c^9 f^h z^2 - 49152 a^6 c^{10} d^m f^z^2 + \\
& 716800 a^8 b^3 c^5 m^2 z^2 - 483840 a^7 b^5 c^4 m^2 z^2 + 170496 a^6 b^7 c^3 m^2 z^2 - \\
& 33232 a^5 b^9 c^2 m^2 z^2 + 516096 a^8 b^2 c^6 l^2 z^2 - 288768 a^7 b^4 c^5 l^2 z^2 + \\
& 88576 a^6 b^6 c^4 l^2 z^2 - 15744 a^5 b^8 c^3 l^2 z^2 + 1536 a^4 b^{10} c^2 l^2 z^2 - \\
& 61440 a^7 b^3 c^6 k^2 z^2 + 24064 a^6 b^5 c^5 k^2 z^2 - 4608 a^5 b^7 c^4 k^2 z^2 + \\
& 432 a^4 b^9 c^3 k^2 z^2 - 16 a^3 b^{11} c^2 k^2 z^2 + 24576 a^7 b^2 c^7 j^2 z^2 - 6144 a^6 b^4 c^6 j^2 z^2 + \\
& 512 a^5 b^6 c^5 j^2 z^2 - 8192 a^6 b^3 c^7 h^2 z^2 + 1536 a^5 b^5 c^6 h^2 z^2 - \\
& 16 a^3 b^9 c^4 h^2 z^2 - 8192 a^6 b^2 c^8 g^2 z^2 + 6144 a^5 b^4 c^7 g^2 z^2 - \\
& 1536 a^4 b^6 c^6 g^2 z^2 + 128 a^3 b^8 c^5 g^2 z^2 - 8192 a^5 b^3 c^8 f^2 z^2 + \\
& 1536 a^4 b^5 c^7 f^2 z^2 - 16 a^2 b^9 c^5 f^2 z^2 + 24576 a^5 b^2 c^9 e^2 z^2 - \\
& 6144 a^4 b^4 c^8 e^2 z^2 + 512 a^3 b^6 c^7 e^2 z^2 - 61440 a^4 b^3 c^9 d^2 z^2 + \\
& 24064 a^3 b^5 c^8 d^2 z^2 - 4608 a^2 b^7 c^7 d^2 z^2 - 393216 a^9 c^7 l^2 z^2 - \\
& 144 a^3 b^{13} m^2 z^2 - 32768 a^8 c^8 j^2 z^2 - 32768 a^6 c^{10} e^2 z^2 - \\
& 16 b^{11} c^5 d^2 z^2 + 18432 a^8 b^6 c^5 h^1 l^m z - 96 a^3 b^{10} c^g k^m z + \\
& 90112 a^7 b^6 c^6 e^k m z + 36864 a^7 b^6 c^6 f^j m z - 16384 a^7 b^6 c^6 g^j l^m z + \\
& 14336 a^7 b^6 c^6 d^1 m z - 10240 a^7 b^6 c^6 f^k l^m z + 4096 a^7 b^6 c^6 h^j k^m z + \\
& 10240 a^7 b^6 c^6 g^h m z - 47104 a^6 b^6 c^7 d^h l^m z + 36864 a^6 b^6 c^7 e^f m z + \\
& 30720 a^6 b^6 c^7 d^g m z - 16384 a^6 b^6 c^7 e^g l^m z + 6144 a^6 b^6 c^7 f^g k^m z + \\
& 4096 a^6 b^6 c^7 e^h k^m z + 32 a^4 b^{10} c^3 d^m f^1 z - 4096 a^5 b^6 c^8 d^m f^j z - \\
& 6144 a^5 b^6 c^8 d^m g^h z - 32 a^4 b^8 c^5 d^m f^g z - 4096 a^4 b^6 c^9 d^m e^f z + \\
& 64 a^4 b^7 c^6 d^m e^f z + 110592 a^8 b^2 c^4 k^1 m z - 36864 a^7 b^4 c^3 k^1 m z + \\
& 5376 a^6 b^6 c^2 k^1 m z - 79872 a^7 b^3 c^4 j^k m z + 26112 a^6 b^5 c^3 j^k m z - \\
& 3712 a^5 b^7 c^2 j^k m z - 13824 a^7 b^3 c^4 h^1 m z + 3456 a^6 b^5 c^3 h^1 m z - 288 a^5 b^7 c^2 h^1 m z - \\
& 45056 a^7 b^2 c^5 g^k m z + 39936 a^6 b^4 c^4 g^k m z + 30720 a^7 b^2 c^5 f^1 m z - \\
& 18432 a^7 b^2 c^5 h^k l^m z - 13056 a^5 b^6 c^3 g^k m z - 7680 a^6 b^4 c^4 f^1 m z + \\
& 5376 a^6 b^4 c^4 h^j m z + 4608 a^6 b^4 c^4 h^k l^m z + 3072 a^7 b^2 c^5 h^j m z - \\
& 1984 a^5 b^6 c^3 h^j m z + 1856 a^4 b^8 c^2 g^k m z + 640 a^5 b^6 c^3 f^1 m z - \\
& 384 a^5 b^6 c^3 h^k l^m z + 192 a^4 b^8 c^2 h^j m z - 79872 a^6 b^3 c^5 e^k m z - \\
& 27648 a^6 b^3 c^5 f^j m z + 26112 a^5 b^5 c^4 e^k m z + 12288 a^6 b^3 c^5 g^j l^m z - \\
& 10752 a^6 b^3 c^5 d^1 m z + 7680 a^6 b^3 c^5 f^k l^m z + 6912 a^5 b^5 c^4 f^j m z - \\
& 3712 a^4 b^7 c^3 e^k m z - 3072 a^6 b^3 c^5 h^j k^m z - 3072 a^5 b^5 c^4 g^j l^m z + \\
& 2688 a^5 b^5 c^4 d^1 m z - 1920 a^5 b^5 c^4 f^k l^m z + 768 a^5 b^5 c^4 h^j k^m z - \\
& 576 a^4 b^7 c^3 f^j m z + 256 a^4 b^7 c^3 g^j l^m z - 224 a^4 b^7 c^3 d^1 m z + \\
& 192 a^3 b^9 c^2 e^k m z + 160 a^4 b^7 c^3 f^k l^m z - 64 a^4 b^7 c^3 h^j k^m z - \\
& 2688 a^5 b^5 c^4 g^h m z - 1536 a^6 b^3 c^5 g^h m z + 992 a^4 b^7 c^3 g^h m z - \\
& 96 a^3 b^9 c^2 g^h m z - 65536 a^6 b^2 c^6 d^k l^m z + 46080 a^6 b^2 c^6 d^j m z - \\
& 24576 a^6 b^2 c^6 e^j l^m z + 21504 a^5 b^4 c^5 d^k l^m z - 11520 a^5 b^4 c^5
\end{aligned}$$

$5*d*j*m*z + 9216*a^6*b^2*c^6*f*j*k*z + 6144*a^5*b^4*c^5*e*j*1*z - 3072*a^4*b^6*c^4*d*k*1*z - 2304*a^5*b^4*c^5*f*j*k*z + 960*a^4*b^6*c^4*d*j*m*z - 512*a^4*b^6*c^4*e*j*1*z + 192*a^4*b^6*c^4*f*j*k*z + 160*a^3*b^8*c^3*d*k*1*z - 18432*a^6*b^2*c^6*f*g*m*z + 13824*a^5*b^4*c^5*f*g*m*z + 5376*a^5*b^4*c^5*e*h*m*z - 3456*a^4*b^6*c^4*f*g*m*z + 3072*a^6*b^2*c^6*e*h*m*z - 3072*a^5*b^4*c^5*f*h*1*z - 2048*a^6*b^2*c^6*g*h*k*z - 1984*a^4*b^6*c^4*e*h*m*z + 1536*a^5*b^4*c^5*g*h*k*z + 1024*a^4*b^6*c^4*f*h*1*z - 384*a^4*b^6*c^4*g*h*k*z + 288*a^3*b^8*c^3*f*g*m*z + 192*a^3*b^8*c^3*e*h*m*z - 96*a^3*b^8*c^3*f*h*1*z + 32*a^3*b^8*c^3*g*h*k*z + 41472*a^5*b^3*c^6*d*h*1*z - 27648*a^5*b^3*c^6*e*f*m*z - 23040*a^5*b^3*c^6*d*g*m*z - 13440*a^4*b^5*c^5*d*h*1*z + 12288*a^5*b^3*c^6*e*g*1*z + 6912*a^4*b^5*c^5*e*f*m*z + 5760*a^4*b^5*c^5*d*g*m*z - 4608*a^5*b^3*c^6*f*g*k*z - 3072*a^5*b^3*c^6*e*h*k*z - 3072*a^4*b^5*c^5*e*g*1*z + 1888*a^3*b^7*c^4*d*h*1*z + 1152*a^4*b^5*c^5*f*g*k*z + 768*a^4*b^5*c^5*e*h*k*z - 576*a^3*b^7*c^4*e*f*m*z - 480*a^3*b^7*c^4*d*g*m*z + 256*a^3*b^7*c^4*e*g*1*z - 96*a^3*b^7*c^4*f*g*k*z - 96*a^2*b^9*c^3*d*h*1*z - 64*a^3*b^7*c^4*e*h*k*z + 46080*a^5*b^2*c^7*d*e*m*z - 11520*a^4*b^4*c^6*d*e*m*z + 9216*a^5*b^2*c^7*e*f*k*z - 9216*a^5*b^2*c^7*d*h*j*z - 6656*a^4*b^4*c^6*d*f*1*z - 6144*a^5*b^2*c^7*d*f*1*z + 3456*a^3*b^6*c^5*d*f*1*z - 2304*a^4*b^4*c^6*e*f*k*z + 2304*a^4*b^4*c^6*d*h*j*z + 960*a^3*b^6*c^5*d*e*m*z - 576*a^2*b^8*c^4*d*f*1*z + 192*a^3*b^6*c^5*e*f*k*z - 192*a^3*b^6*c^5*d*h*j*z + 3072*a^4*b^3*c^7*d*f*j*z - 768*a^3*b^5*c^6*d*f*j*z + 64*a^2*b^7*c^5*d*f*j*z + 4608*a^4*b^3*c^7*d*g*h*z - 1152*a^3*b^5*c^6*d*g*h*z + 96*a^2*b^7*c^5*d*g*h*z - 9216*a^4*b^2*c^8*d*e*h*z + 2304*a^3*b^4*c^7*d*e*h*z + 2048*a^4*b^2*c^8*d*f*g*z - 1536*a^3*b^4*c^7*d*f*g*z + 384*a^2*b^6*c^6*d*f*g*z - 192*a^2*b^6*c^6*d*e*h*z + 3072*a^3*b^3*c^8*d*e*f*z - 768*a^2*b^5*c^7*d*e*f*z - 288*a^5*b^8*c*k*1*m*z + 90112*a^8*b*c^5*j*k*m*z + 192*a^4*b^9*c*j*k*m*z + 138240*a^9*b*c^4*1*m^2*z - 7344*a^6*b^7*c*1*m^2*z + 5088*a^5*b^8*c*j*m^2*z - 3072*a^8*b*c^5*k^2*1*z - 49152*a^8*b*c^5*j*1^2*z - 128*a^4*b^9*c*j*1^2*z - 25600*a^8*b*c^5*g*m^2*z - 9216*a^7*b*c^6*h^2*1*z - 2544*a^4*b^9*c*g*m^2*z + 64*a^3*b^10*c*g*1^2*z + 9216*a^7*b*c^6*g*k^2*z - 3072*a^6*b*c^7*f^2*1*z - 288*a^3*b^10*c*e*m^2*z - 49152*a^7*b*c^6*e*1^2*z - 58368*a^5*b*c^8*d^2*1*z - 432*a*b^9*c^4*d^2*1*z - 1024*a^6*b*c^7*g*h^2*z + 32*a*b^8*c^5*d^2*j*z + 1024*a^5*b*c^8*f^2*g*z - 9216*a^4*b*c^9*d^2*g*z + 336*a*b^7*c^6*d^2*g*z - 672*a*b^6*c^7*d^2*e*z - 122880*a^9*c^5*k*1*m*z - 40960*a^8*c^6*f*1*m*z + 24576*a^8*c^6*h*k*1*z - 20480*a^8*c^6*h*j*m*z + 73728*a^7*c^7*d*k*1*z - 61440*a^7*c^7*d*j*m*z + 32768*a^7*c^7*e*j*1*z - 12288*a^7*c^7*f*j*k*z - 20480*a^7*c^7*e*h*m*z + 8192*a^7*c^7*f*h*1*z - 61440*a^6*c^8*d*e*m*z + 24576*a^6*c^8*d*f*1*z - 12288*a^6*c^8*e*f*k*z + 12288*a^6*c^8*d*h*j*z + 12288*a^5*c^9*d*e*h*z - 131328*a^8*b^3*c^3*1*m^2*z + 46656*a^7*b^5*c^2*1*m^2*z - 142848*a^8*b^2*c^4*j*m^2*z + 106368*a^7*b^4*c^3*j*m^2*z - 34208*a^6*b^6*c^2*j*m^2*z + 2304*a^7*b^3*c^4*k^2*1*z - 576*a^6*b^5*c^3*k^2*1*z + 48*a^5*b^7*c^2*k^2*1*z + 45056*a^7*b^3*c^4*j*1^2*z - 15360*a^6*b^5*c^3*j*1^2*z - 12288*a^7*b^2*c^5*j^2*1*z + 3072*a^6*b^4*c^4*j^2*1*z + 2304*a^5*b^7*c^2*j*1^2*z - 256*a^5*b^6*c^3*j^2*1*z + 15872*a^7*b^2*c^5*j*k^2*z - 4992*a^6*b^4*c^4*j*k^2*z + 672*a^5*b^6*c^3*j*k^2*z - 32*a^4*b^8*c^2*j*k^2*z + 71424*a^7*b^3*c^4*g*m^2*z - 53184*a^6*b^5*c^3*g*m^2$

$$\begin{aligned}
& 2z + 17104a^5b^7c^2g^m^2z + 6912a^6b^3c^5h^2*1z - 1728a^5b^5c^4h^2*1z + 144a^4b^7c^3h^2*1z + 24576a^7b^2c^5g^*1^2z - 22528a^6b^4c^4g^*1^2z + 7680a^5b^6c^3g^*1^2z + 4096a^6b^2c^6g^2*1z - 3072a^5b^4c^5g^2*1z - 1152a^4b^8c^2g^*1^2z + 768a^4b^6c^4g^2*1z - 64a^3b^8c^3g^2*1z - 142848a^7b^2c^5e^m^2z + 106368a^6b^4c^4e^m^2z - 34208a^5b^6c^3e^m^2z - 7936a^6b^3c^5g^*k^2z + 5088a^4b^8c^2e^m^2z + 2496a^5b^5c^4g^*k^2z - 1536a^6b^2c^6h^2*jz + 1280a^5b^3c^6f^2*1z + 384a^5b^4c^5h^2*jz - 336a^4b^7c^3g^*k^2z + 192a^4b^5c^5f^2*1z - 144a^3b^7c^4f^2*1z - 32a^4b^6c^4h^2*jz + 16a^3b^9c^2g^*k^2z + 16a^2b^9c^3f^2*1z + 45056a^6b^3c^5e^*1^2z - 15360a^5b^5c^4e^*1^2z - 12288a^5b^2c^7e^2*1z + 3072a^4b^4c^6e^2*1z + 2304a^4b^7c^3e^*1^2z - 256a^3b^6c^5e^2*1z - 128a^3b^9c^2e^*1^2z + 59136a^4b^3c^7d^2*1z - 23488a^3b^5c^6d^2*1z + 15872a^6b^2c^6e^*k^2z - 4992a^5b^4c^5e^*k^2z + 4560a^2b^7c^5d^2*1z + 1536a^5b^2c^7f^2*jz + 672a^4b^6c^4e^*k^2z - 384a^4b^4c^6f^2*jz - 32a^3b^8c^3e^*k^2z + 32a^3b^6c^5f^2*jz + 768a^5b^3c^6g^*h^2z - 192a^4b^5c^5g^*h^2z + 16a^3b^7c^4g^*h^2z - 15872a^4b^2c^8d^2*jz + 4992a^3b^4c^7d^2*jz - 672a^2b^6c^6d^2*jz - 1536a^5b^2c^7e^*h^2z - 768a^4b^3c^7f^2*g^*z + 384a^4b^4c^6e^*h^2z + 192a^3b^5c^6f^2*g^*z - 32a^3b^6c^5e^*h^2z - 16a^2b^7c^5f^2*g^*z + 7936a^3b^3c^8d^2*g^*z - 2496a^2b^5c^7d^2*g^*z + 1536a^4b^2c^8e^*f^2z - 384a^3b^4c^7e^*f^2z + 32a^2b^6c^6e^*f^2z - 15872a^3b^2c^9d^2e^*z + 4992a^2b^4c^8d^2e^*z - 61440a^8b^2c^4*1^3z + 21504a^7b^4c^3*1^3z - 3328a^6b^6c^2*1^3z + 432a^5b^9*1^m^2z + 51200a^9c^5*j^*m^2z + 16384a^8c^6*j^2*1z - 288a^4b^10*j^*m^2z - 18432a^8c^6*j^*k^2z + 144a^3b^11*g^*m^2z + 51200a^8c^6e^*m^2z + 2048a^7c^7h^2*jz + 16384a^6c^8e^2*1z + 16b^11c^3d^2*1z - 18432a^7c^7e^*k^2z - 2048a^6c^8f^2*jz + 18432a^5c^9d^2*jz + 192a^5b^8c^1^3z + 2048a^6c^8e^*h^2z - 16b^9c^5d^2*g^*z - 2048a^5c^9e^*f^2z + 32b^8c^6d^2e^*z + 18432a^4c^10d^2e^*z + 65536a^9c^5*1^3z - 11008a^8b^c^3*j^*k^1*m - 288a^6b^5c^j^*k^1*m + 144a^5b^6c^g^*k^1*m - 11008a^7b^c^4e^*k^1*m - 5376a^7b^c^4f^*j^1*m + 3840a^7b^c^4g^*j^*k^1*m - 3328a^7b^c^4h^*j^*k^1 - 96a^4b^7c^g^*j^*k^1*m - 2560a^7b^c^4g^*h^1*m - 36a^3b^8c^f^*h^*k^1*m - 6912a^6b^c^5d^*j^*k^1 - 7872a^6b^c^5d^*h^*k^1*m - 7680a^6b^c^5d^*g^*1*m - 5376a^6b^c^5e^*f^*1*m + 3840a^6b^c^5e^*g^*k^1*m - 3328a^6b^c^5e^*h^*k^1 - 1536a^6b^c^5f^*g^*k^1 + 1280a^6b^c^5f^*g^*j^*m - 768a^6b^c^5g^*h^*j^*k - 768a^6b^c^5f^*h^*j^*1 - 768a^6b^c^5e^*h^*j^*m - 36a^2b^9c^d^*h^*k^1*m - 6912a^5b^c^6d^e^*k^1 - 4864a^5b^c^6d^e^*j^*m - 2304a^5b^c^6d^*g^*j^*k - 1792a^5b^c^6e^*f^*j^*k - 1280a^5b^c^6d^*f^*j^*1 - 4544a^5b^c^6d^*f^*h^*m + 1536a^5b^c^6d^*g^*h^*1 + 1280a^5b^c^6e^*f^*g^*m - 768a^5b^c^6e^*g^*h^*k - 768a^5b^c^6e^*f^*h^*1 - 256a^5b^c^6f^*g^*h^*j + 12a^b^9c^2d^*f^*h^*m + 16a^b^8c^3d^*f^*g^*1 - 4a^b^8c^3d^*f^*h^*k - 2304a^4b^c^7d^e^*g^*k - 1792a^4b^c^7d^e^*h^*j - 1280a^4b^c^7d^e^*f^*1 - 768a^4b^c^7d^*f^*g^*j - 32a^b^7c^4d^e^*f^*1 - 256a^4b^c^7e^*f^*g^*h - 768a^3b^c^8d^e^*f^*g + 32a^b^5c^6d^e^*f^*g + 12a^b^10c^d^*f^*k^1*m + 3648a^7b^3c^2*j^*k^1*m + 5504a^7b^2c^3g^*k^1*m - 1
\end{aligned}$$

$$\begin{aligned}
& 824a^6b^4c^2g^*k^*l^*m + 384a^7b^2c^3h^*j^*l^*m - 288a^6b^4c^2h^*j^*l^*m \\
& - 4800a^6b^3c^3g^*j^*k^*m + 3648a^6b^3c^3e^*k^*l^*m + 1280a^5b^5c^2g^*j^*k^*m + 1088a^6b^3c^3f^*j^*l^*m + 576a^6b^3c^3h^*j^*k^*l^*m - 288a^5b^5c^2e^*k^*l^*m \\
& - 192a^6b^3c^3g^*h^*l^*m + 144a^5b^5c^2g^*h^*l^*m + 9600a^6b^2c^4e^*j^*k^*m - 4224a^6b^2c^4d^*j^*l^*m - 2560a^5b^4c^3e^*j^*k^*m + 384a^6b^2c^4f^*j^*k^*l^*m \\
& + 224a^5b^4c^3d^*j^*l^*m + 192a^4b^6c^2e^*j^*k^*m - 160a^5b^4c^3f^*j^*k^*l^*m - 4608a^6b^2c^4f^*h^*k^*m + 2688a^6b^2c^4f^*g^*l^*m + 1664a^6b^2c^4g^*h^*k^*l^*m \\
& - 744a^5b^4c^3f^*h^*k^*m - 544a^5b^4c^3f^*g^*l^*m + 492a^4b^6c^2f^*h^*k^*m + 416a^5b^4c^3g^*h^*j^*m + 384a^6b^2c^4g^*h^*j^*m + 384a^6b^2c^4e^*h^*l^*m \\
& - 288a^5b^4c^3g^*h^*k^*l^*m - 288a^5b^4c^3e^*h^*l^*m - 96a^4b^6c^2g^*h^*j^*m + 2112a^5b^3c^4d^*j^*k^*l^*m - 160a^4b^5c^3d^*j^*k^*l^*m \\
& + 16992a^5b^3c^4d^*h^*k^*m - 6252a^4b^5c^3d^*h^*k^*m - 4800a^5b^3c^4e^*g^*k^*m + 2112a^5b^3c^4d^*g^*l^*m - 1728a^5b^3c^4f^*g^*j^*m + 1280a^4b^5c^3e^*g^*k^*m \\
& + 1088a^5b^3c^4e^*f^*l^*m - 832a^5b^3c^4e^*h^*j^*m + 816a^3b^7c^2d^*h^*k^*m + 576a^5b^3c^4e^*h^*k^*l^*m - 448a^5b^3c^4f^*h^*j^*l^*m + 288a^4b^5c^3f^*g^*j^*m \\
& - 192a^5b^3c^4g^*h^*j^*k^*m - 192a^5b^3c^4f^*g^*k^*l^*m + 192a^4b^5c^3e^*h^*j^*m - 112a^4b^5c^3d^*g^*l^*m + 96a^4b^5c^3f^*h^*j^*l^*m \\
& - 96a^3b^7c^2e^*g^*k^*m + 80a^4b^5c^3f^*g^*k^*l^*m + 32a^4b^5c^3g^*h^*j^*k^*m - 11456a^5b^2c^5d^*f^*k^*m + 4992a^5b^2c^5d^*h^*j^*l^*m - 4608a^5b^2c^5e^*g^*j^*l^*m \\
& - 4224a^5b^2c^5d^*e^*l^*m + 3456a^5b^2c^5e^*f^*j^*m + 3456a^5b^2c^5d^*g^*k^*l^*m + 2432a^5b^2c^5d^*g^*j^*m - 1312a^4b^4c^4d^*h^*j^*l^*m \\
& + 1272a^3b^6c^3d^*f^*k^*m - 1056a^4b^4c^4d^*g^*k^*l^*m + 896a^5b^2c^5f^*g^*j^*k^*m + 768a^4b^4c^4e^*g^*j^*l^*m - 576a^4b^4c^4e^*f^*j^*m \\
& - 480a^4b^4c^4d^*g^*j^*m + 384a^5b^2c^5e^*h^*j^*k^*m + 384a^5b^2c^5e^*f^*k^*l^*m - 232a^2b^8c^2d^*f^*k^*m + 224a^4b^4c^4d^*e^*l^*m \\
& - 160a^4b^4c^4e^*f^*k^*l^*m - 96a^4b^4c^4f^*g^*j^*k^*m + 96a^3b^6c^3d^*h^*j^*l^*m + 80a^3b^6c^3d^*g^*k^*l^*m - 64a^4b^4c^4e^*h^*j^*k^*m \\
& - 24a^4b^4c^4d^*f^*k^*m + 416a^4b^4c^4e^*g^*h^*m + 384a^5b^2c^5f^*g^*h^*l^*m + 384a^5b^2c^5e^*g^*h^*m + 224a^4b^4c^4f^*g^*h^*l^*m \\
& - 96a^3b^6c^3e^*g^*h^*m - 48a^3b^6c^3f^*g^*h^*l^*m + 2112a^4b^3c^5d^*e^*k^*l^*m - 960a^4b^3c^5d^*f^*j^*l^*m + 960a^4b^3c^5d^*e^*j^*m \\
& + 384a^3b^5c^4d^*f^*j^*l^*m + 320a^4b^3c^5d^*g^*j^*k^*m + 192a^4b^3c^5e^*f^*j^*k^*m - 160a^3b^5c^4d^*e^*k^*l^*m - 32a^2b^7c^3d^*f^*j^*l^*m \\
& + 7392a^4b^3c^5d^*f^*h^*m - 2496a^4b^3c^5d^*g^*h^*l^*m - 1728a^4b^3c^5e^*f^*g^*m - 1500a^3b^5c^4d^*f^*h^*m + 656a^3b^5c^4d^*d^*g^*h^*l^*m \\
& - 448a^4b^3c^5e^*f^*h^*l^*m + 288a^3b^5c^4e^*f^*g^*m - 192a^4b^3c^5f^*g^*h^*j^*m - 192a^4b^3c^5e^*g^*h^*k^*m + 96a^3b^5c^4e^*f^*h^*l^*m \\
& - 48a^2b^7c^3d^*g^*h^*l^*m + 32a^3b^5c^4e^*g^*h^*k^*m - 16a^2b^7c^3d^*f^*h^*m - 640a^4b^2c^6d^*e^*j^*k^*m + 4992a^4b^2c^6d^*e^*h^*l^*m \\
& - 3584a^4b^2c^6d^*f^*h^*k^*m + 2432a^4b^2c^6d^*e^*g^*m - 1312a^3b^4c^5d^*e^*h^*l^*m + 896a^4b^2c^6e^*f^*g^*k^*m + 896a^4b^2c^6d^*g^*h^*j^*m \\
& + 640a^4b^2c^6d^*f^*g^*l^*m + 600a^3b^4c^5d^*f^*h^*k^*m + 480a^3b^4c^5d^*f^*g^*l^*m - 480a^3b^4c^5d^*e^*g^*m + 384a^4b^2c^6e^*f^*h^*j^*m \\
& - 192a^2b^6c^4d^*f^*g^*l^*m - 96a^3b^4c^5e^*f^*g^*k^*m - 96a^3b^4c^5d^*g^*h^*j^*m + 96a^2b^6c^4d^*e^*h^*l^*m + 12a^2b^6c^4d^*d^*f^*h^*k^*m \\
& - 960a^3b^3c^6d^*e^*f^*l^*m + 384a^2b^5c^5d^*e^*f^*l^*m + 320a^3b^3c^6d^*e^*g^*k^*m - 192a^3b^3c^6d^*d^*f^*g^*j^*m + 192a^3b^3c^6d^*e^*h^*j^*m \\
& + 32a^2b^5c^5d^*d^*f^*g^*j^*m - 192a^3b^3c^6e^*f^*g^*h^*m + 384a^3b^2c^7d^*e^*f^*j^*m - 64a^2b^4c^6d^*e^*f^*j^*m + 896a^4b^2c^6d^*e^*f^*j^*m
\end{aligned}$$

$$\begin{aligned}
&^3b^2c^7d*eg*h - 96a^2b^4c^6d*eg*h - 192a^2b^3c^7d*ef*g + 496 \\
&a^7b^4c*k^1^2m - 4752a^7b^4c*j^1m^2 + 96a^5b^6c*j^2k^m - 6144a \\
&^8b*c^3h^1^2m - 168a^6b^5c*h^1^2m + 6400a^8b*c^3g^1m^2 - 2862a^ \\
&6b^5c*h*k^m^2 + 2376a^6b^5c*g^1m^2 - 1632a^7b*c^4h^2k^m - 480a^8 \\
&*b*c^3h*k^m^2 - 180a^5b^6c*h*k^2m + 54a^4b^7c*h^2k^m - 384a^7b*c \\
&^4h*j^2m + 120a^5b^6c*h*k^1^2 + 56a^5b^6c*f^1^2m + 24a^3b^8c*g^ \\
&2k^m + 4512a^7b*c^4f*k^2m - 2304a^7b*c^4g*k^2^1 - 1680a^5b^6c*g* \\
&j^m^2 + 1184a^6b*c^5f^2k^m + 804a^5b^6c*f*k^m^2 + 432a^5b^6c*e*l^ \\
&m^2 + 60a^4b^7c*f*k^2m + 6a^2b^9c*f^2k^m - 13312a^7b*c^4d*l^2m \\
&+ 2048a^7b*c^4g*j^1^2 - 1024a^7b*c^4f*k^1^2 + 64a^4b^7c*g*j^1^2 + \\
&56a^4b^7c*d^1^2m - 40a^4b^7c*f*k^1^2 + 13440a^7b*c^4e*j^m^2 - 892 \\
&8a^5b*c^6d^2k^m - 6240a^7b*c^4d*k^m^2 + 1614a^4b^7c*d*k^m^2 - 288 \\
&a^4b^7c*e*j^m^2 - 170a*b^9c^2d^2k^m + 60a^3b^8c*d*k^2m + 4608a^ \\
&6b*c^5e*j^2^1 + 4608a^5b*c^6e^2*j^1 - 2432a^6b*c^5d*j^2m + 1440a^ \\
&7b*c^4f*h^m^2 - 896a^6b*c^5f*j^2k - 864a^6b*c^5f*h^2m - 558a^4b \\
&^7c*f*h^m^2 + 256a^6b*c^5g*h^2^1 - 40a^3b^8c*d*k^1^2 - 1920a^6b*c^ \\
&5e*j*k^2 - 384a^5b*c^6e^2h^m + 24a^3b^8c*f*h^1^2 - 16a*b^8c^3d^2 \\
&*j^1 + 2208a^6b*c^5f*h*k^2 - 1044a^3b^8c*d*h^m^2 + 800a^5b*c^6f^2* \\
&h*k - 256a^5b*c^6f^2g^1 + 144a^3b^8c*e*g^m^2 - 116a*b^8c^3d^2h^m \\
&+ 8192a^6b*c^5d*h^1^2 + 2048a^6b*c^5e*g^1^2 + 24a^2b^9c*d*h^1^2 - \\
&5856a^4b*c^7d^2f^m + 4896a^4b*c^7d^2h*k + 2720a^6b*c^5d*f^m^2 + \\
&2304a^4b*c^7d^2g^1 + 1824a^5b*c^6d*h^2k + 438a*b^7c^4d^2f^m - \\
&384a^5b*c^6e*h^2j + 318a^2b^9c*d*f^m^2 - 168a*b^7c^4d^2g^1 + 42* \\
&a*b^7c^4d^2h*k - 36a*b^8c^3d*f^2m - 2432a^4b*c^7d*e^2m + 1536a^ \\
&5b*c^6e*g*j^2 + 1536a^4b*c^7e^2g*j - 896a^5b*c^6d*h*j^2 - 896a^4b \\
&*c^7e^2f*k + 4896a^5b*c^6d*f*k^2 + 1824a^4b*c^7d*f^2k - 384a^4b \\
&*c^7e*f^2j + 336a*b^6c^5d^2e*1 - 156a*b^6c^5d^2f*k + 16a*b^6c^5 \\
&*d^2g*j + 12a*b^7c^4d*f^2k - 2a*b^9c^2d*f*k^2 - 1920a^3b*c^8d^2* \\
&e*j - 32a*b^5c^6d^2e*j + 2208a^3b*c^8d^2f*h + 800a^4b*c^7d*f*h^2 \\
&- 102a*b^5c^6d^2f*h + 12a*b^6c^5d*f^2h - 2a*b^7c^4d*f*h^2 - 896 \\
&a^3b*c^8d*e^2h - 8a*b^6c^5d*f*g^2 - 240a*b^4c^7d^2e*g - 32a*b^4 \\
&*c^7d*e^2f + 5120a^8c^4h*j^1m + 15360a^7c^5d*j^1m - 7680a^7c^5e \\
&*j*k^m + 3072a^7c^5f*j*k^1 + 5120a^7c^5e*h^1m + 1920a^7c^5f*h*k^m \\
&+ 15360a^6c^6d*e*1m + 5760a^6c^6d*f*k^m + 3072a^6c^6e*f*k^1 - 3 \\
&072a^6c^6d*h*j^1 - 2560a^6c^6e*f*j^m + 1536a^6c^6e*h*j^k + 4608a^ \\
&5c^7d*e*j^k - 3072a^5c^7d*e*h^1 - 1152a^5c^7d*f*h*k + 512a^5c^7e \\
&*f*h^j + 1536a^4c^8d*e*f^j - 8a*b^10c*d*f^1^2 - 5568a^8b^2c^2k^1^2 \\
&*m + 15552a^8b^2c^2j^1m^2 + 4800a^7b^2c^3j^2k^m - 1280a^6b^4c^ \\
&2j^2k^m + 2080a^7b^3c^2h^1^2m - 1088a^7b^2c^3j*k^2^1 + 48a^6b^ \\
&4c^2j*k^2^1 - 8544a^7b^2c^3h*k^2m - 7776a^7b^3c^2g^1m^2 + 7632* \\
&a^7b^3c^2h*k^m^2 + 3600a^6b^3c^3h^2k^m + 2484a^6b^4c^2h*k^2m - \\
&918a^5b^5c^2h^2k^m + 4800a^7b^2c^3h*k^1^2 - 1424a^6b^4c^2h*k^ \\
&1^2 + 1200a^5b^4c^3g^2k^m - 960a^6b^2c^4g^2k^m - 528a^6b^4c^2* \\
&f^1^2m - 416a^6b^3c^3h*j^2m - 320a^4b^6c^2g^2k^m + 192a^7b^2c^ \\
&^3f^1^2m + 96a^5b^5c^2h*j^2m + 15552a^7b^2c^3e*1m^2 - 6720a^7*
\end{aligned}$$

$$\begin{aligned}
& b^2c^3g^jm^2 + 6160a^6b^4c^2g^jm^2 - 4752a^6b^4c^2e^1m^2 - 201 \\
& 6a^7b^2c^3f^km^2 - 1164a^6b^4c^2f^km^2 + 1104a^5b^3c^4f^2km \\
& + 1008a^6b^3c^3f^k^2m + 960a^6b^2c^4h^2j^1 - 678a^5b^5c^2f^k \\
& ^2m + 544a^6b^3c^3g^k^2l - 144a^5b^4c^3h^2j^1 - 102a^4b^5c^3f \\
& ^2km - 62a^3b^7c^2f^2km - 24a^5b^5c^2g^k^2l + 6432a^6b^3c^ \\
& 3d^1^2m + 4800a^5b^2c^5e^2km - 2304a^6b^2c^4g^j^2l + 1920a^6b \\
& ^3c^3g^j^1^2 + 1728a^6b^2c^4f^j^2m - 1280a^4b^4c^4e^2km + 115 \\
& 2a^5b^3c^4g^2j^1 - 1032a^5b^5c^2d^1^2m - 864a^6b^3c^3f^k^1^2 \\
& - 768a^5b^5c^2g^j^1^2 + 408a^5b^5c^2f^k^1^2 + 384a^5b^4c^3g^j^2 \\
& *1 - 288a^5b^4c^3f^j^2m + 192a^6b^2c^4h^j^2k - 192a^4b^5c^3g^ \\
& 2j^1 + 96a^3b^6c^3e^2km - 32a^5b^4c^3h^j^2k - 21120a^6b^2c^4 \\
& *dk^2m + 20880a^6b^3c^3dk^2m + 19760a^4b^3c^5d^2km - 12320a^ \\
& 6b^3c^3e^jm^2 - 9750a^5b^5c^2dk^2m - 9390a^3b^5c^4d^2km + 8 \\
& 460a^5b^4c^3dk^2m + 3360a^5b^5c^2e^jm^2 + 1860a^2b^7c^3d^2k \\
& *m - 1218a^4b^6c^2dk^2m - 1088a^6b^2c^4e^k^2l + 960a^6b^2c^4g \\
& ^jk^2 - 240a^5b^4c^3g^jk^2 + 192a^5b^2c^5f^2j^1 - 104a^4b^5c \\
& ^3g^2hm - 96a^5b^3c^4g^2hm + 48a^5b^4c^3e^k^2l + 48a^4b^4c \\
& ^4f^2j^1 + 24a^3b^7c^2g^2hm + 16a^4b^6c^2g^jk^2 - 16a^3b^6c \\
& ^3f^2j^1 + 13376a^6b^2c^4dk^1^2 - 5136a^5b^4c^3dk^1^2 - 3840a^ \\
& 6b^2c^4e^j^1^2 + 1536a^5b^4c^3e^j^1^2 + 1392a^5b^3c^4f^h^2m + 1 \\
& 386a^5b^5c^2f^hm^2 - 768a^5b^3c^4e^j^2l + 768a^4b^6c^2dk^1^2 \\
& - 768a^4b^3c^5e^2j^1 - 588a^4b^4c^4f^2hm - 480a^5b^3c^4g^h^ \\
& 2l + 480a^5b^3c^4dj^2m - 480a^5b^2c^5f^2hm - 128a^4b^6c^2e \\
& ^j^1^2 + 100a^3b^6c^3f^2hm + 96a^5b^3c^4f^j^2k + 72a^4b^5c^3g \\
& ^h^2l - 54a^4b^5c^3f^h^2m - 48a^6b^3c^3f^hm^2 - 36a^3b^7c^2f \\
& ^h^2m + 6a^2b^8c^2f^2hm + 6848a^4b^2c^6d^2j^1 - 2448a^3b^4c \\
& ^5d^2j^1 + 624a^5b^4c^3f^h^1^2 + 576a^6b^2c^4f^h^1^2 + 480a^5b^ \\
& 3c^4e^jk^2 + 432a^4b^4c^4f^g^2m - 416a^4b^3c^5e^2hm + 336a^2 \\
& *b^6c^4d^2j^1 - 320a^5b^2c^5f^g^2m - 256a^4b^6c^2f^h^1^2 + 192a \\
& ^5b^2c^5g^2hk + 96a^3b^5c^4e^2hm - 72a^3b^6c^3f^g^2m + 48a \\
& ^4b^4c^4g^2hk - 32a^4b^5c^3e^jk^2 - 8a^3b^6c^3g^2hk + 2476 \\
& 8a^6b^2c^4d^hm^2 - 21108a^5b^4c^3d^hm^2 - 10048a^4b^2c^6d^2h \\
& *m + 7218a^4b^6c^2d^hm^2 - 6720a^6b^2c^4e^gm^2 + 6160a^5b^4c^3 \\
& *e^gm^2 - 2592a^5b^2c^5d^h^2m - 1680a^4b^6c^2e^gm^2 + 1068a^3b \\
& ^4c^5d^2hm + 960a^5b^2c^5e^h^2l - 876a^4b^4c^4d^h^2m - 864a^ \\
& 5b^2c^5f^h^2k + 546a^2b^6c^4d^2hm + 432a^3b^6c^3d^h^2m + 336 \\
& *a^4b^3c^5f^2hk - 320a^5b^2c^5dj^2k + 192a^5b^2c^5g^h^2j + \\
& 144a^5b^3c^4f^hk^2 - 144a^4b^4c^4e^h^2l - 102a^4b^5c^3f^hk^2 \\
& - 96a^4b^3c^5f^2g^1 - 36a^2b^8c^2d^h^2m - 30a^3b^5c^4f^2hk \\
& - 24a^3b^5c^4f^2g^1 + 16a^4b^4c^4g^h^2j - 12a^4b^4c^4f^h^2k \\
& + 12a^3b^6c^3f^h^2k + 8a^2b^7c^3f^2g^1 + 6a^3b^7c^2f^hk^2 - \\
& 2a^2b^7c^3f^2hk - 9312a^5b^3c^4d^h^1^2 + 3288a^4b^5c^3d^h^1^ \\
& 2 - 2304a^4b^2c^6e^2g^1 + 1920a^5b^3c^4e^g^1^2 + 1728a^4b^2c^6e \\
& ^2fm + 1152a^4b^3c^5e^g^2l - 768a^4b^5c^3e^g^1^2 - 608a^4b^3c \\
& ^5dg^2m - 472a^3b^7c^2d^h^1^2 + 384a^3b^4c^5e^2g^1 - 288a^3b
\end{aligned}$$



$$\begin{aligned}
&^4c^5e^2f^m - 224a^4b^3c^5f^g^2k + 192a^5b^2c^5f^h^j^2 + 192a^4b^2c^6e^2h^k - 192a^3b^5c^4e^g^2l + 120a^3b^5c^4d^g^2m + 64a^3b^7c^2e^g^1l^2 - 32a^3b^4c^5e^2h^k + 24a^3b^5c^4f^g^2k + 9936a^3b^3c^6d^2f^m + 3786a^4b^5c^3d^f^m^2 - 3552a^5b^2c^5d^h^k^2 - 3486a^2b^5c^5d^2f^m - 3424a^3b^3c^6d^2g^1l - 1868a^3b^7c^2d^f^m^2 + 1332a^4b^4c^4d^h^k^2 - 1296a^5b^3c^4d^f^m^2 - 1236a^3b^4c^5d^f^2m + 1224a^2b^5c^5d^2g^1l - 1152a^4b^2c^6d^f^2m + 960a^5b^2c^5e^g^k^2 - 496a^3b^3c^6d^2h^k + 462a^2b^6c^4d^f^2m + 432a^4b^3c^5d^h^2k - 240a^4b^4c^4e^g^k^2 - 222a^2b^5c^5d^2h^k + 192a^4b^2c^6f^2g^j + 192a^4b^2c^6e^f^2l - 174a^3b^5c^4d^h^2k - 156a^3b^6c^3d^h^k^2 + 48a^3b^4c^5e^f^2l - 32a^4b^3c^5e^h^2j + 16a^3b^6c^3e^g^k^2 + 16a^3b^4c^5f^2g^j - 16a^2b^6c^4e^f^2l + 12a^2b^7c^3d^h^2k + 6a^2b^8c^2d^h^k^2 + 1728a^5b^2c^5d^f^1l^2 + 1392a^4b^4c^4d^f^1l^2 - 840a^3b^6c^3d^f^1l^2 - 768a^4b^2c^6e^g^2j + 576a^4b^2c^6d^g^2k + 480a^3b^3c^6d^e^2m + 144a^2b^8c^2d^f^1l^2 + 96a^4b^3c^5d^h^j^2 + 96a^3b^3c^6e^2f^k - 80a^3b^4c^5d^g^2k + 6848a^3b^2c^7d^2e^1l - 3552a^3b^2c^7d^2f^k - 2448a^2b^4c^6d^2e^1l + 1332a^2b^4c^6d^2f^k + 960a^3b^2c^7d^2g^j - 496a^4b^3c^5d^f^k^2 + 432a^3b^3c^6d^f^2k - 240a^2b^4c^6d^2g^j - 222a^3b^5c^4d^f^k^2 - 174a^2b^5c^5d^f^2k + 64a^4b^2c^6f^g^2h + 48a^3b^4c^5f^g^2h + 42a^2b^7c^3d^f^k^2 - 32a^3b^3c^6e^f^2j - 320a^3b^2c^7d^e^2k + 192a^4b^2c^6e^g^h^2 + 192a^4b^2c^6d^f^j^2 - 32a^3b^4c^5d^f^j^2 + 16a^3b^4c^5e^g^h^2 + 480a^2b^3c^7d^2e^j - 224a^3b^3c^6d^g^2h + 192a^3b^2c^7e^2f^h + 24a^2b^5c^5d^g^2h - 864a^3b^2c^7d^f^2h + 336a^3b^3c^6d^f^h^2 + 192a^3b^2c^7e^f^2g + 144a^2b^3c^7d^2f^h - 30a^2b^5c^5d^f^h^2 + 16a^2b^4c^6e^f^2g - 12a^2b^4c^6d^f^2h + 192a^3b^2c^7d^f^g^2 + 96a^2b^3c^7d^e^2h + 48a^2b^4c^6d^f^g^2 + 960a^2b^2c^8d^2e^g + 192a^2b^2c^8d^e^2f - 7680a^9b^c^2l^2m^2 + 3152a^8b^3c^1l^2m^2 + 2070a^7b^4c^k^2m^2 - 1840a^7b^3c^2k^3m + 6720a^8b^c^3j^2m^2 - 3072a^8b^c^3k^2l^2 + 1680a^6b^5c^j^2m^2 - 100a^6b^5c^k^2l^2 - 2176a^7b^3c^2j^1l^3 - 256a^6b^3c^3j^3l - 64a^5b^6c^j^2l^2 - 12480a^8b^2c^2h^m^3 + 972a^5b^6c^h^2m^2 - 960a^7b^c^4j^2k^2 - 252a^5b^4c^3h^3m - 192a^6b^2c^4h^3m + 54a^4b^6c^2h^3m + 1536a^7b^c^4h^2l^2 + 420a^4b^7c^g^2m^2 - 36a^4b^7c^h^2l^2 - 3072a^7b^2c^3g^1l^3 + 2096a^7b^3c^2f^m^3 + 1088a^6b^4c^2g^1l^3 - 496a^6b^3c^3h^k^3 - 192a^4b^4c^4g^3l + 176a^4b^3c^5f^3m + 144a^5b^3c^4h^3k + 78a^3b^8c^f^2m^2 + 54a^3b^5c^4f^3m + 32a^3b^6c^3g^3l + 30a^5b^5c^2h^k^3 - 18a^4b^5c^3h^3k - 18a^2b^7c^3f^3m - 16a^3b^8c^g^2l^2 + 6720a^6b^c^5e^2m^2 - 192a^6b^c^5h^2j^2 - 4a^2b^9c^f^2l^2 - 35040a^7b^2c^3d^m^3 + 14300a^6b^4c^2d^m^3 - 12000a^3b^2c^7d^3m + 4380a^2b^4c^6d^3m - 2176a^6b^3c^3e^1l^3 - 256a^3b^3c^6e^3l - 192a^6b^2c^4f^k^3 + 192a^5b^5c^2e^1l^3 - 192a^4b^2c^6f^3k + 132a^5b^4c^3f^k^3 + 128a^4b^3c^5g^3j - 28a^3b^4c^5f^3k - 10a^4b^6c^2f^k^3 + 6a^2b^6c^4f^3k + 10752a^5b^c^6d^2l^2 - 960*
\end{aligned}$$

$$\begin{aligned}
& a^5 b^3 c^6 e^2 k^2 - 192 a^5 b^3 c^6 f^2 j^2 + 108 a^4 b^9 c^2 d^2 l^2 - 1680 a^5 b^3 c^4 d^2 k^3 - 1680 a^2 b^3 c^7 d^3 k + 222 a^4 b^5 c^3 d^2 k^3 + 30 a^4 b^8 c^3 d^2 k^2 - 10 a^3 b^7 c^2 d^2 k^3 - 960 a^4 b^3 c^7 d^2 j^2 + 80 a^4 b^3 c^5 f^3 h^3 + 80 a^3 b^3 c^6 f^3 h + 6 a^3 b^5 c^4 f^3 h^3 + 6 a^2 b^5 c^5 f^3 h - 192 a^4 b^3 c^7 e^2 h^2 - 192 a^4 b^2 c^6 d^3 h^3 - 192 a^2 b^2 c^8 d^3 h + 128 a^3 b^3 c^6 e^2 g^3 - 28 a^3 b^4 c^5 d^2 h^3 + 12 a^2 b^6 c^5 d^2 h^2 + 6 a^2 b^6 c^4 d^2 h^3 - 192 a^3 b^3 c^8 e^2 f^2 + 60 a^2 b^5 c^6 d^2 g^2 + 198 a^2 b^4 c^7 d^2 f^2 + 144 a^2 b^3 c^7 d^2 f^3 - 960 a^2 b^3 c^9 d^2 e^2 + 240 a^2 b^3 c^8 d^2 e^2 + 15360 a^9 c^3 k^2 l^2 m - 12800 a^9 c^3 j^2 l^2 m^2 - 3840 a^8 c^4 j^2 k^2 m + 432 a^6 b^6 j^2 l^2 m^2 + 4608 a^8 c^4 j^2 k^2 l^2 m + 2880 a^8 c^4 h^2 k^2 m + 5120 a^8 c^4 f^2 l^2 m - 3072 a^8 c^4 h^2 k^2 l^2 m + 270 a^5 b^7 h^2 k^2 m^2 - 216 a^5 b^7 g^2 l^2 m^2 - 12800 a^8 c^4 e^2 l^2 m^2 - 4800 a^8 c^4 f^2 k^2 m^2 - 512 a^7 c^5 h^2 j^2 l^2 m - 3840 a^6 c^6 e^2 k^2 m - 1280 a^7 c^5 f^2 j^2 m + 768 a^7 c^5 h^2 j^2 k + 144 a^4 b^8 g^2 j^2 m^2 - 90 a^4 b^8 f^2 k^2 m^2 + 8640 a^7 c^5 d^2 k^2 m + 4608 a^7 c^5 e^2 k^2 l^2 m + 512 a^6 c^6 f^2 j^2 l^2 m - 9216 a^7 c^5 d^2 k^2 l^2 m - 4096 a^7 c^5 e^2 j^2 l^2 m + 320 a^6 c^6 f^2 h^2 m - 90 a^3 b^9 d^2 k^2 m^2 + 15200 a^9 b^3 c^2 k^2 m^3 - 6192 a^8 b^3 c^2 k^2 m^3 + 5472 a^8 b^3 c^3 k^3 m - 4608 a^5 c^7 d^2 j^2 l^2 m - 1024 a^7 c^5 f^2 h^2 l^2 m + 150 a^6 b^5 c^2 k^3 m + 54 a^3 b^9 f^2 h^2 m^2 + 6 b^10 c^2 d^2 h^2 m - 14400 a^7 c^5 d^2 h^2 m^2 + 8640 a^5 c^7 d^2 h^2 m + 2880 a^6 c^6 d^2 h^2 m + 2304 a^6 c^6 d^2 j^2 k - 512 a^6 c^6 e^2 h^2 l^2 m - 192 a^6 c^6 f^2 h^2 k + 6144 a^8 b^3 c^3 j^2 l^3 + 1536 a^7 b^3 c^4 j^3 l^3 - 1280 a^5 c^7 e^2 f^2 m + 768 a^5 c^7 e^2 h^2 k + 256 a^6 c^6 f^2 h^2 j^2 + 192 a^6 b^5 c^2 j^2 l^3 + 54 a^2 b^10 d^2 h^2 m^2 - 18 b^9 c^3 d^2 f^2 m + 8 b^9 c^3 d^2 g^2 l - 2 b^9 c^3 d^2 h^2 k + 4068 a^7 b^4 c^2 h^2 m^3 - 1728 a^6 c^6 d^2 h^2 k^2 + 960 a^5 c^7 d^2 f^2 m + 512 a^5 c^7 e^2 f^2 l - 3072 a^6 c^6 d^2 f^2 l^2 - 16 b^8 c^4 d^2 e^2 l + 6 b^8 c^4 d^2 f^2 k - 4608 a^4 c^8 d^2 e^2 l + 2400 a^8 b^3 c^3 f^2 m^3 + 2016 a^7 b^3 c^4 h^2 k^3 - 1728 a^4 c^8 d^2 f^2 k - 1146 a^6 b^5 c^2 f^2 m^3 + 224 a^6 b^3 c^5 h^3 k - 96 a^5 b^6 c^2 g^2 l^3 + 96 a^5 b^3 c^6 f^3 m + 2304 a^4 c^8 d^2 e^2 k + 768 a^5 c^7 d^2 f^2 j^2 + 6144 a^7 b^3 c^4 e^2 l^3 - 2280 a^5 b^6 c^2 d^2 m^3 + 1536 a^4 b^3 c^7 e^3 l - 616 a^2 b^6 c^5 d^3 m + 512 a^6 b^3 c^5 g^2 j^3 + 256 a^4 c^8 e^2 f^2 h + 240 a^2 b^10 c^2 d^2 m^2 + 6 b^7 c^5 d^2 f^2 h - 192 a^4 c^8 d^2 f^2 h + 4320 a^6 b^3 c^5 d^2 k^3 + 4320 a^3 b^3 c^8 d^3 k + 222 a^2 b^5 c^6 d^3 k + 16 b^6 c^6 d^2 e^2 g + 96 a^5 b^3 c^6 f^2 h^3 + 96 a^4 b^3 c^7 f^3 h + 768 a^3 c^9 d^2 e^2 f + 512 a^3 b^3 c^8 e^3 g + 132 a^2 b^4 c^7 d^3 h + 2016 a^2 b^3 c^9 d^3 f - 496 a^2 b^3 c^8 d^3 f + 224 a^3 b^3 c^8 d^2 f^3 - 18 a^2 b^5 c^6 d^2 f^3 - 3264 a^8 b^2 c^2 k^2 m^2 - 6160 a^7 b^3 c^2 j^2 m^2 + 1104 a^7 b^3 c^2 k^2 l^2 - 1920 a^7 b^2 c^3 j^2 l^2 + 768 a^6 b^4 c^2 j^2 l^2 + 3888 a^7 b^2 c^3 h^2 m^2 - 3510 a^6 b^4 c^2 h^2 m^2 + 240 a^6 b^3 c^3 j^2 k^2 - 16 a^5 b^5 c^2 j^2 k^2 + 1680 a^6 b^3 c^3 g^2 m^2 - 1648 a^6 b^3 c^3 h^2 l^2 - 1540 a^5 b^5 c^2 g^2 m^2 + 444 a^5 b^5 c^2 h^2 l^2 - 960 a^6 b^2 c^4 h^2 k^2 - 576 a^6 b^2 c^4 f^2 m^2 - 512 a^6 b^2 c^4 g^2 l^2 - 480 a^5 b^4 c^3 g^2 l^2 + 198 a^5 b^4 c^3 h^2 k^2 + 192 a^4 b^6 c^2 g^2 l^2 - 186 a^5 b^4 c^3 f^2 m^2 - 97 a^4 b^6 c^2 f^2 m^2 - 9 a^4 b^6 c^2 h^2 k^2 - 6160 a^5 b^3 c^4 e^2 m^2 + 1680 a^4 b^5 c^3 e^2 m^2 - 240 a^5 b^3 c^4 g^2 k^2 - 240 a^5 b^3 c^4 f^2 l^2 - 144 a^3 b^7 c^2 e^2 m^2 + 60 a^4 b^5 c^3 g^2 k^2 - 36 a^4 b^5 c^3 f^2 l^2 + 36 a^3 b^7 c^2 f^2 l^2 - 16 a^5 b^3 c^4 h^2
\end{aligned}$$

$$\begin{aligned}
& *j^2 - 4*a^3*b^7*c^2*g^2*k^2 + 38512*a^5*b^2*c^5*d^2*m^2 - 32310*a^4*b^4*c^4*d^2*m^2 + 12720*a^3*b^6*c^3*d^2*m^2 - 2500*a^2*b^8*c^2*d^2*m^2 - 1920*a^5 \\
& *b^2*c^5*e^2*l^2 + 768*a^4*b^4*c^4*e^2*l^2 - 464*a^5*b^2*c^5*f^2*k^2 - 384* \\
& a^5*b^2*c^5*g^2*j^2 - 64*a^3*b^6*c^3*e^2*l^2 + 42*a^4*b^4*c^4*f^2*k^2 + 12* \\
& a^3*b^6*c^3*f^2*k^2 - 13104*a^4*b^3*c^5*d^2*l^2 + 5628*a^3*b^5*c^4*d^2*l^2 \\
& - 1128*a^2*b^7*c^3*d^2*l^2 + 240*a^4*b^3*c^5*e^2*k^2 - 16*a^4*b^3*c^5*f^2*j \\
& ^2 - 16*a^3*b^5*c^4*e^2*k^2 - 2880*a^4*b^2*c^6*d^2*k^2 + 1750*a^3*b^4*c^5*d \\
& ^2*k^2 - 345*a^2*b^6*c^4*d^2*k^2 - 48*a^4*b^3*c^5*g^2*h^2 - 4*a^3*b^5*c^4*g \\
& ^2*h^2 + 240*a^3*b^3*c^6*d^2*j^2 - 192*a^4*b^2*c^6*f^2*h^2 - 42*a^3*b^4*c^5 \\
& *f^2*h^2 - 16*a^2*b^5*c^5*d^2*j^2 - 48*a^3*b^3*c^6*f^2*g^2 - 16*a^3*b^3*c^6 \\
& *e^2*h^2 - 4*a^2*b^5*c^5*f^2*g^2 - 464*a^3*b^2*c^7*d^2*h^2 - 384*a^3*b^2*c^ \\
& 7*e^2*g^2 + 42*a^2*b^4*c^6*d^2*h^2 - 240*a^2*b^3*c^7*d^2*g^2 - 16*a^2*b^3*c \\
& ^7*e^2*f^2 - 960*a^2*b^2*c^8*d^2*f^2 + 6*b^11*c*d^2*k*m - 18*a*b^11*d*f*m^2 \\
& - 7200*a^9*c^3*k^2*m^2 - 324*a^7*b^5*l^2*m^2 - 225*a^6*b^6*k^2*m^2 - 2048* \\
& a^8*c^4*j^2*l^2 - 144*a^5*b^7*j^2*m^2 - 2400*a^8*c^4*h^2*m^2 - 81*a^4*b^8*h \\
& ^2*m^2 - 800*a^7*c^5*f^2*m^2 - 288*a^7*c^5*h^2*k^2 - 36*a^3*b^9*g^2*m^2 - 9 \\
& *a^2*b^10*f^2*m^2 - 21600*a^6*c^6*d^2*m^2 - 2048*a^6*c^6*e^2*l^2 - 864*a^6* \\
& c^6*f^2*k^2 - 2592*a^5*c^7*d^2*k^2 - 1536*a^5*c^7*e^2*j^2 + 1536*a^8*b^2*c^ \\
& 2*l^4 - 32*a^5*c^7*f^2*h^2 + 360*a^7*b^2*c^3*k^4 - 25*a^6*b^4*c^2*k^4 - 864 \\
& *a^4*c^8*d^2*h^2 - 4*b^7*c^5*d^2*g^2 - 9*b^6*c^6*d^2*f^2 - 288*a^3*c^9*d^2* \\
& f^2 - 24*a^5*b^2*c^5*h^4 - 16*b^5*c^7*d^2*e^2 - 9*a^4*b^4*c^4*h^4 - 16*a^3* \\
& b^4*c^5*g^4 - 24*a^3*b^2*c^7*f^4 - 9*a^2*b^4*c^6*f^4 - a^2*b^8*c^2*f^2*k^2 \\
& - a^2*b^6*c^4*f^2*h^2 + 630*a^7*b^5*k*m^3 + 8000*a^9*c^3*h*m^3 + 320*a^7*c^ \\
& 5*h^3*m - 378*a^6*b^6*h*m^3 + 126*a^5*b^7*f*m^3 + 30*b^8*c^4*d^3*m + 24000* \\
& a^8*c^4*d*m^3 + 8640*a^4*c^8*d^3*m - 1728*a^7*c^5*f*k^3 - 192*a^5*c^7*f^3*k \\
& - 4*b^11*c*d^2*l^2 + 126*a^4*b^8*d*m^3 - 10*b^7*c^5*d^3*k + 4200*a^9*b^2*c \\
& *m^4 - 1024*a^6*c^6*e*j^3 - 1024*a^4*c^8*e^3*j - 144*a^7*b^4*c*l^4 - 10*b^6 \\
& *c^6*d^3*h - 1728*a^3*c^9*d^3*h - 192*a^5*c^7*d*h^3 + 30*b^5*c^7*d^3*f + 36 \\
& 0*a*b^2*c^9*d^4 - 9*b^12*d^2*m^2 - 10000*a^10*c^2*m^4 - 4096*a^9*c^3*l^4 - \\
& 441*a^8*b^4*m^4 - 1296*a^8*c^4*k^4 - 256*a^7*c^5*j^4 - 16*a^6*c^6*h^4 - 16* \\
& a^4*c^8*f^4 - 256*a^3*c^9*e^4 - 25*b^4*c^8*d^4 - 1296*a^2*c^10*d^4 - b^10*c \\
& ^2*d^2*k^2 - b^8*c^4*d^2*h^2, z, k1)*x*(8192*a^6*b*c^9 + 32*a^2*b^9*c^5 - 5 \\
& 12*a^3*b^7*c^6 + 3072*a^4*b^5*c^7 - 8192*a^5*b^3*c^8))/(4*(64*a^5*c^6 - a^2 \\
& *b^6*c^3 + 12*a^3*b^4*c^4 - 48*a^4*b^2*c^5))) + (x*(2*b^6*c^6*d^2 - 576*a^3 \\
& *c^9*d^2 + 64*a^4*c^8*f^2 - 64*a^5*c^7*h^2 + 576*a^6*c^6*k^2 + 18*a^2*b^10* \\
& m^2 - 1600*a^7*c^5*m^2 - 36*a*b^4*c^7*d^2 + 128*a^3*b*c^8*e^2 + 128*a^5*b*c \\
& ^6*j^2 + 8*a^2*b^9*c*l^2 + 3072*a^6*b*c^5*l^2 - 300*a^3*b^8*c*m^2 + 256*a^2 \\
& *b^2*c^8*d^2 - 32*a^2*b^3*c^7*e^2 + 20*a^2*b^4*c^6*f^2 - 96*a^3*b^2*c^7*f^2 \\
& - 8*a^2*b^5*c^5*g^2 + 32*a^3*b^3*c^6*g^2 + 2*a^2*b^6*c^4*h^2 - 4*a^3*b^4*c \\
& ^5*h^2 - 32*a^4*b^3*c^5*j^2 + 2*a^2*b^8*c^2*k^2 - 40*a^3*b^6*c^3*k^2 + 276* \\
& a^4*b^4*c^4*k^2 - 736*a^5*b^2*c^5*k^2 - 136*a^3*b^7*c^2*l^2 + 888*a^4*b^5*c \\
& ^3*l^2 - 2656*a^5*b^3*c^4*l^2 + 1874*a^4*b^6*c^2*m^2 - 5284*a^5*b^4*c^3*m^2 \\
& + 6144*a^6*b^2*c^4*m^2 - 384*a^4*c^8*d*h + 1920*a^5*c^7*d*m - 1024*a^5*c^7 \\
& *e*l + 384*a^5*c^7*f*k + 640*a^6*c^6*h*m - 1024*a^6*c^6*j*l + 4*a*b^5*c^6*d \\
& *f + 320*a^3*b*c^8*d*f + 64*a^4*b*c^7*f*h + 576*a^4*b*c^7*d*k + 256*a^4*b*c
\end{aligned}$$

$$\begin{aligned}
& ^7e*j - 1472*a^5*b*c^6*f*m + 512*a^5*b*c^6*g*1 + 64*a^5*b*c^6*h*k - 12*a^2 \\
& *b^9*c*k*m - 3776*a^6*b*c^5*k*m - 96*a^2*b^3*c^7*d*f + 8*a^2*b^4*c^6*d*h + \\
& 32*a^2*b^4*c^6*e*g + 64*a^3*b^2*c^7*d*h - 128*a^3*b^2*c^7*e*g - 12*a^2*b^5* \\
& c^5*f*h + 32*a^3*b^3*c^6*f*h + 20*a^2*b^5*c^5*d*k - 224*a^3*b^3*c^6*d*k - 6 \\
& 4*a^3*b^3*c^6*e*j - 60*a^2*b^6*c^4*d*m - 12*a^2*b^6*c^4*f*k + 632*a^3*b^4*c \\
& ^5*d*m - 32*a^3*b^4*c^5*e*1 + 152*a^3*b^4*c^5*f*k + 32*a^3*b^4*c^5*g*j - 20 \\
& 48*a^4*b^2*c^6*d*m + 384*a^4*b^2*c^6*e*1 - 512*a^4*b^2*c^6*f*k - 128*a^4*b^ \\
& 2*c^6*g*j + 36*a^2*b^7*c^3*f*m + 4*a^2*b^7*c^3*h*k - 396*a^3*b^5*c^4*f*m + \\
& 16*a^3*b^5*c^4*g*1 - 44*a^3*b^5*c^4*h*k + 1376*a^4*b^3*c^5*f*m - 192*a^4*b^ \\
& 3*c^5*g*1 + 96*a^4*b^3*c^5*h*k - 12*a^2*b^8*c^2*h*m + 112*a^3*b^6*c^3*h*m - \\
& 248*a^4*b^4*c^4*h*m - 192*a^5*b^2*c^5*h*m - 32*a^4*b^4*c^4*j*1 + 384*a^5*b \\
& ^2*c^5*j*1 + 220*a^3*b^7*c^2*k*m - 1436*a^4*b^5*c^3*k*m + 3936*a^5*b^3*c^4* \\
& k*m))/(4*(64*a^5*c^6 - a^2*b^6*c^3 + 12*a^3*b^4*c^4 - 48*a^4*b^2*c^5))) - ( \\
& 5*b^3*c^7*d^3 + 8*a^3*c^7*f^3 + 216*a^6*c^4*k^3 - 63*a^5*b^5*m^3 - 96*a^2*c \\
& ^8*d*e^2 + 72*a^2*c^8*d^2*f - 4*a^4*b*c^5*h^3 - 3*b^4*c^6*d^2*f - 32*a^3*c^ \\
& 7*e^2*h + b^5*c^5*d^2*h - 96*a^4*c^6*d*j^2 + 8*a^4*c^6*f*h^2 + 216*a^3*c^7* \\
& d^2*k + 573*a^6*b^3*c*m^3 - 1300*a^7*b*c^2*m^3 + 384*a^5*c^5*d*1^2 + b^6*c^ \\
& 4*d^2*k + 72*a^4*c^6*f^2*k + 216*a^5*c^5*f*k^2 + 9*a^2*b^8*f*m^2 + 160*a^4* \\
& c^6*e^2*m - 32*a^5*c^5*h*j^2 - 3*b^7*c^3*d^2*m + 24*a^5*c^5*h^2*k + 200*a^6 \\
& *c^4*f*m^2 - 27*a^3*b^7*h*m^2 + 128*a^6*c^4*h*1^2 + 45*a^4*b^6*k*m^2 + 160* \\
& a^6*c^4*j^2*m + 600*a^7*c^3*k*m^2 - 640*a^7*c^3*1^2*m + 6*a^2*b^2*c^6*f^3 - \\
& 3*a^3*b^3*c^4*h^3 + 5*a^4*b^4*c^2*k^3 - 66*a^5*b^2*c^3*k^3 - 36*a*b*c^8*d^ \\
& 3 + 9*a*b^9*d*m^2 + 4*a*b^8*c*d*1^2 + 48*a^3*c^7*d*f*h - 192*a^3*c^7*d*e*j \\
& - 240*a^4*c^6*d*f*m + 144*a^4*c^6*d*h*k - 128*a^4*c^6*e*f*1 - 64*a^4*c^6*e* \\
& h*j - 80*a^5*c^5*f*h*m - 720*a^5*c^5*d*k*m + 320*a^5*c^5*e*j*m - 384*a^5*c^ \\
& 5*e*k*1 - 128*a^5*c^5*f*j*1 - 240*a^6*c^4*h*k*m - 384*a^6*c^4*j*k*1 + 16*a* \\
& b^2*c^7*d*e^2 + 18*a*b^2*c^7*d^2*f + 3*a*b^3*c^6*d*f^2 - 60*a^2*b*c^7*d*f^2 \\
& + 4*a*b^4*c^5*d*g^2 + 16*a^2*b*c^7*e^2*f - a*b^3*c^6*d^2*h + a*b^5*c^4*d*h \\
& ^2 - 60*a^2*b*c^7*d^2*h - 28*a^3*b*c^6*d*h^2 - 28*a^3*b*c^6*f^2*h - 10*a*b^ \\
& 4*c^5*d^2*k + a*b^7*c^2*d*k^2 - 396*a^4*b*c^5*d*k^2 + 16*a^3*b*c^6*e^2*k + \\
& 16*a^4*b*c^5*f*j^2 + 25*a*b^5*c^4*d^2*m - 159*a^2*b^7*c*d*m^2 - 348*a^3*b*c \\
& ^6*d^2*m + 1460*a^5*b*c^4*d*m^2 + 4*a^2*b^7*c*f*1^2 + 128*a^5*b*c^4*f*1^2 - \\
& 78*a^3*b^6*c*f*m^2 - 76*a^4*b*c^5*f^2*m - 204*a^5*b*c^4*h*k^2 - 12*a^3*b^6 \\
& *c*h*1^2 + 279*a^4*b^5*c*h*m^2 - 12*a^5*b*c^4*h^2*m + 16*a^5*b*c^4*j^2*k + \\
& 420*a^6*b*c^3*h*m^2 + 20*a^4*b^5*c*k*1^2 + 512*a^6*b*c^3*k*1^2 - 30*a^4*b^5 \\
& *c*k^2*m - 402*a^5*b^4*c*k*m^2 - 924*a^6*b*c^3*k^2*m - 28*a^5*b^4*c*1^2*m - \\
& 24*a^2*b^2*c^6*d*g^2 - 9*a^2*b^3*c^5*d*h^2 + 4*a^2*b^3*c^5*f*g^2 - 5*a^2*b \\
& ^3*c^5*f^2*h + a^2*b^4*c^4*f*h^2 + 16*a^3*b^2*c^5*d*j^2 + 18*a^3*b^2*c^5*f* \\
& h^2 - 6*a^2*b^2*c^6*d^2*k - 21*a^2*b^5*c^3*d*k^2 - 8*a^3*b^2*c^5*g^2*h + 15 \\
& 5*a^3*b^3*c^4*d*k^2 - 72*a^2*b^6*c^2*d*1^2 + 436*a^3*b^4*c^3*d*1^2 - 952*a^ \\
& 4*b^2*c^4*d*1^2 + 23*a^2*b^3*c^5*d^2*m - 5*a^2*b^4*c^4*f^2*k + a^2*b^6*c^2* \\
& f*k^2 + 26*a^3*b^2*c^5*f^2*k - 12*a^3*b^4*c^3*f*k^2 + 970*a^3*b^5*c^2*d*m^2 \\
& + 2*a^4*b^2*c^4*f*k^2 - 2289*a^4*b^3*c^3*d*m^2 - 48*a^3*b^2*c^5*e^2*m + 4* \\
& a^3*b^3*c^4*g^2*k - 36*a^3*b^5*c^2*f*1^2 + 52*a^4*b^3*c^3*f*1^2 + 15*a^2*b^ \\
& 5*c^3*f^2*m - 53*a^3*b^3*c^4*f^2*m - 6*a^3*b^4*c^3*h^2*k - 3*a^3*b^5*c^2*h*
\end{aligned}$$

$$\begin{aligned}
& k^2 + 42a^4b^2c^4h^2k + 51a^4b^3c^3hk^2 + 133a^4b^4c^2f^2m^2 + \\
& 114a^5b^2c^3f^2m^2 - 12a^3b^4c^3g^2m + 40a^4b^2c^4g^2m + 128a^4b^4c^2h^2l^2 - 360a^5b^2c^3h^2l^2 + 18a^3b^5c^2h^2m - 81a^4b^3c^3h^2m - 801a^5b^3c^2h^2m^2 - 48a^5b^2c^3j^2m - 204a^5b^3c^2k^2l^2 + 339a^5b^3c^2k^2m + 762a^6b^2c^2k^2m^2 + 264a^6b^2c^2l^2m - 6a^8bcd^2k^2m - 16a^8b^3c^6d^2e^2g + 96a^2b^7c^6d^2e^2g - 4a^8b^4c^5d^2f^2h + 32a^3b^6c^6e^2g^2h + 16a^8b^5c^4d^2e^2l - 4a^8b^5c^4d^2f^2k + 544a^3b^6c^6d^2e^2l - 312a^3b^6c^6d^2f^2k + 96a^3b^6c^6d^2g^2j + 32a^3b^6c^6e^2f^2j + 12a^8b^6c^3d^2f^2m - 8a^8b^6c^3d^2g^2l + 2a^8b^6c^3d^2h^2k - 6a^8b^7c^2d^2h^2m - 152a^4b^6c^5d^2h^2m - 160a^4b^6c^5e^2g^2m + 224a^4b^6c^5e^2h^2l + 64a^4b^6c^5f^2g^2l - 152a^4b^6c^5f^2h^2k + 32a^4b^6c^5g^2h^2j + 544a^4b^6c^5d^2j^2l + 32a^4b^6c^5e^2j^2k - 6a^2b^7c^6f^2k^2m + 32a^5b^6c^4e^2l^2m - 536a^5b^6c^4f^2k^2m - 160a^5b^6c^4g^2j^2m + 192a^5b^6c^4g^2k^2l + 224a^5b^6c^4h^2j^2l + 18a^3b^6c^6h^2k^2m + 32a^6b^6c^3j^2l^2m + 52a^2b^2c^6d^2f^2h - 16a^2b^2c^6e^2f^2g + 32a^2b^2c^6d^2e^2j - 192a^2b^3c^5d^2e^2l + 70a^2b^3c^5d^2f^2k - 16a^2b^3c^5d^2g^2j - 190a^2b^4c^4d^2f^2m + 96a^2b^4c^4d^2g^2l - 30a^2b^4c^4d^2h^2k + 16a^2b^4c^4e^2f^2l + 676a^3b^2c^5d^2f^2m - 272a^3b^2c^5d^2g^2l + 100a^3b^2c^5d^2h^2k - 48a^3b^2c^5e^2f^2l - 16a^3b^2c^5e^2g^2k - 16a^3b^2c^5f^2g^2j + 80a^2b^5c^3d^2h^2m - 8a^2b^5c^3f^2g^2l + 2a^2b^5c^3f^2h^2k - 210a^3b^3c^4d^2h^2m + 48a^3b^3c^4e^2g^2m - 48a^3b^3c^4e^2h^2l + 24a^3b^3c^4f^2g^2l + 6a^3b^3c^4f^2h^2k + 16a^2b^5c^3d^2j^2l - 192a^3b^3c^4d^2j^2l - 6a^2b^6c^2f^2h^2m - 28a^3b^4c^3f^2h^2m + 24a^3b^4c^3g^2h^2l + 276a^4b^2c^4f^2h^2m - 112a^4b^2c^4g^2h^2l + 116a^2b^6c^2d^2k^2m - 780a^3b^4c^3d^2k^2m + 16a^3b^4c^3f^2j^2l + 1876a^4b^2c^4d^2k^2m - 96a^4b^2c^4e^2j^2m + 80a^4b^2c^4e^2k^2l - 48a^4b^2c^4f^2j^2l - 16a^4b^2c^4g^2j^2k + 62a^3b^5c^2f^2k^2m - 42a^4b^3c^3f^2k^2m + 48a^4b^3c^3g^2j^2m - 40a^4b^3c^3g^2k^2l - 48a^4b^3c^3h^2j^2l - 246a^4b^4c^2h^2k^2m - 16a^5b^2c^3g^2l^2m + 804a^5b^2c^3h^2k^2m + 80a^5b^2c^3j^2k^2l)/(8(64a^5c^6 - a^2b^6c^3 + 12a^3b^4c^4 - 48a^4b^2c^5)) + (x*(32a^2c^8e^3 + 32a^5c^5j^3 - 2b^3c^7d^2e + b^4c^6d^2g - 12a^4b^5c^1^3 - 320a^6b^6c^3l^3 + 96a^3c^7e^2j + 96a^4c^6e^2j^2 + 144a^3c^7d^2l + 128a^5c^5e^2l^2 - b^6c^4d^2l - 16a^4c^6f^2l - 9a^2b^8g^2m^2 + 16a^5c^5h^2l + 18a^3b^7j^2m^2 + 128a^6c^4j^2l^2 - 144a^6c^4k^2l - 27a^4b^6l^2m^2 + 400a^7c^3l^2m^2 - 4a^2b^3c^5g^3 + 124a^5b^3c^2l^3 + 24a^8b^8c^8d^2e - 48a^2c^8d^2e^2f - 16a^3c^7e^2f^2h - 144a^3c^7d^2e^2k - 48a^3c^7d^2f^2j + 96a^4c^6d^2h^2l + 80a^4c^6e^2f^2m - 48a^4c^6e^2h^2k - 16a^4c^6f^2h^2j - 144a^4c^6d^2j^2k - 480a^5c^5d^2l^2m + 240a^5c^5e^2k^2m + 80a^5c^5f^2j^2m - 96a^5c^5f^2k^2l - 48a^5c^5h^2j^2k - 160a^6c^4h^2l^2m + 240a^6c^4j^2k^2m - 12a^8b^2c^7d^2g + 16a^2b^7c^7e^2f^2 - 48a^2b^6c^7e^2g + 8a^3b^6c^6e^2h^2 - 2a^8b^3c^6d^2j + 24a^2b^7c^7d^2j + 18a^8b^4c^5d^2l + 16a^3b^6c^6f^2j + 96a^4b^6c^5e^2k^2 - 176a^3b^6c^6e^2l^2 - 48a^4b^6c^5g^2j^2 + 18a^2b^7c^6e^2m^2 + 8a^4b^6c^5h^2j - 520a^5b^6c^4e^2m^2 - 4a^2b^7c^6g^2l^2 - 64a^5b^6c^4g^2l^2 + 96a^3b^6c^6g^2m^2 + 96a^5b^6c^4j^2k^2 + 8a^3b^6c^6j^2l^2 - 176a^5b^6c^4j^2l - 192a^4b^6
\end{aligned}$$

$$\begin{aligned}
& 5*c*j*m^2 - 520*a^6*b*c^3*j*m^2 + 270*a^5*b^4*c^1*m^2 + 24*a^2*b^2*c^6*e*g^2 \\
& - 8*a^2*b^2*c^6*f^2*g + 2*a^2*b^3*c^5*e*h^2 - a^2*b^4*c^4*g*h^2 - 4*a^3*b^2*c^5*g*h^2 \\
& - 100*a^2*b^2*c^6*d^2*l + 2*a^2*b^5*c^3*e*k^2 - 28*a^3*b^3*c^4*e*k^2 + 32*a^2*b^3*c^5*e^2*l \\
& + 8*a^2*b^6*c^2*e^1^2 + 24*a^3*b^2*c^5*g^2*j - 88*a^3*b^4*c^3*e^1^2 + 216*a^4*b^2*c^4*e^1^2 \\
& - a^2*b^4*c^4*f^2*l - a^2*b^6*c^2*g*k^2 + 2*a^3*b^3*c^4*h^2*j + 14*a^3*b^4*c^3*g*k^2 - 192*a^3*b^5*c^2*e*m^2 \\
& - 48*a^4*b^2*c^4*g*k^2 + 614*a^4*b^3*c^3*e*m^2 + 8*a^2*b^5*c^3*g^2*l - 44*a^3*b^3*c^4*g^2*l \\
& + 44*a^3*b^5*c^2*g^1^2 - 108*a^4*b^3*c^3*g^1^2 - 12*a^4*b^2*c^4*h^2*l - 307*a^4*b^4*c^2*g*m^2 \\
& + 260*a^5*b^2*c^3*g*m^2 + 2*a^3*b^5*c^2*j*k^2 - 28*a^4*b^3*c^3*j*k^2 + 32*a^4*b^3*c^3*j^2*l \\
& - 88*a^4*b^4*c^2*j*l^2 + 216*a^5*b^2*c^3*j^1^2 - 3*a^4*b^4*c^2*k^2*l + 40*a^5*b^2*c^3*k^2*l \\
& + 614*a^5*b^3*c^2*j*m^2 - 756*a^6*b^2*c^2*l*m^2 - 4*a*b^2*c^7*d*e*f + 2*a*b^3*c^6*d*f*g \\
& + 32*a^2*b*c^7*d*e*h + 24*a^2*b*c^7*d*f*g + 8*a^3*b*c^6*f*g*h - 2*a*b^5*c^4*d*f^1 \\
& + 272*a^3*b*c^6*d*e*m - 8*a^3*b*c^6*d*f^1 + 72*a^3*b*c^6*d*g*k + 32*a^3*b*c^6*d*h*j \\
& + 80*a^3*b*c^6*e*f*k - 96*a^3*b*c^6*e*g*j + 64*a^4*b*c^5*e*h*m - 40*a^4*b*c^5*f*g*m \\
& + 8*a^4*b*c^5*f*h^1 + 24*a^4*b*c^5*g*h*k + 272*a^4*b*c^5*d*j*m + 72*a^4*b*c^5*d*k^1 \\
& - 352*a^4*b*c^5*e*j^1 + 80*a^4*b*c^5*f*j*k + 6*a^2*b^7*c*g*k*m + 248*a^5*b*c^4*f^1*m \\
& - 120*a^5*b*c^4*g*k*m + 64*a^5*b*c^4*h*j*m + 56*a^5*b*c^4*h*k^1 - 12*a^3*b^6*c*j*k*m \\
& + 18*a^4*b^5*c*k^1*m + 584*a^6*b*c^3*k^1*m - 16*a^2*b^2*c^6*d*g*h - 12*a^2*b^2*c^6 \\
& *e*f*h + 20*a^2*b^2*c^6*d*e*k - 4*a^2*b^2*c^6*d*f*j + 6*a^2*b^3*c^5*f*g*h - 60*a^2*b^3*c^5 \\
& *d*e*m + 18*a^2*b^3*c^5*d*f^1 - 10*a^2*b^3*c^5*d*g*k - 12*a^2*b^3*c^5*e*f*k \\
& + 30*a^2*b^4*c^4*d*g*m + 6*a^2*b^4*c^4*d*h^1 + 36*a^2*b^4*c^4*e*f*m - 32*a^2*b^4*c^4 \\
& *e*g^1 + 4*a^2*b^4*c^4*e*h*k + 6*a^2*b^4*c^4*f*g*k - 136*a^3*b^2*c^5*d*g*m \\
& - 64*a^3*b^2*c^5*d*h^1 - 180*a^3*b^2*c^5*e*f*m + 176*a^3*b^2*c^5*e*g^1 \\
& - 20*a^3*b^2*c^5*e*h*k - 40*a^3*b^2*c^5*f*g*k - 12*a^3*b^2*c^5*f*h*j \\
& + 20*a^3*b^2*c^5*d*j*k - 12*a^2*b^5*c^3*e*h*m - 18*a^2*b^5*c^3*f*g*m \\
& - 2*a^2*b^5*c^3*g*h*k + 40*a^3*b^3*c^4*e*h*m + 90*a^3*b^3*c^4*f*g*m + 6*a^3*b^3*c^4 \\
& *f*h^1 + 10*a^3*b^3*c^4*g*h*k - 60*a^3*b^3*c^4*d*j*m - 10*a^3*b^3*c^4*d*k^1 \\
& + 64*a^3*b^3*c^4*e*j^1 - 12*a^3*b^3*c^4*f*j*k + 6*a^2*b^6*c^2*g*h*m - 20*a^3*b^4 \\
& *c^3*g*h*m - 32*a^4*b^2*c^4*g*h*m - 12*a^2*b^6*c^2*e*k*m + 148*a^3*b^4*c^3 \\
& *e*k*m + 36*a^3*b^4*c^3*f*j*m - 32*a^3*b^4*c^3*g*j^1 + 4*a^3*b^4*c^3*h*j*k \\
& + 104*a^4*b^2*c^4*d^1*m - 476*a^4*b^2*c^4*e*k*m - 180*a^4*b^2*c^4*f*j*m \\
& + 8*a^4*b^2*c^4*f*k^1 + 176*a^4*b^2*c^4*g*j^1 - 20*a^4*b^2*c^4*h*j*k \\
& - 74*a^3*b^5*c^2*g*k*m - 12*a^3*b^5*c^2*h*j*m - 54*a^4*b^3*c^3*f^1*m \\
& + 238*a^4*b^3*c^3*g*k*m + 40*a^4*b^3*c^3*h*j*m - 6*a^4*b^3*c^3*h*k^1 + 18*a^4 \\
& *b^4*c^2*h^1*m - 48*a^5*b^2*c^3*h^1*m + 148*a^4*b^4*c^2*j*k*m - 476*a^5*b^2 \\
& *c^3*j*k*m - 210*a^5*b^3*c^2*k^1*m)) / (4*(64*a^5*c^6 - a^2*b^6*c^3 + 12*a^3*b^4 \\
& *c^4 - 48*a^4*b^2*c^5)) * root(1572864*a^8*b^2*c^10*z^4 - 983040*a^7*b^4*c^9 \\
& *z^4 + 327680*a^6*b^6*c^8*z^4 - 61440*a^5*b^8*c^7*z^4 + 6144*a^4*b^10*c^6 \\
& *z^4 - 256*a^3*b^12*c^5*z^4 - 1048576*a^9*c^11*z^4 - 1572864*a^8*b^2*c^8 \\
& *l*z^3 + 983040*a^7*b^4*c^7*l*z^3 - 327680*a^6*b^6*c^6*l*z^3 + 61440*a^5 \\
& *b^8*c^5*l*z^3 - 6144*a^4*b^10*c^4*l*z^3 + 256*a^3*b^12*c^3*l*z^3 + 1048576 \\
& *a^9*c^9*l*z^3 + 96*a^3*b^12*c*k*m*z^2 + 98304*a^8*b*c^7*j^1*z^2 + 24576 \\
& *a^8*b*c^7*h*m*z^2 + 155648*a^7*b*c^8*d*m*z^2 + 98304*a^7*b*c^8*e^1*z^2 +
\end{aligned}$$

$$\begin{aligned}
& 57344a^7b^8c^8f^8k^8z^2 + 32768a^7b^8c^8g^8j^8z^2 + 57344a^6b^8c^9d^8h^8z^2 \\
& + 32768a^6b^8c^9e^8g^8z^2 - 32a^8b^{10}c^5d^8f^8z^2 - 491520a^8b^2c^6k^8m^8z^2 + 358400a^7b^4c^5k^8m^8z^2 - 129024a^6b^6c^4k^8m^8z^2 + 24768a^5b^8c^3k^8m^8z^2 - 2432a^4b^{10}c^2k^8m^8z^2 - 90112a^7b^3c^6j^8l^8z^2 + 30720a^6b^5c^5j^8l^8z^2 - 4608a^5b^7c^4j^8l^8z^2 + 256a^4b^9c^3j^8l^8z^2 - 21504a^6b^5c^5h^8m^8z^2 + 9216a^5b^7c^4h^8m^8z^2 + 8192a^7b^3c^6h^8m^8z^2 - 1568a^4b^9c^3h^8m^8z^2 + 96a^3b^{11}c^2h^8m^8z^2 - 172032a^7b^2c^7f^8m^8z^2 + 116736a^6b^4c^6f^8m^8z^2 - 49152a^7b^2c^7g^8l^8z^2 + 45056a^6b^4c^6g^8l^8z^2 - 35840a^5b^6c^5f^8m^8z^2 + 24576a^7b^2c^7h^8k^8z^2 - 15360a^5b^6c^5g^8l^8z^2 + 5184a^4b^8c^4f^8m^8z^2 - 3072a^5b^6c^5h^8k^8z^2 + 2304a^4b^8c^4g^8l^8z^2 + 2048a^6b^4c^6h^8k^8z^2 + 576a^4b^8c^4h^8k^8z^2 - 288a^3b^{10}c^3f^8m^8z^2 - 128a^3b^{10}c^3g^8l^8z^2 - 32a^3b^{10}c^3h^8k^8z^2 - 147456a^6b^3c^7d^8m^8z^2 - 90112a^6b^3c^7e^8l^8z^2 + 52224a^5b^5c^6d^8m^8z^2 - 49152a^6b^3c^7f^8k^8z^2 + 30720a^5b^5c^6e^8l^8z^2 - 24576a^6b^3c^7g^8j^8z^2 + 15360a^5b^5c^6f^8k^8z^2 - 8192a^4b^7c^5d^8m^8z^2 + 6144a^5b^5c^6g^8j^8z^2 - 4608a^4b^7c^5e^8l^8z^2 - 2048a^4b^7c^5f^8k^8z^2 - 512a^4b^7c^5g^8j^8z^2 + 480a^3b^9c^4d^8m^8z^2 + 256a^3b^9c^4e^8l^8z^2 + 96a^3b^9c^4f^8k^8z^2 + 131072a^6b^2c^8d^8k^8z^2 + 49152a^6b^2c^8e^8j^8z^2 - 43008a^5b^4c^7d^8k^8z^2 - 12288a^5b^4c^7e^8j^8z^2 + 6144a^4b^6c^6d^8k^8z^2 + 1024a^4b^6c^6e^8j^8z^2 - 320a^3b^8c^5d^8k^8z^2 + 6144a^5b^4c^7f^8h^8z^2 - 2048a^4b^6c^6f^8h^8z^2 + 192a^3b^8c^5f^8h^8z^2 - 49152a^5b^3c^8d^8h^8z^2 - 24576a^5b^3c^8e^8g^8z^2 + 15360a^4b^5c^7d^8h^8z^2 + 6144a^4b^5c^7e^8g^8z^2 - 2048a^3b^7c^6d^8h^8z^2 - 512a^3b^7c^6e^8g^8z^2 + 96a^2b^9c^5d^8h^8z^2 + 24576a^5b^2c^9d^8f^8z^2 - 3072a^3b^6c^7d^8f^8z^2 + 2048a^4b^4c^8d^8f^8z^2 + 576a^2b^8c^6d^8f^8z^2 - 430080a^9b^8c^6m^8z^2 + 3408a^4b^{11}c^2m^8z^2 - 64a^3b^{12}c^1l^8z^2 + 61440a^8b^8c^7k^8z^2 + 12288a^7b^8c^8h^8z^2 + 12288a^6b^8c^9f^8z^2 + 61440a^5b^8c^{10}d^8z^2 + 432a^8b^9c^6d^8z^2 + 245760a^9c^7k^8m^8z^2 + 81920a^8c^8f^8m^8z^2 - 49152a^8c^8h^8k^8z^2 - 147456a^7c^9d^8k^8z^2 - 65536a^7c^9e^8j^8z^2 - 16384a^7c^9f^8h^8z^2 - 49152a^6c^{10}d^8f^8z^2 + 716800a^8b^3c^5m^8z^2 - 483840a^7b^5c^4m^8z^2 + 170496a^6b^7c^3m^8z^2 - 33232a^5b^9c^2m^8z^2 + 516096a^8b^2c^6l^8z^2 - 288768a^7b^4c^5l^8z^2 + 88576a^6b^6c^4l^8z^2 - 15744a^5b^8c^3l^8z^2 + 1536a^4b^{10}c^2l^8z^2 - 61440a^7b^3c^6k^8z^2 + 24064a^6b^5c^5k^8z^2 - 4608a^5b^7c^4k^8z^2 + 432a^4b^9c^3k^8z^2 - 16a^3b^{11}c^2k^8z^2 + 24576a^7b^2c^7j^8z^2 - 6144a^6b^4c^6j^8z^2 + 512a^5b^6c^5j^8z^2 - 8192a^6b^3c^7h^8z^2 + 1536a^5b^5c^6h^8z^2 - 16a^3b^9c^4h^8z^2 - 8192a^6b^2c^8g^8z^2 + 6144a^5b^4c^7g^8z^2 - 1536a^4b^6c^6g^8z^2 + 128a^3b^8c^5g^8z^2 - 8192a^5b^3c^8f^8z^2 + 1536a^4b^5c^7f^8z^2 - 16a^2b^9c^5f^8z^2 + 24576a^5b^2c^9e^8z^2 - 6144a^4b^4c^8e^8z^2 + 512a^3b^6c^7e^8z^2 - 61440a^4b^3c^9d^8z^2 + 24064a^3b^5c^8d^8z^2 - 4608a^2b^7c^7d^8z^2 - 393216a^9c^7l^8z^2 - 144a^3b^{13}m^8z^2 - 32768a^8c^8j^8z^2 - 32768a^6c^{10}e^8z^2 - 16b^{11}c^5d^8z^2 + 18432a^8b^8c^5h^8l^8m^8z - 96a^3b^{10}c^8g^8k^8m^8z + 90112a^7b^8c^6e^8k^8m^8z
\end{aligned}$$

$z + 36864a^7b^6c^6f^jkmz - 16384a^7b^6c^6g^jklz + 14336a^7b^6c^6d^1$   
 $kmz - 10240a^7b^6c^6f^k*lz + 4096a^7b^6c^6h^j*kmz + 10240a^7b^6c^6g$   
 $h^mz - 47104a^6b^7c^7d^h*lz + 36864a^6b^7c^7e^f^mz + 30720a^6b^7c^7$   
 $d^g^mz - 16384a^6b^7c^7e^g^*lz + 6144a^6b^7c^7f^g^*kmz + 4096a^6b^7c^7$   
 $e^h^*kmz + 32a^6b^10c^3d^f^*lz - 4096a^5b^7c^8d^f^*jz - 6144a^5b^7c^8$   
 $d^g^*hz - 32a^6b^8c^5d^f^*gz - 4096a^4b^7c^9d^e^*fz + 64a^6b^7c^6d^e$   
 $e^f^*z + 110592a^8b^2c^4k^*lmz - 36864a^7b^4c^3k^*lmz + 5376a^6b^6$   
 $c^2k^*lmz - 79872a^7b^3c^4j^*kmz + 26112a^6b^5c^3j^*kmz - 37$   
 $12a^5b^7c^2j^*kmz - 13824a^7b^3c^4h^*lmz + 3456a^6b^5c^3h^*lm$   
 $z - 288a^5b^7c^2h^*lmz - 45056a^7b^2c^5g^*kmz + 39936a^6b^4c^4$   
 $g^*kmz + 30720a^7b^2c^5f^*lmz - 18432a^7b^2c^5h^*k*lz - 13056a^5$   
 $b^6c^3g^*kmz - 7680a^6b^4c^4f^*lmz + 5376a^6b^4c^4h^*j^*mz +$   
 $4608a^6b^4c^4h^*k*lz + 3072a^7b^2c^5h^*j^*mz - 1984a^5b^6c^3h^*j^*$   
 $mz + 1856a^4b^8c^2g^*kmz + 640a^5b^6c^3f^*lmz - 384a^5b^6c^3h^*$   
 $k*lz + 192a^4b^8c^2h^*j^*mz - 79872a^6b^3c^5e^*k*lmz - 27648a^6b^3$   
 $c^5f^*j^*mz + 26112a^5b^5c^4e^*k*lmz + 12288a^6b^3c^5g^*j^*lz - 10$   
 $752a^6b^3c^5d^*lmz + 7680a^6b^3c^5f^*k*lz + 6912a^5b^5c^4f^*j^*m$   
 $z - 3712a^4b^7c^3e^*k*lmz - 3072a^6b^3c^5h^*j^*kz - 3072a^5b^5c^4$   
 $g^*j^*lz + 2688a^5b^5c^4d^*lmz - 1920a^5b^5c^4f^*k*lz + 768a^5b^5$   
 $c^4h^*j^*kz - 576a^4b^7c^3f^*j^*mz + 256a^4b^7c^3g^*j^*lz - 224a^4$   
 $b^7c^3d^*lmz + 192a^3b^9c^2e^*k*lmz + 160a^4b^7c^3f^*k*lz - 64a^4$   
 $b^7c^3h^*j^*kz - 2688a^5b^5c^4g^*h^*mz - 1536a^6b^3c^5g^*h^*mz +$   
 $992a^4b^7c^3g^*h^*mz - 96a^3b^9c^2g^*h^*mz - 65536a^6b^2c^6d^*k*lz$   
 $z + 46080a^6b^2c^6d^*j^*mz - 24576a^6b^2c^6e^*j^*lz + 21504a^5b^4c^5$   
 $d^*k*lz - 11520a^5b^4c^5d^*j^*mz + 9216a^6b^2c^6f^*j^*kz + 6144a^5$   
 $b^4c^5e^*j^*lz - 3072a^4b^6c^4d^*k*lz - 2304a^5b^4c^5f^*j^*kz + 9$   
 $60a^4b^6c^4d^*j^*mz - 512a^4b^6c^4e^*j^*lz + 192a^4b^6c^4f^*j^*kz$   
 $+ 160a^3b^8c^3d^*k*lz - 18432a^6b^2c^6f^*g^*mz + 13824a^5b^4c^5f^*$   
 $g^*mz + 5376a^5b^4c^5e^*h^*mz - 3456a^4b^6c^4f^*g^*mz + 3072a^6b^2$   
 $c^6e^*h^*mz - 3072a^5b^4c^5f^*h^*lz - 2048a^6b^2c^6g^*h^*kz - 1984a^4$   
 $b^6c^4e^*h^*mz + 1536a^5b^4c^5g^*h^*kz + 1024a^4b^6c^4f^*h^*lz -$   
 $384a^4b^6c^4g^*h^*kz + 288a^3b^8c^3f^*g^*mz + 192a^3b^8c^3e^*h^*mz$   
 $- 96a^3b^8c^3f^*h^*lz + 32a^3b^8c^3g^*h^*kz + 41472a^5b^3c^6d^*h^*$   
 $lz - 27648a^5b^3c^6e^*f^*mz - 23040a^5b^3c^6d^*g^*mz - 13440a^4b^5$   
 $c^5d^*h^*lz + 12288a^5b^3c^6e^*g^*lz + 6912a^4b^5c^5e^*f^*mz + 5760a^4$   
 $b^5c^5d^*g^*mz - 4608a^5b^3c^6f^*g^*kz - 3072a^5b^3c^6e^*h^*kz -$   
 $3072a^4b^5c^5e^*g^*lz + 1888a^3b^7c^4d^*h^*lz + 1152a^4b^5c^5f^*g^*$   
 $kz + 768a^4b^5c^5e^*h^*kz - 576a^3b^7c^4e^*f^*mz - 480a^3b^7c^4d^*$   
 $g^*mz + 256a^3b^7c^4e^*g^*lz - 96a^3b^7c^4f^*g^*kz - 96a^2b^9c^3$   
 $d^*h^*lz - 64a^3b^7c^4e^*h^*kz + 46080a^5b^2c^7d^*e^*mz - 11520a^4b^4$   
 $c^6d^*e^*mz + 9216a^5b^2c^7e^*f^*kz - 9216a^5b^2c^7d^*h^*jz - 6656$   
 $a^4b^4c^6d^*f^*lz - 6144a^5b^2c^7d^*f^*lz + 3456a^3b^6c^5d^*f^*lz$   
 $- 2304a^4b^4c^6e^*f^*kz + 2304a^4b^4c^6d^*h^*jz + 960a^3b^6c^5d^*e^*$   
 $mz - 576a^2b^8c^4d^*f^*lz + 192a^3b^6c^5e^*f^*kz - 192a^3b^6c^5d^*$   
 $h^*jz + 3072a^4b^3c^7d^*f^*jz - 768a^3b^5c^6d^*f^*jz + 64a^2b^7c$



$$\begin{aligned}
& ^5d*f*j*z + 4608*a^4*b^3*c^7*d*g*h*z - 1152*a^3*b^5*c^6*d*g*h*z + 96*a^2*b^7*c^5*d*g*h*z - 9216*a^4*b^2*c^8*d*e*h*z + 2304*a^3*b^4*c^7*d*e*h*z + 2048 \\
& *a^4*b^2*c^8*d*f*g*z - 1536*a^3*b^4*c^7*d*f*g*z + 384*a^2*b^6*c^6*d*f*g*z - \\
& 192*a^2*b^6*c^6*d*e*h*z + 3072*a^3*b^3*c^8*d*e*f*z - 768*a^2*b^5*c^7*d*e*f \\
& *z - 288*a^5*b^8*c*k*l*m*z + 90112*a^8*b*c^5*j*k*m*z + 192*a^4*b^9*c*j*k*m \\
& z + 138240*a^9*b*c^4*l*m^2*z - 7344*a^6*b^7*c*l*m^2*z + 5088*a^5*b^8*c*j*m^ \\
& 2*z - 3072*a^8*b*c^5*k^2*l*z - 49152*a^8*b*c^5*j*l^2*z - 128*a^4*b^9*c*j*l^ \\
& 2*z - 25600*a^8*b*c^5*g*m^2*z - 9216*a^7*b*c^6*h^2*l*z - 2544*a^4*b^9*c*g*m \\
& ^2*z + 64*a^3*b^10*c*g*l^2*z + 9216*a^7*b*c^6*g*k^2*z - 3072*a^6*b*c^7*f^2* \\
& l*z - 288*a^3*b^10*c*e*m^2*z - 49152*a^7*b*c^6*e*l^2*z - 58368*a^5*b*c^8*d^ \\
& 2*l*z - 432*a*b^9*c^4*d^2*l*z - 1024*a^6*b*c^7*g*h^2*z + 32*a*b^8*c^5*d^2*j \\
& *z + 1024*a^5*b*c^8*f^2*g*z - 9216*a^4*b*c^9*d^2*g*z + 336*a*b^7*c^6*d^2*g* \\
& z - 672*a*b^6*c^7*d^2*e*z - 122880*a^9*c^5*k*l*m*z - 40960*a^8*c^6*f*l*m*z \\
& + 24576*a^8*c^6*h*k*l*z - 20480*a^8*c^6*h*j*m*z + 73728*a^7*c^7*d*k*l*z - 6 \\
& 1440*a^7*c^7*d*j*m*z + 32768*a^7*c^7*e*j*l*z - 12288*a^7*c^7*f*j*k*z - 2048 \\
& 0*a^7*c^7*e*h*m*z + 8192*a^7*c^7*f*h*l*z - 61440*a^6*c^8*d*e*m*z + 24576*a^ \\
& 6*c^8*d*f*l*z - 12288*a^6*c^8*e*f*k*z + 12288*a^6*c^8*d*h*j*z + 12288*a^5*c \\
& ^9*d*e*h*z - 131328*a^8*b^3*c^3*l*m^2*z + 46656*a^7*b^5*c^2*l*m^2*z - 14284 \\
& 8*a^8*b^2*c^4*j*m^2*z + 106368*a^7*b^4*c^3*j*m^2*z - 34208*a^6*b^6*c^2*j*m^ \\
& 2*z + 2304*a^7*b^3*c^4*k^2*l*z - 576*a^6*b^5*c^3*k^2*l*z + 48*a^5*b^7*c^2*k \\
& ^2*l*z + 45056*a^7*b^3*c^4*j*l^2*z - 15360*a^6*b^5*c^3*j*l^2*z - 12288*a^7* \\
& b^2*c^5*j^2*l*z + 3072*a^6*b^4*c^4*j^2*l*z + 2304*a^5*b^7*c^2*j*l^2*z - 256 \\
& *a^5*b^6*c^3*j^2*l*z + 15872*a^7*b^2*c^5*j*k^2*z - 4992*a^6*b^4*c^4*j*k^2*z \\
& + 672*a^5*b^6*c^3*j*k^2*z - 32*a^4*b^8*c^2*j*k^2*z + 71424*a^7*b^3*c^4*g*m \\
& ^2*z - 53184*a^6*b^5*c^3*g*m^2*z + 17104*a^5*b^7*c^2*g*m^2*z + 6912*a^6*b^3 \\
& *c^5*h^2*l*z - 1728*a^5*b^5*c^4*h^2*l*z + 144*a^4*b^7*c^3*h^2*l*z + 24576*a \\
& ^7*b^2*c^5*g*l^2*z - 22528*a^6*b^4*c^4*g*l^2*z + 7680*a^5*b^6*c^3*g*l^2*z + \\
& 4096*a^6*b^2*c^6*g^2*l*z - 3072*a^5*b^4*c^5*g^2*l*z - 1152*a^4*b^8*c^2*g*l \\
& ^2*z + 768*a^4*b^6*c^4*g^2*l*z - 64*a^3*b^8*c^3*g^2*l*z - 142848*a^7*b^2*c^ \\
& 5*e*m^2*z + 106368*a^6*b^4*c^4*e*m^2*z - 34208*a^5*b^6*c^3*e*m^2*z - 7936*a \\
& ^6*b^3*c^5*g*k^2*z + 5088*a^4*b^8*c^2*e*m^2*z + 2496*a^5*b^5*c^4*g*k^2*z - \\
& 1536*a^6*b^2*c^6*h^2*j*z + 1280*a^5*b^3*c^6*f^2*l*z + 384*a^5*b^4*c^5*h^2*j \\
& *z - 336*a^4*b^7*c^3*g*k^2*z + 192*a^4*b^5*c^5*f^2*l*z - 144*a^3*b^7*c^4*f^ \\
& 2*l*z - 32*a^4*b^6*c^4*h^2*j*z + 16*a^3*b^9*c^2*g*k^2*z + 16*a^2*b^9*c^3*f^ \\
& 2*l*z + 45056*a^6*b^3*c^5*e*l^2*z - 15360*a^5*b^5*c^4*e*l^2*z - 12288*a^5*b \\
& ^2*c^7*e^2*l*z + 3072*a^4*b^4*c^6*e^2*l*z + 2304*a^4*b^7*c^3*e*l^2*z - 256* \\
& a^3*b^6*c^5*e^2*l*z - 128*a^3*b^9*c^2*e*l^2*z + 59136*a^4*b^3*c^7*d^2*l*z - \\
& 23488*a^3*b^5*c^6*d^2*l*z + 15872*a^6*b^2*c^6*e*k^2*z - 4992*a^5*b^4*c^5*e \\
& *k^2*z + 4560*a^2*b^7*c^5*d^2*l*z + 1536*a^5*b^2*c^7*f^2*j*z + 672*a^4*b^6* \\
& c^4*e*k^2*z - 384*a^4*b^4*c^6*f^2*j*z - 32*a^3*b^8*c^3*e*k^2*z + 32*a^3*b^6 \\
& *c^5*f^2*j*z + 768*a^5*b^3*c^6*g*h^2*z - 192*a^4*b^5*c^5*g*h^2*z + 16*a^3*b \\
& ^7*c^4*g*h^2*z - 15872*a^4*b^2*c^8*d^2*j*z + 4992*a^3*b^4*c^7*d^2*j*z - 672 \\
& *a^2*b^6*c^6*d^2*j*z - 1536*a^5*b^2*c^7*e*h^2*z - 768*a^4*b^3*c^7*f^2*g*z + \\
& 384*a^4*b^4*c^6*e*h^2*z + 192*a^3*b^5*c^6*f^2*g*z - 32*a^3*b^6*c^5*e*h^2*z \\
& - 16*a^2*b^7*c^5*f^2*g*z + 7936*a^3*b^3*c^8*d^2*g*z - 2496*a^2*b^5*c^7*d^2
\end{aligned}$$

$$\begin{aligned}
 & *g*z + 1536*a^4*b^2*c^8*e*f^2*z - 384*a^3*b^4*c^7*e*f^2*z + 32*a^2*b^6*c^6* \\
 & e*f^2*z - 15872*a^3*b^2*c^9*d^2*e*z + 4992*a^2*b^4*c^8*d^2*e*z - 61440*a^8* \\
 & b^2*c^4*l^3*z + 21504*a^7*b^4*c^3*l^3*z - 3328*a^6*b^6*c^2*l^3*z + 432*a^5* \\
 & b^9*l*m^2*z + 51200*a^9*c^5*j*m^2*z + 16384*a^8*c^6*j^2*l*z - 288*a^4*b^10* \\
 & j*m^2*z - 18432*a^8*c^6*j*k^2*z + 144*a^3*b^11*g*m^2*z + 51200*a^8*c^6*e*m^ \\
 & 2*z + 2048*a^7*c^7*h^2*j*z + 16384*a^6*c^8*e^2*l*z + 16*b^11*c^3*d^2*l*z - \\
 & 18432*a^7*c^7*e*k^2*z - 2048*a^6*c^8*f^2*j*z + 18432*a^5*c^9*d^2*j*z + 192* \\
 & a^5*b^8*c^1^3*z + 2048*a^6*c^8*e*h^2*z - 16*b^9*c^5*d^2*g*z - 2048*a^5*c^9* \\
 & e*f^2*z + 32*b^8*c^6*d^2*e*z + 18432*a^4*c^10*d^2*e*z + 65536*a^9*c^5*l^3*z \\
 & - 11008*a^8*b*c^3*j*k*l*m - 288*a^6*b^5*c*j*k*l*m + 144*a^5*b^6*c*g*k*l*m \\
 & - 11008*a^7*b*c^4*e*k*l*m - 5376*a^7*b*c^4*f*j*l*m + 3840*a^7*b*c^4*g*j*k*m \\
 & - 3328*a^7*b*c^4*h*j*k*l - 96*a^4*b^7*c*g*j*k*m - 2560*a^7*b*c^4*g*h*l*m - \\
 & 36*a^3*b^8*c*f*h*k*m - 6912*a^6*b*c^5*d*j*k*l - 7872*a^6*b*c^5*d*h*k*m - 7 \\
 & 680*a^6*b*c^5*d*g*l*m - 5376*a^6*b*c^5*e*f*l*m + 3840*a^6*b*c^5*e*g*k*m - 3 \\
 & 328*a^6*b*c^5*e*h*k*l - 1536*a^6*b*c^5*f*g*k*l + 1280*a^6*b*c^5*f*g*j*m - 7 \\
 & 68*a^6*b*c^5*g*h*j*k - 768*a^6*b*c^5*f*h*j*l - 768*a^6*b*c^5*e*h*j*m - 36*a \\
 & ^2*b^9*c*d*h*k*m - 6912*a^5*b*c^6*d*e*k*l - 4864*a^5*b*c^6*d*e*j*m - 2304*a \\
 & ^5*b*c^6*d*g*j*k - 1792*a^5*b*c^6*e*f*j*k - 1280*a^5*b*c^6*d*f*j*l - 4544*a \\
 & ^5*b*c^6*d*f*h*m + 1536*a^5*b*c^6*d*g*h*l + 1280*a^5*b*c^6*e*f*g*m - 768*a^ \\
 & 5*b*c^6*e*g*h*k - 768*a^5*b*c^6*e*f*h*l - 256*a^5*b*c^6*f*g*h*j + 12*a*b^9* \\
 & c^2*d*f*h*m + 16*a*b^8*c^3*d*f*g*l - 4*a*b^8*c^3*d*f*h*k - 2304*a^4*b*c^7*d \\
 & *e*g*k - 1792*a^4*b*c^7*d*e*h*j - 1280*a^4*b*c^7*d*e*f*l - 768*a^4*b*c^7*d* \\
 & f*g*j - 32*a*b^7*c^4*d*e*f*l - 256*a^4*b*c^7*e*f*g*h - 768*a^3*b*c^8*d*e*f* \\
 & g + 32*a*b^5*c^6*d*e*f*g + 12*a*b^10*c*d*f*k*m + 3648*a^7*b^3*c^2*j*k*l*m + \\
 & 5504*a^7*b^2*c^3*g*k*l*m - 1824*a^6*b^4*c^2*g*k*l*m + 384*a^7*b^2*c^3*h*j* \\
 & l*m - 288*a^6*b^4*c^2*h*j*l*m - 4800*a^6*b^3*c^3*g*j*k*m + 3648*a^6*b^3*c^3 \\
 & *e*k*l*m + 1280*a^5*b^5*c^2*g*j*k*m + 1088*a^6*b^3*c^3*f*j*l*m + 576*a^6*b^ \\
 & 3*c^3*h*j*k*l - 288*a^5*b^5*c^2*e*k*l*m - 192*a^6*b^3*c^3*g*h*l*m + 144*a^5 \\
 & *b^5*c^2*g*h*l*m + 9600*a^6*b^2*c^4*e*j*k*m - 4224*a^6*b^2*c^4*d*j*l*m - 25 \\
 & 60*a^5*b^4*c^3*e*j*k*m + 384*a^6*b^2*c^4*f*j*k*l + 224*a^5*b^4*c^3*d*j*l*m \\
 & + 192*a^4*b^6*c^2*e*j*k*m - 160*a^5*b^4*c^3*f*j*k*l - 4608*a^6*b^2*c^4*f*h* \\
 & k*m + 2688*a^6*b^2*c^4*f*g*l*m + 1664*a^6*b^2*c^4*g*h*k*l - 744*a^5*b^4*c^3 \\
 & *f*h*k*m - 544*a^5*b^4*c^3*f*g*l*m + 492*a^4*b^6*c^2*f*h*k*m + 416*a^5*b^4* \\
 & c^3*g*h*j*m + 384*a^6*b^2*c^4*g*h*j*m + 384*a^6*b^2*c^4*e*h*l*m - 288*a^5*b \\
 & ^4*c^3*g*h*k*l - 288*a^5*b^4*c^3*e*h*l*m - 96*a^4*b^6*c^2*g*h*j*m + 2112*a^ \\
 & 5*b^3*c^4*d*j*k*l - 160*a^4*b^5*c^3*d*j*k*l + 16992*a^5*b^3*c^4*d*h*k*m - 6 \\
 & 252*a^4*b^5*c^3*d*h*k*m - 4800*a^5*b^3*c^4*e*g*k*m + 2112*a^5*b^3*c^4*d*g*l \\
 & *m - 1728*a^5*b^3*c^4*f*g*j*m + 1280*a^4*b^5*c^3*e*g*k*m + 1088*a^5*b^3*c^4 \\
 & *e*f*l*m - 832*a^5*b^3*c^4*e*h*j*m + 816*a^3*b^7*c^2*d*h*k*m + 576*a^5*b^3* \\
 & c^4*e*h*k*l - 448*a^5*b^3*c^4*f*h*j*l + 288*a^4*b^5*c^3*f*g*j*m - 192*a^5*b \\
 & ^3*c^4*g*h*j*k - 192*a^5*b^3*c^4*f*g*k*l + 192*a^4*b^5*c^3*e*h*j*m - 112*a^ \\
 & 4*b^5*c^3*d*g*l*m + 96*a^4*b^5*c^3*f*h*j*l - 96*a^3*b^7*c^2*e*g*k*m + 80*a^ \\
 & 4*b^5*c^3*f*g*k*l + 32*a^4*b^5*c^3*g*h*j*k - 11456*a^5*b^2*c^5*d*f*k*m + 49 \\
 & 92*a^5*b^2*c^5*d*h*j*l - 4608*a^5*b^2*c^5*e*g*j*l - 4224*a^5*b^2*c^5*d*e*l* \\
 & m + 3456*a^5*b^2*c^5*e*f*j*m + 3456*a^5*b^2*c^5*d*g*k*l + 2432*a^5*b^2*c^5*
 \end{aligned}$$

$d*g*j*m - 1312*a^4*b^4*c^4*d*h*j*1 + 1272*a^3*b^6*c^3*d*f*k*m - 1056*a^4*b^4*c^4*d*g*k*1 + 896*a^5*b^2*c^5*f*g*j*k + 768*a^4*b^4*c^4*e*g*j*1 - 576*a^4*b^4*c^4*e*f*j*m - 480*a^4*b^4*c^4*d*g*j*m + 384*a^5*b^2*c^5*e*h*j*k + 384*a^5*b^2*c^5*e*f*k*1 - 232*a^2*b^8*c^2*d*f*k*m + 224*a^4*b^4*c^4*d*e*1*m - 160*a^4*b^4*c^4*e*f*k*1 - 96*a^4*b^4*c^4*f*g*j*k + 96*a^3*b^6*c^3*d*h*j*1 + 80*a^3*b^6*c^3*d*g*k*1 - 64*a^4*b^4*c^4*e*h*j*k - 24*a^4*b^4*c^4*d*f*k*m + 416*a^4*b^4*c^4*e*g*h*m + 384*a^5*b^2*c^5*f*g*h*1 + 384*a^5*b^2*c^5*e*g*h*m + 224*a^4*b^4*c^4*f*g*h*1 - 96*a^3*b^6*c^3*e*g*h*m - 48*a^3*b^6*c^3*f*g*h*1 + 2112*a^4*b^3*c^5*d*e*k*1 - 960*a^4*b^3*c^5*d*f*j*1 + 960*a^4*b^3*c^5*d*e*j*m + 384*a^3*b^5*c^4*d*f*j*1 + 320*a^4*b^3*c^5*d*g*j*k + 192*a^4*b^3*c^5*e*f*j*k - 160*a^3*b^5*c^4*d*e*k*1 - 32*a^2*b^7*c^3*d*f*j*1 + 7392*a^4*b^3*c^5*d*f*h*m - 2496*a^4*b^3*c^5*d*g*h*1 - 1728*a^4*b^3*c^5*e*f*g*m - 1500*a^3*b^5*c^4*d*f*h*m + 656*a^3*b^5*c^4*d*g*h*1 - 448*a^4*b^3*c^5*e*f*h*1 + 288*a^3*b^5*c^4*e*f*g*m - 192*a^4*b^3*c^5*f*g*h*j - 192*a^4*b^3*c^5*e*g*h*k + 96*a^3*b^5*c^4*e*f*h*1 - 48*a^2*b^7*c^3*d*g*h*1 + 32*a^3*b^5*c^4*e*g*h*k - 16*a^2*b^7*c^3*d*f*h*m - 640*a^4*b^2*c^6*d*e*j*k + 4992*a^4*b^2*c^6*d*e*h*1 - 3584*a^4*b^2*c^6*d*f*h*k + 2432*a^4*b^2*c^6*d*e*g*m - 1312*a^3*b^4*c^5*d*e*h*1 + 896*a^4*b^2*c^6*e*f*g*k + 896*a^4*b^2*c^6*d*g*h*j + 640*a^4*b^2*c^6*d*f*g*1 + 600*a^3*b^4*c^5*d*f*h*k + 480*a^3*b^4*c^5*d*f*g*1 - 480*a^3*b^4*c^5*d*e*g*m + 384*a^4*b^2*c^6*e*f*h*j - 192*a^2*b^6*c^4*d*f*g*1 - 96*a^3*b^4*c^5*e*f*g*k - 96*a^3*b^4*c^5*d*g*h*j + 96*a^2*b^6*c^4*d*e*h*1 + 12*a^2*b^6*c^4*d*f*h*k - 960*a^3*b^3*c^6*d*e*f*1 + 384*a^2*b^5*c^5*d*e*f*1 + 320*a^3*b^3*c^6*d*e*g*k - 192*a^3*b^3*c^6*d*f*g*j + 192*a^3*b^3*c^6*d*e*h*j + 32*a^2*b^5*c^5*d*f*g*j - 192*a^3*b^3*c^6*e*f*g*h + 384*a^3*b^2*c^7*d*e*f*j - 64*a^2*b^4*c^6*d*e*f*j + 896*a^3*b^2*c^7*d*e*g*h - 96*a^2*b^4*c^6*d*e*g*h - 192*a^2*b^3*c^7*d*e*f*g + 496*a^7*b^4*c*k*1^2*m - 4752*a^7*b^4*c*j*1*m^2 + 96*a^5*b^6*c*j^2*k*m - 6144*a^8*b*c^3*h*1^2*m - 168*a^6*b^5*c*h*1^2*m + 6400*a^8*b*c^3*g*1*m^2 - 2862*a^6*b^5*c*h*k*m^2 + 2376*a^6*b^5*c*g*1*m^2 - 1632*a^7*b*c^4*h^2*k*m - 480*a^8*b*c^3*h*k*m^2 - 180*a^5*b^6*c*h*k^2*m + 54*a^4*b^7*c*h^2*k*m - 384*a^7*b*c^4*h*j^2*m + 120*a^5*b^6*c*h*k*1^2 + 56*a^5*b^6*c*f*1^2*m + 24*a^3*b^8*c*g^2*k*m + 4512*a^7*b*c^4*f*k^2*m - 2304*a^7*b*c^4*g*k^2*1 - 1680*a^5*b^6*c*g*j*m^2 + 1184*a^6*b*c^5*f^2*k*m + 804*a^5*b^6*c*f*k*m^2 + 432*a^5*b^6*c*e*1*m^2 + 60*a^4*b^7*c*f*k^2*m + 6*a^2*b^9*c*f^2*k*m - 13312*a^7*b*c^4*d*1^2*m + 2048*a^7*b*c^4*g*j*1^2 - 1024*a^7*b*c^4*f*k*1^2 + 64*a^4*b^7*c*g*j*1^2 + 56*a^4*b^7*c*d*1^2*m - 40*a^4*b^7*c*f*k*1^2 + 13440*a^7*b*c^4*e*j*m^2 - 8928*a^5*b*c^6*d^2*k*m - 6240*a^7*b*c^4*d*k*m^2 + 1614*a^4*b^7*c*d*k*m^2 - 288*a^4*b^7*c*e*j*m^2 - 170*a*b^9*c^2*d^2*k*m + 600*a^3*b^8*c*d*k^2*m + 4608*a^6*b*c^5*e*j^2*1 + 4608*a^5*b*c^6*e^2*j*1 - 2432*a^6*b*c^5*d*j^2*m + 1440*a^7*b*c^4*f*h*m^2 - 896*a^6*b*c^5*f*j^2*k - 864*a^6*b*c^5*f*h^2*m - 558*a^4*b^7*c*f*h*m^2 + 256*a^6*b*c^5*g*h^2*1 - 40*a^3*b^8*c*d*k*1^2 - 1920*a^6*b*c^5*e*j*k^2 - 384*a^5*b*c^6*e^2*h*m + 24*a^3*b^8*c*f*h*1^2 - 16*a*b^8*c^3*d^2*j*1 + 2208*a^6*b*c^5*f*h*k^2 - 1044*a^3*b^8*c*d*h*m^2 + 800*a^5*b*c^6*f^2*h*k - 256*a^5*b*c^6*f^2*g*1 + 144*a^3*b^8*c*e*g*m^2 - 116*a*b^8*c^3*d^2*h*m + 8192*a^6*b*c^5*d*h*1^2 + 2048*a^6*b*c^5*e*g*1^2 + 24*a^2*b^9*c*d*h*1^2 - 5856*a^4*b*c^7*d^2*f*m + 4896*a^4*b*c^7*d^2*h$

$$\begin{aligned}
& *k + 2720*a^6*b*c^5*d*f*m^2 + 2304*a^4*b*c^7*d^2*g*1 + 1824*a^5*b*c^6*d*h^2 \\
& *k + 438*a*b^7*c^4*d^2*f*m - 384*a^5*b*c^6*e*h^2*j + 318*a^2*b^9*c*d*f*m^2 \\
& - 168*a*b^7*c^4*d^2*g*1 + 42*a*b^7*c^4*d^2*h*k - 36*a*b^8*c^3*d*f^2*m - 243 \\
& 2*a^4*b*c^7*d*e^2*m + 1536*a^5*b*c^6*e*g*j^2 + 1536*a^4*b*c^7*e^2*g*j - 896 \\
& *a^5*b*c^6*d*h*j^2 - 896*a^4*b*c^7*e^2*f*k + 4896*a^5*b*c^6*d*f*k^2 + 1824* \\
& a^4*b*c^7*d*f^2*k - 384*a^4*b*c^7*e*f^2*j + 336*a*b^6*c^5*d^2*e*1 - 156*a*b \\
& ^6*c^5*d^2*f*k + 16*a*b^6*c^5*d^2*g*j + 12*a*b^7*c^4*d*f^2*k - 2*a*b^9*c^2* \\
& d*f*k^2 - 1920*a^3*b*c^8*d^2*e*j - 32*a*b^5*c^6*d^2*e*j + 2208*a^3*b*c^8*d^ \\
& 2*f*h + 800*a^4*b*c^7*d*f*h^2 - 102*a*b^5*c^6*d^2*f*h + 12*a*b^6*c^5*d*f^2* \\
& h - 2*a*b^7*c^4*d*f*h^2 - 896*a^3*b*c^8*d*e^2*h - 8*a*b^6*c^5*d*f*g^2 - 240 \\
& *a*b^4*c^7*d^2*e*g - 32*a*b^4*c^7*d*e^2*f + 5120*a^8*c^4*h*j*1*m + 15360*a^ \\
& 7*c^5*d*j*1*m - 7680*a^7*c^5*e*j*k*m + 3072*a^7*c^5*f*j*k*1 + 5120*a^7*c^5* \\
& e*h*1*m + 1920*a^7*c^5*f*h*k*m + 15360*a^6*c^6*d*e*1*m + 5760*a^6*c^6*d*f*k \\
& *m + 3072*a^6*c^6*e*f*k*1 - 3072*a^6*c^6*d*h*j*1 - 2560*a^6*c^6*e*f*j*m + 1 \\
& 536*a^6*c^6*e*h*j*k + 4608*a^5*c^7*d*e*j*k - 3072*a^5*c^7*d*e*h*1 - 1152*a^ \\
& 5*c^7*d*f*h*k + 512*a^5*c^7*e*f*h*j + 1536*a^4*c^8*d*e*f*j - 8*a*b^10*c*d*f \\
& *1^2 - 5568*a^8*b^2*c^2*k*1^2*m + 15552*a^8*b^2*c^2*j*1*m^2 + 4800*a^7*b^2* \\
& c^3*j^2*k*m - 1280*a^6*b^4*c^2*j^2*k*m + 2080*a^7*b^3*c^2*h*1^2*m - 1088*a^ \\
& 7*b^2*c^3*j*k^2*1 + 48*a^6*b^4*c^2*j*k^2*1 - 8544*a^7*b^2*c^3*h*k^2*m - 777 \\
& 6*a^7*b^3*c^2*g*1*m^2 + 7632*a^7*b^3*c^2*h*k*m^2 + 3600*a^6*b^3*c^3*h^2*k*m \\
& + 2484*a^6*b^4*c^2*h*k^2*m - 918*a^5*b^5*c^2*h^2*k*m + 4800*a^7*b^2*c^3*h* \\
& k*1^2 - 1424*a^6*b^4*c^2*h*k*1^2 + 1200*a^5*b^4*c^3*g^2*k*m - 960*a^6*b^2*c \\
& ^4*g^2*k*m - 528*a^6*b^4*c^2*f*1^2*m - 416*a^6*b^3*c^3*h*j^2*m - 320*a^4*b^ \\
& 6*c^2*g^2*k*m + 192*a^7*b^2*c^3*f*1^2*m + 96*a^5*b^5*c^2*h*j^2*m + 15552*a^ \\
& 7*b^2*c^3*e*1*m^2 - 6720*a^7*b^2*c^3*g*j*m^2 + 6160*a^6*b^4*c^2*g*j*m^2 - 4 \\
& 752*a^6*b^4*c^2*e*1*m^2 - 2016*a^7*b^2*c^3*f*k*m^2 - 1164*a^6*b^4*c^2*f*k*m \\
& ^2 + 1104*a^5*b^3*c^4*f^2*k*m + 1008*a^6*b^3*c^3*f*k^2*m + 960*a^6*b^2*c^4* \\
& h^2*j*1 - 678*a^5*b^5*c^2*f*k^2*m + 544*a^6*b^3*c^3*g*k^2*1 - 144*a^5*b^4*c \\
& ^3*h^2*j*1 - 102*a^4*b^5*c^3*f^2*k*m - 62*a^3*b^7*c^2*f^2*k*m - 24*a^5*b^5* \\
& c^2*g*k^2*1 + 6432*a^6*b^3*c^3*d*1^2*m + 4800*a^5*b^2*c^5*e^2*k*m - 2304*a^ \\
& 6*b^2*c^4*g*j^2*1 + 1920*a^6*b^3*c^3*g*j*1^2 + 1728*a^6*b^2*c^4*f*j^2*m - 1 \\
& 280*a^4*b^4*c^4*e^2*k*m + 1152*a^5*b^3*c^4*g^2*j*1 - 1032*a^5*b^5*c^2*d*1^2 \\
& *m - 864*a^6*b^3*c^3*f*k*1^2 - 768*a^5*b^5*c^2*g*j*1^2 + 408*a^5*b^5*c^2*f* \\
& k*1^2 + 384*a^5*b^4*c^3*g*j^2*1 - 288*a^5*b^4*c^3*f*j^2*m + 192*a^6*b^2*c^4 \\
& *h*j^2*k - 192*a^4*b^5*c^3*g^2*j*1 + 96*a^3*b^6*c^3*e^2*k*m - 32*a^5*b^4*c^ \\
& 3*h*j^2*k - 21120*a^6*b^2*c^4*d*k^2*m + 20880*a^6*b^3*c^3*d*k*m^2 + 19760*a \\
& ^4*b^3*c^5*d^2*k*m - 12320*a^6*b^3*c^3*e*j*m^2 - 9750*a^5*b^5*c^2*d*k*m^2 - \\
& 9390*a^3*b^5*c^4*d^2*k*m + 8460*a^5*b^4*c^3*d*k^2*m + 3360*a^5*b^5*c^2*e*j \\
& *m^2 + 1860*a^2*b^7*c^3*d^2*k*m - 1218*a^4*b^6*c^2*d*k^2*m - 1088*a^6*b^2*c \\
& ^4*e*k^2*1 + 960*a^6*b^2*c^4*g*j*k^2 - 240*a^5*b^4*c^3*g*j*k^2 + 192*a^5*b^ \\
& 2*c^5*f^2*j*1 - 104*a^4*b^5*c^3*g^2*h*m - 96*a^5*b^3*c^4*g^2*h*m + 48*a^5*b \\
& ^4*c^3*e*k^2*1 + 48*a^4*b^4*c^4*f^2*j*1 + 24*a^3*b^7*c^2*g^2*h*m + 16*a^4*b \\
& ^6*c^2*g*j*k^2 - 16*a^3*b^6*c^3*f^2*j*1 + 13376*a^6*b^2*c^4*d*k*1^2 - 5136* \\
& a^5*b^4*c^3*d*k*1^2 - 3840*a^6*b^2*c^4*e*j*1^2 + 1536*a^5*b^4*c^3*e*j*1^2 + \\
& 1392*a^5*b^3*c^4*f*h^2*m + 1386*a^5*b^5*c^2*f*h*m^2 - 768*a^5*b^3*c^4*e*j^
\end{aligned}$$

$$\begin{aligned}
& 2*1 + 768*a^4*b^6*c^2*d*k*k^1^2 - 768*a^4*b^3*c^5*e^2*j*1 - 588*a^4*b^4*c^4*f \\
& ^2*h*m - 480*a^5*b^3*c^4*g*h^2*1 + 480*a^5*b^3*c^4*d*j^2*m - 480*a^5*b^2*c^ \\
& 5*f^2*h*m - 128*a^4*b^6*c^2*e*j*1^2 + 100*a^3*b^6*c^3*f^2*h*m + 96*a^5*b^3* \\
& c^4*f*j^2*k + 72*a^4*b^5*c^3*g*h^2*1 - 54*a^4*b^5*c^3*f*h^2*m - 48*a^6*b^3* \\
& c^3*f*h*m^2 - 36*a^3*b^7*c^2*f*h^2*m + 6*a^2*b^8*c^2*f^2*h*m + 6848*a^4*b^2 \\
& *c^6*d^2*j*1 - 2448*a^3*b^4*c^5*d^2*j*1 + 624*a^5*b^4*c^3*f*h*1^2 + 576*a^6 \\
& *b^2*c^4*f*h*1^2 + 480*a^5*b^3*c^4*e*j*k^2 + 432*a^4*b^4*c^4*f*g^2*m - 416* \\
& a^4*b^3*c^5*e^2*h*m + 336*a^2*b^6*c^4*d^2*j*1 - 320*a^5*b^2*c^5*f*g^2*m - 2 \\
& 56*a^4*b^6*c^2*f*h*1^2 + 192*a^5*b^2*c^5*g^2*h*k + 96*a^3*b^5*c^4*e^2*h*m - \\
& 72*a^3*b^6*c^3*f*g^2*m + 48*a^4*b^4*c^4*g^2*h*k - 32*a^4*b^5*c^3*e*j*k^2 - \\
& 8*a^3*b^6*c^3*g^2*h*k + 24768*a^6*b^2*c^4*d*h*m^2 - 21108*a^5*b^4*c^3*d*h* \\
& m^2 - 10048*a^4*b^2*c^6*d^2*h*m + 7218*a^4*b^6*c^2*d*h*m^2 - 6720*a^6*b^2*c \\
& ^4*e*g*m^2 + 6160*a^5*b^4*c^3*e*g*m^2 - 2592*a^5*b^2*c^5*d*h^2*m - 1680*a^4 \\
& *b^6*c^2*e*g*m^2 + 1068*a^3*b^4*c^5*d^2*h*m + 960*a^5*b^2*c^5*e*h^2*1 - 876 \\
& *a^4*b^4*c^4*d*h^2*m - 864*a^5*b^2*c^5*f*h^2*k + 546*a^2*b^6*c^4*d^2*h*m + \\
& 432*a^3*b^6*c^3*d*h^2*m + 336*a^4*b^3*c^5*f^2*h*k - 320*a^5*b^2*c^5*d*j^2*k \\
& + 192*a^5*b^2*c^5*g*h^2*j + 144*a^5*b^3*c^4*f*h*k^2 - 144*a^4*b^4*c^4*e*h^ \\
& 2*1 - 102*a^4*b^5*c^3*f*h*k^2 - 96*a^4*b^3*c^5*f^2*g*1 - 36*a^2*b^8*c^2*d*h \\
& ^2*m - 30*a^3*b^5*c^4*f^2*h*k - 24*a^3*b^5*c^4*f^2*g*1 + 16*a^4*b^4*c^4*g*h \\
& ^2*j - 12*a^4*b^4*c^4*f*h^2*k + 12*a^3*b^6*c^3*f*h^2*k + 8*a^2*b^7*c^3*f^2* \\
& g*1 + 6*a^3*b^7*c^2*f*h*k^2 - 2*a^2*b^7*c^3*f^2*h*k - 9312*a^5*b^3*c^4*d*h* \\
& 1^2 + 3288*a^4*b^5*c^3*d*h*1^2 - 2304*a^4*b^2*c^6*e^2*g*1 + 1920*a^5*b^3*c^ \\
& 4*e*g*1^2 + 1728*a^4*b^2*c^6*e^2*f*m + 1152*a^4*b^3*c^5*e*g^2*1 - 768*a^4*b \\
& ^5*c^3*e*g*1^2 - 608*a^4*b^3*c^5*d*g^2*m - 472*a^3*b^7*c^2*d*h*1^2 + 384*a^ \\
& 3*b^4*c^5*e^2*g*1 - 288*a^3*b^4*c^5*e^2*f*m - 224*a^4*b^3*c^5*f*g^2*k + 192 \\
& *a^5*b^2*c^5*f*h*j^2 + 192*a^4*b^2*c^6*e^2*h*k - 192*a^3*b^5*c^4*e*g^2*1 + \\
& 120*a^3*b^5*c^4*d*g^2*m + 64*a^3*b^7*c^2*e*g*1^2 - 32*a^3*b^4*c^5*e^2*h*k + \\
& 24*a^3*b^5*c^4*f*g^2*k + 9936*a^3*b^3*c^6*d^2*f*m + 3786*a^4*b^5*c^3*d*f*m \\
& ^2 - 3552*a^5*b^2*c^5*d*h*k^2 - 3486*a^2*b^5*c^5*d^2*f*m - 3424*a^3*b^3*c^6 \\
& *d^2*g*1 - 1868*a^3*b^7*c^2*d*f*m^2 + 1332*a^4*b^4*c^4*d*h*k^2 - 1296*a^5*b \\
& ^3*c^4*d*f*m^2 - 1236*a^3*b^4*c^5*d*f^2*m + 1224*a^2*b^5*c^5*d^2*g*1 - 1152 \\
& *a^4*b^2*c^6*d*f^2*m + 960*a^5*b^2*c^5*e*g*k^2 - 496*a^3*b^3*c^6*d^2*h*k + \\
& 462*a^2*b^6*c^4*d*f^2*m + 432*a^4*b^3*c^5*d*h^2*k - 240*a^4*b^4*c^4*e*g*k^2 \\
& - 222*a^2*b^5*c^5*d^2*h*k + 192*a^4*b^2*c^6*f^2*g*j + 192*a^4*b^2*c^6*e*f^ \\
& 2*1 - 174*a^3*b^5*c^4*d*h^2*k - 156*a^3*b^6*c^3*d*h*k^2 + 48*a^3*b^4*c^5*e* \\
& f^2*1 - 32*a^4*b^3*c^5*e*h^2*j + 16*a^3*b^6*c^3*e*g*k^2 + 16*a^3*b^4*c^5*f^ \\
& 2*g*j - 16*a^2*b^6*c^4*e*f^2*1 + 12*a^2*b^7*c^3*d*h^2*k + 6*a^2*b^8*c^2*d*h \\
& *k^2 + 1728*a^5*b^2*c^5*d*f*1^2 + 1392*a^4*b^4*c^4*d*f*1^2 - 840*a^3*b^6*c^ \\
& 3*d*f*1^2 - 768*a^4*b^2*c^6*e*g^2*j + 576*a^4*b^2*c^6*d*g^2*k + 480*a^3*b^3 \\
& *c^6*d*e^2*m + 144*a^2*b^8*c^2*d*f*1^2 + 96*a^4*b^3*c^5*d*h*j^2 + 96*a^3*b^ \\
& 3*c^6*e^2*f*k - 80*a^3*b^4*c^5*d*g^2*k + 6848*a^3*b^2*c^7*d^2*e*1 - 3552*a^ \\
& 3*b^2*c^7*d^2*f*k - 2448*a^2*b^4*c^6*d^2*e*1 + 1332*a^2*b^4*c^6*d^2*f*k + 9 \\
& 60*a^3*b^2*c^7*d^2*g*j - 496*a^4*b^3*c^5*d*f*k^2 + 432*a^3*b^3*c^6*d*f^2*k \\
& - 240*a^2*b^4*c^6*d^2*g*j - 222*a^3*b^5*c^4*d*f*k^2 - 174*a^2*b^5*c^5*d*f^2 \\
& *k + 64*a^4*b^2*c^6*f*g^2*h + 48*a^3*b^4*c^5*f*g^2*h + 42*a^2*b^7*c^3*d*f*k
\end{aligned}$$

$$\begin{aligned}
&^2 - 32a^3b^3c^6ef^2j - 320a^3b^2c^7d^2e^2k + 192a^4b^2c^6efg \\
& * h^2 + 192a^4b^2c^6d^2f^2j - 32a^3b^4c^5d^2f^2j + 16a^3b^4c^5efg \\
& * h^2 + 480a^2b^3c^7d^2e^2j - 224a^3b^3c^6d^2g^2h + 192a^3b^2c^7 \\
& * e^2f^2h + 24a^2b^5c^5d^2g^2h - 864a^3b^2c^7d^2f^2h + 336a^3b^3c \\
& ^6d^2f^2h^2 + 192a^3b^2c^7ef^2g + 144a^2b^3c^7d^2f^2h - 30a^2b^5 \\
& * c^5d^2f^2h^2 + 16a^2b^4c^6ef^2g - 12a^2b^4c^6d^2f^2h + 192a^3b^2 \\
& * c^7d^2f^2g^2 + 96a^2b^3c^7d^2e^2h + 48a^2b^4c^6d^2f^2g^2 + 960a^2b \\
& ^2c^8d^2e^2g + 192a^2b^2c^8d^2e^2f - 7680a^9b^2c^2l^2m^2 + 3152a^8 \\
& * b^3c^2l^2m^2 + 2070a^7b^4c^2k^2m^2 - 1840a^7b^3c^2k^3m + 6720a^8 \\
& * b^3c^2j^2m^2 - 3072a^8b^3c^2k^2l^2 + 1680a^6b^5c^2j^2m^2 - 100a^6 \\
& * b^5c^2k^2l^2 - 2176a^7b^3c^2j^2l^3 - 256a^6b^3c^3j^3l - 64a^5b^6 \\
& * c^2j^2l^2 - 12480a^8b^2c^2h^2m^3 + 972a^5b^6c^2h^2m^2 - 960a^7b^3c \\
& ^4j^2k^2 - 252a^5b^4c^3h^3m - 192a^6b^2c^4h^3m + 54a^4b^6c^2 \\
& * h^3m + 1536a^7b^3c^4h^2l^2 + 420a^4b^7c^2g^2m^2 - 36a^4b^7c^2h^2 \\
& * l^2 - 3072a^7b^2c^3g^2l^3 + 2096a^7b^3c^2f^2m^3 + 1088a^6b^4c^2g^2 \\
& * l^3 - 496a^6b^3c^3h^2k^3 - 192a^4b^4c^4g^3l + 176a^4b^3c^5f^3m \\
& + 144a^5b^3c^4h^3k + 78a^3b^8c^2f^2m^2 + 54a^3b^5c^4f^3m + 32 \\
& * a^3b^6c^3g^3l + 30a^5b^5c^2h^2k^3 - 18a^4b^5c^3h^3k - 18a^2b^7 \\
& * c^3f^3m - 16a^3b^8c^2g^2l^2 + 6720a^6b^3c^5e^2m^2 - 192a^6b^3c^5 \\
& * h^2j^2 - 4a^2b^9c^2f^2l^2 - 35040a^7b^2c^3d^2m^3 + 14300a^6b^4c^2 \\
& * d^2m^3 - 12000a^3b^2c^7d^3m + 4380a^2b^4c^6d^3m - 2176a^6b^3c^3 \\
& * e^2l^3 - 256a^3b^3c^6e^3l - 192a^6b^2c^4f^2k^3 + 192a^5b^5c^2 \\
& * e^2l^3 - 192a^4b^2c^6f^3k + 132a^5b^4c^3f^2k^3 + 128a^4b^3c^5g^3 \\
& * j - 28a^3b^4c^5f^3k - 10a^4b^6c^2f^2k^3 + 6a^2b^6c^4f^3k + 1 \\
& 0752a^5b^3c^6d^2l^2 - 960a^5b^3c^6e^2k^2 - 192a^5b^3c^6f^2j^2 + 10 \\
& 8a^2b^9c^2d^2l^2 - 1680a^5b^3c^4d^2k^3 - 1680a^2b^3c^7d^3k + 222 \\
& * a^4b^5c^3d^2k^3 + 30a^2b^8c^3d^2k^2 - 10a^3b^7c^2d^2k^3 - 960a^4 \\
& * b^3c^7d^2j^2 + 80a^4b^3c^5f^2h^3 + 80a^3b^3c^6f^3h + 6a^3b^5c^4 \\
& * f^2h^3 + 6a^2b^5c^5f^3h - 192a^4b^3c^7e^2h^2 - 192a^4b^2c^6d^2h^3 \\
& - 192a^2b^2c^8d^3h + 128a^3b^3c^6efg^3 - 28a^3b^4c^5d^2h^3 + \\
& 12a^2b^6c^5d^2h^2 + 6a^2b^6c^4d^2h^3 - 192a^3b^3c^8e^2f^2 + 60a^2b^5 \\
& * c^6d^2g^2 + 198a^2b^4c^7d^2f^2 + 144a^2b^3c^7d^2f^3 - 960a^2b^3 \\
& * c^9d^2e^2 + 240a^2b^3c^8d^2e^2 + 15360a^9c^3k^2l^2m - 12800a^9c^3 \\
& * j^2l^2m^2 - 3840a^8c^4j^2k^2m + 432a^6b^6j^2l^2m^2 + 4608a^8c^4j^2k^2 \\
& * l + 2880a^8c^4h^2k^2m + 5120a^8c^4f^2l^2m - 3072a^8c^4h^2k^2l + 27 \\
& 0a^5b^7h^2k^2m - 216a^5b^7g^2l^2m - 12800a^8c^4e^2l^2m - 4800a^8c^4 \\
& * f^2k^2m - 512a^7c^5h^2j^2l - 3840a^6c^6e^2k^2m - 1280a^7c^5f^2j^2 \\
& * m + 768a^7c^5h^2j^2k + 144a^4b^8g^2j^2m - 90a^4b^8f^2k^2m + 864 \\
& 0a^7c^5d^2k^2m + 4608a^7c^5e^2k^2l + 512a^6c^6f^2j^2l - 9216a^7c^5 \\
& * d^2k^2l^2 - 4096a^7c^5e^2j^2l^2 + 320a^6c^6f^2h^2m - 90a^3b^9d^2k^2m^2 \\
& + 15200a^9b^3c^2k^2m^3 - 6192a^8b^3c^2k^2m^3 + 5472a^8b^3c^3k^3m - 4 \\
& 608a^5c^7d^2j^2l - 1024a^7c^5f^2h^2l^2 + 150a^6b^5c^2k^3m + 54a^3b^9 \\
& * f^2h^2m^2 + 6b^10c^2d^2h^2m - 14400a^7c^5d^2h^2m^2 + 8640a^5c^7d^2 \\
& * h^2m + 2880a^6c^6d^2h^2m + 2304a^6c^6d^2j^2k - 512a^6c^6e^2h^2l - 1 \\
& 92a^6c^6f^2h^2k + 6144a^8b^3c^3j^2l^3 + 1536a^7b^3c^4j^3l - 1280a^5
\end{aligned}$$

$$\begin{aligned}
& *c^7e^2f^m + 768a^5c^7e^2h^k + 256a^6c^6f^h*j^2 + 192a^6b^5c*j \\
& l^3 + 54a^2b^{10}d^h*m^2 - 18b^9c^3d^2f^m + 8b^9c^3d^2g^1 - 2b^9c^3d^2h^k + 4068a^7b^4c^h*m^3 - 1728a^6c^6d^h*k^2 + 960a^5c^7d^f \\
& ^2m + 512a^5c^7e^f^2*1 - 3072a^6c^6d^f*1^2 - 16b^8c^4d^2e^1 + 6b^8c^4d^2f^k - 4608a^4c^8d^2e^1 + 2400a^8b^c^3f^m^3 + 2016a^7b^c^4h^k^3 - 1728a^4c^8d^2f^k - 1146a^6b^5c^f^m^3 + 224a^6b^c^5h^3 \\
& *k - 96a^5b^6c^g^1^3 + 96a^5b^c^6f^3*m + 2304a^4c^8d^2e^2*k + 768a^5c^7d^f*j^2 + 6144a^7b^c^4e^1^3 - 2280a^5b^6c^d^m^3 + 1536a^4b^c^7e^3*1 - 616a^b^6c^5d^3*m + 512a^6b^c^5g^j^3 + 256a^4c^8e^2f^h \\
& + 240a^b^{10}c^d^2*m^2 + 6b^7c^5d^2f^h - 192a^4c^8d^f^2*h + 4320a^6b^c^5d^k^3 + 4320a^3b^c^8d^3*k + 222a^b^5c^6d^3*k + 16b^6c^6d^2e^g + 96a^5b^c^6f^h^3 + 96a^4b^c^7f^3*h + 768a^3c^9d^2e^2*f + 512a^3b^c^8e^3*g + 132a^b^4c^7d^3*h + 2016a^2b^c^9d^3*f - 496a^b^3c^8d^3*f + 224a^3b^c^8d^f^3 - 18a^b^5c^6d^f^3 - 3264a^8b^2c^2k^2*m^2 - 6160a^7b^3c^2j^2*m^2 + 1104a^7b^3c^2k^2*1^2 - 1920a^7b^2c^3j^2*1^2 + 768a^6b^4c^2j^2*1^2 + 3888a^7b^2c^3h^2*m^2 - 3510a^6b^4c^2h^2*m^2 + 240a^6b^3c^3j^2*k^2 - 16a^5b^5c^2j^2*k^2 + 1680a^6b^3c^3g^2*m^2 - 1648a^6b^3c^3h^2*1^2 - 1540a^5b^5c^2g^2*m^2 + 444a^5b^5c^2h^2*1^2 - 960a^6b^2c^4h^2*k^2 - 576a^6b^2c^4f^2*m^2 - 512a^6b^2c^4g^2*1^2 - 480a^5b^4c^3g^2*1^2 + 198a^5b^4c^3h^2*k^2 + 192a^4b^6c^2g^2*1^2 - 186a^5b^4c^3f^2*m^2 - 97a^4b^6c^2f^2*m^2 - 9a^4b^6c^2h^2*k^2 - 6160a^5b^3c^4e^2*m^2 + 1680a^4b^5c^3e^2*m^2 - 240a^5b^3c^4g^2*k^2 - 240a^5b^3c^4f^2*1^2 - 144a^3b^7c^2e^2*m^2 + 60a^4b^5c^3g^2*k^2 - 36a^4b^5c^3f^2*1^2 + 36a^3b^7c^2f^2*1^2 - 16a^5b^3c^4h^2*j^2 - 4a^3b^7c^2g^2*k^2 + 38512a^5b^2c^5d^2*m^2 - 32310a^4b^4c^4d^2*m^2 + 12720a^3b^6c^3d^2*m^2 - 2500a^2b^8c^2d^2*m^2 - 1920a^5b^2c^5e^2*1^2 + 768a^4b^4c^4e^2*1^2 - 464a^5b^2c^5f^2*k^2 - 384a^5b^2c^5g^2*j^2 - 64a^3b^6c^3e^2*1^2 + 42a^4b^4c^4f^2*k^2 + 12a^3b^6c^3f^2*k^2 - 13104a^4b^3c^5d^2*1^2 + 5628a^3b^5c^4d^2*1^2 - 1128a^2b^7c^3d^2*1^2 + 240a^4b^3c^5e^2*k^2 - 16a^4b^3c^5f^2*j^2 - 16a^3b^5c^4e^2*k^2 - 2880a^4b^2c^6d^2*k^2 + 1750a^3b^4c^5d^2*k^2 - 345a^2b^6c^4d^2*k^2 - 48a^4b^3c^5g^2*h^2 - 4a^3b^5c^4g^2*h^2 + 240a^3b^3c^6d^2*j^2 - 192a^4b^2c^6f^2*h^2 - 42a^3b^4c^5f^2*h^2 - 16a^2b^5c^5d^2*j^2 - 48a^3b^3c^6f^2*g^2 - 16a^3b^3c^6e^2*h^2 - 4a^2b^5c^5f^2*g^2 - 464a^3b^2c^7d^2*h^2 - 384a^3b^2c^7e^2*g^2 + 42a^2b^4c^6d^2*h^2 - 240a^2b^3c^7d^2*g^2 - 16a^2b^3c^7e^2*f^2 - 960a^2b^2c^8d^2f^2 + 6b^{11}c^d^2*k^m - 18a^b^{11}d^f^m^2 - 7200a^9c^3k^2*m^2 - 324a^7b^5*1^2*m^2 - 225a^6b^6k^2*m^2 - 2048a^8c^4j^2*1^2 - 144a^5b^7j^2*m^2 - 2400a^8c^4h^2*m^2 - 81a^4b^8h^2*m^2 - 800a^7c^5f^2*m^2 - 288a^7c^5h^2*k^2 - 36a^3b^9g^2*m^2 - 9a^2b^{10}f^2*m^2 - 21600a^6c^6d^2*m^2 - 2048a^6c^6e^2*1^2 - 864a^6c^6f^2*k^2 - 2592a^5c^7d^2*k^2 - 1536a^5c^7e^2*j^2 + 1536a^8b^2c^2*1^4 - 32a^5c^7f^2*h^2 + 360a^7b^2c^3k^4 - 25a^6b^4c^2k^4 - 864a^4c^8d^2h^2 - 4b^7c^5d^2g^2 - 9b^6c^6d^2f^2 - 288a^3c^9d^2f^2 - 24a^5b^2c^5h^4 - 16b^5c^7d^2e^2
\end{aligned}$$

$$\begin{aligned}
& - 9a^4b^4c^4h^4 - 16a^3b^4c^5g^4 - 24a^3b^2c^7f^4 - 9a^2b^4c^6f^4 - a^2b^8c^2f^2k^2 - a^2b^6c^4f^2h^2 + 630a^7b^5k^3m^3 + 8000a^9c^3h^3m^3 + 320a^7c^5h^3m - 378a^6b^6h^3m^3 + 126a^5b^7f^3m^3 + 30b^8c^4d^3m + 24000a^8c^4d^3m^3 + 8640a^4c^8d^3m - 1728a^7c^5f^3k^3 - 192a^5c^7f^3k - 4b^{11}c^2d^2l^2 + 126a^4b^8d^3m^3 - 10b^7c^5d^3k + 4200a^9b^2c^3m^4 - 1024a^6c^6e^3j^3 - 1024a^4c^8e^3j - 144a^7b^4c^3l^4 - 10b^6c^6d^3h - 1728a^3c^9d^3h - 192a^5c^7d^3h^3 + 30b^5c^7d^3f + 360a^2c^9d^4 - 9b^{12}d^2m^2 - 10000a^{10}c^2m^4 - 4096a^9c^3l^4 - 441a^8b^4m^4 - 1296a^8c^4k^4 - 256a^7c^5j^4 - 16a^6c^6h^4 - 16a^4c^8f^4 - 256a^3c^9e^4 - 25b^4c^8d^4 - 1296a^2c^{10}d^4 - b^{10}c^2d^2k^2 - b^8c^4d^2h^2, z, k1), k1, 1, 4) \\
& + ((b^2c^2e - 2ac^2g - ab^2l + 2a^2c^2l + abc^2j)/(2(4ac - b^2)) \\
& + (x^2(2c^3e - b^3l - bc^2g - 2ac^2j + b^2c^2j + 3abc^2l))/(2(4ac - b^2)) + (x(2ac^3d - 2a^2c^2h - a^2b^2m - b^2c^2d + 2a^3c^3m + abc^2f + a^2b^2c^2k))/(2a(4ac - b^2)) - (x^3(2a^2c^2k + bc^3d - 2ac^3f + ab^3m + abc^2h - ab^2c^2k - 3a^2b^2c^2m))/(2a(4ac - b^2)))/(a^2c^2 + c^3x^4 + b^2c^2x^2) + (mx)/c^2
\end{aligned}$$



### 3.42 $\int \frac{d+ex}{(4-5x^2+x^4)^3} dx$

Optimal result	473
Rubi [A] (verified)	473
Mathematica [A] (verified)	476
Maple [A] (verified)	476
Fricas [B] (verification not implemented)	477
Sympy [B] (verification not implemented)	477
Maxima [A] (verification not implemented)	479
Giac [A] (verification not implemented)	479
Mupad [B] (verification not implemented)	480

#### Optimal result

Integrand size = 18, antiderivative size = 143

$$\int \frac{d+ex}{(4-5x^2+x^4)^3} dx = \frac{dx(17-5x^2)}{144(4-5x^2+x^4)^2} + \frac{e(5-2x^2)}{36(4-5x^2+x^4)^2} - \frac{dx(59-35x^2)}{3456(4-5x^2+x^4)} - \frac{e(5-2x^2)}{54(4-5x^2+x^4)} - \frac{313\text{darctanh}\left(\frac{x}{2}\right)}{20736} + \frac{13}{648}\text{darctanh}(x) - \frac{1}{81}e \log(1-x^2) + \frac{1}{81}e \log(4-x^2)$$

[Out] 1/144\*d\*x\*(-5\*x^2+17)/(x^4-5\*x^2+4)^2+1/36\*e\*(-2\*x^2+5)/(x^4-5\*x^2+4)^2-1/3456\*d\*x\*(-35\*x^2+59)/(x^4-5\*x^2+4)-1/54\*e\*(-2\*x^2+5)/(x^4-5\*x^2+4)-313/20736\*d\*arctanh(1/2\*x)+13/648\*d\*arctanh(x)-1/81\*e\*ln(-x^2+1)+1/81\*e\*ln(-x^2+4)

#### Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 143, normalized size of antiderivative = 1.00, number of steps used = 14, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.556$ , Rules used = {1687, 12, 1106, 1192, 1180, 213, 1121, 628, 630, 31}

$$\int \frac{d+ex}{(4-5x^2+x^4)^3} dx = -\frac{313\text{darctanh}\left(\frac{x}{2}\right)}{20736} + \frac{13}{648}\text{darctanh}(x) - \frac{dx(59-35x^2)}{3456(x^4-5x^2+4)} + \frac{dx(17-5x^2)}{144(x^4-5x^2+4)^2} - \frac{1}{81}e \log(1-x^2) + \frac{1}{81}e \log(4-x^2) - \frac{e(5-2x^2)}{54(x^4-5x^2+4)} + \frac{e(5-2x^2)}{36(x^4-5x^2+4)^2}$$

[In] Int[(d + e\*x)/(4 - 5\*x^2 + x^4)^3,x]

[Out]  $(d*x*(17 - 5*x^2))/(144*(4 - 5*x^2 + x^4)^2) + (e*(5 - 2*x^2))/(36*(4 - 5*x^2 + x^4)^2) - (d*x*(59 - 35*x^2))/(3456*(4 - 5*x^2 + x^4)) - (e*(5 - 2*x^2))/(54*(4 - 5*x^2 + x^4)) - (313*d*ArcTanh[x/2])/20736 + (13*d*ArcTanh[x])/648 - (e*Log[1 - x^2])/81 + (e*Log[4 - x^2])/81$

#### Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

#### Rule 31

Int[((a\_) + (b\_.)\*(x\_))<sup>(-1)</sup>, x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

#### Rule 213

Int[((a\_) + (b\_.)\*(x\_)^2)<sup>(-1)</sup>, x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[b, 2])<sup>(-1)</sup>\*ArcTanh[Rt[b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a, 0] || GtQ[b, 0])

#### Rule 628

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)<sup>(p\_)</sup>, x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)<sup>(p + 1)</sup>/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)<sup>(p + 1)</sup>, x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

#### Rule 630

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)<sup>(-1)</sup>, x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[c/q, Int[1/Simp[b/2 - q/2 + c\*x, x], x], x] - Dist[c/q, Int[1/Simp[b/2 + q/2 + c\*x, x], x], x]] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[b^2 - 4\*a\*c] && PerfectSquareQ[b^2 - 4\*a\*c]

#### Rule 1106

Int[((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)<sup>(p\_)</sup>, x\_Symbol] := Simp[(-x)\*(b^2 - 2\*a\*c + b\*c\*x^2)\*((a + b\*x^2 + c\*x^4)<sup>(p + 1)</sup>/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c))), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[(b^2 - 2\*a\*c + 2\*(p + 1)\*(b^2 - 4\*a\*c) + b\*c\*(4\*p + 7)\*x^2)\*(a + b\*x^2 + c\*x^4)<sup>(p + 1)</sup>, x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && IntegerQ[2\*p]

#### Rule 1121

Int[(x\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)<sup>(p\_)</sup>, x\_Symbol] := Dist[1/2, Subst[Int[(a + b\*x + c\*x^2)<sup>p</sup>, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]

## Rule 1180

```
Int[((d_) + (e_)*(x_)^2)/((a_) + (b_)*(x_)^2 + (c_)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

## Rule 1192

```
Int[((d_) + (e_)*(x_)^2)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symb
ol] :> Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 +
c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2
- 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

## Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] :> Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

## Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d}{(4 - 5x^2 + x^4)^3} dx + \int \frac{ex}{(4 - 5x^2 + x^4)^3} dx \\
&= d \int \frac{1}{(4 - 5x^2 + x^4)^3} dx + e \int \frac{x}{(4 - 5x^2 + x^4)^3} dx \\
&= \frac{dx(17 - 5x^2)}{144(4 - 5x^2 + x^4)^2} - \frac{1}{144}d \int \frac{-19 + 25x^2}{(4 - 5x^2 + x^4)^2} dx + \frac{1}{2}e \text{Subst} \left( \int \frac{1}{(4 - 5x + x^2)^3} dx, x, x^2 \right) \\
&= \frac{dx(17 - 5x^2)}{144(4 - 5x^2 + x^4)^2} + \frac{e(5 - 2x^2)}{36(4 - 5x^2 + x^4)^2} - \frac{dx(59 - 35x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad + \frac{d \int \frac{519 + 105x^2}{4 - 5x^2 + x^4} dx}{10368} - \frac{1}{6}e \text{Subst} \left( \int \frac{1}{(4 - 5x + x^2)^2} dx, x, x^2 \right) \\
&= \frac{dx(17 - 5x^2)}{144(4 - 5x^2 + x^4)^2} + \frac{e(5 - 2x^2)}{36(4 - 5x^2 + x^4)^2} - \frac{dx(59 - 35x^2)}{3456(4 - 5x^2 + x^4)} - \frac{e(5 - 2x^2)}{54(4 - 5x^2 + x^4)} \\
&\quad - \frac{1}{648}(13d) \int \frac{1}{-1 + x^2} dx + \frac{(313d) \int \frac{1}{-4 + x^2} dx}{10368} + \frac{1}{27}e \text{Subst} \left( \int \frac{1}{4 - 5x + x^2} dx, x, x^2 \right)
\end{aligned}$$

$$\begin{aligned}
&= \frac{dx(17-5x^2)}{144(4-5x^2+x^4)^2} + \frac{e(5-2x^2)}{36(4-5x^2+x^4)^2} - \frac{dx(59-35x^2)}{3456(4-5x^2+x^4)} \\
&\quad - \frac{e(5-2x^2)}{54(4-5x^2+x^4)} - \frac{313d \tanh^{-1}\left(\frac{x}{2}\right)}{20736} + \frac{13}{648}d \tanh^{-1}(x) \\
&\quad + \frac{1}{81}e \operatorname{Subst}\left(\int \frac{1}{-4+x} dx, x, x^2\right) - \frac{1}{81}e \operatorname{Subst}\left(\int \frac{1}{-1+x} dx, x, x^2\right) \\
&= \frac{dx(17-5x^2)}{144(4-5x^2+x^4)^2} + \frac{e(5-2x^2)}{36(4-5x^2+x^4)^2} - \frac{dx(59-35x^2)}{3456(4-5x^2+x^4)} - \frac{e(5-2x^2)}{54(4-5x^2+x^4)} \\
&\quad - \frac{313d \tanh^{-1}\left(\frac{x}{2}\right)}{20736} + \frac{13}{648}d \tanh^{-1}(x) - \frac{1}{81}e \log(1-x^2) + \frac{1}{81}e \log(4-x^2)
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.07 (sec) , antiderivative size = 128, normalized size of antiderivative = 0.90

$$\int \frac{d+ex}{(4-5x^2+x^4)^3} dx = \frac{288(e(20-8x^2)+dx(17-5x^2))}{(4-5x^2+x^4)^2} + \frac{12(64e(-5+2x^2)+dx(-59+35x^2))}{4-5x^2+x^4} - 32(13d+16e) \log(1-x) + (313d+512e) \log(2-x)$$

41472

[In] Integrate[(d + e\*x)/(4 - 5\*x^2 + x^4)^3, x]

[Out] ((288\*(e\*(20 - 8\*x^2) + d\*x\*(17 - 5\*x^2)))/(4 - 5\*x^2 + x^4)^2 + (12\*(64\*e\*(-5 + 2\*x^2) + d\*x\*(-59 + 35\*x^2)))/(4 - 5\*x^2 + x^4) - 32\*(13\*d + 16\*e)\*Log[1 - x] + (313\*d + 512\*e)\*Log[2 - x] + 32\*(13\*d - 16\*e)\*Log[1 + x] + (-313\*d + 512\*e)\*Log[2 + x])/41472

### Maple [A] (verified)

Time = 0.09 (sec) , antiderivative size = 107, normalized size of antiderivative = 0.75

method	result
norman	$\frac{5}{9}ex^2 + \frac{1}{27}ex^6 - \frac{5}{18}ex^4 + \frac{43}{864}dx + \frac{35}{3456}dx^7 + \frac{35}{384}x^3d - \frac{13}{192}x^5d - \frac{25}{108}e}{(x^4-5x^2+4)^2} + \left(-\frac{313d}{41472} + \frac{e}{81}\right) \ln(x+2) + \left(-\frac{13d}{1296} - \frac{e}{81}\right) \ln(x-2)$
risch	$\frac{5}{9}ex^2 + \frac{1}{27}ex^6 - \frac{5}{18}ex^4 + \frac{43}{864}dx + \frac{35}{3456}dx^7 + \frac{35}{384}x^3d - \frac{13}{192}x^5d - \frac{25}{108}e}{(x^4-5x^2+4)^2} + \frac{13 \ln(x+1)d}{1296} - \frac{\ln(x+1)e}{81} - \frac{313 \ln(x+2)d}{41472} + \frac{\ln(x+2)e}{81}$
default	$\left(-\frac{313d}{41472} + \frac{e}{81}\right) \ln(x+2) - \frac{-19d + 17e}{6912 + 3456} - \frac{-\frac{d}{1728} + \frac{e}{864}}{2(x+2)^2} - \frac{-\frac{d}{432} + \frac{e}{144}}{x+1} - \frac{\frac{d}{216} - \frac{e}{216}}{2(x+1)^2} + \left(\frac{13d}{1296} - \frac{e}{81}\right) \ln(x-2)$
parallelrisc	$\frac{1536ex^6 - 11520ex^4 - 9600e + 420dx^7 + 2064dx + 5008 \ln(x-2)d + 8192 \ln(x-2)e - 6656 \ln(x-1)d - 8192 \ln(x-1)e - 4160 \ln(x+1)d}{(x^4-5x^2+4)^2}$

[In] int((e\*x+d)/(x^4-5\*x^2+4)^3, x, method=\_RETURNVERBOSE)

[Out]  $(5/9*e*x^2+1/27*e*x^6-5/18*e*x^4+43/864*d*x+35/3456*d*x^7+35/384*x^3*d-13/192*x^5*d-25/108*e)/(x^4-5*x^2+4)^2+(-313/41472*d+1/81*e)*\ln(x+2)+(-13/1296*d-1/81*e)*\ln(x-1)+(13/1296*d-1/81*e)*\ln(x+1)+(313/41472*d+1/81*e)*\ln(x-2)$

### Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 307 vs.  $2(125) = 250$ .

Time = 0.29 (sec) , antiderivative size = 307, normalized size of antiderivative = 2.15

$$\int \frac{d + ex}{(4 - 5x^2 + x^4)^3} dx$$


---


$$= \frac{420 dx^7 + 1536 ex^6 - 2808 dx^5 - 11520 ex^4 + 3780 dx^3 + 23040 ex^2 + 2064 dx - ((313d - 512e)x^8 - 10(313d - 512e)x^6 + 33(313d - 512e)x^4 - 40(313d - 512e)x^2 + 5008d - 8192e)\log(x + 2) + 32((13d - 16e)x^8 - 10(13d - 16e)x^6 + 33(13d - 16e)x^4 - 40(13d - 16e)x^2 + 208d - 256e)\log(x + 1) - 32((13d + 16e)x^8 - 10(13d + 16e)x^6 + 33(13d + 16e)x^4 - 40(13d + 16e)x^2 + 208d + 256e)\log(x - 1) + ((313d + 512e)x^8 - 10(313d + 512e)x^6 + 33(313d + 512e)x^4 - 40(313d + 512e)x^2 + 5008d + 8192e)\log(x - 2) - 960e}{(x^8 - 10x^6 + 33x^4 - 40x^2 + 16)}$$

[In] `integrate((e*x+d)/(x^4-5*x^2+4)^3,x, algorithm="fricas")`

[Out]  $1/41472*(420*d*x^7 + 1536*e*x^6 - 2808*d*x^5 - 11520*e*x^4 + 3780*d*x^3 + 23040*e*x^2 + 2064*d*x - ((313*d - 512*e)*x^8 - 10*(313*d - 512*e)*x^6 + 33*(313*d - 512*e)*x^4 - 40*(313*d - 512*e)*x^2 + 5008*d - 8192*e)*\log(x + 2) + 32*((13*d - 16*e)*x^8 - 10*(13*d - 16*e)*x^6 + 33*(13*d - 16*e)*x^4 - 40*(13*d - 16*e)*x^2 + 208*d - 256*e)*\log(x + 1) - 32*((13*d + 16*e)*x^8 - 10*(13*d + 16*e)*x^6 + 33*(13*d + 16*e)*x^4 - 40*(13*d + 16*e)*x^2 + 208*d + 256*e)*\log(x - 1) + ((313*d + 512*e)*x^8 - 10*(313*d + 512*e)*x^6 + 33*(313*d + 512*e)*x^4 - 40*(313*d + 512*e)*x^2 + 5008*d + 8192*e)*\log(x - 2) - 960*e)/(x^8 - 10*x^6 + 33*x^4 - 40*x^2 + 16)$

### Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 668 vs.  $2(126) = 252$ .

Time = 2.23 (sec) , antiderivative size = 668, normalized size of antiderivative = 4.67

$$\int \frac{d + ex}{(4 - 5x^2 + x^4)^3} dx$$

$$= \frac{(13d - 16e) \log\left(x + \frac{-1106258459719280d^4e - 13113710954343d^4 \cdot (13d - 16e) - 817263343042560d^2e^3 + 153628968222720d^2e^2 \cdot (13d - 16e) + 9530197557248d^2e \cdot (13d - 16e)^2 + 88038005760d^2e \cdot (13d - 16e)^3 + 5035763255214080e^5 + 142661633703936e^4 \cdot (13d - 16e) - 19670950215680e^3 \cdot (13d - 16e)^2 - 557272006656e^2 \cdot (13d - 16e)^3}{22941256248261d^5 - 2312740746035200d^3e^2 + 4473912813420544d^2e^4}\right)}{1296} \\ - \frac{(13d + 16e) \log\left(x + \frac{-1106258459719280d^4e + 13113710954343d^4 \cdot (13d + 16e) - 817263343042560d^2e^3 - 153628968222720d^2e^2 \cdot (13d + 16e) + 9530197557248d^2e \cdot (13d + 16e)^2 - 88038005760d^2e \cdot (13d + 16e)^3 + 5035763255214080e^5 - 142661633703936e^4 \cdot (13d + 16e) - 19670950215680e^3 \cdot (13d + 16e)^2 + 557272006656e^2 \cdot (13d + 16e)^3}{22941256248261d^5 - 2312740746035200d^3e^2 + 4473912813420544d^2e^4}\right)}{1296} \\ + \frac{(313d - 512e) \log\left(x + \frac{-1106258459719280d^4e + \frac{13113710954343d^4 \cdot (313d - 512e)}{32} - 817263343042560d^2e^3 - 4800905256960d^2e^2 \cdot (313d - 512e) + 9306833552d^2e \cdot (313d - 512e)^2 - 85974615d^2e \cdot (313d - 512e)^3}{41472} - 817263343042560d^2e^3 - 4800905256960d^2e^2 \cdot (313d - 512e) + 9306833552d^2e \cdot (313d - 512e)^2 - 85974615d^2e \cdot (313d - 512e)^3}{41472}\right)}{41472} \\ + \frac{(313d + 512e) \log\left(x + \frac{-1106258459719280d^4e - \frac{13113710954343d^4 \cdot (313d + 512e)}{32} - 817263343042560d^2e^3 + 4800905256960d^2e^2 \cdot (313d + 512e) + 9306833552d^2e \cdot (313d + 512e)^2 + 85974615d^2e \cdot (313d + 512e)^3}{41472} - 817263343042560d^2e^3 + 4800905256960d^2e^2 \cdot (313d + 512e) + 9306833552d^2e \cdot (313d + 512e)^2 + 85974615d^2e \cdot (313d + 512e)^3}{41472}\right)}{41472} \\ + \frac{35dx^7 - 234dx^5 + 315dx^3 + 172dx + 128ex^6 - 960ex^4 + 1920ex^2 - 800e}{3456x^8 - 34560x^6 + 114048x^4 - 138240x^2 + 55296}$$

[In] integrate((e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*3,x)

[Out] (13\*d - 16\*e)\*log(x + (-1106258459719280\*d\*\*4\*e - 13113710954343\*d\*\*4\*(13\*d - 16\*e) - 817263343042560\*d\*\*2\*e\*\*3 + 153628968222720\*d\*\*2\*e\*\*2\*(13\*d - 16\*e) + 9530197557248\*d\*\*2\*e\*(13\*d - 16\*e)\*\*2 + 88038005760\*d\*\*2\*(13\*d - 16\*e)\*\*3 + 5035763255214080\*e\*\*5 + 142661633703936\*e\*\*4\*(13\*d - 16\*e) - 19670950215680\*e\*\*3\*(13\*d - 16\*e)\*\*2 - 557272006656\*e\*\*2\*(13\*d - 16\*e)\*\*3)/(22941256248261\*d\*\*5 - 2312740746035200\*d\*\*3\*e\*\*2 + 4473912813420544\*d\*e\*\*4))/1296 - (13\*d + 16\*e)\*log(x + (-1106258459719280\*d\*\*4\*e + 13113710954343\*d\*\*4\*(13\*d + 16\*e) - 817263343042560\*d\*\*2\*e\*\*3 - 153628968222720\*d\*\*2\*e\*\*2\*(13\*d + 16\*e) + 9530197557248\*d\*\*2\*e\*(13\*d + 16\*e)\*\*2 - 88038005760\*d\*\*2\*(13\*d + 16\*e)\*\*3 + 5035763255214080\*e\*\*5 - 142661633703936\*e\*\*4\*(13\*d + 16\*e) - 19670950215680\*e\*\*3\*(13\*d + 16\*e)\*\*2 + 557272006656\*e\*\*2\*(13\*d + 16\*e)\*\*3)/(22941256248261\*d\*\*5 - 2312740746035200\*d\*\*3\*e\*\*2 + 4473912813420544\*d\*e\*\*4))/1296 - (313\*d - 512\*e)\*log(x + (-1106258459719280\*d\*\*4\*e + 13113710954343\*d\*\*4\*(313\*d - 512\*e)/32 - 817263343042560\*d\*\*2\*e\*\*3 - 4800905256960\*d\*\*2\*e\*\*2\*(313\*d - 512\*e) + 9306833552\*d\*\*2\*e\*(313\*d - 512\*e)\*\*2 - 85974615\*d\*\*2\*(313\*d - 512\*e)\*\*3/32 + 5035763255214080\*e\*\*5 - 4458176053248\*e\*\*4\*(313\*d - 512\*e) - 19209912320\*e\*\*3\*(313\*d - 512\*e)\*\*2 + 17006592\*e\*\*2\*(313\*d - 512\*e)\*\*3)/(22941256248261\*d\*\*5 - 2312740746035200\*d\*\*3\*e\*\*2 + 4473912813420544\*d\*e\*\*4))/41472 + (313\*d + 512\*e)\*log(x + (-1106258459719280\*d\*\*4\*e - 13113710954343\*d\*\*4\*(313\*d + 512\*e)/32 - 817263343042560\*d\*\*2\*e\*\*3 + 4800905256960\*d\*\*2\*e\*\*2\*(313\*d + 512\*e) + 9306833552\*d\*\*2\*e\*(313\*d + 512\*e)\*\*2 + 85974615\*d\*\*2\*(313\*d + 512\*e)\*\*3/32 + 5035763255214080\*e\*\*5 + 4458176053248\*e\*\*4\*(313\*d + 512\*e) - 19209912320\*e\*\*3\*(313\*d + 512\*e)\*\*2 - 17006592\*e\*\*2\*(313\*d + 512\*e)\*\*3)/(22941256248261\*d\*\*5 - 2312740746035200\*d\*\*3\*e\*\*2 + 4473912813420544\*d\*e\*\*4))/41472

$(420544*d*e**4)/41472 + (35*d*x**7 - 234*d*x**5 + 315*d*x**3 + 172*d*x + 128*e*x**6 - 960*e*x**4 + 1920*e*x**2 - 800*e)/(3456*x**8 - 34560*x**6 + 114048*x**4 - 138240*x**2 + 55296)$

### Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 121, normalized size of antiderivative = 0.85

$$\int \frac{d + ex}{(4 - 5x^2 + x^4)^3} dx$$

$$= -\frac{1}{41472} (313d - 512e) \log(x + 2) + \frac{1}{1296} (13d - 16e) \log(x + 1)$$

$$- \frac{1}{1296} (13d + 16e) \log(x - 1) + \frac{1}{41472} (313d + 512e) \log(x - 2)$$

$$+ \frac{35dx^7 + 128ex^6 - 234dx^5 - 960ex^4 + 315dx^3 + 1920ex^2 + 172dx - 800e}{3456(x^8 - 10x^6 + 33x^4 - 40x^2 + 16)}$$

[In] integrate((e\*x+d)/(x^4-5\*x^2+4)^3,x, algorithm="maxima")

[Out]  $-1/41472*(313*d - 512*e)*\log(x + 2) + 1/1296*(13*d - 16*e)*\log(x + 1) - 1/1296*(13*d + 16*e)*\log(x - 1) + 1/41472*(313*d + 512*e)*\log(x - 2) + 1/3456*(35*d*x^7 + 128*e*x^6 - 234*d*x^5 - 960*e*x^4 + 315*d*x^3 + 1920*e*x^2 + 172*d*x - 800*e)/(x^8 - 10*x^6 + 33*x^4 - 40*x^2 + 16)$

### Giac [A] (verification not implemented)

none

Time = 0.31 (sec) , antiderivative size = 115, normalized size of antiderivative = 0.80

$$\int \frac{d + ex}{(4 - 5x^2 + x^4)^3} dx$$

$$= -\frac{1}{41472} (313d - 512e) \log(|x + 2|) + \frac{1}{1296} (13d - 16e) \log(|x + 1|)$$

$$- \frac{1}{1296} (13d + 16e) \log(|x - 1|) + \frac{1}{41472} (313d + 512e) \log(|x - 2|)$$

$$+ \frac{35dx^7 + 128ex^6 - 234dx^5 - 960ex^4 + 315dx^3 + 1920ex^2 + 172dx - 800e}{3456(x^4 - 5x^2 + 4)^2}$$

[In] integrate((e\*x+d)/(x^4-5\*x^2+4)^3,x, algorithm="giac")

[Out]  $-1/41472*(313*d - 512*e)*\log(\text{abs}(x + 2)) + 1/1296*(13*d - 16*e)*\log(\text{abs}(x + 1)) - 1/1296*(13*d + 16*e)*\log(\text{abs}(x - 1)) + 1/41472*(313*d + 512*e)*\log(\text{abs}(x - 2)) + 1/3456*(35*d*x^7 + 128*e*x^6 - 234*d*x^5 - 960*e*x^4 + 315*d*x^3 + 1920*e*x^2 + 172*d*x - 800*e)/(x^4 - 5*x^2 + 4)^2$

**Mupad [B] (verification not implemented)**

Time = 0.05 (sec) , antiderivative size = 118, normalized size of antiderivative = 0.83

$$\int \frac{d + ex}{(4 - 5x^2 + x^4)^3} dx = \ln(x + 1) \left( \frac{13d}{1296} - \frac{e}{81} \right) - \ln(x - 1) \left( \frac{13d}{1296} + \frac{e}{81} \right) \\ + \ln(x - 2) \left( \frac{313d}{41472} + \frac{e}{81} \right) - \ln(x + 2) \left( \frac{313d}{41472} - \frac{e}{81} \right) \\ + \frac{\frac{35dx^7}{3456} + \frac{ex^6}{27} - \frac{13dx^5}{192} - \frac{5ex^4}{18} + \frac{35dx^3}{384} + \frac{5ex^2}{9} + \frac{43dx}{864} - \frac{25e}{108}}{x^8 - 10x^6 + 33x^4 - 40x^2 + 16}$$

`[In] int((d + e*x)/(x^4 - 5*x^2 + 4)^3,x)`

```
[Out] log(x + 1)*((13*d)/1296 - e/81) - log(x - 1)*((13*d)/1296 + e/81) + log(x -
2)*((313*d)/41472 + e/81) - log(x + 2)*((313*d)/41472 - e/81) + ((43*d*x)/
864 - (25*e)/108 + (35*d*x^3)/384 - (13*d*x^5)/192 + (35*d*x^7)/3456 + (5*e
*x^2)/9 - (5*e*x^4)/18 + (e*x^6)/27)/(33*x^4 - 40*x^2 - 10*x^6 + x^8 + 16)
```



### 3.43 $\int \frac{d+ex+fx^2}{(4-5x^2+x^4)^3} dx$

Optimal result	481
Rubi [A] (verified)	481
Mathematica [A] (verified)	485
Maple [A] (verified)	485
Fricas [B] (verification not implemented)	486
Sympy [F(-1)]	486
Maxima [A] (verification not implemented)	486
Giac [A] (verification not implemented)	487
Mupad [B] (verification not implemented)	488

#### Optimal result

Integrand size = 23, antiderivative size = 175

$$\int \frac{d+ex+fx^2}{(4-5x^2+x^4)^3} dx = \frac{e(5-2x^2)}{36(4-5x^2+x^4)^2} + \frac{x(17d+20f-(5d+8f)x^2)}{144(4-5x^2+x^4)^2} - \frac{e(5-2x^2)}{54(4-5x^2+x^4)} - \frac{x(59d+380f-35(d+4f)x^2)}{3456(4-5x^2+x^4)} - \frac{(313d+820f)\operatorname{arctanh}\left(\frac{x}{2}\right)}{20736} + \frac{1}{648}(13d+25f)\operatorname{arctanh}(x) - \frac{1}{81}e \log(1-x^2) + \frac{1}{81}e \log(4-x^2)$$

[Out] 1/36\*e\*(-2\*x^2+5)/(x^4-5\*x^2+4)^2+1/144\*x\*(17\*d+20\*f-(5\*d+8\*f)\*x^2)/(x^4-5\*x^2+4)^2-1/54\*e\*(-2\*x^2+5)/(x^4-5\*x^2+4)-1/3456\*x\*(59\*d+380\*f-35\*(d+4\*f)\*x^2)/(x^4-5\*x^2+4)-1/20736\*(313\*d+820\*f)\*arctanh(1/2\*x)+1/648\*(13\*d+25\*f)\*arctanh(x)-1/81\*e\*ln(-x^2+1)+1/81\*e\*ln(-x^2+4)

#### Rubi [A] (verified)

Time = 0.14 (sec) , antiderivative size = 175, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.391$ , Rules used

= {1687, 1192, 1180, 213, 12, 1121, 628, 630, 31}

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^3} dx = -\frac{\operatorname{arctanh}\left(\frac{x}{2}\right)(313d + 820f)}{20736} + \frac{1}{648}\operatorname{arctanh}(x)(13d + 25f) - \frac{x(-35x^2(d + 4f) + 59d + 380f)}{3456(x^4 - 5x^2 + 4)} + \frac{x(-(x^2(5d + 8f)) + 17d + 20f)}{144(x^4 - 5x^2 + 4)^2} - \frac{1}{81}e \log(1 - x^2) + \frac{1}{81}e \log(4 - x^2) - \frac{e(5 - 2x^2)}{54(x^4 - 5x^2 + 4)} + \frac{e(5 - 2x^2)}{36(x^4 - 5x^2 + 4)^2}$$

[In] Int[(d + e\*x + f\*x^2)/(4 - 5\*x^2 + x^4)^3,x]

[Out] (e\*(5 - 2\*x^2))/(36\*(4 - 5\*x^2 + x^4)^2) + (x\*(17\*d + 20\*f - (5\*d + 8\*f)\*x^2))/(144\*(4 - 5\*x^2 + x^4)^2) - (e\*(5 - 2\*x^2))/(54\*(4 - 5\*x^2 + x^4)) - (x\*(59\*d + 380\*f - 35\*(d + 4\*f)\*x^2))/(3456\*(4 - 5\*x^2 + x^4)) - ((313\*d + 820\*f)\*ArcTanh[x/2])/20736 + ((13\*d + 25\*f)\*ArcTanh[x])/648 - (e\*Log[1 - x^2])/81 + (e\*Log[4 - x^2])/81

#### Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

#### Rule 31

Int[((a\_) + (b\_.)\*(x\_))^(p\_), x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

#### Rule 213

Int[((a\_) + (b\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[b, 2])^(p\_ - 1)\*ArcTanh[Rt[b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a, 0] || GtQ[b, 0])

#### Rule 628

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p + 1)/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

#### Rule 630

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[c/q, Int[1/Simp[b/2 - q/2 + c\*x, x], x], x] - Dist[c/q,

```
Int[1/Simp[b/2 + q/2 + c*x, x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && PosQ[b^2 - 4*a*c] && PerfectSquareQ[b^2 - 4*a*c]
```

### Rule 1121

```
Int[(x_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Dist[1/2, Subst[Int[(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]
```

### Rule 1180

```
Int[((d_) + (e_)*(x_)^2)/((a_) + (b_)*(x_)^2 + (c_)*(x_)^4), x_Symbol] :> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2 - q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2 + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

### Rule 1192

```
Int[((d_) + (e_)*(x_)^2)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 + c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && LtQ[p, -1] && IntegerQ[2*p]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]
```

### Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{ex}{(4 - 5x^2 + x^4)^3} dx + \int \frac{d + fx^2}{(4 - 5x^2 + x^4)^3} dx \\ &= \frac{x(17d + 20f - (5d + 8f)x^2)}{144(4 - 5x^2 + x^4)^2} \\ &\quad - \frac{1}{144} \int \frac{-19d + 20f + 5(5d + 8f)x^2}{(4 - 5x^2 + x^4)^2} dx + e \int \frac{x}{(4 - 5x^2 + x^4)^3} dx \end{aligned}$$

$$\begin{aligned}
&= \frac{x(17d + 20f - (5d + 8f)x^2)}{144(4 - 5x^2 + x^4)^2} - \frac{x(59d + 380f - 35(d + 4f)x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad + \frac{\int \frac{3(173d+260f)+105(d+4f)x^2}{4-5x^2+x^4} dx}{10368} + \frac{1}{2} e\text{Subst} \left( \int \frac{1}{(4 - 5x + x^2)^3} dx, x, x^2 \right) \\
&= \frac{e(5 - 2x^2)}{36(4 - 5x^2 + x^4)^2} + \frac{x(17d + 20f - (5d + 8f)x^2)}{144(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{x(59d + 380f - 35(d + 4f)x^2)}{3456(4 - 5x^2 + x^4)} - \frac{1}{6} e\text{Subst} \left( \int \frac{1}{(4 - 5x + x^2)^2} dx, x, x^2 \right) \\
&\quad + \frac{1}{648} (-13d - 25f) \int \frac{1}{-1 + x^2} dx + \frac{(313d + 820f) \int \frac{1}{-4+x^2} dx}{10368} \\
&= \frac{e(5 - 2x^2)}{36(4 - 5x^2 + x^4)^2} + \frac{x(17d + 20f - (5d + 8f)x^2)}{144(4 - 5x^2 + x^4)^2} - \frac{e(5 - 2x^2)}{54(4 - 5x^2 + x^4)} \\
&\quad - \frac{x(59d + 380f - 35(d + 4f)x^2)}{3456(4 - 5x^2 + x^4)} - \frac{(313d + 820f) \tanh^{-1} \left( \frac{x}{2} \right)}{20736} \\
&\quad + \frac{1}{648} (13d + 25f) \tanh^{-1}(x) + \frac{1}{27} e\text{Subst} \left( \int \frac{1}{4 - 5x + x^2} dx, x, x^2 \right) \\
&= \frac{e(5 - 2x^2)}{36(4 - 5x^2 + x^4)^2} + \frac{x(17d + 20f - (5d + 8f)x^2)}{144(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{e(5 - 2x^2)}{54(4 - 5x^2 + x^4)} - \frac{x(59d + 380f - 35(d + 4f)x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad - \frac{(313d + 820f) \tanh^{-1} \left( \frac{x}{2} \right)}{20736} + \frac{1}{648} (13d + 25f) \tanh^{-1}(x) \\
&\quad + \frac{1}{81} e\text{Subst} \left( \int \frac{1}{-4 + x} dx, x, x^2 \right) - \frac{1}{81} e\text{Subst} \left( \int \frac{1}{-1 + x} dx, x, x^2 \right) \\
&= \frac{e(5 - 2x^2)}{36(4 - 5x^2 + x^4)^2} + \frac{x(17d + 20f - (5d + 8f)x^2)}{144(4 - 5x^2 + x^4)^2} - \frac{e(5 - 2x^2)}{54(4 - 5x^2 + x^4)} \\
&\quad - \frac{x(59d + 380f - 35(d + 4f)x^2)}{3456(4 - 5x^2 + x^4)} - \frac{(313d + 820f) \tanh^{-1} \left( \frac{x}{2} \right)}{20736} \\
&\quad + \frac{1}{648} (13d + 25f) \tanh^{-1}(x) - \frac{1}{81} e \log(1 - x^2) + \frac{1}{81} e \log(4 - x^2)
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.09 (sec) , antiderivative size = 161, normalized size of antiderivative = 0.92

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^3} dx$$

$$= \frac{288(17dx + 20fx - 5dx^3 - 8fx^3 + e(20 - 8x^2))}{(4 - 5x^2 + x^4)^2} + \frac{12(64e(-5 + 2x^2) + 20fx(-19 + 7x^2) + dx(-59 + 35x^2))}{4 - 5x^2 + x^4} - 32(13d + 16e + 25f) \log(1$$

[In] Integrate[(d + e\*x + f\*x^2)/(4 - 5\*x^2 + x^4)^3,x]

[Out] ((288\*(17\*d\*x + 20\*f\*x - 5\*d\*x^3 - 8\*f\*x^3 + e\*(20 - 8\*x^2)))/(4 - 5\*x^2 + x^4)^2 + (12\*(64\*e\*(-5 + 2\*x^2) + 20\*f\*x\*(-19 + 7\*x^2) + d\*x\*(-59 + 35\*x^2)))/(4 - 5\*x^2 + x^4) - 32\*(13\*d + 16\*e + 25\*f)\*Log[1 - x] + (313\*d + 512\*e + 820\*f)\*Log[2 - x] + 32\*(13\*d - 16\*e + 25\*f)\*Log[1 + x] + (-313\*d + 512\*e - 820\*f)\*Log[2 + x])/41472

**Maple [A] (verified)**

Time = 0.12 (sec) , antiderivative size = 139, normalized size of antiderivative = 0.79

method	result
norman	$\frac{\left(-\frac{13d}{192} - \frac{5f}{16}\right)x^5 + \left(\frac{35d}{384} + \frac{21f}{32}\right)x^3 + \left(\frac{35d}{3456} + \frac{35f}{864}\right)x^7 + \left(\frac{43d}{864} - \frac{65f}{216}\right)x + \frac{5ex^2}{9} + \frac{ex^6}{27} - \frac{5ex^4}{18} - \frac{25e}{108}}{(x^4 - 5x^2 + 4)^2} + \left(-\frac{313d}{41472} + \frac{e}{81} - \frac{205f}{10368}\right)$
risch	$\frac{\left(-\frac{13d}{192} - \frac{5f}{16}\right)x^5 + \left(\frac{35d}{384} + \frac{21f}{32}\right)x^3 + \left(\frac{35d}{3456} + \frac{35f}{864}\right)x^7 + \left(\frac{43d}{864} - \frac{65f}{216}\right)x + \frac{5ex^2}{9} + \frac{ex^6}{27} - \frac{5ex^4}{18} - \frac{25e}{108}}{(x^4 - 5x^2 + 4)^2} + \frac{313 \ln(2-x)d}{41472} + \frac{\ln(2-x)e}{81} +$
default	$\left(-\frac{313d}{41472} + \frac{e}{81} - \frac{205f}{10368}\right) \ln(x+2) - \frac{-\frac{19d}{6912} + \frac{17e}{3456} - \frac{5f}{576}}{x+2} - \frac{-\frac{d}{1728} + \frac{e}{864} - \frac{f}{432}}{2(x+2)^2} - \frac{-\frac{d}{432} + \frac{e}{144} - \frac{5f}{432}}{x+1} - \frac{\frac{d}{216} - \frac{e}{216} + \frac{f}{216}}{2(x+1)}$
parallelrisch	$-12960f x^5 + 1536e x^6 - 11520e x^4 - 9600e + 27216f x^3 + 420d x^7 + 1680f x^7 + 2064dx + 5008 \ln(x-2)d + 8192 \ln(x-2)e - 6656 \ln(x-2)$

[In] int((f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^3,x,method=\_RETURNVERBOSE)

[Out] ((-13/192\*d-5/16\*f)\*x^5+(35/384\*d+21/32\*f)\*x^3+(35/3456\*d+35/864\*f)\*x^7+(43/864\*d-65/216\*f)\*x+5/9\*e\*x^2+1/27\*e\*x^6-5/18\*e\*x^4-25/108\*e)/(x^4-5\*x^2+4)^2+(-313/41472\*d+1/81\*e-205/10368\*f)\*ln(x+2)+(-13/1296\*d-1/81\*e-25/1296\*f)\*ln(x-1)+(13/1296\*d-1/81\*e+25/1296\*f)\*ln(x+1)+(313/41472\*d+1/81\*e+205/10368\*f)\*ln(x-2)

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 389 vs. 2(156) = 312.

Time = 0.32 (sec) , antiderivative size = 389, normalized size of antiderivative = 2.22

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^3} dx$$

$$= \frac{420(d + 4f)x^7 + 1536ex^6 - 216(13d + 60f)x^5 - 11520ex^4 + 756(5d + 36f)x^3 + 23040ex^2 + 48(43d - 12e + 820f)x - ((313d - 512e + 820f)x^8 - 10(313d - 512e + 820f)x^6 + 33(313d - 512e + 820f)x^4 - 40(313d - 512e + 820f)x^2 + 5008d - 8192e + 13120f)\log(x + 2) + 32((13d - 16e + 25f)x^8 - 10(13d - 16e + 25f)x^6 + 33(13d - 16e + 25f)x^4 - 40(13d - 16e + 25f)x^2 + 208d - 256e + 400f)\log(x + 1) - 32((13d + 16e + 25f)x^8 - 10(13d + 16e + 25f)x^6 + 33(13d + 16e + 25f)x^4 - 40(13d + 16e + 25f)x^2 + 208d + 256e + 400f)\log(x - 1) + ((313d + 512e + 820f)x^8 - 10(313d + 512e + 820f)x^6 + 33(313d + 512e + 820f)x^4 - 40(313d + 512e + 820f)x^2 + 5008d + 8192e + 13120f)\log(x - 2) - 9600e}{(x^8 - 10x^6 + 33x^4 - 40x^2 + 16)}$$

[In] integrate((f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^3,x, algorithm="fricas")

[Out] 1/41472\*(420\*(d + 4\*f)\*x^7 + 1536\*e\*x^6 - 216\*(13\*d + 60\*f)\*x^5 - 11520\*e\*x^4 + 756\*(5\*d + 36\*f)\*x^3 + 23040\*e\*x^2 + 48\*(43\*d - 260\*f)\*x - ((313\*d - 512\*e + 820\*f)\*x^8 - 10\*(313\*d - 512\*e + 820\*f)\*x^6 + 33\*(313\*d - 512\*e + 820\*f)\*x^4 - 40\*(313\*d - 512\*e + 820\*f)\*x^2 + 5008\*d - 8192\*e + 13120\*f)\*log(x + 2) + 32\*((13\*d - 16\*e + 25\*f)\*x^8 - 10\*(13\*d - 16\*e + 25\*f)\*x^6 + 33\*(13\*d - 16\*e + 25\*f)\*x^4 - 40\*(13\*d - 16\*e + 25\*f)\*x^2 + 208\*d - 256\*e + 400\*f)\*log(x + 1) - 32\*((13\*d + 16\*e + 25\*f)\*x^8 - 10\*(13\*d + 16\*e + 25\*f)\*x^6 + 33\*(13\*d + 16\*e + 25\*f)\*x^4 - 40\*(13\*d + 16\*e + 25\*f)\*x^2 + 208\*d + 256\*e + 400\*f)\*log(x - 1) + ((313\*d + 512\*e + 820\*f)\*x^8 - 10\*(313\*d + 512\*e + 820\*f)\*x^6 + 33\*(313\*d + 512\*e + 820\*f)\*x^4 - 40\*(313\*d + 512\*e + 820\*f)\*x^2 + 5008\*d + 8192\*e + 13120\*f)\*log(x - 2) - 9600\*e)/(x^8 - 10\*x^6 + 33\*x^4 - 40\*x^2 + 16)

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^3} dx = \text{Timed out}$$

[In] integrate((f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*3,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.20 (sec) , antiderivative size = 155, normalized size of antiderivative = 0.89

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^3} dx$$

$$= -\frac{1}{41472} (313d - 512e + 820f) \log(x + 2) + \frac{1}{1296} (13d - 16e + 25f) \log(x + 1)$$

$$- \frac{1}{1296} (13d + 16e + 25f) \log(x - 1) + \frac{1}{41472} (313d + 512e + 820f) \log(x - 2)$$

$$+ \frac{35(d + 4f)x^7 + 128ex^6 - 18(13d + 60f)x^5 - 960ex^4 + 63(5d + 36f)x^3 + 1920ex^2 + 4(43d - 260f)x - 800e}{3456(x^8 - 10x^6 + 33x^4 - 40x^2 + 16)}$$

[In] integrate((f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^3,x, algorithm="maxima")

[Out] -1/41472\*(313\*d - 512\*e + 820\*f)\*log(x + 2) + 1/1296\*(13\*d - 16\*e + 25\*f)\*log(x + 1) - 1/1296\*(13\*d + 16\*e + 25\*f)\*log(x - 1) + 1/41472\*(313\*d + 512\*e + 820\*f)\*log(x - 2) + 1/3456\*(35\*(d + 4\*f)\*x^7 + 128\*e\*x^6 - 18\*(13\*d + 60\*f)\*x^5 - 960\*e\*x^4 + 63\*(5\*d + 36\*f)\*x^3 + 1920\*e\*x^2 + 4\*(43\*d - 260\*f)\*x - 800\*e)/(x^8 - 10\*x^6 + 33\*x^4 - 40\*x^2 + 16)

### Giac [A] (verification not implemented)

none

Time = 0.32 (sec) , antiderivative size = 149, normalized size of antiderivative = 0.85

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^3} dx$$

$$= -\frac{1}{41472} (313d - 512e + 820f) \log(|x + 2|) + \frac{1}{1296} (13d - 16e + 25f) \log(|x + 1|)$$

$$- \frac{1}{1296} (13d + 16e + 25f) \log(|x - 1|) + \frac{1}{41472} (313d + 512e + 820f) \log(|x - 2|)$$

$$+ \frac{35dx^7 + 140fx^7 + 128ex^6 - 234dx^5 - 1080fx^5 - 960ex^4 + 315dx^3 + 2268fx^3 + 1920ex^2 + 172dx - 1040fx - 800e}{3456(x^4 - 5x^2 + 4)^2}$$

[In] integrate((f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^3,x, algorithm="giac")

[Out] -1/41472\*(313\*d - 512\*e + 820\*f)\*log(abs(x + 2)) + 1/1296\*(13\*d - 16\*e + 25\*f)\*log(abs(x + 1)) - 1/1296\*(13\*d + 16\*e + 25\*f)\*log(abs(x - 1)) + 1/41472\*(313\*d + 512\*e + 820\*f)\*log(abs(x - 2)) + 1/3456\*(35\*d\*x^7 + 140\*f\*x^7 + 128\*e\*x^6 - 234\*d\*x^5 - 1080\*f\*x^5 - 960\*e\*x^4 + 315\*d\*x^3 + 2268\*f\*x^3 + 1920\*e\*x^2 + 172\*d\*x - 1040\*f\*x - 800\*e)/(x^4 - 5\*x^2 + 4)^2

**Mupad [B] (verification not implemented)**

Time = 0.06 (sec) , antiderivative size = 151, normalized size of antiderivative = 0.86

$$\int \frac{d + ex + fx^2}{(4 - 5x^2 + x^4)^3} dx = \ln(x + 1) \left( \frac{13d}{1296} - \frac{e}{81} + \frac{25f}{1296} \right) - \ln(x - 1) \left( \frac{13d}{1296} + \frac{e}{81} + \frac{25f}{1296} \right) \\ + \ln(x - 2) \left( \frac{313d}{41472} + \frac{e}{81} + \frac{205f}{10368} \right) - \ln(x + 2) \left( \frac{313d}{41472} - \frac{e}{81} + \frac{205f}{10368} \right) \\ + \frac{\left( \frac{35d}{3456} + \frac{35f}{864} \right) x^7 + \frac{ex^6}{27} + \left( -\frac{13d}{192} - \frac{5f}{16} \right) x^5 - \frac{5ex^4}{18} + \left( \frac{35d}{384} + \frac{21f}{32} \right) x^3 + \frac{5ex^2}{9} + \left( \frac{43d}{864} - \frac{65f}{216} \right) x - \frac{25e}{108}}{x^8 - 10x^6 + 33x^4 - 40x^2 + 16}$$

[In] int((d + e\*x + f\*x^2)/(x^4 - 5\*x^2 + 4)^3,x)

[Out] log(x + 1)\*((13\*d)/1296 - e/81 + (25\*f)/1296) - log(x - 1)\*((13\*d)/1296 + e/81 + (25\*f)/1296) + log(x - 2)\*((313\*d)/41472 + e/81 + (205\*f)/10368) - log(x + 2)\*((313\*d)/41472 - e/81 + (205\*f)/10368) + (x^3\*((35\*d)/384 + (21\*f)/32) - x^5\*((13\*d)/192 + (5\*f)/16) - (25\*e)/108 + x^7\*((35\*d)/3456 + (35\*f)/864) + (5\*e\*x^2)/9 - (5\*e\*x^4)/18 + (e\*x^6)/27 + x\*((43\*d)/864 - (65\*f)/216))/(33\*x^4 - 40\*x^2 - 10\*x^6 + x^8 + 16)



$$3.44 \quad \int \frac{d+ex+fx^2+gx^3}{(4-5x^2+x^4)^3} dx$$

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### Optimal result

Integrand size = 28, antiderivative size = 204

$$\int \frac{d+ex+fx^2+gx^3}{(4-5x^2+x^4)^3} dx = \frac{x(17d+20f-(5d+8f)x^2)}{144(4-5x^2+x^4)^2} + \frac{5e+8g-(2e+5g)x^2}{36(4-5x^2+x^4)^2} - \frac{(2e+5g)(5-2x^2)}{108(4-5x^2+x^4)} - \frac{x(59d+380f-35(d+4f)x^2)}{3456(4-5x^2+x^4)} - \frac{(313d+820f)\operatorname{arctanh}\left(\frac{x}{2}\right)}{20736} + \frac{1}{648}(13d+25f)\operatorname{arctanh}(x) - \frac{1}{162}(2e+5g)\log(1-x^2) + \frac{1}{162}(2e+5g)\log(4-x^2)$$

[Out] 1/144\*x\*(17\*d+20\*f-(5\*d+8\*f)\*x^2)/(x^4-5\*x^2+4)^2+1/36\*(5\*e+8\*g-(2\*e+5\*g)\*x^2)/(x^4-5\*x^2+4)^2-1/108\*(2\*e+5\*g)\*(-2\*x^2+5)/(x^4-5\*x^2+4)-1/3456\*x\*(59\*d+380\*f-35\*(d+4\*f)\*x^2)/(x^4-5\*x^2+4)-1/20736\*(313\*d+820\*f)\*arctanh(1/2\*x)+1/648\*(13\*d+25\*f)\*arctanh(x)-1/162\*(2\*e+5\*g)\*ln(-x^2+1)+1/162\*(2\*e+5\*g)\*ln(-x^2+4)

### Rubi [A] (verified)

Time = 0.16 (sec) , antiderivative size = 204, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.321$ , Rules used

= {1687, 1192, 1180, 213, 1261, 652, 628, 630, 31}

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^3} dx = -\frac{\operatorname{arctanh}\left(\frac{x}{2}\right)(313d + 820f)}{20736} + \frac{1}{648}\operatorname{arctanh}(x)(13d + 25f)$$

$$- \frac{x(-35x^2(d + 4f) + 59d + 380f)}{3456(x^4 - 5x^2 + 4)}$$

$$+ \frac{x(-(x^2(5d + 8f)) + 17d + 20f)}{144(x^4 - 5x^2 + 4)^2}$$

$$- \frac{1}{162}(2e + 5g)\log(1 - x^2) + \frac{1}{162}(2e + 5g)\log(4 - x^2)$$

$$- \frac{(5 - 2x^2)(2e + 5g)}{108(x^4 - 5x^2 + 4)} + \frac{-(x^2(2e + 5g)) + 5e + 8g}{36(x^4 - 5x^2 + 4)^2}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)/(4 - 5\*x^2 + x^4)^3,x]

[Out] (x\*(17\*d + 20\*f - (5\*d + 8\*f)\*x^2))/(144\*(4 - 5\*x^2 + x^4)^2) + (5\*e + 8\*g - (2\*e + 5\*g)\*x^2)/(36\*(4 - 5\*x^2 + x^4)^2) - ((2\*e + 5\*g)\*(5 - 2\*x^2))/(10\*8\*(4 - 5\*x^2 + x^4)) - (x\*(59\*d + 380\*f - 35\*(d + 4\*f)\*x^2))/(3456\*(4 - 5\*x^2 + x^4)) - ((313\*d + 820\*f)\*ArcTanh[x/2])/20736 + ((13\*d + 25\*f)\*ArcTanh[x])/648 - ((2\*e + 5\*g)\*Log[1 - x^2])/162 + ((2\*e + 5\*g)\*Log[4 - x^2])/162

### Rule 31

Int[((a\_) + (b\_.)\*(x\_))^(n\_), x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

### Rule 213

Int[((a\_) + (b\_.)\*(x\_)^2)^(n\_), x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[b, 2])^(n\_ - 1)\*ArcTanh[Rt[b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a, 0] || GtQ[b, 0])

### Rule 628

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p + 1)/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

### Rule 630

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(n\_), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[c/q, Int[1/Simp[b/2 - q/2 + c\*x, x], x], x] - Dist[c/q, Int[1/Simp[b/2 + q/2 + c\*x, x], x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[b^2 - 4\*a\*c] && PerfectSquareQ[b^2 - 4\*a\*c]

Rule 652

```
Int[((d_.) + (e_.)*(x_))*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol]
:> Simp[((b*d - 2*a*e + (2*c*d - b*e)*x)/((p + 1)*(b^2 - 4*a*c)))*(a + b*x + c*x^2)^(p + 1), x] - Dist[(2*p + 3)*((2*c*d - b*e)/((p + 1)*(b^2 - 4*a*c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2]
```

Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2 - q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2 + c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

Rule 1192

```
Int[((d_) + (e_.)*(x_)^2)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol]
:> Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 + c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && LtQ[p, -1] && IntegerQ[2*p]
```

Rule 1261

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol]
:> Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] :> Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]
```

Rubi steps

$$\text{integral} = \int \frac{d + fx^2}{(4 - 5x^2 + x^4)^3} dx + \int \frac{x(e + gx^2)}{(4 - 5x^2 + x^4)^3} dx$$

$$\begin{aligned}
&= \frac{x(17d + 20f - (5d + 8f)x^2)}{144(4 - 5x^2 + x^4)^2} - \frac{1}{144} \int \frac{-19d + 20f + 5(5d + 8f)x^2}{(4 - 5x^2 + x^4)^2} dx \\
&\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{(4 - 5x + x^2)^3} dx, x, x^2 \right) \\
&= \frac{x(17d + 20f - (5d + 8f)x^2)}{144(4 - 5x^2 + x^4)^2} + \frac{5e + 8g - (2e + 5g)x^2}{36(4 - 5x^2 + x^4)^2} - \frac{x(59d + 380f - 35(d + 4f)x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad + \frac{\int \frac{3(173d + 260f) + 105(d + 4f)x^2}{4 - 5x^2 + x^4} dx}{10368} + \frac{1}{12} (-2e - 5g) \text{Subst} \left( \int \frac{1}{(4 - 5x + x^2)^2} dx, x, x^2 \right) \\
&= \frac{x(17d + 20f - (5d + 8f)x^2)}{144(4 - 5x^2 + x^4)^2} + \frac{5e + 8g - (2e + 5g)x^2}{36(4 - 5x^2 + x^4)^2} - \frac{(2e + 5g)(5 - 2x^2)}{108(4 - 5x^2 + x^4)} \\
&\quad - \frac{x(59d + 380f - 35(d + 4f)x^2)}{3456(4 - 5x^2 + x^4)} + \frac{1}{648} (-13d - 25f) \int \frac{1}{-1 + x^2} dx \\
&\quad + \frac{(313d + 820f) \int \frac{1}{-4 + x^2} dx}{10368} + \frac{1}{54} (2e + 5g) \text{Subst} \left( \int \frac{1}{4 - 5x + x^2} dx, x, x^2 \right) \\
&= \frac{x(17d + 20f - (5d + 8f)x^2)}{144(4 - 5x^2 + x^4)^2} + \frac{5e + 8g - (2e + 5g)x^2}{36(4 - 5x^2 + x^4)^2} - \frac{(2e + 5g)(5 - 2x^2)}{108(4 - 5x^2 + x^4)} \\
&\quad - \frac{x(59d + 380f - 35(d + 4f)x^2)}{3456(4 - 5x^2 + x^4)} - \frac{(313d + 820f) \tanh^{-1} \left( \frac{x}{2} \right)}{20736} \\
&\quad + \frac{1}{648} (13d + 25f) \tanh^{-1}(x) + \frac{1}{162} (-2e - 5g) \text{Subst} \left( \int \frac{1}{-1 + x} dx, x, x^2 \right) + \frac{1}{162} (2e \\
&\quad\quad\quad + 5g) \text{Subst} \left( \int \frac{1}{-4 + x} dx, x, x^2 \right) \\
&= \frac{x(17d + 20f - (5d + 8f)x^2)}{144(4 - 5x^2 + x^4)^2} + \frac{5e + 8g - (2e + 5g)x^2}{36(4 - 5x^2 + x^4)^2} - \frac{(2e + 5g)(5 - 2x^2)}{108(4 - 5x^2 + x^4)} \\
&\quad - \frac{x(59d + 380f - 35(d + 4f)x^2)}{3456(4 - 5x^2 + x^4)} - \frac{(313d + 820f) \tanh^{-1} \left( \frac{x}{2} \right)}{20736} \\
&\quad + \frac{1}{648} (13d + 25f) \tanh^{-1}(x) - \frac{1}{162} (2e + 5g) \log(1 - x^2) + \frac{1}{162} (2e + 5g) \log(4 - x^2)
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.06 (sec) , antiderivative size = 193, normalized size of antiderivative = 0.95

$$\begin{aligned}
&\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^3} dx \\
&= \frac{288(17dx + 20fx - 5dx^3 - 8fx^3 + e(20 - 8x^2) - 4g(-8 + 5x^2))}{(4 - 5x^2 + x^4)^2} + \frac{12(64e(-5 + 2x^2) + 160g(-5 + 2x^2) + 20fx(-19 + 7x^2) + dx(-59 + 35x^2))}{4 - 5x^2 + x^4} - 32(1
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)/(4 - 5\*x^2 + x^4)^3, x]

```
[Out] ((288*(17*d*x + 20*f*x - 5*d*x^3 - 8*f*x^3 + e*(20 - 8*x^2) - 4*g*(-8 + 5*x^2)))/(4 - 5*x^2 + x^4)^2 + (12*(64*e*(-5 + 2*x^2) + 160*g*(-5 + 2*x^2) + 20*f*x*(-19 + 7*x^2) + d*x*(-59 + 35*x^2)))/(4 - 5*x^2 + x^4) - 32*(13*d + 16*e + 25*f + 40*g)*Log[1 - x] + (313*d + 512*e + 820*f + 1280*g)*Log[2 - x] + 32*(13*d - 16*e + 25*f - 40*g)*Log[1 + x] + (-313*d + 512*e - 820*f + 1280*g)*Log[2 + x])/41472
```

## Maple [A] (verified)

Time = 0.11 (sec) , antiderivative size = 169, normalized size of antiderivative = 0.83

method	result
norman	$\frac{\left(-\frac{13d}{192} - \frac{5f}{16}\right)x^5 + \left(\frac{35d}{384} + \frac{21f}{32}\right)x^3 + \left(\frac{35d}{3456} + \frac{35f}{864}\right)x^7 + \left(\frac{43d}{864} - \frac{65f}{216}\right)x + \left(-\frac{5e}{18} - \frac{25g}{36}\right)x^4 + \left(\frac{5e}{9} + \frac{25g}{18}\right)x^2 + \left(\frac{e}{27} + \frac{5g}{54}\right)x^6 - \frac{25e}{108} - \frac{19g}{27}}{(x^4 - 5x^2 + 4)^2}$
risch	$\frac{\left(-\frac{13d}{192} - \frac{5f}{16}\right)x^5 + \left(\frac{35d}{384} + \frac{21f}{32}\right)x^3 + \left(\frac{35d}{3456} + \frac{35f}{864}\right)x^7 + \left(\frac{43d}{864} - \frac{65f}{216}\right)x + \left(-\frac{5e}{18} - \frac{25g}{36}\right)x^4 + \left(\frac{5e}{9} + \frac{25g}{18}\right)x^2 + \left(\frac{e}{27} + \frac{5g}{54}\right)x^6 - \frac{25e}{108} - \frac{19g}{27}}{(x^4 - 5x^2 + 4)^2}$
default	$\left(-\frac{313d}{41472} + \frac{e}{81} - \frac{205f}{10368} + \frac{5g}{162}\right) \ln(x+2) - \frac{-\frac{19d}{6912} + \frac{17e}{3456} - \frac{5f}{576} + \frac{13g}{864}}{x+2} - \frac{-\frac{d}{1728} + \frac{e}{864} - \frac{f}{432} + \frac{g}{216}}{2(x+2)^2} - \frac{-\frac{d}{432} + \frac{e}{144}}{x+1}$
parallelrisch	Expression too large to display

```
[In] int((g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^3,x,method=_RETURNVERBOSE)
```

```
[Out] ((-13/192*d-5/16*f)*x^5+(35/384*d+21/32*f)*x^3+(35/3456*d+35/864*f)*x^7+(43/864*d-65/216*f)*x+(-5/18*e-25/36*g)*x^4+(5/9*e+25/18*g)*x^2+(1/27*e+5/54*g)*x^6-25/108*e-19/27*g)/(x^4-5*x^2+4)^2+(-313/41472*d+1/81*e-205/10368*f+5/162*g)*ln(x+2)+(-13/1296*d-1/81*e-25/1296*f-5/162*g)*ln(x-1)+(13/1296*d-1/81*e+25/1296*f-5/162*g)*ln(x+1)+(313/41472*d+1/81*e+205/10368*f+5/162*g)*ln(x-2)
```

## Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 470 vs. 2(184) = 368.

Time = 0.50 (sec) , antiderivative size = 470, normalized size of antiderivative = 2.30

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^3} dx$$

$$= \frac{420(d + 4f)x^7 + 768(2e + 5g)x^6 - 216(13d + 60f)x^5 - 5760(2e + 5g)x^4 + 756(5d + 36f)x^3 + 11520(2e + 5g)x^2 + 48(43d - 260f)x - ((313d - 512e + 820f - 1280g)x^8 - 10(313d - 512e$$

```
[In] integrate((g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^3,x, algorithm="fricas")
```

```
[Out] 1/41472*(420*(d + 4*f)*x^7 + 768*(2*e + 5*g)*x^6 - 216*(13*d + 60*f)*x^5 - 5760*(2*e + 5*g)*x^4 + 756*(5*d + 36*f)*x^3 + 11520*(2*e + 5*g)*x^2 + 48*(43*d - 260*f)*x - ((313*d - 512*e + 820*f - 1280*g)*x^8 - 10*(313*d - 512*e
```

+ 820\*f - 1280\*g)\*x^6 + 33\*(313\*d - 512\*e + 820\*f - 1280\*g)\*x^4 - 40\*(313\*d - 512\*e + 820\*f - 1280\*g)\*x^2 + 5008\*d - 8192\*e + 13120\*f - 20480\*g)\*log(x + 2) + 32\*((13\*d - 16\*e + 25\*f - 40\*g)\*x^8 - 10\*(13\*d - 16\*e + 25\*f - 40\*g)\*x^6 + 33\*(13\*d - 16\*e + 25\*f - 40\*g)\*x^4 - 40\*(13\*d - 16\*e + 25\*f - 40\*g)\*x^2 + 208\*d - 256\*e + 400\*f - 640\*g)\*log(x + 1) - 32\*((13\*d + 16\*e + 25\*f + 40\*g)\*x^8 - 10\*(13\*d + 16\*e + 25\*f + 40\*g)\*x^6 + 33\*(13\*d + 16\*e + 25\*f + 40\*g)\*x^4 - 40\*(13\*d + 16\*e + 25\*f + 40\*g)\*x^2 + 208\*d + 256\*e + 400\*f + 640\*g)\*log(x - 1) + ((313\*d + 512\*e + 820\*f + 1280\*g)\*x^8 - 10\*(313\*d + 512\*e + 820\*f + 1280\*g)\*x^6 + 33\*(313\*d + 512\*e + 820\*f + 1280\*g)\*x^4 - 40\*(313\*d + 512\*e + 820\*f + 1280\*g)\*x^2 + 5008\*d + 8192\*e + 13120\*f + 20480\*g)\*log(x - 2) - 9600\*e - 29184\*g)/(x^8 - 10\*x^6 + 33\*x^4 - 40\*x^2 + 16)

## Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^3} dx = \text{Timed out}$$

[In] integrate((g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*3,x)

[Out] Timed out

## Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 188, normalized size of antiderivative = 0.92

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^3} dx = -\frac{1}{41472} (313d - 512e + 820f - 1280g) \log(x + 2) + \frac{1}{1296} (13d - 16e + 25f - 40g) \log(x + 1) - \frac{1}{1296} (13d + 16e + 25f + 40g) \log(x - 1) + \frac{1}{41472} (313d + 512e + 820f + 1280g) \log(x - 2) + \frac{35(d + 4f)x^7 + 64(2e + 5g)x^6 - 18(13d + 60f)x^5 - 480(2e + 5g)x^4 + 63(5d + 36f)x^3 + 960(2e + 5g)x^2 + 4(43d - 260f)x - 800e - 2432g}{3456(x^8 - 10x^6 + 33x^4 - 40x^2 + 16)}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^3,x, algorithm="maxima")

[Out] -1/41472\*(313\*d - 512\*e + 820\*f - 1280\*g)\*log(x + 2) + 1/1296\*(13\*d - 16\*e + 25\*f - 40\*g)\*log(x + 1) - 1/1296\*(13\*d + 16\*e + 25\*f + 40\*g)\*log(x - 1) + 1/41472\*(313\*d + 512\*e + 820\*f + 1280\*g)\*log(x - 2) + 1/3456\*(35\*(d + 4\*f)\*x^7 + 64\*(2\*e + 5\*g)\*x^6 - 18\*(13\*d + 60\*f)\*x^5 - 480\*(2\*e + 5\*g)\*x^4 + 63\*(5\*d + 36\*f)\*x^3 + 960\*(2\*e + 5\*g)\*x^2 + 4\*(43\*d - 260\*f)\*x - 800\*e - 2432\*g)/(x^8 - 10\*x^6 + 33\*x^4 - 40\*x^2 + 16)

**Giac [A] (verification not implemented)**

none

Time = 0.31 (sec) , antiderivative size = 182, normalized size of antiderivative = 0.89

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^3} dx = -\frac{1}{41472} (313d - 512e + 820f - 1280g) \log(|x + 2|) + \frac{1}{1296} (13d - 16e + 25f - 40g) \log(|x + 1|) - \frac{1}{1296} (13d + 16e + 25f + 40g) \log(|x - 1|) + \frac{1}{41472} (313d + 512e + 820f + 1280g) \log(|x - 2|) + \frac{35dx^7 + 140fx^7 + 128ex^6 + 320gx^6 - 234dx^5 - 1080fx^5 - 960ex^4 - 2400gx^4 + 315dx^3 + 2268fx^3 + 1920ex^2 + 4800gx^2 + 172d^2x - 1040f^2x - 800e - 2432g)}{3456(x^4 - 5x^2 + 4)^2}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^3,x, algorithm="giac")

[Out] -1/41472\*(313\*d - 512\*e + 820\*f - 1280\*g)\*log(abs(x + 2)) + 1/1296\*(13\*d - 16\*e + 25\*f - 40\*g)\*log(abs(x + 1)) - 1/1296\*(13\*d + 16\*e + 25\*f + 40\*g)\*log(abs(x - 1)) + 1/41472\*(313\*d + 512\*e + 820\*f + 1280\*g)\*log(abs(x - 2)) + 1/3456\*(35\*d\*x^7 + 140\*f\*x^7 + 128\*e\*x^6 + 320\*g\*x^6 - 234\*d\*x^5 - 1080\*f\*x^5 - 960\*e\*x^4 - 2400\*g\*x^4 + 315\*d\*x^3 + 2268\*f\*x^3 + 1920\*e\*x^2 + 4800\*g\*x^2 + 172\*d\*x - 1040\*f\*x - 800\*e - 2432\*g)/(x^4 - 5\*x^2 + 4)^2

**Mupad [B] (verification not implemented)**

Time = 7.86 (sec) , antiderivative size = 182, normalized size of antiderivative = 0.89

$$\int \frac{d + ex + fx^2 + gx^3}{(4 - 5x^2 + x^4)^3} dx = \frac{\left(\frac{35d}{3456} + \frac{35f}{864}\right)x^7 + \left(\frac{e}{27} + \frac{5g}{54}\right)x^6 + \left(-\frac{13d}{192} - \frac{5f}{16}\right)x^5 + \left(-\frac{5e}{18} - \frac{25g}{36}\right)x^4 + \left(\frac{35d}{384} + \frac{21f}{32}\right)x^3 + \left(\frac{5e}{9} + \frac{25g}{18}\right)x^2}{x^8 - 10x^6 + 33x^4 - 40x^2 + 16} - \ln(x - 1) \left(\frac{13d}{1296} + \frac{e}{81} + \frac{25f}{1296} + \frac{5g}{162}\right) + \ln(x + 1) \left(\frac{13d}{1296} - \frac{e}{81} + \frac{25f}{1296} - \frac{5g}{162}\right) + \ln(x - 2) \left(\frac{313d}{41472} + \frac{e}{81} + \frac{205f}{10368} + \frac{5g}{162}\right) - \ln(x + 2) \left(\frac{313d}{41472} - \frac{e}{81} + \frac{205f}{10368} - \frac{5g}{162}\right)$$

[In] int((d + e\*x + f\*x^2 + g\*x^3)/(x^4 - 5\*x^2 + 4)^3,x)

[Out] (x^3\*((35\*d)/384 + (21\*f)/32) - (19\*g)/27 - x^5\*((13\*d)/192 + (5\*f)/16) - (25\*e)/108 + x^7\*((35\*d)/3456 + (35\*f)/864) + x^2\*((5\*e)/9 + (25\*g)/18) - x^4\*((5\*e)/18 + (25\*g)/36) + x^6\*(e/27 + (5\*g)/54) + x\*((43\*d)/864 - (65\*f)/216))/((33\*x^4 - 40\*x^2 - 10\*x^6 + x^8 + 16) - log(x - 1)\*((13\*d)/1296 + e/81

$$\begin{aligned} & + (25*f)/1296 + (5*g)/162) + \log(x + 1)*((13*d)/1296 - e/81 + (25*f)/1296 \\ & - (5*g)/162) + \log(x - 2)*((313*d)/41472 + e/81 + (205*f)/10368 + (5*g)/162 \\ & ) - \log(x + 2)*((313*d)/41472 - e/81 + (205*f)/10368 - (5*g)/162) \end{aligned}$$



$$3.45 \quad \int \frac{d+ex+fx^2+gx^3+hx^4}{(4-5x^2+x^4)^3} dx$$

Optimal result	497
Rubi [A] (verified)	498
Mathematica [A] (verified)	501
Maple [A] (verified)	502
Fricas [B] (verification not implemented)	502
Sympy [F(-1)]	503
Maxima [A] (verification not implemented)	503
Giac [A] (verification not implemented)	504
Mupad [B] (verification not implemented)	505

### Optimal result

Integrand size = 33, antiderivative size = 224

$$\int \frac{d+ex+fx^2+gx^3+hx^4}{(4-5x^2+x^4)^3} dx = \frac{5e+8g-(2e+5g)x^2}{36(4-5x^2+x^4)^2} + \frac{x(17d+20f+32h-(5d+8f+20h)x^2)}{144(4-5x^2+x^4)^2} - \frac{(2e+5g)(5-2x^2)}{108(4-5x^2+x^4)} - \frac{x(59d+380f+848h-5(7d+28f+64h)x^2)}{3456(4-5x^2+x^4)} - \frac{(313d+820f+1936h)\operatorname{arctanh}\left(\frac{x}{2}\right)}{20736} + \frac{1}{648}(13d+25f+61h)\operatorname{arctanh}(x) - \frac{1}{162}(2e+5g)\log(1-x^2) + \frac{1}{162}(2e+5g)\log(4-x^2)$$

[Out] 1/36\*(5\*e+8\*g-(2\*e+5\*g)\*x^2)/(x^4-5\*x^2+4)^2+1/144\*x\*(17\*d+20\*f+32\*h-(5\*d+8\*f+20\*h)\*x^2)/(x^4-5\*x^2+4)^2-1/108\*(2\*e+5\*g)\*(-2\*x^2+5)/(x^4-5\*x^2+4)-1/3456\*x\*(59\*d+380\*f+848\*h-5\*(7\*d+28\*f+64\*h)\*x^2)/(x^4-5\*x^2+4)-1/20736\*(313\*d+820\*f+1936\*h)\*arctanh(1/2\*x)+1/648\*(13\*d+25\*f+61\*h)\*arctanh(x)-1/162\*(2\*e+5\*g)\*ln(-x^2+1)+1/162\*(2\*e+5\*g)\*ln(-x^2+4)

**Rubi [A] (verified)**

Time = 0.21 (sec) , antiderivative size = 224, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.303$ , Rules used = {1687, 1692, 1192, 1180, 213, 1261, 652, 628, 630, 31}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^3} dx = -\frac{\operatorname{arctanh}\left(\frac{x}{2}\right) (313d + 820f + 1936h)}{20736} + \frac{1}{648} \operatorname{arctanh}(x)(13d + 25f + 61h) - \frac{x(-5x^2(7d + 28f + 64h) + 59d + 380f + 848h)}{3456(x^4 - 5x^2 + 4)} + \frac{x(-(x^2(5d + 8f + 20h)) + 17d + 20f + 32h)}{144(x^4 - 5x^2 + 4)^2} - \frac{1}{162}(2e + 5g) \log(1 - x^2) + \frac{1}{162}(2e + 5g) \log(4 - x^2) - \frac{(5 - 2x^2)(2e + 5g)}{108(x^4 - 5x^2 + 4)} + \frac{-(x^2(2e + 5g)) + 5e + 8g}{36(x^4 - 5x^2 + 4)^2}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(4 - 5\*x^2 + x^4)^3,x]

[Out] (5\*e + 8\*g - (2\*e + 5\*g)\*x^2)/(36\*(4 - 5\*x^2 + x^4)^2) + (x\*(17\*d + 20\*f + 32\*h - (5\*d + 8\*f + 20\*h)\*x^2))/(144\*(4 - 5\*x^2 + x^4)^2) - ((2\*e + 5\*g)\*(5 - 2\*x^2))/(108\*(4 - 5\*x^2 + x^4)) - (x\*(59\*d + 380\*f + 848\*h - 5\*(7\*d + 28\*f + 64\*h)\*x^2))/(3456\*(4 - 5\*x^2 + x^4)) - ((313\*d + 820\*f + 1936\*h)\*ArcTanh[x/2])/20736 + ((13\*d + 25\*f + 61\*h)\*ArcTanh[x])/648 - ((2\*e + 5\*g)\*Log[1 - x^2])/162 + ((2\*e + 5\*g)\*Log[4 - x^2])/162

Rule 31

Int[((a\_) + (b\_.)\*(x\_))^(n\_), x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

Rule 213

Int[((a\_) + (b\_.)\*(x\_)^2)^(n\_), x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[b, 2])^(n-1)\*ArcTanh[Rt[b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (LtQ[a, 0] || GtQ[b, 0])

Rule 628

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p+1)/((p+1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p+3)/((p+1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p+1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

Rule 630

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] := With[{q = Rt[b^2
- 4*a*c, 2]}, Dist[c/q, Int[1/Simp[b/2 - q/2 + c*x, x], x] - Dist[c/q,
Int[1/Simp[b/2 + q/2 + c*x, x], x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2
- 4*a*c, 0] && PosQ[b^2 - 4*a*c] && PerfectSquareQ[b^2 - 4*a*c]
```

Rule 652

```
Int[((d_.) + (e_.)*(x_))*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol
] := Simp[((b*d - 2*a*e + (2*c*d - b*e)*x)/((p + 1)*(b^2 - 4*a*c)))*(a + b*
x + c*x^2)^(p + 1), x] - Dist[(2*p + 3)*((2*c*d - b*e)/((p + 1)*(b^2 - 4*a*
c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] &&
NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2]
```

Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

Rule 1192

```
Int[((d_) + (e_.)*(x_)^2)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symb
ol] := Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 +
c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2
- 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

Rule 1261

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(
p_.), x_Symbol] := Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

## Rule 1692

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := With[{d =
  Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b^2 - 4*a*c)), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a + b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p + 7)*(b*d - 2*a*e)*x^2, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1]
```

## Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{x(e + gx^2)}{(4 - 5x^2 + x^4)^3} dx + \int \frac{d + fx^2 + hx^4}{(4 - 5x^2 + x^4)^3} dx \\
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{144(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{1}{144} \int \frac{-19d + 20f + 32h + 5(5d + 8f + 20h)x^2}{(4 - 5x^2 + x^4)^2} dx \\
&\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{(4 - 5x + x^2)^3} dx, x, x^2 \right) \\
&= \frac{5e + 8g - (2e + 5g)x^2}{36(4 - 5x^2 + x^4)^2} + \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{144(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{x(59d + 380f + 848h - 5(7d + 28f + 64h)x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad + \frac{\int \frac{3(173d + 260f + 656h) + 15(7d + 28f + 64h)x^2}{4 - 5x^2 + x^4} dx}{10368} \\
&\quad + \frac{1}{12} (-2e - 5g) \text{Subst} \left( \int \frac{1}{(4 - 5x + x^2)^2} dx, x, x^2 \right) \\
&= \frac{5e + 8g - (2e + 5g)x^2}{36(4 - 5x^2 + x^4)^2} + \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{144(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{(2e + 5g)(5 - 2x^2)}{108(4 - 5x^2 + x^4)} - \frac{x(59d + 380f + 848h - 5(7d + 28f + 64h)x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad + \frac{1}{54} (2e + 5g) \text{Subst} \left( \int \frac{1}{4 - 5x + x^2} dx, x, x^2 \right) \\
&\quad + \frac{1}{648} (-13d - 25f - 61h) \int \frac{1}{-1 + x^2} dx + \frac{(313d + 820f + 1936h) \int \frac{1}{-4 + x^2} dx}{10368}
\end{aligned}$$

$$\begin{aligned}
&= \frac{5e + 8g - (2e + 5g)x^2}{36(4 - 5x^2 + x^4)^2} + \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{144(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{(2e + 5g)(5 - 2x^2)}{108(4 - 5x^2 + x^4)} - \frac{x(59d + 380f + 848h - 5(7d + 28f + 64h)x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad - \frac{(313d + 820f + 1936h) \tanh^{-1}\left(\frac{x}{2}\right)}{20736} + \frac{1}{648}(13d + 25f + 61h) \tanh^{-1}(x) \\
&\quad + \frac{1}{162}(-2e - 5g) \text{Subst}\left(\int \frac{1}{-1 + x} dx, x, x^2\right) \\
&\quad + \frac{1}{162}(2e + 5g) \text{Subst}\left(\int \frac{1}{-4 + x} dx, x, x^2\right) \\
&= \frac{5e + 8g - (2e + 5g)x^2}{36(4 - 5x^2 + x^4)^2} + \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{144(4 - 5x^2 + x^4)^2} - \frac{(2e + 5g)(5 - 2x^2)}{108(4 - 5x^2 + x^4)} \\
&\quad - \frac{x(59d + 380f + 848h - 5(7d + 28f + 64h)x^2)}{3456(4 - 5x^2 + x^4)} - \frac{(313d + 820f + 1936h) \tanh^{-1}\left(\frac{x}{2}\right)}{20736} \\
&\quad + \frac{1}{648}(13d + 25f + 61h) \tanh^{-1}(x) - \frac{1}{162}(2e + 5g) \log(1 - x^2) + \frac{1}{162}(2e + 5g) \log(4 - x^2)
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.09 (sec) , antiderivative size = 231, normalized size of antiderivative = 1.03

$$\begin{aligned}
&\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^3} dx \\
&= \frac{20e + 32g + 17dx + 20fx + 32hx - 8ex^2 - 20gx^2 - 5dx^3 - 8fx^3 - 20hx^3}{144(4 - 5x^2 + x^4)^2} \\
&\quad + \frac{-320e - 800g - 59dx - 380fx - 848hx + 128ex^2 + 320gx^2 + 35dx^3 + 140fx^3 + 320hx^3}{3456(4 - 5x^2 + x^4)} \\
&\quad + \frac{(-13d - 16e - 25f - 40g - 61h) \log(1 - x)}{1296} \\
&\quad + \frac{(313d + 512e + 820f + 1280g + 1936h) \log(2 - x)}{41472} \\
&\quad + \frac{(13d - 16e + 25f - 40g + 61h) \log(1 + x)}{1296} \\
&\quad + \frac{(-313d + 512e - 820f + 1280g - 1936h) \log(2 + x)}{41472}
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(4 - 5\*x^2 + x^4)^3, x]

[Out] (20\*e + 32\*g + 17\*d\*x + 20\*f\*x + 32\*h\*x - 8\*e\*x^2 - 20\*g\*x^2 - 5\*d\*x^3 - 8\*f\*x^3 - 20\*h\*x^3)/(144\*(4 - 5\*x^2 + x^4)^2) + (-320\*e - 800\*g - 59\*d\*x - 380\*f\*x - 848\*h\*x + 128\*e\*x^2 + 320\*g\*x^2 + 35\*d\*x^3 + 140\*f\*x^3 + 320\*h\*x^3)/(3456\*(4 - 5\*x^2 + x^4)) + ((-13\*d - 16\*e - 25\*f - 40\*g - 61\*h)\*Log[1 - x]

)/1296 + ((313\*d + 512\*e + 820\*f + 1280\*g + 1936\*h)\*Log[2 - x])/41472 + ((13\*d - 16\*e + 25\*f - 40\*g + 61\*h)\*Log[1 + x])/1296 + ((-313\*d + 512\*e - 820\*f + 1280\*g - 1936\*h)\*Log[2 + x])/41472

### Maple [A] (verified)

Time = 0.12 (sec) , antiderivative size = 193, normalized size of antiderivative = 0.86

method	result
norman	$\frac{\left(-\frac{13d}{192} - \frac{5f}{16} - \frac{17h}{24}\right)x^5 + \left(\frac{35d}{384} + \frac{21f}{32} + \frac{35h}{24}\right)x^3 + \left(\frac{35d}{3456} + \frac{35f}{864} + \frac{5h}{54}\right)x^7 + \left(\frac{43d}{864} - \frac{65f}{216} - \frac{41h}{54}\right)x + \left(-\frac{5e}{18} - \frac{25g}{36}\right)x^4 + \left(\frac{5e}{9} + \frac{25g}{18}\right)x^2 + \left(\frac{e}{27} + \frac{g}{9}\right)}{(x^4 - 5x^2 + 4)^2}$
risch	$\frac{\left(-\frac{13d}{192} - \frac{5f}{16} - \frac{17h}{24}\right)x^5 + \left(\frac{35d}{384} + \frac{21f}{32} + \frac{35h}{24}\right)x^3 + \left(\frac{35d}{3456} + \frac{35f}{864} + \frac{5h}{54}\right)x^7 + \left(\frac{43d}{864} - \frac{65f}{216} - \frac{41h}{54}\right)x + \left(-\frac{5e}{18} - \frac{25g}{36}\right)x^4 + \left(\frac{5e}{9} + \frac{25g}{18}\right)x^2 + \left(\frac{e}{27} + \frac{g}{9}\right)}{(x^4 - 5x^2 + 4)^2}$
default	$\left(-\frac{313d}{41472} + \frac{e}{81} - \frac{205f}{10368} + \frac{5g}{162} - \frac{121h}{2592}\right) \ln(x+2) - \frac{-\frac{19d}{6912} + \frac{17e}{3456} - \frac{5f}{576} + \frac{13g}{864} - \frac{11h}{432}}{x+2} - \frac{-\frac{d}{1728} + \frac{e}{864} - \frac{f}{432} + \frac{g}{216} - \frac{h}{108}}{2(x+2)^2}$
parallelrisc	Expression too large to display

[In] int((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^3,x,method=\_RETURNVERBOSE)

[Out] ((-13/192\*d-5/16\*f-17/24\*h)\*x^5+(35/384\*d+21/32\*f+35/24\*h)\*x^3+(35/3456\*d+35/864\*f+5/54\*h)\*x^7+(43/864\*d-65/216\*f-41/54\*h)\*x+(-5/18\*e-25/36\*g)\*x^4+(5/9\*e+25/18\*g)\*x^2+(1/27\*e+5/54\*g)\*x^6-25/108\*e-19/27\*g)/(x^4-5\*x^2+4)^2+(-313/41472\*d+1/81\*e-205/10368\*f+5/162\*g-121/2592\*h)\*ln(x+2)+(-13/1296\*d-1/81\*e-25/1296\*f-5/162\*g-61/1296\*h)\*ln(x-1)+(13/1296\*d-1/81\*e+25/1296\*f-5/162\*g+61/1296\*h)\*ln(x+1)+(313/41472\*d+1/81\*e+205/10368\*f+5/162\*g+121/2592\*h)\*ln(x-2)

### Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 544 vs. 2(204) = 408.

Time = 1.45 (sec) , antiderivative size = 544, normalized size of antiderivative = 2.43

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^3} dx$$

$$= \frac{60(7d + 28f + 64h)x^7 + 768(2e + 5g)x^6 - 216(13d + 60f + 136h)x^5 - 5760(2e + 5g)x^4 + 756(5d + 36f + 80h)x^3 + 11520(2e + 5g)x^2 + 48(43d - 260f - 656h)x - ((313d - 512e + 820f - 1280g + 1936h)x^8 - 10(313d - 512e + 820f - 1280g + 1936h)x^6 + 33(313d - 512e + 820f - 1280g + 1936h)x^4 - 40(313d - 512e + 820f$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^3,x, algorithm="fricas")

[Out] 1/41472\*(60\*(7\*d + 28\*f + 64\*h)\*x^7 + 768\*(2\*e + 5\*g)\*x^6 - 216\*(13\*d + 60\*f + 136\*h)\*x^5 - 5760\*(2\*e + 5\*g)\*x^4 + 756\*(5\*d + 36\*f + 80\*h)\*x^3 + 11520\*(2\*e + 5\*g)\*x^2 + 48\*(43\*d - 260\*f - 656\*h)\*x - ((313\*d - 512\*e + 820\*f - 1280\*g + 1936\*h)\*x^8 - 10\*(313\*d - 512\*e + 820\*f - 1280\*g + 1936\*h)\*x^6 + 33\*(313\*d - 512\*e + 820\*f - 1280\*g + 1936\*h)\*x^4 - 40\*(313\*d - 512\*e + 820\*f

- 1280\*g + 1936\*h)\*x^2 + 5008\*d - 8192\*e + 13120\*f - 20480\*g + 30976\*h)\*log(x + 2) + 32\*((13\*d - 16\*e + 25\*f - 40\*g + 61\*h)\*x^8 - 10\*(13\*d - 16\*e + 25\*f - 40\*g + 61\*h)\*x^6 + 33\*(13\*d - 16\*e + 25\*f - 40\*g + 61\*h)\*x^4 - 40\*(13\*d - 16\*e + 25\*f - 40\*g + 61\*h)\*x^2 + 208\*d - 256\*e + 400\*f - 640\*g + 976\*h)\*log(x + 1) - 32\*((13\*d + 16\*e + 25\*f + 40\*g + 61\*h)\*x^8 - 10\*(13\*d + 16\*e + 25\*f + 40\*g + 61\*h)\*x^6 + 33\*(13\*d + 16\*e + 25\*f + 40\*g + 61\*h)\*x^4 - 40\*(13\*d + 16\*e + 25\*f + 40\*g + 61\*h)\*x^2 + 208\*d + 256\*e + 400\*f + 640\*g + 976\*h)\*log(x - 1) + ((313\*d + 512\*e + 820\*f + 1280\*g + 1936\*h)\*x^8 - 10\*(313\*d + 512\*e + 820\*f + 1280\*g + 1936\*h)\*x^6 + 33\*(313\*d + 512\*e + 820\*f + 1280\*g + 1936\*h)\*x^4 - 40\*(313\*d + 512\*e + 820\*f + 1280\*g + 1936\*h)\*x^2 + 5008\*d + 8192\*e + 13120\*f + 20480\*g + 30976\*h)\*log(x - 2) - 9600\*e - 29184\*g)/(x^8 - 10\*x^6 + 33\*x^4 - 40\*x^2 + 16)

### Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^3} dx = \text{Timed out}$$

[In] integrate((h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*3,x)

[Out] Timed out

### Maxima [A] (verification not implemented)

none

Time = 0.20 (sec) , antiderivative size = 214, normalized size of antiderivative = 0.96

$$\begin{aligned} & \int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^3} dx \\ &= -\frac{1}{41472} (313d - 512e + 820f - 1280g + 1936h) \log(x + 2) \\ & \quad + \frac{1}{1296} (13d - 16e + 25f - 40g + 61h) \log(x + 1) \\ & \quad - \frac{1}{1296} (13d + 16e + 25f + 40g + 61h) \log(x - 1) \\ & \quad + \frac{1}{41472} (313d + 512e + 820f + 1280g + 1936h) \log(x - 2) \\ & \quad + \frac{5(7d + 28f + 64h)x^7 + 64(2e + 5g)x^6 - 18(13d + 60f + 136h)x^5 - 480(2e + 5g)x^4 + 63(5d + 3g)}{3456(x^8 - 10x^6 + 33x^4 - 40x^2 + 16)} \end{aligned}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^3,x, algorithm="maxima")

[Out] -1/41472\*(313\*d - 512\*e + 820\*f - 1280\*g + 1936\*h)\*log(x + 2) + 1/1296\*(13\*d - 16\*e + 25\*f - 40\*g + 61\*h)\*log(x + 1) - 1/1296\*(13\*d + 16\*e + 25\*f + 40

\*g + 61\*h)\*log(x - 1) + 1/41472\*(313\*d + 512\*e + 820\*f + 1280\*g + 1936\*h)\*log(x - 2) + 1/3456\*(5\*(7\*d + 28\*f + 64\*h)\*x^7 + 64\*(2\*e + 5\*g)\*x^6 - 18\*(13\*d + 60\*f + 136\*h)\*x^5 - 480\*(2\*e + 5\*g)\*x^4 + 63\*(5\*d + 36\*f + 80\*h)\*x^3 + 960\*(2\*e + 5\*g)\*x^2 + 4\*(43\*d - 260\*f - 656\*h)\*x - 800\*e - 2432\*g)/(x^8 - 10\*x^6 + 33\*x^4 - 40\*x^2 + 16)

## Giac [A] (verification not implemented)

none

Time = 0.36 (sec) , antiderivative size = 216, normalized size of antiderivative = 0.96

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^3} dx$$

$$= -\frac{1}{41472} (313d - 512e + 820f - 1280g + 1936h) \log(|x + 2|)$$

$$+ \frac{1}{1296} (13d - 16e + 25f - 40g + 61h) \log(|x + 1|)$$

$$- \frac{1}{1296} (13d + 16e + 25f + 40g + 61h) \log(|x - 1|)$$

$$+ \frac{1}{41472} (313d + 512e + 820f + 1280g + 1936h) \log(|x - 2|)$$

$$+ \frac{35dx^7 + 140fx^7 + 320hx^7 + 128ex^6 + 320gx^6 - 234dx^5 - 1080fx^5 - 2448hx^5 - 960ex^4 - 2400gx^4}{3456(x^4 - 5x^2 + 4)^3}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^3,x, algorithm="giac")

[Out] -1/41472\*(313\*d - 512\*e + 820\*f - 1280\*g + 1936\*h)\*log(abs(x + 2)) + 1/1296\*(13\*d - 16\*e + 25\*f - 40\*g + 61\*h)\*log(abs(x + 1)) - 1/1296\*(13\*d + 16\*e + 25\*f + 40\*g + 61\*h)\*log(abs(x - 1)) + 1/41472\*(313\*d + 512\*e + 820\*f + 1280\*g + 1936\*h)\*log(abs(x - 2)) + 1/3456\*(35\*d\*x^7 + 140\*f\*x^7 + 320\*h\*x^7 + 128\*e\*x^6 + 320\*g\*x^6 - 234\*d\*x^5 - 1080\*f\*x^5 - 2448\*h\*x^5 - 960\*e\*x^4 - 2400\*g\*x^4 + 315\*d\*x^3 + 2268\*f\*x^3 + 5040\*h\*x^3 + 1920\*e\*x^2 + 4800\*g\*x^2 + 172\*d\*x - 1040\*f\*x - 2624\*h\*x - 800\*e - 2432\*g)/(x^4 - 5\*x^2 + 4)^2



**Mupad [B] (verification not implemented)**

Time = 0.15 (sec) , antiderivative size = 209, normalized size of antiderivative = 0.93

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(4 - 5x^2 + x^4)^3} dx = \ln(x + 1) \left( \frac{13d}{1296} - \frac{e}{81} + \frac{25f}{1296} - \frac{5g}{162} + \frac{61h}{1296} \right) - \ln(x - 1) \left( \frac{13d}{1296} + \frac{e}{81} + \frac{25f}{1296} + \frac{5g}{162} + \frac{61h}{1296} \right) - \frac{\left( -\frac{35d}{3456} - \frac{35f}{864} - \frac{5h}{54} \right) x^7 + \left( -\frac{e}{27} - \frac{5g}{54} \right) x^6 + \left( \frac{13d}{192} + \frac{5f}{16} + \frac{17h}{24} \right) x^5 + \left( \frac{5e}{18} + \frac{25g}{36} \right) x^4 + \left( -\frac{35d}{384} - \frac{21f}{32} - \frac{35h}{24} \right) x^3 + \left( \frac{13d}{192} + \frac{5f}{16} + \frac{17h}{24} \right) x^2 + \left( \frac{5e}{18} + \frac{25g}{36} \right) x + \left( -\frac{35d}{384} - \frac{21f}{32} - \frac{35h}{24} \right)}{x^8 - 10x^6 + 33x^4 - 40x^2 + 16} + \ln(x - 2) \left( \frac{313d}{41472} + \frac{e}{81} + \frac{205f}{10368} + \frac{5g}{162} + \frac{121h}{2592} \right) - \ln(x + 2) \left( \frac{313d}{41472} - \frac{e}{81} + \frac{205f}{10368} - \frac{5g}{162} + \frac{121h}{2592} \right)$$

`[In] int((d + e*x + f*x^2 + g*x^3 + h*x^4)/(x^4 - 5*x^2 + 4)^3,x)`

```
[Out] log(x + 1)*((13*d)/1296 - e/81 + (25*f)/1296 - (5*g)/162 + (61*h)/1296) - 1
log(x - 1)*((13*d)/1296 + e/81 + (25*f)/1296 + (5*g)/162 + (61*h)/1296) - ((
25*e)/108 + (19*g)/27 - x^2*((5*e)/9 + (25*g)/18) + x^4*((5*e)/18 + (25*g)/
36) - x^6*(e/27 + (5*g)/54) + x*((65*f)/216 - (43*d)/864 + (41*h)/54) + x^5
*((13*d)/192 + (5*f)/16 + (17*h)/24) - x^3*((35*d)/384 + (21*f)/32 + (35*h)
/24) - x^7*((35*d)/3456 + (35*f)/864 + (5*h)/54))/(33*x^4 - 40*x^2 - 10*x^6
+ x^8 + 16) + log(x - 2)*((313*d)/41472 + e/81 + (205*f)/10368 + (5*g)/162
+ (121*h)/2592) - log(x + 2)*((313*d)/41472 - e/81 + (205*f)/10368 - (5*g)
/162 + (121*h)/2592)
```

$$3.46 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(4-5x^2+x^4)^3} dx$$

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### Optimal result

Integrand size = 38, antiderivative size = 239

$$\int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(4-5x^2+x^4)^3} dx = \frac{x(17d+20f+32h-(5d+8f+20h)x^2)}{144(4-5x^2+x^4)^2} + \frac{5e+8g+20i-(2e+5g+17i)x^2}{36(4-5x^2+x^4)^2} - \frac{(2e+5g+11i)(5-2x^2)}{108(4-5x^2+x^4)} - \frac{x(59d+380f+848h-5(7d+28f+64h)x^2)}{3456(4-5x^2+x^4)} - \frac{(313d+820f+1936h)\operatorname{arctanh}\left(\frac{x}{2}\right)}{20736} + \frac{1}{648}(13d+25f+61h)\operatorname{arctanh}(x) - \frac{1}{162}(2e+5g+11i)\log(1-x^2) + \frac{1}{162}(2e+5g+11i)\log(4-x^2)$$

```
[Out] 1/144*x*(17*d+20*f+32*h-(5*d+8*f+20*h)*x^2)/(x^4-5*x^2+4)^2+1/36*(5*e+8*g+20*i-(2*e+5*g+17*i)*x^2)/(x^4-5*x^2+4)^2-1/108*(2*e+5*g+11*i)*(-2*x^2+5)/(x^4-5*x^2+4)-1/3456*x*(59*d+380*f+848*h-5*(7*d+28*f+64*h)*x^2)/(x^4-5*x^2+4)-1/20736*(313*d+820*f+1936*h)*arctanh(1/2*x)+1/648*(13*d+25*f+61*h)*arctanh(x)-1/162*(2*e+5*g+11*i)*ln(-x^2+1)+1/162*(2*e+5*g+11*i)*ln(-x^2+4)
```

**Rubi [A] (verified)**

Time = 0.22 (sec) , antiderivative size = 239, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 11,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.289$ , Rules used = {1687, 1692, 1192, 1180, 213, 1677, 1674, 12, 628, 630, 31}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^3} dx = -\frac{\operatorname{arctanh}\left(\frac{x}{2}\right) (313d + 820f + 1936h)}{20736} + \frac{1}{648} \operatorname{arctanh}(x)(13d + 25f + 61h) - \frac{x(-5x^2(7d + 28f + 64h) + 59d + 380f + 848h)}{3456(x^4 - 5x^2 + 4)} + \frac{x(-(x^2(5d + 8f + 20h)) + 17d + 20f + 32h)}{144(x^4 - 5x^2 + 4)^2} - \frac{1}{162} \log(1 - x^2)(2e + 5g + 11i) + \frac{1}{162} \log(4 - x^2)(2e + 5g + 11i) - \frac{(5 - 2x^2)(2e + 5g + 11i)}{108(x^4 - 5x^2 + 4)} + \frac{-(x^2(2e + 5g + 17i)) + 5e + 8g + 20i}{36(x^4 - 5x^2 + 4)^2}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(4 - 5\*x^2 + x^4)^3,x]

[Out] (x\*(17\*d + 20\*f + 32\*h - (5\*d + 8\*f + 20\*h)\*x^2))/(144\*(4 - 5\*x^2 + x^4)^2) + (5\*e + 8\*g + 20\*i - (2\*e + 5\*g + 17\*i)\*x^2)/(36\*(4 - 5\*x^2 + x^4)^2) - ((2\*e + 5\*g + 11\*i)\*(5 - 2\*x^2))/(108\*(4 - 5\*x^2 + x^4)) - (x\*(59\*d + 380\*f + 848\*h - 5\*(7\*d + 28\*f + 64\*h)\*x^2))/(3456\*(4 - 5\*x^2 + x^4)) - ((313\*d + 820\*f + 1936\*h)\*ArcTanh[x/2])/20736 + ((13\*d + 25\*f + 61\*h)\*ArcTanh[x])/648 - ((2\*e + 5\*g + 11\*i)\*Log[1 - x^2])/162 + ((2\*e + 5\*g + 11\*i)\*Log[4 - x^2])/162

Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_) /; FreeQ[b, x]]

Rule 31

Int[((a\_) + (b\_.)\*(x\_))^-1, x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

Rule 213

Int[((a\_) + (b\_.)\*(x\_)^2)^-1, x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[b, 2])^-1)\*ArcTanh[Rt[b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] &&

(LtQ[a, 0] || GtQ[b, 0])

### Rule 628

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := Simp[(b + 2*c*x)
*((a + b*x + c*x^2)^(p + 1)/((p + 1)*(b^2 - 4*a*c))), x] - Dist[2*c*((2*p +
3)/((p + 1)*(b^2 - 4*a*c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; Free
Q[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && Int
egerQ[4*p]
```

### Rule 630

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] := With[{q = Rt[b^2
- 4*a*c, 2]}, Dist[c/q, Int[1/Simp[b/2 - q/2 + c*x, x], x], x] - Dist[c/q,
Int[1/Simp[b/2 + q/2 + c*x, x], x], x]] /; FreeQ[{a, b, c}, x] && NeQ[b^2
- 4*a*c, 0] && PosQ[b^2 - 4*a*c] && PerfectSquareQ[b^2 - 4*a*c]
```

### Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

### Rule 1192

```
Int[((d_) + (e_.)*(x_)^2)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symb
ol] := Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 +
c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2
- 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

### Rule 1674

```
Int[(Pq_)*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := With[{Q =
PolynomialQuotient[Pq, a + b*x + c*x^2, x], f = Coeff[PolynomialRemainder[P
q, a + b*x + c*x^2, x], x, 0], g = Coeff[PolynomialRemainder[Pq, a + b*x +
c*x^2, x], x, 1]}, Simp[(b*f - 2*a*g + (2*c*f - b*g)*x)*((a + b*x + c*x^2)^(
p + 1)/((p + 1)*(b^2 - 4*a*c))), x] + Dist[1/((p + 1)*(b^2 - 4*a*c)), Int[
(a + b*x + c*x^2)^(p + 1)*ExpandToSum[(p + 1)*(b^2 - 4*a*c)*Q - (2*p + 3)*(
2*c*f - b*g), x], x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && NeQ[b^2
- 4*a*c, 0] && LtQ[p, -1]
```

Rule 1677

```
Int[(Pq_)*(x_)^(m_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] :
> Dist[1/2, Subst[Int[x^((m - 1)/2)*SubstFor[x^2, Pq, x]*(a + b*x + c*x^2)^
p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x^2] && IntegerQ[
(m - 1)/2]
```

Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

Rule 1692

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := With[{d =
Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[Poly
nomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^
4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b
^2 - 4*a*c)), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*
x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a
+ b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p
+ 7)*(b*d - 2*a*e)*x^2, x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^
2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d + fx^2 + hx^4}{(4 - 5x^2 + x^4)^3} dx + \int \frac{x(e + gx^2 + ix^4)}{(4 - 5x^2 + x^4)^3} dx \\
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{144(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{1}{144} \int \frac{-19d + 20f + 32h + 5(5d + 8f + 20h)x^2}{(4 - 5x^2 + x^4)^2} dx \\
&\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx + ix^2}{(4 - 5x + x^2)^3} dx, x, x^2 \right) \\
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{144(4 - 5x^2 + x^4)^2} + \frac{5e + 8g + 20i - (2e + 5g + 17i)x^2}{36(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{x(59d + 380f + 848h - 5(7d + 28f + 64h)x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad + \frac{\int \frac{3(173d + 260f + 656h) + 15(7d + 28f + 64h)x^2}{4 - 5x^2 + x^4} dx}{10368} - \frac{1}{36} \text{Subst} \left( \int \frac{3(2e + 5g + 11i)}{(4 - 5x + x^2)^2} dx, x, x^2 \right)
\end{aligned}$$

$$\begin{aligned}
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{144(4 - 5x^2 + x^4)^2} + \frac{5e + 8g + 20i - (2e + 5g + 17i)x^2}{36(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{x(59d + 380f + 848h - 5(7d + 28f + 64h)x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad + \frac{1}{648}(-13d - 25f - 61h) \int \frac{1}{-1 + x^2} dx + \frac{(313d + 820f + 1936h) \int \frac{1}{-4+x^2} dx}{10368} \\
&\quad - \frac{1}{12}(2e + 5g + 11i) \text{Subst} \left( \int \frac{1}{(4 - 5x + x^2)^2} dx, x, x^2 \right) \\
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{144(4 - 5x^2 + x^4)^2} + \frac{5e + 8g + 20i - (2e + 5g + 17i)x^2}{36(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{(2e + 5g + 11i)(5 - 2x^2)}{108(4 - 5x^2 + x^4)} - \frac{x(59d + 380f + 848h - 5(7d + 28f + 64h)x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad - \frac{(313d + 820f + 1936h) \tanh^{-1} \left( \frac{x}{2} \right)}{20736} + \frac{1}{648}(13d + 25f + 61h) \tanh^{-1}(x) \\
&\quad - \frac{1}{54}(-2e - 5g - 11i) \text{Subst} \left( \int \frac{1}{4 - 5x + x^2} dx, x, x^2 \right) \\
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{144(4 - 5x^2 + x^4)^2} + \frac{5e + 8g + 20i - (2e + 5g + 17i)x^2}{36(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{(2e + 5g + 11i)(5 - 2x^2)}{108(4 - 5x^2 + x^4)} - \frac{x(59d + 380f + 848h - 5(7d + 28f + 64h)x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad - \frac{(313d + 820f + 1936h) \tanh^{-1} \left( \frac{x}{2} \right)}{20736} + \frac{1}{648}(13d + 25f + 61h) \tanh^{-1}(x) \\
&\quad - \frac{1}{162}(-2e - 5g - 11i) \text{Subst} \left( \int \frac{1}{-4 + x} dx, x, x^2 \right) \\
&\quad - \frac{1}{162}(2e + 5g + 11i) \text{Subst} \left( \int \frac{1}{-1 + x} dx, x, x^2 \right) \\
&= \frac{x(17d + 20f + 32h - (5d + 8f + 20h)x^2)}{144(4 - 5x^2 + x^4)^2} + \frac{5e + 8g + 20i - (2e + 5g + 17i)x^2}{36(4 - 5x^2 + x^4)^2} \\
&\quad - \frac{(2e + 5g + 11i)(5 - 2x^2)}{108(4 - 5x^2 + x^4)} - \frac{x(59d + 380f + 848h - 5(7d + 28f + 64h)x^2)}{3456(4 - 5x^2 + x^4)} \\
&\quad - \frac{(313d + 820f + 1936h) \tanh^{-1} \left( \frac{x}{2} \right)}{20736} + \frac{1}{648}(13d + 25f + 61h) \tanh^{-1}(x) \\
&\quad - \frac{1}{162}(2e + 5g + 11i) \log(1 - x^2) + \frac{1}{162}(2e + 5g + 11i) \log(4 - x^2)
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.09 (sec) , antiderivative size = 261, normalized size of antiderivative = 1.09

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^3} dx$$

$$= \frac{20e + 32g + 80i + 17dx + 20fx + 32hx - 8ex^2 - 20gx^2 - 68ix^2 - 5dx^3 - 8fx^3 - 20hx^3}{144(4 - 5x^2 + x^4)^2}$$

$$+ \frac{-320e - 800g - 1760i - 59dx - 380fx - 848hx + 128ex^2 + 320gx^2 + 704ix^2 + 35dx^3 + 140fx^3 + 320hx^3}{3456(4 - 5x^2 + x^4)}$$

$$+ \frac{(-13d - 16e - 25f - 40g - 61h - 88i) \log(1 - x)}{1296}$$

$$+ \frac{(313d + 512e + 820f + 1280g + 1936h + 2816i) \log(2 - x)}{41472}$$

$$+ \frac{(13d - 16e + 25f - 40g + 61h - 88i) \log(1 + x)}{1296}$$

$$+ \frac{(-313d + 512e - 820f + 1280g - 1936h + 2816i) \log(2 + x)}{41472}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(4 - 5\*x^2 + x^4)^3,x]

```
[Out] (20*e + 32*g + 80*i + 17*d*x + 20*f*x + 32*h*x - 8*e*x^2 - 20*g*x^2 - 68*i*x^2 - 5*d*x^3 - 8*f*x^3 - 20*h*x^3)/(144*(4 - 5*x^2 + x^4)^2) + (-320*e - 800*g - 1760*i - 59*d*x - 380*f*x - 848*h*x + 128*e*x^2 + 320*g*x^2 + 704*i*x^2 + 35*d*x^3 + 140*f*x^3 + 320*h*x^3)/(3456*(4 - 5*x^2 + x^4)) + ((-13*d - 16*e - 25*f - 40*g - 61*h - 88*i)*Log[1 - x])/1296 + ((313*d + 512*e + 820*f + 1280*g + 1936*h + 2816*i)*Log[2 - x])/41472 + ((13*d - 16*e + 25*f - 40*g + 61*h - 88*i)*Log[1 + x])/1296 + ((-313*d + 512*e - 820*f + 1280*g - 1936*h + 2816*i)*Log[2 + x])/41472
```

**Maple [A] (verified)**

Time = 0.13 (sec) , antiderivative size = 217, normalized size of antiderivative = 0.91

method	result
norman	$\frac{\left(-\frac{13d}{192} - \frac{5f}{16} - \frac{17h}{24}\right)x^5 + \left(\frac{35d}{384} + \frac{21f}{32} + \frac{35h}{24}\right)x^3 + \left(\frac{35d}{3456} + \frac{35f}{864} + \frac{5h}{54}\right)x^7 + \left(\frac{43d}{864} - \frac{65f}{216} - \frac{41h}{54}\right)x + \left(-\frac{5e}{18} - \frac{25g}{36} - \frac{55i}{36}\right)x^4 + \left(\frac{5e}{9} + \frac{25g}{18} + \frac{26i}{9}\right)x^2}{(x^4 - 5x^2 + 4)^2}$
default	$\left(-\frac{313d}{41472} + \frac{e}{81} - \frac{205f}{10368} + \frac{5g}{162} - \frac{121h}{2592} + \frac{11i}{162}\right) \ln(x + 2) - \frac{-\frac{19d}{6912} + \frac{17e}{3456} - \frac{5f}{576} + \frac{13g}{864} - \frac{11h}{432} + \frac{i}{24}}{x+2} - \frac{-\frac{d}{1728} + \frac{e}{864}}{9}$
risch	$-\frac{11 \ln(x+1)i}{162} - \frac{205 \ln(x+2)f}{10368} - \frac{25 \ln(1-x)f}{1296} + \frac{25 \ln(x+1)f}{1296} + \frac{205 \ln(2-x)f}{10368} + \frac{313 \ln(2-x)d}{41472} + \frac{\ln(2-x)e}{81} - \frac{313i}{4}$
parallelrisch	Expression too large to display

```
[In] int((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^3,x,method=_RETURNVERBOSE)
```

```
[Out] ((-13/192*d-5/16*f-17/24*h)*x^5+(35/384*d+21/32*f+35/24*h)*x^3+(35/3456*d+35/864*f+5/54*h)*x^7+(43/864*d-65/216*f-41/54*h)*x+(-5/18*e-25/36*g-55/36*i)*x^4+(5/9*e+25/18*g+26/9*i)*x^2+(1/27*e+5/54*g+11/54*i)*x^6-25/108*e-19/27*g-40/27*i)/(x^4-5*x^2+4)^2+(-313/41472*d+1/81*e-205/10368*f+5/162*g-121/2592*h+11/162*i)*ln(x+2)+(-13/1296*d-1/81*e-25/1296*f-5/162*g-61/1296*h-11/162*i)*ln(x-1)+(13/1296*d-1/81*e+25/1296*f-5/162*g+61/1296*h-11/162*i)*ln(x+1)+(313/41472*d+1/81*e+205/10368*f+5/162*g+121/2592*h+11/162*i)*ln(x-2)
```

## Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 616 vs. 2(219) = 438.

Time = 6.60 (sec) , antiderivative size = 616, normalized size of antiderivative = 2.58

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^3} dx$$

$$= \frac{60(7d + 28f + 64h)x^7 + 768(2e + 5g + 11i)x^6 - 216(13d + 60f + 136h)x^5 - 5760(2e + 5g + 11i)x^4 + 756(5d + 36f + 80h)x^3 + 2304(10e + 25g + 52i)x^2 + 48(43d - 260f - 656h)x - ((313d - 512e + 820f - 1280g + 1936h - 2816i)x^8 - 10(313d - 512e + 820f - 1280g + 1936h - 2816i)x^6 + 33(313d - 512e + 820f - 1280g + 1936h - 2816i)x^4 - 40(313d - 512e + 820f - 1280g + 1936h - 2816i)x^2 + 5008d - 8192e + 13120f - 20480g + 30976h - 45056i)\log(x + 2) + 32((13d - 16e + 25f - 40g + 61h - 88i)x^8 - 10(13d - 16e + 25f - 40g + 61h - 88i)x^6 + 33(13d - 16e + 25f - 40g + 61h - 88i)x^4 - 40(13d - 16e + 25f - 40g + 61h - 88i)x^2 + 208d - 256e + 400f - 640g + 976h - 1408i)\log(x + 1) - 32((13d + 16e + 25f + 40g + 61h + 88i)x^8 - 10(13d + 16e + 25f + 40g + 61h + 88i)x^6 + 33(13d + 16e + 25f + 40g + 61h + 88i)x^4 - 40(13d + 16e + 25f + 40g + 61h + 88i)x^2 + 208d + 256e + 400f + 640g + 976h + 1408i)\log(x - 1) + ((313d + 512e + 820f + 1280g + 1936h + 2816i)x^8 - 10(313d + 512e + 820f + 1280g + 1936h + 2816i)x^6 + 33(313d + 512e + 820f + 1280g + 1936h + 2816i)x^4 - 40(313d + 512e + 820f + 1280g + 1936h + 2816i)x^2 + 5008d + 8192e + 13120f + 20480g + 30976h + 45056i)\log(x - 2) - 9600e - 29184g - 61440i)/(x^8 - 10x^6 + 33x^4 - 40x^2 + 16)}$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^3,x, algorithm="fricas")
```

```
[Out] 1/41472*(60*(7*d + 28*f + 64*h)*x^7 + 768*(2*e + 5*g + 11*i)*x^6 - 216*(13*d + 60*f + 136*h)*x^5 - 5760*(2*e + 5*g + 11*i)*x^4 + 756*(5*d + 36*f + 80*h)*x^3 + 2304*(10*e + 25*g + 52*i)*x^2 + 48*(43*d - 260*f - 656*h)*x - ((313*d - 512*e + 820*f - 1280*g + 1936*h - 2816*i)*x^8 - 10*(313*d - 512*e + 820*f - 1280*g + 1936*h - 2816*i)*x^6 + 33*(313*d - 512*e + 820*f - 1280*g + 1936*h - 2816*i)*x^4 - 40*(313*d - 512*e + 820*f - 1280*g + 1936*h - 2816*i)*x^2 + 5008*d - 8192*e + 13120*f - 20480*g + 30976*h - 45056*i)*log(x + 2) + 32*((13*d - 16*e + 25*f - 40*g + 61*h - 88*i)*x^8 - 10*(13*d - 16*e + 25*f - 40*g + 61*h - 88*i)*x^6 + 33*(13*d - 16*e + 25*f - 40*g + 61*h - 88*i)*x^4 - 40*(13*d - 16*e + 25*f - 40*g + 61*h - 88*i)*x^2 + 208*d - 256*e + 400*f - 640*g + 976*h - 1408*i)*log(x + 1) - 32*((13*d + 16*e + 25*f + 40*g + 61*h + 88*i)*x^8 - 10*(13*d + 16*e + 25*f + 40*g + 61*h + 88*i)*x^6 + 33*(13*d + 16*e + 25*f + 40*g + 61*h + 88*i)*x^4 - 40*(13*d + 16*e + 25*f + 40*g + 61*h + 88*i)*x^2 + 208*d + 256*e + 400*f + 640*g + 976*h + 1408*i)*log(x - 1) + ((313*d + 512*e + 820*f + 1280*g + 1936*h + 2816*i)*x^8 - 10*(313*d + 512*e + 820*f + 1280*g + 1936*h + 2816*i)*x^6 + 33*(313*d + 512*e + 820*f + 1280*g + 1936*h + 2816*i)*x^4 - 40*(313*d + 512*e + 820*f + 1280*g + 1936*h + 2816*i)*x^2 + 5008*d + 8192*e + 13120*f + 20480*g + 30976*h + 45056*i)*log(x - 2) - 9600*e - 29184*g - 61440*i)/(x^8 - 10*x^6 + 33*x^4 - 40*x^2 + 16)
```



**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^3} dx = \text{Timed out}$$

```
[In] integrate((i*x**5+h*x**4+g*x**3+f*x**2+e*x+d)/(x**4-5*x**2+4)**3,x)
```

```
[Out] Timed out
```

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 238, normalized size of antiderivative = 1.00

$$\begin{aligned} & \int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^3} dx \\ &= -\frac{1}{41472} (313d - 512e + 820f - 1280g + 1936h - 2816i) \log(x + 2) \\ & \quad + \frac{1}{1296} (13d - 16e + 25f - 40g + 61h - 88i) \log(x + 1) \\ & \quad - \frac{1}{1296} (13d + 16e + 25f + 40g + 61h + 88i) \log(x - 1) \\ & \quad + \frac{1}{41472} (313d + 512e + 820f + 1280g + 1936h + 2816i) \log(x - 2) \\ & \quad + \frac{5(7d + 28f + 64h)x^7 + 64(2e + 5g + 11i)x^6 - 18(13d + 60f + 136h)x^5 - 480(2e + 5g + 11i)x^4}{3456(x^8 - 10x^6} \end{aligned}$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^3,x, algorithm="maxima")
```

```
[Out] -1/41472*(313*d - 512*e + 820*f - 1280*g + 1936*h - 2816*i)*log(x + 2) + 1/1296*(13*d - 16*e + 25*f - 40*g + 61*h - 88*i)*log(x + 1) - 1/1296*(13*d + 16*e + 25*f + 40*g + 61*h + 88*i)*log(x - 1) + 1/41472*(313*d + 512*e + 820*f + 1280*g + 1936*h + 2816*i)*log(x - 2) + 1/3456*(5*(7*d + 28*f + 64*h)*x^7 + 64*(2*e + 5*g + 11*i)*x^6 - 18*(13*d + 60*f + 136*h)*x^5 - 480*(2*e + 5*g + 11*i)*x^4 + 63*(5*d + 36*f + 80*h)*x^3 + 192*(10*e + 25*g + 52*i)*x^2 + 4*(43*d - 260*f - 656*h)*x - 800*e - 2432*g - 5120*i)/(x^8 - 10*x^6 + 33*x^4 - 40*x^2 + 16)
```

**Giac [A] (verification not implemented)**

none

Time = 0.28 (sec) , antiderivative size = 249, normalized size of antiderivative = 1.04

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^3} dx$$

$$= -\frac{1}{41472} (313d - 512e + 820f - 1280g + 1936h - 2816i) \log(|x + 2|)$$

$$+ \frac{1}{1296} (13d - 16e + 25f - 40g + 61h - 88i) \log(|x + 1|)$$

$$- \frac{1}{1296} (13d + 16e + 25f + 40g + 61h + 88i) \log(|x - 1|)$$

$$+ \frac{1}{41472} (313d + 512e + 820f + 1280g + 1936h + 2816i) \log(|x - 2|)$$

$$+ \frac{35dx^7 + 140fx^7 + 320hx^7 + 128ex^6 + 320gx^6 + 704ix^6 - 234dx^5 - 1080fx^5 - 2448hx^5 - 960ex^4 - 2400gx^4 - 5280ix^4 + 315dx^3 + 2268fx^3 + 5040hx^3 + 1920ex^2 + 4800gx^2 + 9984ix^2 + 172dx - 1040fx - 2624hx - 800e - 2432g - 5120i}{(x^4 - 5x^2 + 4)^2}$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^3,x, algorithm="giac")

[Out] -1/41472\*(313\*d - 512\*e + 820\*f - 1280\*g + 1936\*h - 2816\*i)\*log(abs(x + 2)) + 1/1296\*(13\*d - 16\*e + 25\*f - 40\*g + 61\*h - 88\*i)\*log(abs(x + 1)) - 1/1296\*(13\*d + 16\*e + 25\*f + 40\*g + 61\*h + 88\*i)\*log(abs(x - 1)) + 1/41472\*(313\*d + 512\*e + 820\*f + 1280\*g + 1936\*h + 2816\*i)\*log(abs(x - 2)) + 1/3456\*(35\*d\*x^7 + 140\*f\*x^7 + 320\*h\*x^7 + 128\*e\*x^6 + 320\*g\*x^6 + 704\*i\*x^6 - 234\*d\*x^5 - 1080\*f\*x^5 - 2448\*h\*x^5 - 960\*e\*x^4 - 2400\*g\*x^4 - 5280\*i\*x^4 + 315\*d\*x^3 + 2268\*f\*x^3 + 5040\*h\*x^3 + 1920\*e\*x^2 + 4800\*g\*x^2 + 9984\*i\*x^2 + 172\*d\*x - 1040\*f\*x - 2624\*h\*x - 800\*e - 2432\*g - 5120\*i)/(x^4 - 5\*x^2 + 4)^2

**Mupad [B] (verification not implemented)**

Time = 0.37 (sec) , antiderivative size = 233, normalized size of antiderivative = 0.97

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(4 - 5x^2 + x^4)^3} dx = \ln(x+1) \left( \frac{13d}{1296} - \frac{e}{81} + \frac{25f}{1296} - \frac{5g}{162} + \frac{61h}{1296} - \frac{11i}{162} \right)$$

$$- \ln(x-1) \left( \frac{13d}{1296} + \frac{e}{81} + \frac{25f}{1296} + \frac{5g}{162} + \frac{61h}{1296} + \frac{11i}{162} \right)$$

$$- \frac{\left( -\frac{35d}{3456} - \frac{35f}{864} - \frac{5h}{54} \right) x^7 + \left( -\frac{e}{27} - \frac{5g}{54} - \frac{11i}{54} \right) x^6 + \left( \frac{13d}{192} + \frac{5f}{16} + \frac{17h}{24} \right) x^5 + \left( \frac{5e}{18} + \frac{25g}{36} + \frac{55i}{36} \right) x^4 + \left( -\frac{35d}{384} - \frac{105f}{128} - \frac{15h}{64} \right) x^3 + \left( -\frac{5e}{18} - \frac{25g}{36} - \frac{55i}{36} \right) x^2 + \left( \frac{13d}{192} - \frac{5f}{16} - \frac{17h}{24} \right) x + \frac{e}{81} + \frac{5g}{162} - \frac{11i}{162}}{x^8 - 10x^6 + 33x^4 - 40x^2}$$

$$+ \ln(x-2) \left( \frac{313d}{41472} + \frac{e}{81} + \frac{205f}{10368} + \frac{5g}{162} + \frac{121h}{2592} + \frac{11i}{162} \right)$$

$$- \ln(x+2) \left( \frac{313d}{41472} - \frac{e}{81} + \frac{205f}{10368} - \frac{5g}{162} + \frac{121h}{2592} - \frac{11i}{162} \right)$$

[In]  $\text{int}((d + e*x + f*x^2 + g*x^3 + h*x^4 + i*x^5)/(x^4 - 5*x^2 + 4)^3, x)$

[Out]  $\log(x + 1)*((13*d)/1296 - e/81 + (25*f)/1296 - (5*g)/162 + (61*h)/1296 - (11*i)/162) - \log(x - 1)*((13*d)/1296 + e/81 + (25*f)/1296 + (5*g)/162 + (61*h)/1296 + (11*i)/162) - ((25*e)/108 + (19*g)/27 + (40*i)/27 + x*((65*f)/216 - (43*d)/864 + (41*h)/54) + x^5*((13*d)/192 + (5*f)/16 + (17*h)/24) - x^3*((35*d)/384 + (21*f)/32 + (35*h)/24) - x^7*((35*d)/3456 + (35*f)/864 + (5*h)/54) - x^2*((5*e)/9 + (25*g)/18 + (26*i)/9) - x^6*(e/27 + (5*g)/54 + (11*i)/54) + x^4*((5*e)/18 + (25*g)/36 + (55*i)/36))/(33*x^4 - 40*x^2 - 10*x^6 + x^8 + 16) + \log(x - 2)*((313*d)/41472 + e/81 + (205*f)/10368 + (5*g)/162 + (121*h)/2592 + (11*i)/162) - \log(x + 2)*((313*d)/41472 - e/81 + (205*f)/10368 - (5*g)/162 + (121*h)/2592 - (11*i)/162)$

### 3.47 $\int \frac{d+ex}{(1+x^2+x^4)^3} dx$

Optimal result	516
Rubi [A] (verified)	516
Mathematica [C] (verified)	520
Maple [A] (verified)	520
Fricas [A] (verification not implemented)	521
Sympy [C] (verification not implemented)	521
Maxima [A] (verification not implemented)	522
Giac [A] (verification not implemented)	523
Mupad [B] (verification not implemented)	523

#### Optimal result

Integrand size = 16, antiderivative size = 185

$$\int \frac{d+ex}{(1+x^2+x^4)^3} dx = \frac{dx(1-x^2)}{12(1+x^2+x^4)^2} + \frac{e(1+2x^2)}{12(1+x^2+x^4)^2} + \frac{dx(2-7x^2)}{24(1+x^2+x^4)} \\ + \frac{e(1+2x^2)}{6(1+x^2+x^4)} - \frac{13d \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{48\sqrt{3}} + \frac{13d \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{48\sqrt{3}} \\ + \frac{2e \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{9}{32}d \log(1-x+x^2) + \frac{9}{32}d \log(1+x+x^2)$$

[Out] 1/12\*d\*x\*(-x^2+1)/(x^4+x^2+1)^2+1/12\*e\*(2\*x^2+1)/(x^4+x^2+1)^2+1/24\*d\*x\*(-7\*x^2+2)/(x^4+x^2+1)+1/6\*e\*(2\*x^2+1)/(x^4+x^2+1)-9/32\*d\*ln(x^2-x+1)+9/32\*d\*ln(x^2+x+1)-13/144\*d\*arctan(1/3\*(1-2\*x)\*3^(1/2))\*3^(1/2)+13/144\*d\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)+2/9\*e\*arctan(1/3\*(2\*x^2+1)\*3^(1/2))\*3^(1/2)

#### Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 185, normalized size of antiderivative = 1.00, number of steps used = 19, number of rules used = 11,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.688$ , Rules used = {1687, 12, 1106, 1192, 1183, 648, 632, 210, 642, 1121, 628}

$$\int \frac{d+ex}{(1+x^2+x^4)^3} dx = -\frac{13d \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{48\sqrt{3}} + \frac{13d \arctan\left(\frac{2x+1}{\sqrt{3}}\right)}{48\sqrt{3}} + \frac{2e \arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)}{3\sqrt{3}} \\ - \frac{9}{32}d \log(x^2-x+1) + \frac{9}{32}d \log(x^2+x+1) + \frac{dx(2-7x^2)}{24(x^4+x^2+1)} \\ + \frac{dx(1-x^2)}{12(x^4+x^2+1)^2} + \frac{e(2x^2+1)}{6(x^4+x^2+1)} + \frac{e(2x^2+1)}{12(x^4+x^2+1)^2}$$

[In] Int[(d + e\*x)/(1 + x^2 + x^4)^3, x]

[Out] (d\*x\*(1 - x^2))/(12\*(1 + x^2 + x^4)^2) + (e\*(1 + 2\*x^2))/(12\*(1 + x^2 + x^4)^2) + (d\*x\*(2 - 7\*x^2))/(24\*(1 + x^2 + x^4)) + (e\*(1 + 2\*x^2))/(6\*(1 + x^2 + x^4)) - (13\*d\*ArcTan[(1 - 2\*x)/Sqrt[3]])/(48\*Sqrt[3]) + (13\*d\*ArcTan[(1 + 2\*x)/Sqrt[3]])/(48\*Sqrt[3]) + (2\*e\*ArcTan[(1 + 2\*x^2)/Sqrt[3]])/(3\*Sqrt[3]) - (9\*d\*Log[1 - x + x^2])/32 + (9\*d\*Log[1 + x + x^2])/32

### Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_) /; FreeQ[b, x]]

### Rule 210

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[-b, 2])^(-1)\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

### Rule 628

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p + 1)/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

### Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

### Rule 642

Int[((d\_) + (e\_.)\*(x\_))/((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] := Simp[d\*(Log[RemoveContent[a + b\*x + c\*x^2, x]]/b), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[2\*c\*d - b\*e, 0]

### Rule 648

Int[((d\_.) + (e\_.)\*(x\_))/((a\_) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] := Dist[(2\*c\*d - b\*e)/(2\*c), Int[1/(a + b\*x + c\*x^2), x], x] + Dist[e/(2\*c), Int[(b + 2\*c\*x)/(a + b\*x + c\*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && !NiceSqrtQ[b^2 - 4\*a\*c]

### Rule 1106

Int[((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_), x\_Symbol] := Simp[(-x)\*(b^2 - 2\*a\*c + b\*c\*x^2)\*((a + b\*x^2 + c\*x^4)^(p + 1)/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[(b^2 - 2\*a\*c + 2\*(p + 1)\*(b^2 - 4\*a\*c) + b\*c\*(4\*p + 7)\*x^2)\*(a + b\*x^2 + c\*x^4)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && IntegerQ[2\*p]

#### Rule 1121

Int[(x\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_.), x\_Symbol] := Dist[1/2, Subst[Int[(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]

#### Rule 1183

Int[((d\_) + (e\_.)\*(x\_)^2)/((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4), x\_Symbol] :> With[{q = Rt[a/c, 2]}, With[{r = Rt[2\*q - b/c, 2]}, Dist[1/(2\*c\*q\*r), Int[(d\*r - (d - e\*q)\*x)/(q - r\*x + x^2), x], x] + Dist[1/(2\*c\*q\*r), Int[(d\*r + (d - e\*q)\*x)/(q + r\*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && NegQ[b^2 - 4\*a\*c]

#### Rule 1192

Int[((d\_) + (e\_.)\*(x\_)^2)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_), x\_Symbol] := Simp[x\*(a\*b\*e - d\*(b^2 - 2\*a\*c) - c\*(b\*d - 2\*a\*e)\*x^2)\*((a + b\*x^2 + c\*x^4)^(p + 1)/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[Simp[(2\*p + 3)\*d\*b^2 - a\*b\*e - 2\*a\*c\*d\*(4\*p + 5) + (4\*p + 7)\*(d\*b - 2\*a\*e)\*c\*x^2, x]\*(a + b\*x^2 + c\*x^4)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && LtQ[p, -1] && IntegerQ[2\*p]

#### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

#### Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d}{(1+x^2+x^4)^3} dx + \int \frac{ex}{(1+x^2+x^4)^3} dx \\ &= d \int \frac{1}{(1+x^2+x^4)^3} dx + e \int \frac{x}{(1+x^2+x^4)^3} dx \\ &= \frac{dx(1-x^2)}{12(1+x^2+x^4)^2} + \frac{1}{12}d \int \frac{11-5x^2}{(1+x^2+x^4)^2} dx + \frac{1}{2}e \text{Subst}\left(\int \frac{1}{(1+x+x^2)^3} dx, x, x^2\right) \end{aligned}$$

$$\begin{aligned}
&= \frac{dx(1-x^2)}{12(1+x^2+x^4)^2} + \frac{e(1+2x^2)}{12(1+x^2+x^4)^2} + \frac{dx(2-7x^2)}{24(1+x^2+x^4)} \\
&\quad + \frac{1}{72}d \int \frac{60-21x^2}{1+x^2+x^4} dx + \frac{1}{2}e \text{Subst} \left( \int \frac{1}{(1+x+x^2)^2} dx, x, x^2 \right) \\
&= \frac{dx(1-x^2)}{12(1+x^2+x^4)^2} + \frac{e(1+2x^2)}{12(1+x^2+x^4)^2} + \frac{dx(2-7x^2)}{24(1+x^2+x^4)} \\
&\quad + \frac{e(1+2x^2)}{6(1+x^2+x^4)} + \frac{1}{144}d \int \frac{60-81x}{1-x+x^2} dx + \frac{1}{144}d \int \frac{60+81x}{1+x+x^2} dx \\
&\quad + \frac{1}{3}e \text{Subst} \left( \int \frac{1}{1+x+x^2} dx, x, x^2 \right) \\
&= \frac{dx(1-x^2)}{12(1+x^2+x^4)^2} + \frac{e(1+2x^2)}{12(1+x^2+x^4)^2} + \frac{dx(2-7x^2)}{24(1+x^2+x^4)} + \frac{e(1+2x^2)}{6(1+x^2+x^4)} \\
&\quad + \frac{1}{96}(13d) \int \frac{1}{1-x+x^2} dx + \frac{1}{96}(13d) \int \frac{1}{1+x+x^2} dx - \frac{1}{32}(9d) \int \frac{-1+2x}{1-x+x^2} dx \\
&\quad + \frac{1}{32}(9d) \int \frac{1+2x}{1+x+x^2} dx - \frac{1}{3}(2e) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x^2 \right) \\
&= \frac{dx(1-x^2)}{12(1+x^2+x^4)^2} + \frac{e(1+2x^2)}{12(1+x^2+x^4)^2} + \frac{dx(2-7x^2)}{24(1+x^2+x^4)} \\
&\quad + \frac{e(1+2x^2)}{6(1+x^2+x^4)} + \frac{2e \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{3\sqrt{3}} - \frac{9}{32}d \log(1-x+x^2) \\
&\quad + \frac{9}{32}d \log(1+x+x^2) - \frac{1}{48}(13d) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, -1+2x \right) \\
&\quad - \frac{1}{48}(13d) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x \right) \\
&= \frac{dx(1-x^2)}{12(1+x^2+x^4)^2} + \frac{e(1+2x^2)}{12(1+x^2+x^4)^2} + \frac{dx(2-7x^2)}{24(1+x^2+x^4)} \\
&\quad + \frac{e(1+2x^2)}{6(1+x^2+x^4)} - \frac{13d \tan^{-1} \left( \frac{1-2x}{\sqrt{3}} \right)}{48\sqrt{3}} + \frac{13d \tan^{-1} \left( \frac{1+2x}{\sqrt{3}} \right)}{48\sqrt{3}} \\
&\quad + \frac{2e \tan^{-1} \left( \frac{1+2x^2}{\sqrt{3}} \right)}{3\sqrt{3}} - \frac{9}{32}d \log(1-x+x^2) + \frac{9}{32}d \log(1+x+x^2)
\end{aligned}$$

**Mathematica [C] (verified)**

Result contains complex when optimal does not.

Time = 0.53 (sec) , antiderivative size = 186, normalized size of antiderivative = 1.01

$$\int \frac{d+ex}{(1+x^2+x^4)^3} dx = \frac{1}{144} \left( \frac{12(e+dx+2ex^2-dx^3)}{(1+x^2+x^4)^2} + \frac{6(dx(2-7x^2)+e(4+8x^2))}{1+x^2+x^4} \right. \\ \left. - \frac{(-47i+7\sqrt{3}) d \arctan\left(\frac{1}{2}(-i+\sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1+i\sqrt{3})}} \right. \\ \left. - \frac{(47i+7\sqrt{3}) d \arctan\left(\frac{1}{2}(i+\sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1-i\sqrt{3})}} - 32\sqrt{3}e \arctan\left(\frac{\sqrt{3}}{1+2x^2}\right) \right)$$

[In] Integrate[(d + e\*x)/(1 + x^2 + x^4)^3,x]

[Out] ((12\*(e + d\*x + 2\*e\*x^2 - d\*x^3))/(1 + x^2 + x^4)^2 + (6\*(d\*x\*(2 - 7\*x^2) + e\*(4 + 8\*x^2)))/(1 + x^2 + x^4) - ((-47\*I + 7\*Sqrt[3])\*d\*ArcTan[((-I + Sqrt[3])\*x)/2])/Sqrt[(1 + I\*Sqrt[3])/6] - ((47\*I + 7\*Sqrt[3])\*d\*ArcTan[((I + Sqrt[3])\*x)/2])/Sqrt[(1 - I\*Sqrt[3])/6] - 32\*Sqrt[3]\*e\*ArcTan[Sqrt[3]/(1 + 2\*x^2)])/144

**Maple [A] (verified)**

Time = 0.18 (sec) , antiderivative size = 158, normalized size of antiderivative = 0.85

method	result
default	$-\frac{\left(\frac{7d}{3}-\frac{4e}{3}\right)x^3-6dx^2+\left(\frac{20d}{3}+\frac{e}{3}\right)x-4d-2e}{16(x^2-x+1)^2} - \frac{9d \ln(x^2-x+1)}{32} - \frac{\left(-\frac{13d}{2}-16e\right)\sqrt{3} \arctan\left(\frac{(2x-1)\sqrt{3}}{3}\right)}{72} + \frac{\left(-\frac{7d}{3}-\frac{4e}{3}\right)x^3-6dx^2+}{16(x^2+x+1)}$
risch	$-\frac{9d \ln(15457716d^2x^2+7237632e^2x^2-15457716d^2x-7237632e^2x+15457716d^2+7237632e^2)}{32} + \frac{13\sqrt{3} d \arctan\left(\frac{1458d^2x\sqrt{3}}{2187d^2+1024e^2} + \frac{1}{3}\sqrt{\frac{1}{6}(1+i\sqrt{3})}\right)}{32}$

[In] int((e\*x+d)/(x^4+x^2+1)^3,x,method=\_RETURNVERBOSE)

[Out] -1/16\*((7/3\*d-4/3\*e)\*x^3-6\*d\*x^2+(20/3\*d+1/3\*e)\*x-4\*d-2\*e)/(x^2-x+1)^2-9/32\*d\*ln(x^2-x+1)-1/72\*(-13/2\*d-16\*e)\*3^(1/2)\*arctan(1/3\*(2\*x-1)\*3^(1/2))+1/16\*((-7/3\*d-4/3\*e)\*x^3-6\*d\*x^2+(-20/3\*d+1/3\*e)\*x-4\*d+2\*e)/(x^2+x+1)^2+9/32\*d\*ln(x^2+x+1)+1/72\*(13/2\*d-16\*e)\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)



**Fricas [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 278, normalized size of antiderivative = 1.50

$$\int \frac{d + ex}{(1 + x^2 + x^4)^3} dx = \frac{84 dx^7 - 96 ex^6 + 60 dx^5 - 144 ex^4 + 84 dx^3 - 192 ex^2 - 2\sqrt{3}((13d - 32e)x^8 + 2(13d - 32e)x^6 + 3(13d - 32e)x^4 + 2(13d - 32e)x^2 + 13d - 32e)\arctan(1/3\sqrt{3}(2x + 1)) - 2\sqrt{3}((13d + 32e)x^8 + 2(13d + 32e)x^6 + 3(13d + 32e)x^4 + 2(13d + 32e)x^2 + 13d + 32e)\arctan(1/3\sqrt{3}(2x - 1)) - 48dx - 81(d*x^8 + 2*d*x^6 + 3*d*x^4 + 2*d*x^2 + d)\log(x^2 + x + 1) + 81(d*x^8 + 2*d*x^6 + 3*d*x^4 + 2*d*x^2 + d)\log(x^2 - x + 1) - 72e)/(x^8 + 2*x^6 + 3*x^4 + 2*x^2 + 1)}$$

[In] integrate((e\*x+d)/(x^4+x^2+1)^3,x, algorithm="fricas")

```
[Out] -1/288*(84*d*x^7 - 96*e*x^6 + 60*d*x^5 - 144*e*x^4 + 84*d*x^3 - 192*e*x^2 -
2*sqrt(3)*((13*d - 32*e)*x^8 + 2*(13*d - 32*e)*x^6 + 3*(13*d - 32*e)*x^4 +
2*(13*d - 32*e)*x^2 + 13*d - 32*e)*arctan(1/3*sqrt(3)*(2*x + 1)) - 2*sqrt(
3)*((13*d + 32*e)*x^8 + 2*(13*d + 32*e)*x^6 + 3*(13*d + 32*e)*x^4 + 2*(13*d
+ 32*e)*x^2 + 13*d + 32*e)*arctan(1/3*sqrt(3)*(2*x - 1)) - 48*d*x - 81*(d*
x^8 + 2*d*x^6 + 3*d*x^4 + 2*d*x^2 + d)*log(x^2 + x + 1) + 81*(d*x^8 + 2*d*x
^6 + 3*d*x^4 + 2*d*x^2 + d)*log(x^2 - x + 1) - 72*e)/(x^8 + 2*x^6 + 3*x^4 +
2*x^2 + 1)
```

**Sympy [C] (verification not implemented)**

Result contains complex when optimal does not.

Time = 2.19 (sec) , antiderivative size = 1103, normalized size of antiderivative = 5.96

$$\int \frac{d + ex}{(1 + x^2 + x^4)^3} dx = \text{Too large to display}$$

[In] integrate((e\*x+d)/(x\*\*4+x\*\*2+1)\*\*3,x)

```
[Out] (-9*d/32 - sqrt(3)*I*(13*d + 32*e)/288)*log(x + (-1025428432*d**4*e - 33475
2912*d**4*(-9*d/32 - sqrt(3)*I*(13*d + 32*e)/288) - 431308800*d**2*e**3 - 3
143688192*d**2*e**2*(-9*d/32 - sqrt(3)*I*(13*d + 32*e)/288) + 9917005824*d*
**2*e*(-9*d/32 - sqrt(3)*I*(13*d + 32*e)/288)**2 + 11878244352*d**2*(-9*d/32
- sqrt(3)*I*(13*d + 32*e)/288)**3 + 142606336*e**5 + 754974720*e**4*(-9*d/
32 - sqrt(3)*I*(13*d + 32*e)/288) + 3850371072*e**3*(-9*d/32 - sqrt(3)*I*(1
3*d + 32*e)/288)**2 + 20384317440*e**2*(-9*d/32 - sqrt(3)*I*(13*d + 32*e)/2
88)**3)/(217696167*d**5 - 1217128448*d**3*e**2 - 617611264*d*e**4) + (-9*d
/32 + sqrt(3)*I*(13*d + 32*e)/288)*log(x + (-1025428432*d**4*e - 334752912*
d**4*(-9*d/32 + sqrt(3)*I*(13*d + 32*e)/288) - 431308800*d**2*e**3 - 314368
8192*d**2*e**2*(-9*d/32 + sqrt(3)*I*(13*d + 32*e)/288) + 9917005824*d**2*e*
(-9*d/32 + sqrt(3)*I*(13*d + 32*e)/288)**2 + 11878244352*d**2*(-9*d/32 + sq
rt(3)*I*(13*d + 32*e)/288)**3 + 142606336*e**5 + 754974720*e**4*(-9*d/32 +
```

```

sqrt(3)*I*(13*d + 32*e)/288) + 3850371072*e**3*(-9*d/32 + sqrt(3)*I*(13*d +
  32*e)/288)**2 + 20384317440*e**2*(-9*d/32 + sqrt(3)*I*(13*d + 32*e)/288)**
  3)/(217696167*d**5 - 1217128448*d**3*e**2 - 617611264*d*e**4)) + (9*d/32 -
  sqrt(3)*I*(13*d - 32*e)/288)*log(x + (-1025428432*d**4*e - 334752912*d**4*(
  9*d/32 - sqrt(3)*I*(13*d - 32*e)/288) - 431308800*d**2*e**3 - 3143688192*d*
  *2*e**2*(9*d/32 - sqrt(3)*I*(13*d - 32*e)/288) + 9917005824*d**2*e*(9*d/32
  - sqrt(3)*I*(13*d - 32*e)/288)**2 + 11878244352*d**2*(9*d/32 - sqrt(3)*I*(1
  3*d - 32*e)/288)**3 + 142606336*e**5 + 754974720*e**4*(9*d/32 - sqrt(3)*I*(
  13*d - 32*e)/288) + 3850371072*e**3*(9*d/32 - sqrt(3)*I*(13*d - 32*e)/288)*
  *2 + 20384317440*e**2*(9*d/32 - sqrt(3)*I*(13*d - 32*e)/288)**3)/(217696167
  *d**5 - 1217128448*d**3*e**2 - 617611264*d*e**4)) + (9*d/32 + sqrt(3)*I*(13
  *d - 32*e)/288)*log(x + (-1025428432*d**4*e - 334752912*d**4*(9*d/32 + sqrt
  (3)*I*(13*d - 32*e)/288) - 431308800*d**2*e**3 - 3143688192*d**2*e**2*(9*d/
  32 + sqrt(3)*I*(13*d - 32*e)/288) + 9917005824*d**2*e*(9*d/32 + sqrt(3)*I*(
  13*d - 32*e)/288)**2 + 11878244352*d**2*(9*d/32 + sqrt(3)*I*(13*d - 32*e)/
  288)**3 + 142606336*e**5 + 754974720*e**4*(9*d/32 + sqrt(3)*I*(13*d - 32*e)/
  288) + 3850371072*e**3*(9*d/32 + sqrt(3)*I*(13*d - 32*e)/288)**2 + 20384317
  440*e**2*(9*d/32 + sqrt(3)*I*(13*d - 32*e)/288)**3)/(217696167*d**5 - 12171
  28448*d**3*e**2 - 617611264*d*e**4)) + (-7*d*x**7 - 5*d*x**5 - 7*d*x**3 + 4
  *d*x + 8*e*x**6 + 12*e*x**4 + 16*e*x**2 + 6*e)/(24*x**8 + 48*x**6 + 72*x**4
  + 48*x**2 + 24)

```

## Maxima [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 137, normalized size of antiderivative = 0.74

$$\int \frac{d + ex}{(1 + x^2 + x^4)^3} dx = \frac{1}{144} \sqrt{3}(13d - 32e) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) \\
 + \frac{1}{144} \sqrt{3}(13d + 32e) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) \\
 + \frac{9}{32} d \log(x^2 + x + 1) - \frac{9}{32} d \log(x^2 - x + 1) \\
 - \frac{7dx^7 - 8ex^6 + 5dx^5 - 12ex^4 + 7dx^3 - 16ex^2 - 4dx - 6e}{24(x^8 + 2x^6 + 3x^4 + 2x^2 + 1)}$$

[In] integrate((e\*x+d)/(x^4+x^2+1)^3,x, algorithm="maxima")

```

[Out] 1/144*sqrt(3)*(13*d - 32*e)*arctan(1/3*sqrt(3)*(2*x + 1)) + 1/144*sqrt(3)*
  (13*d + 32*e)*arctan(1/3*sqrt(3)*(2*x - 1)) + 9/32*d*log(x^2 + x + 1) - 9/32
  *d*log(x^2 - x + 1) - 1/24*(7*d*x^7 - 8*e*x^6 + 5*d*x^5 - 12*e*x^4 + 7*d*x^
  3 - 16*e*x^2 - 4*d*x - 6*e)/(x^8 + 2*x^6 + 3*x^4 + 2*x^2 + 1)

```

**Giac [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 125, normalized size of antiderivative = 0.68

$$\int \frac{d+ex}{(1+x^2+x^4)^3} dx = \frac{1}{144} \sqrt{3}(13d-32e) \arctan\left(\frac{1}{3}\sqrt{3}(2x+1)\right) + \frac{1}{144} \sqrt{3}(13d+32e) \arctan\left(\frac{1}{3}\sqrt{3}(2x-1)\right) + \frac{9}{32} d \log(x^2+x+1) - \frac{9}{32} d \log(x^2-x+1) - \frac{7dx^7 - 8ex^6 + 5dx^5 - 12ex^4 + 7dx^3 - 16ex^2 - 4dx - 6e}{24(x^4+x^2+1)^2}$$

[In] integrate((e\*x+d)/(x^4+x^2+1)^3,x, algorithm="giac")

[Out] 1/144\*sqrt(3)\*(13\*d - 32\*e)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/144\*sqrt(3)\*(13\*d + 32\*e)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 9/32\*d\*log(x^2 + x + 1) - 9/32\*d\*log(x^2 - x + 1) - 1/24\*(7\*d\*x^7 - 8\*e\*x^6 + 5\*d\*x^5 - 12\*e\*x^4 + 7\*d\*x^3 - 16\*e\*x^2 - 4\*d\*x - 6\*e)/(x^4 + x^2 + 1)^2

**Mupad [B] (verification not implemented)**

Time = 0.15 (sec) , antiderivative size = 185, normalized size of antiderivative = 1.00

$$\int \frac{d+ex}{(1+x^2+x^4)^3} dx = \frac{-\frac{7dx^7}{24} + \frac{ex^6}{3} - \frac{5dx^5}{24} + \frac{ex^4}{2} - \frac{7dx^3}{24} + \frac{2ex^2}{3} + \frac{dx}{6} + \frac{e}{4}}{x^8 + 2x^6 + 3x^4 + 2x^2 + 1} - \ln\left(x - \frac{1}{2} - \frac{\sqrt{3}i}{2}\right) \left(\frac{9d}{32} + \frac{\sqrt{3}d13i}{288} + \frac{\sqrt{3}e1i}{9}\right) + \ln\left(x + \frac{1}{2} - \frac{\sqrt{3}i}{2}\right) \left(\frac{9d}{32} - \frac{\sqrt{3}d13i}{288} + \frac{\sqrt{3}e1i}{9}\right) + \ln\left(x - \frac{1}{2} + \frac{\sqrt{3}i}{2}\right) \left(-\frac{9d}{32} + \frac{\sqrt{3}d13i}{288} + \frac{\sqrt{3}e1i}{9}\right) + \ln\left(x + \frac{1}{2} + \frac{\sqrt{3}i}{2}\right) \left(\frac{9d}{32} + \frac{\sqrt{3}d13i}{288} - \frac{\sqrt{3}e1i}{9}\right)$$

[In] int((d + e\*x)/(x^2 + x^4 + 1)^3,x)

[Out] (e/4 + (d\*x)/6 - (7\*d\*x^3)/24 - (5\*d\*x^5)/24 - (7\*d\*x^7)/24 + (2\*e\*x^2)/3 + (e\*x^4)/2 + (e\*x^6)/3)/(2\*x^2 + 3\*x^4 + 2\*x^6 + x^8 + 1) - log(x - (3^(1/2)\*1i)/2 - 1/2)\*((9\*d)/32 + (3^(1/2)\*d\*13i)/288 + (3^(1/2)\*e\*1i)/9) + log(x

$$\begin{aligned} & - (3^{1/2}i)/2 + 1/2 * ((9*d)/32 - (3^{1/2}*d*13i)/288 + (3^{1/2}*e*1i)/9) \\ & + \log(x + (3^{1/2}i)/2 - 1/2 * ((3^{1/2}*d*13i)/288 - (9*d)/32 + (3^{1/2} \\ & *e*1i)/9) + \log(x + (3^{1/2}i)/2 + 1/2 * ((9*d)/32 + (3^{1/2}*d*13i)/288 - \\ & (3^{1/2}*e*1i)/9) \end{aligned}$$

### 3.48 $\int \frac{d+ex+fx^2}{(1+x^2+x^4)^3} dx$

Optimal result	525
Rubi [A] (verified)	525
Mathematica [C] (verified)	529
Maple [A] (verified)	530
Fricas [A] (verification not implemented)	530
Sympy [C] (verification not implemented)	531
Maxima [A] (verification not implemented)	534
Giac [A] (verification not implemented)	534
Mupad [B] (verification not implemented)	535

#### Optimal result

Integrand size = 21, antiderivative size = 223

$$\int \frac{d+ex+fx^2}{(1+x^2+x^4)^3} dx = \frac{e(1+2x^2)}{12(1+x^2+x^4)^2} + \frac{x(d+f-(d-2f)x^2)}{12(1+x^2+x^4)^2} + \frac{e(1+2x^2)}{6(1+x^2+x^4)}$$

$$+ \frac{x(2d+3f-7(d-f)x^2)}{24(1+x^2+x^4)} - \frac{(13d+2f)\arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{48\sqrt{3}}$$

$$+ \frac{(13d+2f)\arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{48\sqrt{3}} + \frac{2e\arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}}$$

$$- \frac{1}{32}(9d-4f)\log(1-x+x^2) + \frac{1}{32}(9d-4f)\log(1+x+x^2)$$

[Out] 1/12\*e\*(2\*x^2+1)/(x^4+x^2+1)^2+1/12\*x\*(d+f-(d-2\*f)\*x^2)/(x^4+x^2+1)^2+1/6\*e\*(2\*x^2+1)/(x^4+x^2+1)+1/24\*x\*(2\*d+3\*f-7\*(d-f)\*x^2)/(x^4+x^2+1)-1/32\*(9\*d-4\*f)\*ln(x^2-x+1)+1/32\*(9\*d-4\*f)\*ln(x^2+x+1)-1/144\*(13\*d+2\*f)\*arctan(1/3\*(1-2\*x)\*3^(1/2))\*3^(1/2)+1/144\*(13\*d+2\*f)\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)+2/9\*e\*arctan(1/3\*(2\*x^2+1)\*3^(1/2))\*3^(1/2)

#### Rubi [A] (verified)

Time = 0.14 (sec) , antiderivative size = 223, normalized size of antiderivative = 1.00, number of steps used = 18, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.476$ , Rules

used = {1687, 1192, 1183, 648, 632, 210, 642, 12, 1121, 628}

$$\int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^3} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(13d + 2f)}{48\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(13d + 2f)}{48\sqrt{3}}$$

$$+ \frac{2e \arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{32}(9d - 4f) \log(x^2 - x + 1)$$

$$+ \frac{1}{32}(9d - 4f) \log(x^2 + x + 1) + \frac{x(-7x^2(d - f) + 2d + 3f)}{24(x^4 + x^2 + 1)}$$

$$+ \frac{x(-(x^2(d - 2f)) + d + f)}{12(x^4 + x^2 + 1)^2} + \frac{e(2x^2 + 1)}{6(x^4 + x^2 + 1)} + \frac{e(2x^2 + 1)}{12(x^4 + x^2 + 1)^2}$$

[In] Int[(d + e\*x + f\*x^2)/(1 + x^2 + x^4)^3,x]

[Out] (e\*(1 + 2\*x^2))/(12\*(1 + x^2 + x^4)^2) + (x\*(d + f - (d - 2\*f)\*x^2))/(12\*(1 + x^2 + x^4)^2) + (e\*(1 + 2\*x^2))/(6\*(1 + x^2 + x^4)) + (x\*(2\*d + 3\*f - 7\*(d - f)\*x^2))/(24\*(1 + x^2 + x^4)) - ((13\*d + 2\*f)\*ArcTan[(1 - 2\*x)/Sqrt[3]])/(48\*Sqrt[3]) + ((13\*d + 2\*f)\*ArcTan[(1 + 2\*x)/Sqrt[3]])/(48\*Sqrt[3]) + (2\*e\*ArcTan[(1 + 2\*x^2)/Sqrt[3]])/(3\*Sqrt[3]) - ((9\*d - 4\*f)\*Log[1 - x + x^2])/32 + ((9\*d - 4\*f)\*Log[1 + x + x^2])/32

#### Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

#### Rule 210

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-(Rt[-a, 2]\*Rt[-b, 2])^(-1))\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

#### Rule 628

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p + 1)/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

#### Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

Rule 642

```
Int[((d_) + (e_)*(x_))/((a_) + (b_)*(x_) + (c_)*(x_)^2), x_Symbol] := S
imp[d*(Log[RemoveContent[a + b*x + c*x^2, x]]/b), x] /; FreeQ[{a, b, c, d,
e}, x] && EqQ[2*c*d - b*e, 0]
```

Rule 648

```
Int[((d_) + (e_)*(x_))/((a_) + (b_)*(x_) + (c_)*(x_)^2), x_Symbol] := D
ist[(2*c*d - b*e)/(2*c), Int[1/(a + b*x + c*x^2), x], x] + Dist[e/(2*c), In
t[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && !NiceSqrtQ[b^2 - 4*a*c]
```

Rule 1121

```
Int[(x_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Dist[1/2,
Subst[Int[(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]
```

Rule 1183

```
Int[((d_) + (e_)*(x_)^2)/((a_) + (b_)*(x_)^2 + (c_)*(x_)^4), x_Symbol] :
> With[{q = Rt[a/c, 2]}, With[{r = Rt[2*q - b/c, 2]}, Dist[1/(2*c*q*r), Int
[(d*r - (d - e*q)*x)/(q - r*x + x^2), x], x] + Dist[1/(2*c*q*r), Int[(d*r +
(d - e*q)*x)/(q + r*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && NegQ[b^2 - 4*a*c]
```

Rule 1192

```
Int[((d_) + (e_)*(x_)^2)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symb
ol] := Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 +
c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2
- 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

## Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{ex}{(1+x^2+x^4)^3} dx + \int \frac{d+fx^2}{(1+x^2+x^4)^3} dx \\
&= \frac{x(d+f-(d-2f)x^2)}{12(1+x^2+x^4)^2} + \frac{1}{12} \int \frac{11d-f-5(d-2f)x^2}{(1+x^2+x^4)^2} dx + e \int \frac{x}{(1+x^2+x^4)^3} dx \\
&= \frac{x(d+f-(d-2f)x^2)}{12(1+x^2+x^4)^2} + \frac{x(2d+3f-7(d-f)x^2)}{24(1+x^2+x^4)} \\
&\quad + \frac{1}{72} \int \frac{15(4d-f)-21(d-f)x^2}{1+x^2+x^4} dx + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{(1+x+x^2)^3} dx, x, x^2 \right) \\
&= \frac{e(1+2x^2)}{12(1+x^2+x^4)^2} + \frac{x(d+f-(d-2f)x^2)}{12(1+x^2+x^4)^2} + \frac{x(2d+3f-7(d-f)x^2)}{24(1+x^2+x^4)} \\
&\quad + \frac{1}{144} \int \frac{15(4d-f)-(21(d-f)+15(4d-f))x}{1-x+x^2} dx \\
&\quad + \frac{1}{144} \int \frac{15(4d-f)+(21(d-f)+15(4d-f))x}{1+x+x^2} dx \\
&\quad + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{(1+x+x^2)^2} dx, x, x^2 \right) \\
&= \frac{e(1+2x^2)}{12(1+x^2+x^4)^2} + \frac{x(d+f-(d-2f)x^2)}{12(1+x^2+x^4)^2} + \frac{e(1+2x^2)}{6(1+x^2+x^4)} \\
&\quad + \frac{x(2d+3f-7(d-f)x^2)}{24(1+x^2+x^4)} + \frac{1}{3} e \text{Subst} \left( \int \frac{1}{1+x+x^2} dx, x, x^2 \right) \\
&\quad + \frac{1}{32} (9d-4f) \int \frac{1+2x}{1+x+x^2} dx + \frac{1}{96} (13d+2f) \int \frac{1}{1-x+x^2} dx \\
&\quad + \frac{1}{96} (13d+2f) \int \frac{1}{1+x+x^2} dx + \frac{1}{32} (-9d+4f) \int \frac{-1+2x}{1-x+x^2} dx \\
&= \frac{e(1+2x^2)}{12(1+x^2+x^4)^2} + \frac{x(d+f-(d-2f)x^2)}{12(1+x^2+x^4)^2} + \frac{e(1+2x^2)}{6(1+x^2+x^4)} \\
&\quad + \frac{x(2d+3f-7(d-f)x^2)}{24(1+x^2+x^4)} - \frac{1}{32} (9d-4f) \log(1-x+x^2) \\
&\quad + \frac{1}{32} (9d-4f) \log(1+x+x^2) - \frac{1}{3} (2e) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x^2 \right) \\
&\quad + \frac{1}{48} (-13d-2f) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, -1+2x \right) \\
&\quad + \frac{1}{48} (-13d-2f) \text{Subst} \left( \int \frac{1}{-3-x^2} dx, x, 1+2x \right)
\end{aligned}$$



$$\begin{aligned}
&= \frac{e(1+2x^2)}{12(1+x^2+x^4)^2} + \frac{x(d+f-(d-2f)x^2)}{12(1+x^2+x^4)^2} + \frac{e(1+2x^2)}{6(1+x^2+x^4)} \\
&\quad + \frac{x(2d+3f-7(d-f)x^2)}{24(1+x^2+x^4)} - \frac{(13d+2f)\tan^{-1}\left(\frac{1-2x}{\sqrt{3}}\right)}{48\sqrt{3}} + \frac{(13d+2f)\tan^{-1}\left(\frac{1+2x}{\sqrt{3}}\right)}{48\sqrt{3}} \\
&\quad + \frac{2e\tan^{-1}\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{32}(9d-4f)\log(1-x+x^2) + \frac{1}{32}(9d-4f)\log(1+x+x^2)
\end{aligned}$$

### Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.39 (sec) , antiderivative size = 235, normalized size of antiderivative = 1.05

$$\begin{aligned}
\int \frac{d+ex+fx^2}{(1+x^2+x^4)^3} dx &= \frac{1}{144} \left( \frac{6(2dx+3fx-7dx^3+7fx^3+e(4+8x^2))}{1+x^2+x^4} \right. \\
&\quad + \frac{12(e+2ex^2+x(d+f-dx^2+2fx^2))}{(1+x^2+x^4)^2} \\
&\quad - \frac{((-47i+7\sqrt{3})d+(17i-7\sqrt{3})f)\arctan\left(\frac{1}{2}(-i+\sqrt{3})x\right)}{\sqrt{\frac{1}{6}}(1+i\sqrt{3})} \\
&\quad - \frac{((47i+7\sqrt{3})d-(17i+7\sqrt{3})f)\arctan\left(\frac{1}{2}(i+\sqrt{3})x\right)}{\sqrt{\frac{1}{6}}(1-i\sqrt{3})} \\
&\quad \left. - 32\sqrt{3}e\arctan\left(\frac{\sqrt{3}}{1+2x^2}\right) \right)
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2)/(1 + x^2 + x^4)^3,x]

[Out] ((6\*(2\*d\*x + 3\*f\*x - 7\*d\*x^3 + 7\*f\*x^3 + e\*(4 + 8\*x^2)))/(1 + x^2 + x^4) + (12\*(e + 2\*e\*x^2 + x\*(d + f - d\*x^2 + 2\*f\*x^2)))/(1 + x^2 + x^4)^2 - (((-47\*I + 7\*Sqrt[3])\*d + (17\*I - 7\*Sqrt[3])\*f)\*ArcTan[(-I + Sqrt[3])\*x]/2))/Sqrt[(1 + I\*Sqrt[3])/6] - (((47\*I + 7\*Sqrt[3])\*d - (17\*I + 7\*Sqrt[3])\*f)\*ArcTan[(I + Sqrt[3])\*x]/2))/Sqrt[(1 - I\*Sqrt[3])/6] - 32\*Sqrt[3]\*e\*ArcTan[Sqrt[3]/(1 + 2\*x^2)]/144

**Maple [A] (verified)**

Time = 0.28 (sec) , antiderivative size = 202, normalized size of antiderivative = 0.91

method	result
default	$-\frac{\left(\frac{7d}{3}-\frac{7f}{3}-\frac{4e}{3}\right)x^3+(-6d+4f)x^2+\left(\frac{20d}{3}-\frac{13f}{3}+\frac{e}{3}\right)x-4d+\frac{4f}{3}-2e}{16(x^2-x+1)^2} - \frac{(27d-12f)\ln(x^2-x+1)}{96} - \frac{\left(-\frac{13d}{2}-16e-f\right)\sqrt{3}\arctan\left(\frac{2x-1}{\sqrt{3}}\right)}{72}$
risch	Expression too large to display

[In] int((f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x,method=\_RETURNVERBOSE)

```
[Out] -1/16*((7/3*d-7/3*f-4/3*e)*x^3+(-6*d+4*f)*x^2+(20/3*d-13/3*f+1/3*e)*x-4*d+4/3*f-2*e)/(x^2-x+1)^2-1/96*(27*d-12*f)*ln(x^2-x+1)-1/72*(-13/2*d-16*e-f)*3^(1/2)*arctan(1/3*(2*x-1)*3^(1/2))+1/16*((-7/3*d+7/3*f-4/3*e)*x^3+(-6*d+4*f)*x^2+(-20/3*d+13/3*f+1/3*e)*x-4*d+4/3*f+2*e)/(x^2+x+1)^2+1/96*(27*d-12*f)*ln(x^2+x+1)+1/72*(13/2*d-16*e+f)*arctan(1/3*(1+2*x)*3^(1/2))*3^(1/2)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.31 (sec) , antiderivative size = 384, normalized size of antiderivative = 1.72

$$\int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^3} dx = \frac{84(d-f)x^7 - 96ex^6 + 60(d-2f)x^5 - 144ex^4 + 84(d-2f)x^3 - 192ex^2 - 2\sqrt{3}((13d-32e+2f)x^8 + 2(13d-32e+2f)x^6 + 3(13d-32e+2f)x^4 + 2(13d-32e+2f)x^2 + 13d-32e+2f)\arctan(1/3\sqrt{3}(2x+1)) - 2\sqrt{3}((13d+32e+2f)x^8 + 2(13d+32e+2f)x^6 + 3(13d+32e+2f)x^4 + 2(13d+32e+2f)x^2 + 13d+32e+2f)\arctan(1/3\sqrt{3}(2x-1)) - 12(4d+5f)x - 9((9d-4f)x^8 + 2(9d-4f)x^6 + 3(9d-4f)x^4 + 2(9d-4f)x^2 + 9d-4f)\log(x^2+x+1) + 9((9d-4f)x^8 + 2(9d-4f)x^6 + 3(9d-4f)x^4 + 2(9d-4f)x^2 + 9d-4f)\log(x^2-x+1) - 72e)/(x^8 + 2x^6 + 3x^4 + 2x^2 + 1)}$$

[In] integrate((f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x, algorithm="fricas")

```
[Out] -1/288*(84*(d-f)*x^7 - 96*e*x^6 + 60*(d-2*f)*x^5 - 144*e*x^4 + 84*(d-2*f)*x^3 - 192*e*x^2 - 2*sqrt(3)*((13*d-32*e+2*f)*x^8 + 2*(13*d-32*e+2*f)*x^6 + 3*(13*d-32*e+2*f)*x^4 + 2*(13*d-32*e+2*f)*x^2 + 13*d-32*e+2*f)*arctan(1/3*sqrt(3)*(2*x+1)) - 2*sqrt(3)*((13*d+32*e+2*f)*x^8 + 2*(13*d+32*e+2*f)*x^6 + 3*(13*d+32*e+2*f)*x^4 + 2*(13*d+32*e+2*f)*x^2 + 13*d+32*e+2*f)*arctan(1/3*sqrt(3)*(2*x-1)) - 12*(4*d+5*f)*x - 9*((9*d-4*f)*x^8 + 2*(9*d-4*f)*x^6 + 3*(9*d-4*f)*x^4 + 2*(9*d-4*f)*x^2 + 9*d-4*f)*log(x^2+x+1) + 9*((9*d-4*f)*x^8 + 2*(9*d-4*f)*x^6 + 3*(9*d-4*f)*x^4 + 2*(9*d-4*f)*x^2 + 9*d-4*f)*log(x^2-x+1) - 72*e)/(x^8 + 2*x^6 + 3*x^4 + 2*x^2 + 1)
```

## Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 138.76 (sec) , antiderivative size = 4496, normalized size of antiderivative = 20.16

$$\int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^3} dx = \text{Too large to display}$$

[In] integrate((f\*x\*\*2+e\*x+d)/(x\*\*4+x\*\*2+1)\*\*3,x)

[Out]  $(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)*\log(x + (-1025428432*d*5*e - 334752912*d**5*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) + 2008961360*d**4*e*f + 1151575920*d**4*f*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) - 431308800*d**3*e**3 - 3143688192*d**3*e**2*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) - 1598857120*d**3*e*f**2 + 9917005824*d**3*e*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**2 - 944300160*d**3*f**2*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) + 11878244352*d**3*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**3 + 233164800*d**2*e**3*f + 4409634816*d**2*e**2*f*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) + 662937520*d**2*e*f**3 - 13004623872*d**2*e*f*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**2 + 231796080*d**2*f**3*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) - 10089639936*d**2*f*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**3 + 142606336*d*e**5 + 754974720*d*e**4*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) - 1843200*d*e**3*f**2 + 3850371072*d*e**3*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**2 - 1926291456*d*e**2*f**2*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) + 20384317440*d*e**2*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**3 - 146756960*d*e*f**4 + 5813379072*d*e*f**2*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**2 + 12679200*d*f**4*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) + 1116758016*d*f**2*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**3 - 79691776*e**5*f - 188743680*e**4*f*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) - 7372800*e**3*f**3 - 2151677952*e**3*f*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**2 + 287096832*e**2*f**3*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) - 5096079360*e**2*f*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**3 + 14093632*e*f**5 - 859521024*e*f**3*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**2 - 7648128*f**5*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288) + 453869568*f**3*(-9*d/32 + f/8 - \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**3)/(217696167*d**6 - 301346487*d**5*f - 1217128448*d**4*e**2 + 130506255*d**4*f**2 + 2181281792*d**3*e**2*f - 5619240*d**3*f**3 - 617611264*d**2*e**4 - 1450149888*d**2*e**2*f**2 - 8036820*d**2*f**4 + 495976448*d*e**4*f + 430088192*d*e**2*f**3 + 783648*d*f**5 - 114294784*e**4*f**2 - 47771648*e**2*f**4 + 188352*f**6) + (-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288)*\log(x + (-1025428432*d**5*e - 334752912*d**5*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288) + 2008961360*d**4*e*f + 1151575920*d**4*f*(-9*d/32 + f/8 + \sqrt{3}*I*($

$13*d + 32*e + 2*f)/288) - 431308800*d**3*e**3 - 3143688192*d**3*e**2*(-9*d/$   
 $32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288) - 1598857120*d**3*e*f**2 + 99$   
 $17005824*d**3*e*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**2 - 94$   
 $4300160*d**3*f**2*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288) + 118$   
 $78244352*d**3*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**3 + 2331$   
 $64800*d**2*e**3*f + 4409634816*d**2*e**2*f*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d$   
 $+ 32*e + 2*f)/288) + 662937520*d**2*e*f**3 - 13004623872*d**2*e*f*(-9*d/32$   
 $+ f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**2 + 231796080*d**2*f**3*(-9*d/$   
 $32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288) - 10089639936*d**2*f*(-9*d/32$   
 $+ f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**3 + 142606336*d*e**5 + 7549747$   
 $20*d*e**4*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288) - 1843200*d*e$   
 $**3*f**2 + 3850371072*d*e**3*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)$   
 $/288)**2 - 1926291456*d*e**2*f**2*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e +$   
 $2*f)/288) + 20384317440*d*e**2*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2$   
 $*f)/288)**3 - 146756960*d*e*f**4 + 5813379072*d*e*f**2*(-9*d/32 + f/8 + \sqrt{3}$   
 $*I*(13*d + 32*e + 2*f)/288)**2 + 12679200*d*f**4*(-9*d/32 + f/8 + \sqrt{3}$   
 $(3)*I*(13*d + 32*e + 2*f)/288) + 1116758016*d*f**2*(-9*d/32 + f/8 + \sqrt{3}*I$   
 $(13*d + 32*e + 2*f)/288)**3 - 79691776*e**5*f - 188743680*e**4*f*(-9*d/32$   
 $+ f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288) - 7372800*e**3*f**3 - 215167795$   
 $2*e**3*f*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**2 + 287096832$   
 $*e**2*f**3*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288) - 5096079360$   
 $*e**2*f*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**3 + 14093632*e$   
 $*f**5 - 859521024*e*f**3*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288$   
 $)**2 - 7648128*f**5*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288) + 4$   
 $53869568*f**3*(-9*d/32 + f/8 + \sqrt{3}*I*(13*d + 32*e + 2*f)/288)**3)/(2176$   
 $96167*d**6 - 301346487*d**5*f - 1217128448*d**4*e**2 + 130506255*d**4*f**2$   
 $+ 2181281792*d**3*e**2*f - 5619240*d**3*f**3 - 617611264*d**2*e**4 - 145014$   
 $9888*d**2*e**2*f**2 - 8036820*d**2*f**4 + 495976448*d*e**4*f + 430088192*d*$   
 $e**2*f**3 + 783648*d*f**5 - 114294784*e**4*f**2 - 47771648*e**2*f**4 + 1883$   
 $52*f**6)) + (9*d/32 - f/8 - \sqrt{3}*I*(13*d - 32*e + 2*f)/288)*\log(x + (-10$   
 $25428432*d**5*e - 334752912*d**5*(9*d/32 - f/8 - \sqrt{3}*I*(13*d - 32*e + 2$   
 $*f)/288) + 2008961360*d**4*e*f + 1151575920*d**4*f*(9*d/32 - f/8 - \sqrt{3}*I$   
 $(13*d - 32*e + 2*f)/288) - 431308800*d**3*e**3 - 3143688192*d**3*e**2*(9*$   
 $d/32 - f/8 - \sqrt{3}*I*(13*d - 32*e + 2*f)/288) - 1598857120*d**3*e*f**2 +$   
 $9917005824*d**3*e*(9*d/32 - f/8 - \sqrt{3}*I*(13*d - 32*e + 2*f)/288)**2 - 9$   
 $44300160*d**3*f**2*(9*d/32 - f/8 - \sqrt{3}*I*(13*d - 32*e + 2*f)/288) + 118$   
 $78244352*d**3*(9*d/32 - f/8 - \sqrt{3}*I*(13*d - 32*e + 2*f)/288)**3 + 23316$   
 $4800*d**2*e**3*f + 4409634816*d**2*e**2*f*(9*d/32 - f/8 - \sqrt{3}*I*(13*d -$   
 $32*e + 2*f)/288) + 662937520*d**2*e*f**3 - 13004623872*d**2*e*f*(9*d/32 -$   
 $f/8 - \sqrt{3}*I*(13*d - 32*e + 2*f)/288)**2 + 231796080*d**2*f**3*(9*d/32 -$   
 $f/8 - \sqrt{3}*I*(13*d - 32*e + 2*f)/288) - 10089639936*d**2*f*(9*d/32 - f/$   
 $8 - \sqrt{3}*I*(13*d - 32*e + 2*f)/288)**3 + 142606336*d*e**5 + 754974720*d*$   
 $e**4*(9*d/32 - f/8 - \sqrt{3}*I*(13*d - 32*e + 2*f)/288) - 1843200*d*e**3*f*$   
 $*2 + 3850371072*d*e**3*(9*d/32 - f/8 - \sqrt{3}*I*(13*d - 32*e + 2*f)/288)**$   
 $2 - 1926291456*d*e**2*f**2*(9*d/32 - f/8 - \sqrt{3}*I*(13*d - 32*e + 2*f)/28$

8) + 20384317440\*d\*e\*\*2\*(9\*d/32 - f/8 - sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*  
 \*3 - 146756960\*d\*e\*f\*\*4 + 5813379072\*d\*e\*f\*\*2\*(9\*d/32 - f/8 - sqrt(3)\*I\*(13  
 \*d - 32\*e + 2\*f)/288)\*\*2 + 12679200\*d\*f\*\*4\*(9\*d/32 - f/8 - sqrt(3)\*I\*(13\*d  
 - 32\*e + 2\*f)/288) + 1116758016\*d\*f\*\*2\*(9\*d/32 - f/8 - sqrt(3)\*I\*(13\*d - 32  
 \*e + 2\*f)/288)\*\*3 - 79691776\*e\*\*5\*f - 188743680\*e\*\*4\*f\*(9\*d/32 - f/8 - sqrt  
 (3)\*I\*(13\*d - 32\*e + 2\*f)/288) - 7372800\*e\*\*3\*f\*\*3 - 2151677952\*e\*\*3\*f\*(9\*d  
 /32 - f/8 - sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*\*2 + 287096832\*e\*\*2\*f\*\*3\*(9\*  
 d/32 - f/8 - sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288) - 5096079360\*e\*\*2\*f\*(9\*d/32  
 - f/8 - sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*\*3 + 14093632\*e\*f\*\*5 - 85952102  
 4\*e\*f\*\*3\*(9\*d/32 - f/8 - sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*\*2 - 7648128\*f\*  
 \*5\*(9\*d/32 - f/8 - sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288) + 453869568\*f\*\*3\*(9\*d  
 /32 - f/8 - sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*\*3)/(217696167\*d\*\*6 - 301346  
 487\*d\*\*5\*f - 1217128448\*d\*\*4\*e\*\*2 + 130506255\*d\*\*4\*f\*\*2 + 2181281792\*d\*\*3\*e  
 \*\*2\*f - 5619240\*d\*\*3\*f\*\*3 - 617611264\*d\*\*2\*e\*\*4 - 1450149888\*d\*\*2\*e\*\*2\*f\*\*2  
 - 8036820\*d\*\*2\*f\*\*4 + 495976448\*d\*e\*\*4\*f + 430088192\*d\*e\*\*2\*f\*\*3 + 783648\*  
 d\*f\*\*5 - 114294784\*e\*\*4\*f\*\*2 - 47771648\*e\*\*2\*f\*\*4 + 188352\*f\*\*6) + (9\*d/32  
 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*log(x + (-1025428432\*d\*\*5\*e - 3  
 34752912\*d\*\*5\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288) + 20089613  
 60\*d\*\*4\*e\*f + 1151575920\*d\*\*4\*f\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*  
 f)/288) - 431308800\*d\*\*3\*e\*\*3 - 3143688192\*d\*\*3\*e\*\*2\*(9\*d/32 - f/8 + sqrt(3  
 )\*I\*(13\*d - 32\*e + 2\*f)/288) - 1598857120\*d\*\*3\*e\*f\*\*2 + 9917005824\*d\*\*3\*e\*(  
 9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*\*2 - 944300160\*d\*\*3\*f\*\*2\*  
 (9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288) + 11878244352\*d\*\*3\*(9\*d/  
 32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*\*3 + 233164800\*d\*\*2\*e\*\*3\*f +  
 4409634816\*d\*\*2\*e\*\*2\*f\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288) +  
 662937520\*d\*\*2\*e\*f\*\*3 - 13004623872\*d\*\*2\*e\*f\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13  
 \*d - 32\*e + 2\*f)/288)\*\*2 + 231796080\*d\*\*2\*f\*\*3\*(9\*d/32 - f/8 + sqrt(3)\*I\*(1  
 3\*d - 32\*e + 2\*f)/288) - 10089639936\*d\*\*2\*f\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d  
 - 32\*e + 2\*f)/288)\*\*3 + 142606336\*d\*e\*\*5 + 754974720\*d\*e\*\*4\*(9\*d/32 - f/8  
 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288) - 1843200\*d\*e\*\*3\*f\*\*2 + 3850371072\*d\*e  
 \*\*3\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*\*2 - 1926291456\*d\*e\*  
 \*2\*f\*\*2\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288) + 20384317440\*d\*  
 e\*\*2\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*\*3 - 146756960\*d\*e\*  
 f\*\*4 + 5813379072\*d\*e\*f\*\*2\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/28  
 8)\*\*2 + 12679200\*d\*f\*\*4\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)  
 + 1116758016\*d\*f\*\*2\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*\*3 -  
 79691776\*e\*\*5\*f - 188743680\*e\*\*4\*f\*(9\*d/32 - f/8 + sqrt(3)\*I\*(13\*d - 32\*e  
 + 2\*f)/288) - 7372800\*e\*\*3\*f\*\*3 - 2151677952\*e\*\*3\*f\*(9\*d/32 - f/8 + sqrt(3)  
 \*I\*(13\*d - 32\*e + 2\*f)/288)\*\*2 + 287096832\*e\*\*2\*f\*\*3\*(9\*d/32 - f/8 + sqrt(3  
 )\*I\*(13\*d - 32\*e + 2\*f)/288) - 5096079360\*e\*\*2\*f\*(9\*d/32 - f/8 + sqrt(3)\*I\*  
 (13\*d - 32\*e + 2\*f)/288)\*\*3 + 14093632\*e\*f\*\*5 - 859521024\*e\*f\*\*3\*(9\*d/32 -  
 f/8 + sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288)\*\*2 - 7648128\*f\*\*5\*(9\*d/32 - f/8 +  
 sqrt(3)\*I\*(13\*d - 32\*e + 2\*f)/288) + 453869568\*f\*\*3\*(9\*d/32 - f/8 + sqrt(3)  
 \*I\*(13\*d - 32\*e + 2\*f)/288)\*\*3)/(217696167\*d\*\*6 - 301346487\*d\*\*5\*f - 121712  
 8448\*d\*\*4\*e\*\*2 + 130506255\*d\*\*4\*f\*\*2 + 2181281792\*d\*\*3\*e\*\*2\*f - 5619240\*d\*\*

$3f^3 - 617611264d^2e^4 - 1450149888d^2e^2f^2 - 8036820d^2f^4 + 495976448de^4f + 430088192de^2f^3 + 783648df^5 - 114294784e^4f^2 - 47771648e^2f^4 + 188352f^6) + (8ex^6 + 12ex^4 + 16ex^2 + 6e + x^7(-7d + 7f) + x^5(-5d + 10f) + x^3(-7d + 14f) + x(4d + 5f)) / (24x^8 + 48x^6 + 72x^4 + 48x^2 + 24)$

### Maxima [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 173, normalized size of antiderivative = 0.78

$$\begin{aligned}
 \int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^3} dx &= \frac{1}{144} \sqrt{3}(13d - 32e + 2f) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) \\
 &+ \frac{1}{144} \sqrt{3}(13d + 32e + 2f) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) \\
 &+ \frac{1}{32} (9d - 4f) \log(x^2 + x + 1) - \frac{1}{32} (9d - 4f) \log(x^2 - x + 1) \\
 &- \frac{7(d - f)x^7 - 8ex^6 + 5(d - 2f)x^5 - 12ex^4 + 7(d - 2f)x^3 - 16ex^2 - (4d + 5f)x - 6e}{24(x^8 + 2x^6 + 3x^4 + 2x^2 + 1)}
 \end{aligned}$$

[In] integrate((f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x, algorithm="maxima")

[Out] 1/144\*sqrt(3)\*(13\*d - 32\*e + 2\*f)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/144\*sqrt(3)\*(13\*d + 32\*e + 2\*f)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/32\*(9\*d - 4\*f)\*log(x^2 + x + 1) - 1/32\*(9\*d - 4\*f)\*log(x^2 - x + 1) - 1/24\*(7\*(d - f)\*x^7 - 8\*e\*x^6 + 5\*(d - 2\*f)\*x^5 - 12\*e\*x^4 + 7\*(d - 2\*f)\*x^3 - 16\*e\*x^2 - (4\*d + 5\*f)\*x - 6\*e)/(x^8 + 2\*x^6 + 3\*x^4 + 2\*x^2 + 1)

### Giac [A] (verification not implemented)

none

Time = 0.33 (sec) , antiderivative size = 165, normalized size of antiderivative = 0.74

$$\begin{aligned}
 \int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^3} dx &= \frac{1}{144} \sqrt{3}(13d - 32e + 2f) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) \\
 &+ \frac{1}{144} \sqrt{3}(13d + 32e + 2f) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) \\
 &+ \frac{1}{32} (9d - 4f) \log(x^2 + x + 1) - \frac{1}{32} (9d - 4f) \log(x^2 - x + 1) \\
 &- \frac{7dx^7 - 7fx^7 - 8ex^6 + 5dx^5 - 10fx^5 - 12ex^4 + 7dx^3 - 14fx^3 - 16ex^2 - 4dx - 5fx - 6e}{24(x^4 + x^2 + 1)^2}
 \end{aligned}$$

[In] integrate((f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x, algorithm="giac")

[Out]  $\frac{1}{144}\sqrt{3}(13d - 32e + 2f)\arctan\left(\frac{1}{3}\sqrt{3}(2x + 1)\right) + \frac{1}{144}\sqrt{3}(13d + 32e + 2f)\arctan\left(\frac{1}{3}\sqrt{3}(2x - 1)\right) + \frac{1}{32}(9d - 4f)\log(x^2 + x + 1) - \frac{1}{32}(9d - 4f)\log(x^2 - x + 1) - \frac{1}{24}(7dx^7 - 7fx^7 - 8e^2x^6 + 5d^2x^5 - 10f^2x^5 - 12e^2x^4 + 7d^2x^3 - 14f^2x^3 - 16e^2x^2 - 4d^2x - 5f^2x - 6e^2)/(x^4 + x^2 + 1)^2$

### Mupad [B] (verification not implemented)

Time = 7.97 (sec) , antiderivative size = 249, normalized size of antiderivative = 1.12

$$\int \frac{d + ex + fx^2}{(1 + x^2 + x^4)^3} dx$$

$$= \frac{\left(\frac{7f}{24} - \frac{7d}{24}\right)x^7 + \frac{ex^6}{3} + \left(\frac{5f}{12} - \frac{5d}{24}\right)x^5 + \frac{ex^4}{2} + \left(\frac{7f}{12} - \frac{7d}{24}\right)x^3 + \frac{2ex^2}{3} + \left(\frac{d}{6} + \frac{5f}{24}\right)x + \frac{e}{4}}{x^8 + 2x^6 + 3x^4 + 2x^2 + 1}$$

$$- \ln\left(x - \frac{1}{2} - \frac{\sqrt{3}i}{2}\right) \left(\frac{9d}{32} - \frac{f}{8} + \frac{\sqrt{3}d13i}{288} + \frac{\sqrt{3}e1i}{9} + \frac{\sqrt{3}f1i}{144}\right)$$

$$- \ln\left(x + \frac{1}{2} - \frac{\sqrt{3}i}{2}\right) \left(\frac{f}{8} - \frac{9d}{32} + \frac{\sqrt{3}d13i}{288} - \frac{\sqrt{3}e1i}{9} + \frac{\sqrt{3}f1i}{144}\right)$$

$$+ \ln\left(x - \frac{1}{2} + \frac{\sqrt{3}i}{2}\right) \left(\frac{f}{8} - \frac{9d}{32} + \frac{\sqrt{3}d13i}{288} + \frac{\sqrt{3}e1i}{9} + \frac{\sqrt{3}f1i}{144}\right)$$

$$+ \ln\left(x + \frac{1}{2} + \frac{\sqrt{3}i}{2}\right) \left(\frac{9d}{32} - \frac{f}{8} + \frac{\sqrt{3}d13i}{288} - \frac{\sqrt{3}e1i}{9} + \frac{\sqrt{3}f1i}{144}\right)$$

[In] `int((d + e*x + f*x^2)/(x^2 + x^4 + 1)^3,x)`

[Out]  $(e/4 - x^5*((5*d)/24 - (5*f)/12) - x^3*((7*d)/24 - (7*f)/12) - x^7*((7*d)/24 - (7*f)/24) + (2*e*x^2)/3 + (e*x^4)/2 + (e*x^6)/3 + x*(d/6 + (5*f)/24))/((2*x^2 + 3*x^4 + 2*x^6 + x^8 + 1) - \log(x - (3^{(1/2)}*1i)/2 - 1/2)*((9*d)/32 - f/8 + (3^{(1/2)}*d*13i)/288 + (3^{(1/2)}*e*1i)/9 + (3^{(1/2)}*f*1i)/144) - \log(x - (3^{(1/2)}*1i)/2 + 1/2)*(f/8 - (9*d)/32 + (3^{(1/2)}*d*13i)/288 - (3^{(1/2)}*e*1i)/9 + (3^{(1/2)}*f*1i)/144) + \log(x + (3^{(1/2)}*1i)/2 - 1/2)*(f/8 - (9*d)/32 + (3^{(1/2)}*d*13i)/288 + (3^{(1/2)}*e*1i)/9 + (3^{(1/2)}*f*1i)/144) + \log(x + (3^{(1/2)}*1i)/2 + 1/2)*((9*d)/32 - f/8 + (3^{(1/2)}*d*13i)/288 - (3^{(1/2)}*e*1i)/9 + (3^{(1/2)}*f*1i)/144)$

$$3.49 \quad \int \frac{d+ex+fx^2+gx^3}{(1+x^2+x^4)^3} dx$$

Optimal result	536
Rubi [A] (verified)	537
Mathematica [C] (verified)	540
Maple [A] (verified)	541
Fricas [A] (verification not implemented)	541
Sympy [F(-1)]	542
Maxima [A] (verification not implemented)	542
Giac [A] (verification not implemented)	543
Mupad [B] (verification not implemented)	543

### Optimal result

Integrand size = 26, antiderivative size = 243

$$\begin{aligned} \int \frac{d+ex+fx^2+gx^3}{(1+x^2+x^4)^3} dx &= \frac{x(d+f-(d-2f)x^2)}{12(1+x^2+x^4)^2} + \frac{e-2g+(2e-g)x^2}{12(1+x^2+x^4)^2} \\ &+ \frac{(2e-g)(1+2x^2)}{12(1+x^2+x^4)} + \frac{x(2d+3f-7(d-f)x^2)}{24(1+x^2+x^4)} \\ &- \frac{(13d+2f)\arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{48\sqrt{3}} + \frac{(13d+2f)\arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{48\sqrt{3}} \\ &+ \frac{(2e-g)\arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{32}(9d-4f)\log(1-x+x^2) \\ &+ \frac{1}{32}(9d-4f)\log(1+x+x^2) \end{aligned}$$

```
[Out] 1/12*x*(d+f-(d-2*f)*x^2)/(x^4+x^2+1)^2+1/12*(e-2*g+(2*e-g)*x^2)/(x^4+x^2+1)^2+1/12*(2*e-g)*(2*x^2+1)/(x^4+x^2+1)+1/24*x*(2*d+3*f-7*(d-f)*x^2)/(x^4+x^2+1)-1/32*(9*d-4*f)*ln(x^2-x+1)+1/32*(9*d-4*f)*ln(x^2+x+1)-1/144*(13*d+2*f)*arctan(1/3*(1-2*x)*3^(1/2))*3^(1/2)+1/144*(13*d+2*f)*arctan(1/3*(1+2*x)*3^(1/2))*3^(1/2)+1/9*(2*e-g)*arctan(1/3*(2*x^2+1)*3^(1/2))*3^(1/2)
```



**Rubi [A] (verified)**

Time = 0.15 (sec) , antiderivative size = 243, normalized size of antiderivative = 1.00, number of steps used = 17, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.385$ , Rules used = {1687, 1192, 1183, 648, 632, 210, 642, 1261, 652, 628}

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^3} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(13d + 2f)}{48\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(13d + 2f)}{48\sqrt{3}}$$

$$+ \frac{\arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)(2e - g)}{3\sqrt{3}} - \frac{1}{32}(9d - 4f)\log(x^2 - x + 1)$$

$$+ \frac{1}{32}(9d - 4f)\log(x^2 + x + 1)$$

$$+ \frac{x(-7x^2(d - f) + 2d + 3f)}{24(x^4 + x^2 + 1)} + \frac{x(-(x^2(d - 2f)) + d + f)}{12(x^4 + x^2 + 1)^2}$$

$$+ \frac{(2x^2 + 1)(2e - g)}{12(x^4 + x^2 + 1)} + \frac{x^2(2e - g) + e - 2g}{12(x^4 + x^2 + 1)^2}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)/(1 + x^2 + x^4)^3,x]

[Out] (x\*(d + f - (d - 2\*f)\*x^2))/(12\*(1 + x^2 + x^4)^2) + (e - 2\*g + (2\*e - g)\*x^2)/(12\*(1 + x^2 + x^4)^2) + ((2\*e - g)\*(1 + 2\*x^2))/(12\*(1 + x^2 + x^4)) + (x\*(2\*d + 3\*f - 7\*(d - f)\*x^2))/(24\*(1 + x^2 + x^4)) - ((13\*d + 2\*f)\*ArcTan[(1 - 2\*x)/Sqrt[3]])/(48\*Sqrt[3]) + ((13\*d + 2\*f)\*ArcTan[(1 + 2\*x)/Sqrt[3]])/(48\*Sqrt[3]) + ((2\*e - g)\*ArcTan[(1 + 2\*x^2)/Sqrt[3]])/(3\*Sqrt[3]) - ((9\*d - 4\*f)\*Log[1 - x + x^2])/32 + ((9\*d - 4\*f)\*Log[1 + x + x^2])/32

Rule 210

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-(Rt[-a, 2]\*Rt[-b, 2])^(-1))\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

Rule 628

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p + 1)/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c},

$x] \&\& \text{NeQ}[b^2 - 4ac, 0]$

#### Rule 642

$\text{Int}[\frac{(d_.) + (e_.)x}{(a_.) + (b_.)x + (c_.)x^2}, x\_Symbol] \rightarrow \text{Simp}[d \cdot (\text{Log}[\text{RemoveContent}[a + bx + cx^2, x]]/b), x] /; \text{FreeQ}\{a, b, c, d, e\}, x] \&\& \text{EqQ}[2cd - be, 0]$

#### Rule 648

$\text{Int}[\frac{(d_.) + (e_.)x}{(a_.) + (b_.)x + (c_.)x^2}, x\_Symbol] \rightarrow \text{Dist}[\frac{2cd - be}{2c}, \text{Int}[1/(a + bx + cx^2), x], x] + \text{Dist}[e/(2c), \text{Int}[(b + 2cx)/(a + bx + cx^2), x], x] /; \text{FreeQ}\{a, b, c, d, e\}, x] \&\& \text{NeQ}[2cd - be, 0] \&\& \text{NeQ}[b^2 - 4ac, 0] \&\& \text{!NiceSqrtQ}[b^2 - 4ac]$

#### Rule 652

$\text{Int}[\frac{(d_.) + (e_.)x}{(a_.) + (b_.)x + (c_.)x^2}^{(p_.)}, x\_Symbol] \rightarrow \text{Simp}[\frac{(bd - 2ae + (2cd - be)x)}{(p + 1)(b^2 - 4ac)}(a + bx + cx^2)^{(p + 1)}, x] - \text{Dist}[(2p + 3) \cdot \frac{(2cd - be)}{(p + 1)(b^2 - 4ac)}], \text{Int}[(a + bx + cx^2)^{(p + 1)}, x], x] /; \text{FreeQ}\{a, b, c, d, e\}, x] \&\& \text{NeQ}[2cd - be, 0] \&\& \text{NeQ}[b^2 - 4ac, 0] \&\& \text{LtQ}[p, -1] \&\& \text{NeQ}[p, -3/2]$

#### Rule 1183

$\text{Int}[\frac{(d_.) + (e_.)x^2}{(a_.) + (b_.)x^2 + (c_.)x^4}, x\_Symbol] \rightarrow \text{With}\{q = \text{Rt}[a/c, 2]\}, \text{With}\{r = \text{Rt}[2q - b/c, 2]\}, \text{Dist}[1/(2cq^2r), \text{Int}[(d^2r - (d - eq)x)/(q - rx + x^2), x], x] + \text{Dist}[1/(2cq^2r), \text{Int}[(d^2r + (d - eq)x)/(q + rx + x^2), x], x]] /; \text{FreeQ}\{a, b, c, d, e\}, x] \&\& \text{NeQ}[b^2 - 4ac, 0] \&\& \text{NeQ}[c^2d^2 - b^2d^2e + a^2e^2, 0] \&\& \text{NegQ}[b^2 - 4ac]$

#### Rule 1192

$\text{Int}[\frac{(d_.) + (e_.)x^2}{(a_.) + (b_.)x^2 + (c_.)x^4}^{(p_.)}, x\_Symbol] \rightarrow \text{Simp}[x \cdot (a^2be - d(b^2 - 2ac) - c(bd - 2ae)x^2) \cdot (a + bx^2 + cx^4)^{(p + 1)} / (2a(p + 1)(b^2 - 4ac)), x] + \text{Dist}[1/(2a(p + 1)(b^2 - 4ac)), \text{Int}[\text{Simp}[(2p + 3)db^2 - a^2be - 2acd(4p + 5) + (4p + 7)(db - 2ae)cx^2, x] \cdot (a + bx^2 + cx^4)^{(p + 1)}, x], x] /; \text{FreeQ}\{a, b, c, d, e\}, x] \&\& \text{NeQ}[b^2 - 4ac, 0] \&\& \text{NeQ}[c^2d^2 - b^2d^2e + a^2e^2, 0] \&\& \text{LtQ}[p, -1] \&\& \text{IntegerQ}[2p]$

#### Rule 1261

$\text{Int}[x \cdot \frac{(d_.) + (e_.)x^2}{(a_.) + (b_.)x^2 + (c_.)x^4}^{(q_.)}, x\_Symbol] \rightarrow \text{Dist}[1/2, \text{Subst}[\text{Int}[(d + ex)^q (a + bx + cx^2)^p, x], x, x^2], x] /; \text{FreeQ}\{a, b, c, d, e, p, q\}, x]$

## Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

## Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d + fx^2}{(1 + x^2 + x^4)^3} dx + \int \frac{x(e + gx^2)}{(1 + x^2 + x^4)^3} dx \\
&= \frac{x(d + f - (d - 2f)x^2)}{12(1 + x^2 + x^4)^2} + \frac{1}{12} \int \frac{11d - f - 5(d - 2f)x^2}{(1 + x^2 + x^4)^2} dx \\
&\quad + \frac{1}{2} \text{Subst}\left(\int \frac{e + gx}{(1 + x + x^2)^3} dx, x, x^2\right) \\
&= \frac{x(d + f - (d - 2f)x^2)}{12(1 + x^2 + x^4)^2} + \frac{e - 2g + (2e - g)x^2}{12(1 + x^2 + x^4)^2} + \frac{x(2d + 3f - 7(d - f)x^2)}{24(1 + x^2 + x^4)} \\
&\quad + \frac{1}{72} \int \frac{15(4d - f) - 21(d - f)x^2}{1 + x^2 + x^4} dx + \frac{1}{4}(2e - g) \text{Subst}\left(\int \frac{1}{(1 + x + x^2)^2} dx, x, x^2\right) \\
&= \frac{x(d + f - (d - 2f)x^2)}{12(1 + x^2 + x^4)^2} + \frac{e - 2g + (2e - g)x^2}{12(1 + x^2 + x^4)^2} + \frac{(2e - g)(1 + 2x^2)}{12(1 + x^2 + x^4)} \\
&\quad + \frac{x(2d + 3f - 7(d - f)x^2)}{24(1 + x^2 + x^4)} + \frac{1}{144} \int \frac{15(4d - f) - (21(d - f) + 15(4d - f))x}{1 - x + x^2} dx \\
&\quad + \frac{1}{144} \int \frac{15(4d - f) + (21(d - f) + 15(4d - f))x}{1 + x + x^2} dx \\
&\quad + \frac{1}{6}(2e - g) \text{Subst}\left(\int \frac{1}{1 + x + x^2} dx, x, x^2\right) \\
&= \frac{x(d + f - (d - 2f)x^2)}{12(1 + x^2 + x^4)^2} + \frac{e - 2g + (2e - g)x^2}{12(1 + x^2 + x^4)^2} + \frac{(2e - g)(1 + 2x^2)}{12(1 + x^2 + x^4)} \\
&\quad + \frac{x(2d + 3f - 7(d - f)x^2)}{24(1 + x^2 + x^4)} + \frac{1}{32}(9d - 4f) \int \frac{1 + 2x}{1 + x + x^2} dx \\
&\quad + \frac{1}{96}(13d + 2f) \int \frac{1}{1 - x + x^2} dx + \frac{1}{96}(13d + 2f) \int \frac{1}{1 + x + x^2} dx \\
&\quad + \frac{1}{32}(-9d + 4f) \int \frac{-1 + 2x}{1 - x + x^2} dx + \frac{1}{3}(-2e + g) \text{Subst}\left(\int \frac{1}{-3 - x^2} dx, x, 1 + 2x^2\right)
\end{aligned}$$

$$\begin{aligned}
&= \frac{x(d+f-(d-2f)x^2)}{12(1+x^2+x^4)^2} + \frac{e-2g+(2e-g)x^2}{12(1+x^2+x^4)^2} + \frac{(2e-g)(1+2x^2)}{12(1+x^2+x^4)} \\
&+ \frac{x(2d+3f-7(d-f)x^2)}{24(1+x^2+x^4)} + \frac{(2e-g)\tan^{-1}\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{32}(9d-4f)\log(1-x+x^2) \\
&+ \frac{1}{32}(9d-4f)\log(1+x+x^2) + \frac{1}{48}(-13d-2f)\text{Subst}\left(\int \frac{1}{-3-x^2} dx, x, -1+2x\right) \\
&+ \frac{1}{48}(-13d-2f)\text{Subst}\left(\int \frac{1}{-3-x^2} dx, x, 1+2x\right) \\
&= \frac{x(d+f-(d-2f)x^2)}{12(1+x^2+x^4)^2} + \frac{e-2g+(2e-g)x^2}{12(1+x^2+x^4)^2} + \frac{(2e-g)(1+2x^2)}{12(1+x^2+x^4)} \\
&+ \frac{x(2d+3f-7(d-f)x^2)}{24(1+x^2+x^4)} - \frac{(13d+2f)\tan^{-1}\left(\frac{1-2x}{\sqrt{3}}\right)}{48\sqrt{3}} \\
&+ \frac{(13d+2f)\tan^{-1}\left(\frac{1+2x}{\sqrt{3}}\right)}{48\sqrt{3}} + \frac{(2e-g)\tan^{-1}\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} \\
&- \frac{1}{32}(9d-4f)\log(1-x+x^2) + \frac{1}{32}(9d-4f)\log(1+x+x^2)
\end{aligned}$$

### Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 0.44 (sec) , antiderivative size = 259, normalized size of antiderivative = 1.07

$$\begin{aligned}
\int \frac{d+ex+fx^2+gx^3}{(1+x^2+x^4)^3} dx &= \frac{1}{144} \left( \frac{6(2dx+3fx-7dx^3+7fx^3-2g(1+2x^2)+e(4+8x^2))}{1+x^2+x^4} \right. \\
&+ \frac{12(e+2ex^2-g(2+x^2)+x(d+f-dx^2+2fx^2))}{(1+x^2+x^4)^2} \\
&- \frac{((-47i+7\sqrt{3})d+(17i-7\sqrt{3})f)\arctan\left(\frac{1}{2}(-i+\sqrt{3})x\right)}{\sqrt{\frac{1}{6}}(1+i\sqrt{3})} \\
&- \frac{((47i+7\sqrt{3})d-(17i+7\sqrt{3})f)\arctan\left(\frac{1}{2}(i+\sqrt{3})x\right)}{\sqrt{\frac{1}{6}}(1-i\sqrt{3})} \\
&\left. - 16\sqrt{3}(2e-g)\arctan\left(\frac{\sqrt{3}}{1+2x^2}\right) \right)
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)/(1 + x^2 + x^4)^3, x]

[Out] ((6\*(2\*d\*x + 3\*f\*x - 7\*d\*x^3 + 7\*f\*x^3 - 2\*g\*(1 + 2\*x^2) + e\*(4 + 8\*x^2)))/(1 + x^2 + x^4) + (12\*(e + 2\*e\*x^2 - g\*(2 + x^2) + x\*(d + f - d\*x^2 + 2\*f\*x

$\text{rcTan}\left[\frac{((-I + \sqrt{3})x)/2}{\sqrt{(1 + I\sqrt{3})/6}}\right] - \frac{((47I + 7\sqrt{3})d - (17I - 7\sqrt{3})f) \text{ArcTan}\left[\frac{(I + \sqrt{3})x}{2}\right]}{\sqrt{(1 - I\sqrt{3})/6}} - 16\sqrt{3}(2e - g) \text{ArcTan}\left[\frac{\sqrt{3}}{1 + 2x^2}\right]/144$

### Maple [A] (verified)

Time = 0.30 (sec) , antiderivative size = 232, normalized size of antiderivative = 0.95

method	result
default	$-\frac{\left(\frac{7d}{3} - \frac{7f}{3} - \frac{4e}{3} - \frac{g}{3}\right)x^3 + (-6d + 4f + 2g)x^2 + \left(\frac{20d}{3} - \frac{13f}{3} + \frac{e}{3} - \frac{8g}{3}\right)x - 4d + \frac{4f}{3} - 2e + 2g}{16(x^2 - x + 1)^2} - \frac{(27d - 12f)\ln(x^2 - x + 1)}{96} - \frac{\left(-\frac{13d}{2} - 16e - f + 8g\right)\arctan\left(\frac{1}{3}\sqrt{3}(2x - 1)\right)}{3^2}$
risch	Expression too large to display

[In] `int((g*x^3+f*x^2+e*x+d)/(x^4+x^2+1)^3,x,method=_RETURNVERBOSE)`

[Out] 
$$-\frac{1}{16} \left( \frac{(7/3*d - 7/3*f - 4/3*e - 1/3*g)x^3 + (-6*d + 4*f + 2*g)x^2 + (20/3*d - 13/3*f + 1/3*e - 8/3*g)x - 4*d + 4/3*f - 2*e + 2*g}{(x^2 - x + 1)^2} - \frac{1}{96} (27*d - 12*f) \ln(x^2 - x + 1) - \frac{1}{72} (-13/2*d - 16*e - f + 8*g) \arctan\left(\frac{1}{3}\sqrt{3}(2x - 1)\right) \right) + \frac{1}{16} \left( \frac{(-7/3*d + 7/3*f - 4/3*e - 1/3*g)x^3 + (-6*d + 4*f - 2*g)x^2 + (-20/3*d + 13/3*f + 1/3*e - 8/3*g)x - 4*d + 4/3*f + 2*e - 2*g}{(x^2 + x + 1)^2} + \frac{1}{96} (27*d - 12*f) \ln(x^2 + x + 1) + \frac{1}{72} (13/2*d - 16*e + f + 8*g) \arctan\left(\frac{1}{3}\sqrt{3}(1 + 2x)\right) \right)$$

### Fricas [A] (verification not implemented)

none

Time = 0.49 (sec) , antiderivative size = 435, normalized size of antiderivative = 1.79

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^3} dx = \frac{84(d - f)x^7 - 48(2e - g)x^6 + 60(d - 2f)x^5 - 72(2e - g)x^4 + 84(d - 2f)x^3 - 96(2e - g)x^2 - 2\sqrt{3} \left( (13d - 32e + 2f + 16g)x^8 + 2(13d - 32e + 2f + 16g)x^6 + 3(13d - 32e + 2f + 16g)x^4 + 2(13d - 32e + 2f + 16g)x^2 + 13d - 32e + 2f + 16g \right) \arctan\left(\frac{1}{3}\sqrt{3}(2x + 1)\right) - 2\sqrt{3} \left( (13d + 32e + 2f - 16g)x^8 + 2(13d + 32e + 2f - 16g)x^6 + 3(13d + 32e + 2f - 16g)x^4 + 2(13d + 32e + 2f - 16g)x^2 + 13d + 32e + 2f - 16g \right) \arctan\left(\frac{1}{3}\sqrt{3}(2x - 1)\right) - 12(4d + 5f)x - 9((9d - 4f)x^8 + 2(9d - 4f)x^6 + 3(9d - 4f)x^4 + 2(9d - 4f)x^2 + 9d - 4f) \log(x^2 + x + 1) + 9((9d - 4f)x^8 + 2(9d - 4f)x^6 + 3(9d - 4f)x^4 + 2(9d - 4f)x^2 + 9d - 4f)}{16(1 + x^2 + x^4)^3}$$

[In] `integrate((g*x^3+f*x^2+e*x+d)/(x^4+x^2+1)^3,x, algorithm="fricas")`

[Out] 
$$-\frac{1}{288} (84(d - f)x^7 - 48(2e - g)x^6 + 60(d - 2f)x^5 - 72(2e - g)x^4 + 84(d - 2f)x^3 - 96(2e - g)x^2 - 2\sqrt{3} \left( (13d - 32e + 2f + 16g)x^8 + 2(13d - 32e + 2f + 16g)x^6 + 3(13d - 32e + 2f + 16g)x^4 + 2(13d - 32e + 2f + 16g)x^2 + 13d - 32e + 2f + 16g \right) \arctan\left(\frac{1}{3}\sqrt{3}(2x + 1)\right) - 2\sqrt{3} \left( (13d + 32e + 2f - 16g)x^8 + 2(13d + 32e + 2f - 16g)x^6 + 3(13d + 32e + 2f - 16g)x^4 + 2(13d + 32e + 2f - 16g)x^2 + 13d + 32e + 2f - 16g \right) \arctan\left(\frac{1}{3}\sqrt{3}(2x - 1)\right) - 12(4d + 5f)x - 9((9d - 4f)x^8 + 2(9d - 4f)x^6 + 3(9d - 4f)x^4 + 2(9d - 4f)x^2 + 9d - 4f) \log(x^2 + x + 1) + 9((9d - 4f)x^8 + 2(9d - 4f)x^6 + 3(9d - 4f)x^4 + 2(9d - 4f)x^2 + 9d - 4f))$$

$*f)*x^8 + 2*(9*d - 4*f)*x^6 + 3*(9*d - 4*f)*x^4 + 2*(9*d - 4*f)*x^2 + 9*d - 4*f)*\log(x^2 - x + 1) - 72*e + 72*g)/(x^8 + 2*x^6 + 3*x^4 + 2*x^2 + 1)$

## Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^3} dx = \text{Timed out}$$

[In] integrate((g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4+x\*\*2+1)\*\*3,x)

[Out] Timed out

## Maxima [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 200, normalized size of antiderivative = 0.82

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^3} dx = \frac{1}{144} \sqrt{3}(13d - 32e + 2f + 16g) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) + \frac{1}{144} \sqrt{3}(13d + 32e + 2f - 16g) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) + \frac{1}{32} (9d - 4f) \log(x^2 + x + 1) - \frac{1}{32} (9d - 4f) \log(x^2 - x + 1) - \frac{7(d - f)x^7 - 4(2e - g)x^6 + 5(d - 2f)x^5 - 6(2e - g)x^4 + 7(d - 2f)x^3 - 8(2e - g)x^2 - (4d + 5f)x}{24(x^8 + 2x^6 + 3x^4 + 2x^2 + 1)}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x, algorithm="maxima")

[Out] 1/144\*sqrt(3)\*(13\*d - 32\*e + 2\*f + 16\*g)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/144\*sqrt(3)\*(13\*d + 32\*e + 2\*f - 16\*g)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/32\*(9\*d - 4\*f)\*log(x^2 + x + 1) - 1/32\*(9\*d - 4\*f)\*log(x^2 - x + 1) - 1/24\*(7\*(d - f)\*x^7 - 4\*(2\*e - g)\*x^6 + 5\*(d - 2\*f)\*x^5 - 6\*(2\*e - g)\*x^4 + 7\*(d - 2\*f)\*x^3 - 8\*(2\*e - g)\*x^2 - (4\*d + 5\*f)\*x - 6\*e + 6\*g)/(x^8 + 2\*x^6 + 3\*x^4 + 2\*x^2 + 1)

**Giac [A] (verification not implemented)**

none

Time = 0.31 (sec) , antiderivative size = 192, normalized size of antiderivative = 0.79

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^3} dx = \frac{1}{144} \sqrt{3}(13d - 32e + 2f + 16g) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right) + \frac{1}{144} \sqrt{3}(13d + 32e + 2f - 16g) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right) + \frac{1}{32} (9d - 4f) \log(x^2 + x + 1) - \frac{1}{32} (9d - 4f) \log(x^2 - x + 1) - \frac{7dx^7 - 7fx^7 - 8ex^6 + 4gx^6 + 5dx^5 - 10fx^5 - 12ex^4 + 6gx^4 + 7dx^3 - 14fx^3 - 16ex^2 + 8gx^2 - 4}{24(x^4 + x^2 + 1)^2}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x, algorithm="giac")

[Out] 1/144\*sqrt(3)\*(13\*d - 32\*e + 2\*f + 16\*g)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/144\*sqrt(3)\*(13\*d + 32\*e + 2\*f - 16\*g)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/32\*(9\*d - 4\*f)\*log(x^2 + x + 1) - 1/32\*(9\*d - 4\*f)\*log(x^2 - x + 1) - 1/24\*(7\*d\*x^7 - 7\*f\*x^7 - 8\*e\*x^6 + 4\*g\*x^6 + 5\*d\*x^5 - 10\*f\*x^5 - 12\*e\*x^4 + 6\*g\*x^4 + 7\*d\*x^3 - 14\*f\*x^3 - 16\*e\*x^2 + 8\*g\*x^2 - 4\*d\*x - 5\*f\*x - 6\*e + 6\*g)/(x^4 + x^2 + 1)^2

**Mupad [B] (verification not implemented)**

Time = 8.07 (sec) , antiderivative size = 295, normalized size of antiderivative = 1.21

$$\int \frac{d + ex + fx^2 + gx^3}{(1 + x^2 + x^4)^3} dx = \frac{\left(\frac{7f}{24} - \frac{7d}{24}\right) x^7 + \left(\frac{e}{3} - \frac{g}{6}\right) x^6 + \left(\frac{5f}{12} - \frac{5d}{24}\right) x^5 + \left(\frac{e}{2} - \frac{g}{4}\right) x^4 + \left(\frac{7f}{12} - \frac{7d}{24}\right) x^3 + \left(\frac{2e}{3} - \frac{g}{3}\right) x^2 + \left(\frac{d}{6} + \frac{5f}{24}\right) x + \dots}{x^8 + 2x^6 + 3x^4 + 2x^2 + 1} - \ln\left(x - \frac{1}{2} - \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{9d}{32} - \frac{f}{8} + \frac{\sqrt{3} d 13i}{288} + \frac{\sqrt{3} e 1i}{9} + \frac{\sqrt{3} f 1i}{144} - \frac{\sqrt{3} g 1i}{18}\right) - \ln\left(x + \frac{1}{2} - \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{f}{8} - \frac{9d}{32} + \frac{\sqrt{3} d 13i}{288} - \frac{\sqrt{3} e 1i}{9} + \frac{\sqrt{3} f 1i}{144} + \frac{\sqrt{3} g 1i}{18}\right) + \ln\left(x - \frac{1}{2} + \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{f}{8} - \frac{9d}{32} + \frac{\sqrt{3} d 13i}{288} + \frac{\sqrt{3} e 1i}{9} + \frac{\sqrt{3} f 1i}{144} - \frac{\sqrt{3} g 1i}{18}\right) + \ln\left(x + \frac{1}{2} + \frac{\sqrt{3} \operatorname{li}}{2}\right) \left(\frac{9d}{32} - \frac{f}{8} + \frac{\sqrt{3} d 13i}{288} - \frac{\sqrt{3} e 1i}{9} + \frac{\sqrt{3} f 1i}{144} + \frac{\sqrt{3} g 1i}{18}\right)$$

[In] int((d + e\*x + f\*x^2 + g\*x^3)/(x^2 + x^4 + 1)^3,x)

```
[Out] (e/4 - g/4 - x^5*((5*d)/24 - (5*f)/12) - x^3*((7*d)/24 - (7*f)/12) - x^7*((7*d)/24 - (7*f)/24) + x^2*((2*e)/3 - g/3) + x^4*(e/2 - g/4) + x^6*(e/3 - g/6) + x*(d/6 + (5*f)/24))/(2*x^2 + 3*x^4 + 2*x^6 + x^8 + 1) - log(x - (3^(1/2)*1i)/2 - 1/2)*((9*d)/32 - f/8 + (3^(1/2)*d*13i)/288 + (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/144 - (3^(1/2)*g*1i)/18) - log(x - (3^(1/2)*1i)/2 + 1/2)*(f/8 - (9*d)/32 + (3^(1/2)*d*13i)/288 - (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/144 + (3^(1/2)*g*1i)/18) + log(x + (3^(1/2)*1i)/2 - 1/2)*(f/8 - (9*d)/32 + (3^(1/2)*d*13i)/288 + (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/144 - (3^(1/2)*g*1i)/18) + log(x + (3^(1/2)*1i)/2 + 1/2)*((9*d)/32 - f/8 + (3^(1/2)*d*13i)/288 - (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/144 + (3^(1/2)*g*1i)/18)
```



$$3.50 \quad \int \frac{d+ex+fx^2+gx^3+hx^4}{(1+x^2+x^4)^3} dx$$

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### Optimal result

Integrand size = 31, antiderivative size = 263

$$\begin{aligned} \int \frac{d+ex+fx^2+gx^3+hx^4}{(1+x^2+x^4)^3} dx = & \frac{e-2g+(2e-g)x^2}{12(1+x^2+x^4)^2} + \frac{x(d+f-2h-(d-2f+h)x^2)}{12(1+x^2+x^4)^2} \\ & + \frac{(2e-g)(1+2x^2)}{12(1+x^2+x^4)} \\ & + \frac{x(2d+3f-h-(7d-7f+4h)x^2)}{24(1+x^2+x^4)} \\ & - \frac{(13d+2f+h) \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{48\sqrt{3}} \\ & + \frac{(13d+2f+h) \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{48\sqrt{3}} \\ & + \frac{(2e-g) \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} \\ & - \frac{1}{32}(9d-4f+3h) \log(1-x+x^2) \\ & + \frac{1}{32}(9d-4f+3h) \log(1+x+x^2) \end{aligned}$$

```
[Out] 1/12*(e-2*g+(2*e-g)*x^2)/(x^4+x^2+1)^2+1/12*x*(d+f-2*h-(d-2*f+h)*x^2)/(x^4+x^2+1)^2+1/12*(2*e-g)*(2*x^2+1)/(x^4+x^2+1)+1/24*x*(2*d+3*f-h-(7*d-7*f+4*h)*x^2)/(x^4+x^2+1)-1/32*(9*d-4*f+3*h)*ln(x^2-x+1)+1/32*(9*d-4*f+3*h)*ln(x^2+x+1)-1/144*(13*d+2*f+h)*arctan(1/3*(1-2*x))*3^(1/2)+1/144*(13*d+2*f+h)*arctan(1/3*(1+2*x))*3^(1/2)+1/9*(2*e-g)*arctan(1/3*(2*x^2+1))*3^(1/2)
```

**Rubi [A] (verified)**

Time = 0.18 (sec) , antiderivative size = 263, normalized size of antiderivative = 1.00, number of steps used = 17, number of rules used = 11,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.355$ , Rules used = {1687, 1692, 1192, 1183, 648, 632, 210, 642, 1261, 652, 628}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^3} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(13d + 2f + h)}{48\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(13d + 2f + h)}{48\sqrt{3}} + \frac{\arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)(2e - g)}{3\sqrt{3}} - \frac{1}{32} \log(x^2 - x + 1)(9d - 4f + 3h) + \frac{1}{32} \log(x^2 + x + 1)(9d - 4f + 3h) + \frac{x(-(x^2(7d - 7f + 4h)) + 2d + 3f - h)}{24(x^4 + x^2 + 1)} + \frac{x(-(x^2(d - 2f + h)) + d + f - 2h)}{12(x^4 + x^2 + 1)^2} + \frac{(2x^2 + 1)(2e - g)}{12(x^4 + x^2 + 1)} + \frac{x^2(2e - g) + e - 2g}{12(x^4 + x^2 + 1)^2}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(1 + x^2 + x^4)^3,x]

[Out] (e - 2\*g + (2\*e - g)\*x^2)/(12\*(1 + x^2 + x^4)^2) + (x\*(d + f - 2\*h - (d - 2\*f + h)\*x^2))/(12\*(1 + x^2 + x^4)^2) + ((2\*e - g)\*(1 + 2\*x^2))/(12\*(1 + x^2 + x^4)) + (x\*(2\*d + 3\*f - h - (7\*d - 7\*f + 4\*h)\*x^2))/(24\*(1 + x^2 + x^4)) - ((13\*d + 2\*f + h)\*ArcTan[(1 - 2\*x)/Sqrt[3]])/(48\*Sqrt[3]) + ((13\*d + 2\*f + h)\*ArcTan[(1 + 2\*x)/Sqrt[3]])/(48\*Sqrt[3]) + ((2\*e - g)\*ArcTan[(1 + 2\*x^2)/Sqrt[3]])/(3\*Sqrt[3]) - ((9\*d - 4\*f + 3\*h)\*Log[1 - x + x^2])/32 + ((9\*d - 4\*f + 3\*h)\*Log[1 + x + x^2])/32

Rule 210

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-(Rt[-a, 2]\*Rt[-b, 2])^(-1))\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

Rule 628

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p + 1)/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; Free

$Q[\{a, b, c\}, x] \&\& \text{NeQ}[b^2 - 4*a*c, 0] \&\& \text{LtQ}[p, -1] \&\& \text{NeQ}[p, -3/2] \&\& \text{IntegerQ}[4*p]$

### Rule 632

$\text{Int}[\{(a_.) + (b_.)*(x_) + (c_.)*(x_)^2\}^{-1}, x\_Symbol] \rightarrow \text{Dist}[-2, \text{Subst}[\text{Int}[1/\text{Simp}[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; \text{FreeQ}[\{a, b, c\}, x] \&\& \text{NeQ}[b^2 - 4*a*c, 0]$

### Rule 642

$\text{Int}[\{(d_.) + (e_.)*(x_)\}/\{(a_.) + (b_.)*(x_) + (c_.)*(x_)^2\}, x\_Symbol] \rightarrow \text{Simp}[d*(\text{Log}[\text{RemoveContent}[a + b*x + c*x^2, x]]/b), x] /; \text{FreeQ}[\{a, b, c, d, e\}, x] \&\& \text{EqQ}[2*c*d - b*e, 0]$

### Rule 648

$\text{Int}[\{(d_.) + (e_.)*(x_)\}/\{(a_.) + (b_.)*(x_) + (c_.)*(x_)^2\}, x\_Symbol] \rightarrow \text{Dist}[(2*c*d - b*e)/(2*c), \text{Int}[1/(a + b*x + c*x^2), x], x] + \text{Dist}[e/(2*c), \text{Int}[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; \text{FreeQ}[\{a, b, c, d, e\}, x] \&\& \text{NeQ}[2*c*d - b*e, 0] \&\& \text{NeQ}[b^2 - 4*a*c, 0] \&\& \text{!NiceSqrtQ}[b^2 - 4*a*c]$

### Rule 652

$\text{Int}[\{(d_.) + (e_.)*(x_)\}*\{(a_.) + (b_.)*(x_) + (c_.)*(x_)^2\}^{(p_.)}, x\_Symbol] \rightarrow \text{Simp}[\{(b*d - 2*a*e + (2*c*d - b*e)*x)/((p + 1)*(b^2 - 4*a*c))\}*(a + b*x + c*x^2)^{(p + 1)}, x] - \text{Dist}[(2*p + 3)*\{(2*c*d - b*e)/((p + 1)*(b^2 - 4*a*c))\}, \text{Int}[(a + b*x + c*x^2)^{(p + 1)}, x], x] /; \text{FreeQ}[\{a, b, c, d, e\}, x] \&\& \text{NeQ}[2*c*d - b*e, 0] \&\& \text{NeQ}[b^2 - 4*a*c, 0] \&\& \text{LtQ}[p, -1] \&\& \text{NeQ}[p, -3/2]$

### Rule 1183

$\text{Int}[\{(d_.) + (e_.)*(x_)^2\}/\{(a_.) + (b_.)*(x_)^2 + (c_.)*(x_)^4\}, x\_Symbol] \rightarrow \text{With}[\{q = \text{Rt}[a/c, 2]\}, \text{With}[\{r = \text{Rt}[2*q - b/c, 2]\}, \text{Dist}[1/(2*c*q*r), \text{Int}[(d*r - (d - e*q)*x)/(q - r*x + x^2), x], x] + \text{Dist}[1/(2*c*q*r), \text{Int}[(d*r + (d - e*q)*x)/(q + r*x + x^2), x], x]]] /; \text{FreeQ}[\{a, b, c, d, e\}, x] \&\& \text{NeQ}[b^2 - 4*a*c, 0] \&\& \text{NeQ}[c*d^2 - b*d*e + a*e^2, 0] \&\& \text{NegQ}[b^2 - 4*a*c]$

### Rule 1192

$\text{Int}[\{(d_.) + (e_.)*(x_)^2\}*\{(a_.) + (b_.)*(x_)^2 + (c_.)*(x_)^4\}^{(p_.)}, x\_Symbol] \rightarrow \text{Simp}[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*\{(a + b*x^2 + c*x^4)\}^{(p + 1)}/(2*a*(p + 1)*(b^2 - 4*a*c)), x] + \text{Dist}[1/(2*a*(p + 1)*(b^2 - 4*a*c)), \text{Int}[\text{Simp}[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7)*(d*b - 2*a*e)*c*x^2, x]*\{(a + b*x^2 + c*x^4)\}^{(p + 1)}, x], x] /; \text{FreeQ}[\{a, b, c, d, e\}, x] \&\& \text{NeQ}[b^2 - 4*a*c, 0] \&\& \text{NeQ}[c*d^2 - b*d*e + a*e^2, 0] \&\&$

LtQ[p, -1] && IntegerQ[2\*p]

### Rule 1261

```
Int[(x_)*((d_) + (e_)*(x_)^2)^(q_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(
p_), x_Symbol] := Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

### Rule 1692

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := With[{d =
Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[Poly
nomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^
4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b
^2 - 4*a*c)), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*
x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a
+ b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p
+ 7)*(b*d - 2*a*e)*x^2, x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^
2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1]
```

### Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{x(e + gx^2)}{(1 + x^2 + x^4)^3} dx + \int \frac{d + fx^2 + hx^4}{(1 + x^2 + x^4)^3} dx \\
&= \frac{x(d + f - 2h - (d - 2f + h)x^2)}{12(1 + x^2 + x^4)^2} + \frac{1}{12} \int \frac{11d - f + 2h - 5(d - 2f + h)x^2}{(1 + x^2 + x^4)^2} dx \\
&\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{(1 + x + x^2)^3} dx, x, x^2 \right) \\
&= \frac{e - 2g + (2e - g)x^2}{12(1 + x^2 + x^4)^2} + \frac{x(d + f - 2h - (d - 2f + h)x^2)}{12(1 + x^2 + x^4)^2} \\
&\quad + \frac{x(2d + 3f - h - (7d - 7f + 4h)x^2)}{24(1 + x^2 + x^4)} \\
&\quad + \frac{1}{72} \int \frac{15(4d - f + h) - 3(7d - 7f + 4h)x^2}{1 + x^2 + x^4} dx \\
&\quad + \frac{1}{4} (2e - g) \text{Subst} \left( \int \frac{1}{(1 + x + x^2)^2} dx, x, x^2 \right)
\end{aligned}$$

$$\begin{aligned}
&= \frac{e - 2g + (2e - g)x^2}{12(1 + x^2 + x^4)^2} + \frac{x(d + f - 2h - (d - 2f + h)x^2)}{12(1 + x^2 + x^4)^2} \\
&\quad + \frac{(2e - g)(1 + 2x^2)}{12(1 + x^2 + x^4)} + \frac{x(2d + 3f - h - (7d - 7f + 4h)x^2)}{24(1 + x^2 + x^4)} \\
&\quad + \frac{1}{144} \int \frac{15(4d - f + h) - (15(4d - f + h) + 3(7d - 7f + 4h))x}{1 - x + x^2} dx \\
&\quad + \frac{1}{144} \int \frac{15(4d - f + h) + (15(4d - f + h) + 3(7d - 7f + 4h))x}{1 + x + x^2} dx \\
&\quad + \frac{1}{6}(2e - g)\text{Subst}\left(\int \frac{1}{1 + x + x^2} dx, x, x^2\right) \\
&= \frac{e - 2g + (2e - g)x^2}{12(1 + x^2 + x^4)^2} + \frac{x(d + f - 2h - (d - 2f + h)x^2)}{12(1 + x^2 + x^4)^2} + \frac{(2e - g)(1 + 2x^2)}{12(1 + x^2 + x^4)} \\
&\quad + \frac{x(2d + 3f - h - (7d - 7f + 4h)x^2)}{24(1 + x^2 + x^4)} + \frac{1}{3}(-2e + g)\text{Subst}\left(\int \frac{1}{-3 - x^2} dx, x, 1\right. \\
&\quad \left.+ 2x^2\right) + \frac{1}{32}(-9d + 4f - 3h) \int \frac{-1 + 2x}{1 - x + x^2} dx + \frac{1}{96}(13d + 2f + h) \int \frac{1}{1 - x + x^2} dx \\
&\quad + \frac{1}{96}(13d + 2f + h) \int \frac{1}{1 + x + x^2} dx + \frac{1}{32}(9d - 4f + 3h) \int \frac{1 + 2x}{1 + x + x^2} dx \\
&= \frac{e - 2g + (2e - g)x^2}{12(1 + x^2 + x^4)^2} + \frac{x(d + f - 2h - (d - 2f + h)x^2)}{12(1 + x^2 + x^4)^2} + \frac{(2e - g)(1 + 2x^2)}{12(1 + x^2 + x^4)} \\
&\quad + \frac{x(2d + 3f - h - (7d - 7f + 4h)x^2)}{24(1 + x^2 + x^4)} + \frac{(2e - g) \tan^{-1}\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} \\
&\quad - \frac{1}{32}(9d - 4f + 3h) \log(1 - x + x^2) + \frac{1}{32}(9d - 4f + 3h) \log(1 + x + x^2) \\
&\quad + \frac{1}{48}(-13d - 2f - h)\text{Subst}\left(\int \frac{1}{-3 - x^2} dx, x, -1 + 2x\right) \\
&\quad + \frac{1}{48}(-13d - 2f - h)\text{Subst}\left(\int \frac{1}{-3 - x^2} dx, x, 1 + 2x\right) \\
&= \frac{e - 2g + (2e - g)x^2}{12(1 + x^2 + x^4)^2} + \frac{x(d + f - 2h - (d - 2f + h)x^2)}{12(1 + x^2 + x^4)^2} + \frac{(2e - g)(1 + 2x^2)}{12(1 + x^2 + x^4)} \\
&\quad + \frac{x(2d + 3f - h - (7d - 7f + 4h)x^2)}{24(1 + x^2 + x^4)} - \frac{(13d + 2f + h) \tan^{-1}\left(\frac{1-2x}{\sqrt{3}}\right)}{48\sqrt{3}} \\
&\quad + \frac{(13d + 2f + h) \tan^{-1}\left(\frac{1+2x}{\sqrt{3}}\right)}{48\sqrt{3}} + \frac{(2e - g) \tan^{-1}\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} \\
&\quad - \frac{1}{32}(9d - 4f + 3h) \log(1 - x + x^2) + \frac{1}{32}(9d - 4f + 3h) \log(1 + x + x^2)
\end{aligned}$$

**Mathematica [C] (verified)**

Result contains complex when optimal does not.

Time = 0.57 (sec) , antiderivative size = 303, normalized size of antiderivative = 1.15

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^3} dx$$

$$= \frac{1}{144} \left( -\frac{6(-4e(1 + 2x^2) + g(2 + 4x^2) + x(-2d - 3f + h + 7dx^2 - 7fx^2 + 4hx^2))}{1 + x^2 + x^4} \right.$$

$$+ \frac{12(e + 2ex^2 - g(2 + x^2) + x(d + f - dx^2 + 2fx^2 - h(2 + x^2)))}{(1 + x^2 + x^4)^2}$$

$$- \frac{((-47i + 7\sqrt{3})d + (17i - 7\sqrt{3})f + 2(-7i + 2\sqrt{3})h) \arctan\left(\frac{1}{2}(-i + \sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1 + i\sqrt{3})}}$$

$$- \frac{((47i + 7\sqrt{3})d - (17i + 7\sqrt{3})f + 2(7i + 2\sqrt{3})h) \arctan\left(\frac{1}{2}(i + \sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1 - i\sqrt{3})}}$$

$$\left. - 16\sqrt{3}(2e - g) \arctan\left(\frac{\sqrt{3}}{1 + 2x^2}\right) \right)$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(1 + x^2 + x^4)^3,x]

[Out] ((-6\*(-4\*e\*(1 + 2\*x^2) + g\*(2 + 4\*x^2) + x\*(-2\*d - 3\*f + h + 7\*d\*x^2 - 7\*f\*x^2 + 4\*h\*x^2)))/(1 + x^2 + x^4) + (12\*(e + 2\*e\*x^2 - g\*(2 + x^2) + x\*(d + f - d\*x^2 + 2\*f\*x^2 - h\*(2 + x^2))))/(1 + x^2 + x^4)^2 - (((-47\*I + 7\*sqrt[3])\*d + (17\*I - 7\*sqrt[3])\*f + 2\*(-7\*I + 2\*sqrt[3])\*h)\*ArcTan[((-I + sqrt[3])\*x)/2])/sqrt[(1 + I\*sqrt[3])/6] - (((47\*I + 7\*sqrt[3])\*d - (17\*I + 7\*sqrt[3])\*f + 2\*(7\*I + 2\*sqrt[3])\*h)\*ArcTan[((I + sqrt[3])\*x)/2])/sqrt[(1 - I\*sqrt[3])/6] - 16\*sqrt[3]\*(2\*e - g)\*ArcTan[sqrt[3]/(1 + 2\*x^2)]/144

**Maple [A] (verified)**

Time = 0.43 (sec) , antiderivative size = 262, normalized size of antiderivative = 1.00

method	result
default	$-\frac{\left(\frac{7d}{3} - \frac{7f}{3} + \frac{4h}{3} - \frac{4e}{3} - \frac{g}{3}\right)x^3 + (-6d + 4f - 2h + 2g)x^2 + \left(\frac{20d}{3} - \frac{13f}{3} + \frac{5h}{3} + \frac{e}{3} - \frac{8g}{3}\right)x - 4d + \frac{4f}{3} - 2e + 2g}{16(x^2 - x + 1)^2} - \frac{(27d - 12f + 9h) \ln(x^2 - x + 1)}{96}$
risch	Expression too large to display

[In] int((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x,method=\_RETURNVERBOSE)

```
[Out] -1/16*((7/3*d-7/3*f+4/3*h-4/3*e-1/3*g)*x^3+(-6*d+4*f-2*h+2*g)*x^2+(20/3*d-1
3/3*f+5/3*h+1/3*e-8/3*g)*x-4*d+4/3*f-2*e+2*g)/(x^2-x+1)^2-1/96*(27*d-12*f+9
*h)*ln(x^2-x+1)-1/72*(-13/2*d-16*e-f+8*g-1/2*h)*3^(1/2)*arctan(1/3*(2*x-1)*
3^(1/2))+1/16*((-7/3*d+7/3*f-4/3*h-4/3*e-1/3*g)*x^3+(-6*d+4*f-2*h-2*g)*x^2+
(-20/3*d+13/3*f-5/3*h+1/3*e-8/3*g)*x-4*d+4/3*f+2*e-2*g)/(x^2+x+1)^2+1/96*(2
7*d-12*f+9*h)*ln(x^2+x+1)+1/72*(13/2*d-16*e+f+8*g+1/2*h)*arctan(1/3*(1+2*x)
*3^(1/2))*3^(1/2)
```

## Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 485 vs.  $2(236) = 472$ .

Time = 1.22 (sec) , antiderivative size = 485, normalized size of antiderivative = 1.84

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^3} dx = \frac{12(7d - 7f + 4h)x^7 - 48(2e - g)x^6 + 60(d - 2f + h)x^5 - 72(2e - g)x^4 + 84(d - 2f + h)x^3 - 96(2e - g)x^2 - 2\sqrt{3}((13d - 32e + 2f + 16g + h)x^8 + 2(13d - 32e + 2f + 16g + h)x^6 + 3(13d - 32e + 2f + 16g + h)x^4 + 2(13d - 32e + 2f + 16g + h)x^2 + 13d - 32e + 2f + 16g + h)\arctan(1/3\sqrt{3}(2x + 1)) - 2\sqrt{3}((13d + 32e + 2f - 16g + h)x^8 + 2(13d + 32e + 2f - 16g + h)x^6 + 3(13d + 32e + 2f - 16g + h)x^4 + 2(13d + 32e + 2f - 16g + h)x^2 + 13d + 32e + 2f - 16g + h)\arctan(1/3\sqrt{3}(2x - 1)) - 12(4d + 5f - 5h)x - 9((9d - 4f + 3h)x^8 + 2(9d - 4f + 3h)x^6 + 3(9d - 4f + 3h)x^4 + 2(9d - 4f + 3h)x^2 + 9d - 4f + 3h)\log(x^2 + x + 1) + 9((9d - 4f + 3h)x^8 + 2(9d - 4f + 3h)x^6 + 3(9d - 4f + 3h)x^4 + 2(9d - 4f + 3h)x^2 + 9d - 4f + 3h)\log(x^2 - x + 1) - 7(2e + 72g)/(x^8 + 2x^6 + 3x^4 + 2x^2 + 1)}{1}$$

```
[In] integrate((h*x^4+g*x^3+f*x^2+e*x+d)/(x^4+x^2+1)^3,x, algorithm="fricas")
```

```
[Out] -1/288*(12*(7*d - 7*f + 4*h)*x^7 - 48*(2*e - g)*x^6 + 60*(d - 2*f + h)*x^5
- 72*(2*e - g)*x^4 + 84*(d - 2*f + h)*x^3 - 96*(2*e - g)*x^2 - 2*sqrt(3)*((
13*d - 32*e + 2*f + 16*g + h)*x^8 + 2*(13*d - 32*e + 2*f + 16*g + h)*x^6 +
3*(13*d - 32*e + 2*f + 16*g + h)*x^4 + 2*(13*d - 32*e + 2*f + 16*g + h)*x^2
+ 13*d - 32*e + 2*f + 16*g + h)*arctan(1/3*sqrt(3)*(2*x + 1)) - 2*sqrt(3)*
((13*d + 32*e + 2*f - 16*g + h)*x^8 + 2*(13*d + 32*e + 2*f - 16*g + h)*x^6
+ 3*(13*d + 32*e + 2*f - 16*g + h)*x^4 + 2*(13*d + 32*e + 2*f - 16*g + h)*x
^2 + 13*d + 32*e + 2*f - 16*g + h)*arctan(1/3*sqrt(3)*(2*x - 1)) - 12*(4*d
+ 5*f - 5*h)*x - 9*((9*d - 4*f + 3*h)*x^8 + 2*(9*d - 4*f + 3*h)*x^6 + 3*(9*d
- 4*f + 3*h)*x^4 + 2*(9*d - 4*f + 3*h)*x^2 + 9*d - 4*f + 3*h)*log(x^2 + x
+ 1) + 9*((9*d - 4*f + 3*h)*x^8 + 2*(9*d - 4*f + 3*h)*x^6 + 3*(9*d - 4*f +
3*h)*x^4 + 2*(9*d - 4*f + 3*h)*x^2 + 9*d - 4*f + 3*h)*log(x^2 - x + 1) - 7
2*e + 72*g)/(x^8 + 2*x^6 + 3*x^4 + 2*x^2 + 1)
```

## Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^3} dx = \text{Timed out}$$

```
[In] integrate((h*x**4+g*x**3+f*x**2+e*x+d)/(x**4+x**2+1)**3,x)
```

```
[Out] Timed out
```

**Maxima [A] (verification not implemented)**

none

Time = 0.28 (sec) , antiderivative size = 217, normalized size of antiderivative = 0.83

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^3} dx$$

$$= \frac{1}{144} \sqrt{3}(13d - 32e + 2f + 16g + h) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right)$$

$$+ \frac{1}{144} \sqrt{3}(13d + 32e + 2f - 16g + h) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right)$$

$$+ \frac{1}{32} (9d - 4f + 3h) \log(x^2 + x + 1) - \frac{1}{32} (9d - 4f + 3h) \log(x^2 - x + 1)$$

$$- \frac{(7d - 7f + 4h)x^7 - 4(2e - g)x^6 + 5(d - 2f + h)x^5 - 6(2e - g)x^4 + 7(d - 2f + h)x^3 - 8(2e - g)x^2 - (4d + 5f - 5h)x - 6e + 6g}{24(x^8 + 2x^6 + 3x^4 + 2x^2 + 1)}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x, algorithm="maxima")

```
[Out] 1/144*sqrt(3)*(13*d - 32*e + 2*f + 16*g + h)*arctan(1/3*sqrt(3)*(2*x + 1))
+ 1/144*sqrt(3)*(13*d + 32*e + 2*f - 16*g + h)*arctan(1/3*sqrt(3)*(2*x - 1))
) + 1/32*(9*d - 4*f + 3*h)*log(x^2 + x + 1) - 1/32*(9*d - 4*f + 3*h)*log(x^
2 - x + 1) - 1/24*((7*d - 7*f + 4*h)*x^7 - 4*(2*e - g)*x^6 + 5*(d - 2*f + h
)*x^5 - 6*(2*e - g)*x^4 + 7*(d - 2*f + h)*x^3 - 8*(2*e - g)*x^2 - (4*d + 5*
f - 5*h)*x - 6*e + 6*g)/(x^8 + 2*x^6 + 3*x^4 + 2*x^2 + 1)
```

**Giac [A] (verification not implemented)**

none

Time = 0.31 (sec) , antiderivative size = 222, normalized size of antiderivative = 0.84

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^3} dx$$

$$= \frac{1}{144} \sqrt{3}(13d - 32e + 2f + 16g + h) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right)$$

$$+ \frac{1}{144} \sqrt{3}(13d + 32e + 2f - 16g + h) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right)$$

$$+ \frac{1}{32} (9d - 4f + 3h) \log(x^2 + x + 1) - \frac{1}{32} (9d - 4f + 3h) \log(x^2 - x + 1)$$

$$- \frac{7dx^7 - 7fx^7 + 4hx^7 - 8ex^6 + 4gx^6 + 5dx^5 - 10fx^5 + 5hx^5 - 12ex^4 + 6gx^4 + 7dx^3 - 14fx^3 + 7hx^2 - (4d + 5f - 5h)x - 6e + 6g}{24(x^4 + x^2 + 1)^2}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x, algorithm="giac")



```
[Out] 1/144*sqrt(3)*(13*d - 32*e + 2*f + 16*g + h)*arctan(1/3*sqrt(3)*(2*x + 1))
+ 1/144*sqrt(3)*(13*d + 32*e + 2*f - 16*g + h)*arctan(1/3*sqrt(3)*(2*x - 1)
) + 1/32*(9*d - 4*f + 3*h)*log(x^2 + x + 1) - 1/32*(9*d - 4*f + 3*h)*log(x^
2 - x + 1) - 1/24*(7*d*x^7 - 7*f*x^7 + 4*h*x^7 - 8*e*x^6 + 4*g*x^6 + 5*d*x^
5 - 10*f*x^5 + 5*h*x^5 - 12*e*x^4 + 6*g*x^4 + 7*d*x^3 - 14*f*x^3 + 7*h*x^3
- 16*e*x^2 + 8*g*x^2 - 4*d*x - 5*f*x + 5*h*x - 6*e + 6*g)/(x^4 + x^2 + 1)^2
```

## Mupad [B] (verification not implemented)

Time = 3.44 (sec) , antiderivative size = 1611, normalized size of antiderivative = 6.13

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(1 + x^2 + x^4)^3} dx = \text{Too large to display}$$

```
[In] int((d + e*x + f*x^2 + g*x^3 + h*x^4)/(x^2 + x^4 + 1)^3,x)
```

```
[Out] (e/4 - g/4 + x^2*((2*e)/3 - g/3) + x^4*(e/2 - g/4) + x^6*(e/3 - g/6) + x*(d
/6 + (5*f)/24 - (5*h)/24) - x^7*((7*d)/24 - (7*f)/24 + h/6) - x^5*((5*d)/24
- (5*f)/12 + (5*h)/24) - x^3*((7*d)/24 - (7*f)/12 + (7*h)/24))/(2*x^2 + 3*
x^4 + 2*x^6 + x^8 + 1) - log(960*d*g - 2763*d*f - 1920*d*e + 480*e*f + 1971
*d*h - 480*e*h - 240*f*g - 981*f*h + 240*g*h + 3^(1/2)*d^2*1620i + 3^(1/2)*
f^2*180i + 3^(1/2)*h^2*135i - 3807*d^2*x - 612*f^2*x - 378*h^2*x + 2754*d^2
+ 684*f^2 + 351*h^2 + 3^(1/2)*d*e*1088i - 3^(1/2)*d*f*1125i - 3^(1/2)*d*g*
544i - 3^(1/2)*e*f*608i + 3^(1/2)*d*h*945i + 3^(1/2)*e*h*416i + 3^(1/2)*f*g
*304i - 3^(1/2)*f*h*315i - 3^(1/2)*g*h*208i - 672*d*e*x + 3069*d*f*x + 336*
d*g*x + 672*e*f*x - 2403*d*h*x - 384*e*h*x - 336*f*g*x + 963*f*h*x + 192*g*
h*x + 3^(1/2)*d^2*x*567i + 3^(1/2)*f^2*x*252i + 3^(1/2)*h^2*x*108i - 3^(1/2
)*d*f*x*819i + 3^(1/2)*d*g*x*752i + 3^(1/2)*e*f*x*544i + 3^(1/2)*d*h*x*513i
- 3^(1/2)*e*h*x*448i - 3^(1/2)*f*g*x*272i - 3^(1/2)*f*h*x*333i + 3^(1/2)*g
*h*x*224i - 3^(1/2)*d*e*x*1504i)*((9*d)/32 - f/8 + (3*h)/32 + (3^(1/2)*d*13
i)/288 + (3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/144 - (3^(1/2)*g*1i)/18 + (3^(1/
2)*h*1i)/288) - log(1920*d*e - 2763*d*f - 960*d*g - 480*e*f + 1971*d*h + 48
0*e*h + 240*f*g - 981*f*h - 240*g*h - 3^(1/2)*d^2*1620i - 3^(1/2)*f^2*180i
- 3^(1/2)*h^2*135i + 3807*d^2*x + 612*f^2*x + 378*h^2*x + 2754*d^2 + 684*f^
2 + 351*h^2 + 3^(1/2)*d*e*1088i + 3^(1/2)*d*f*1125i - 3^(1/2)*d*g*544i - 3^
(1/2)*e*f*608i - 3^(1/2)*d*h*945i + 3^(1/2)*e*h*416i + 3^(1/2)*f*g*304i + 3
^(1/2)*f*h*315i - 3^(1/2)*g*h*208i - 672*d*e*x - 3069*d*f*x + 336*d*g*x + 6
72*e*f*x + 2403*d*h*x - 384*e*h*x - 336*f*g*x - 963*f*h*x + 192*g*h*x + 3^(
1/2)*d^2*x*567i + 3^(1/2)*f^2*x*252i + 3^(1/2)*h^2*x*108i - 3^(1/2)*d*f*x*8
19i - 3^(1/2)*d*g*x*752i - 3^(1/2)*e*f*x*544i + 3^(1/2)*d*h*x*513i + 3^(1/2
)*e*h*x*448i + 3^(1/2)*f*g*x*272i - 3^(1/2)*f*h*x*333i - 3^(1/2)*g*h*x*224i
+ 3^(1/2)*d*e*x*1504i)*(f/8 - (9*d)/32 - (3*h)/32 + (3^(1/2)*d*13i)/288 -
(3^(1/2)*e*1i)/9 + (3^(1/2)*f*1i)/144 + (3^(1/2)*g*1i)/18 + (3^(1/2)*h*1i)/
288) + log(1920*d*e - 2763*d*f - 960*d*g - 480*e*f + 1971*d*h + 480*e*h + 2
40*f*g - 981*f*h - 240*g*h + 3^(1/2)*d^2*1620i + 3^(1/2)*f^2*180i + 3^(1/2)
```

$$\begin{aligned}
& *h^2*135i + 3807*d^2*x + 612*f^2*x + 378*h^2*x + 2754*d^2 + 684*f^2 + 351*h \\
& ^2 - 3^{(1/2)}*d*e*1088i - 3^{(1/2)}*d*f*1125i + 3^{(1/2)}*d*g*544i + 3^{(1/2)}*e*f \\
& *608i + 3^{(1/2)}*d*h*945i - 3^{(1/2)}*e*h*416i - 3^{(1/2)}*f*g*304i - 3^{(1/2)}*f* \\
& h*315i + 3^{(1/2)}*g*h*208i - 672*d*e*x - 3069*d*f*x + 336*d*g*x + 672*e*f*x \\
& + 2403*d*h*x - 384*e*h*x - 336*f*g*x - 963*f*h*x + 192*g*h*x - 3^{(1/2)}*d^2* \\
& x*567i - 3^{(1/2)}*f^2*x*252i - 3^{(1/2)}*h^2*x*108i + 3^{(1/2)}*d*f*x*819i + 3^{(1/2)} \\
& *d*g*x*752i + 3^{(1/2)}*e*f*x*544i - 3^{(1/2)}*d*h*x*513i - 3^{(1/2)}*e*h*x*4 \\
& 48i - 3^{(1/2)}*f*g*x*272i + 3^{(1/2)}*f*h*x*333i + 3^{(1/2)}*g*h*x*224i - 3^{(1/2)} \\
& )*d*e*x*1504i)*((9*d)/32 - f/8 + (3*h)/32 + (3^{(1/2)}*d*13i)/288 - (3^{(1/2)}* \\
& e*1i)/9 + (3^{(1/2)}*f*1i)/144 + (3^{(1/2)}*g*1i)/18 + (3^{(1/2)}*h*1i)/288) + lo \\
& g(1920*d*e + 2763*d*f - 960*d*g - 480*e*f - 1971*d*h + 480*e*h + 240*f*g + \\
& 981*f*h - 240*g*h + 3^{(1/2)}*d^2*1620i + 3^{(1/2)}*f^2*180i + 3^{(1/2)}*h^2*135i \\
& + 3807*d^2*x + 612*f^2*x + 378*h^2*x - 2754*d^2 - 684*f^2 - 351*h^2 + 3^{(1/2)} \\
& *d*e*1088i - 3^{(1/2)}*d*f*1125i - 3^{(1/2)}*d*g*544i - 3^{(1/2)}*e*f*608i + 3 \\
& ^{(1/2)}*d*h*945i + 3^{(1/2)}*e*h*416i + 3^{(1/2)}*f*g*304i - 3^{(1/2)}*f*h*315i - \\
& 3^{(1/2)}*g*h*208i + 672*d*e*x - 3069*d*f*x - 336*d*g*x - 672*e*f*x + 2403*d* \\
& h*x + 384*e*h*x + 336*f*g*x - 963*f*h*x - 192*g*h*x + 3^{(1/2)}*d^2*x*567i + \\
& 3^{(1/2)}*f^2*x*252i + 3^{(1/2)}*h^2*x*108i - 3^{(1/2)}*d*f*x*819i + 3^{(1/2)}*d*g* \\
& x*752i + 3^{(1/2)}*e*f*x*544i + 3^{(1/2)}*d*h*x*513i - 3^{(1/2)}*e*h*x*448i - 3^{(1/2)} \\
& *f*g*x*272i - 3^{(1/2)}*f*h*x*333i + 3^{(1/2)}*g*h*x*224i - 3^{(1/2)}*d*e*x*1 \\
& 504i)*(f/8 - (9*d)/32 - (3*h)/32 + (3^{(1/2)}*d*13i)/288 + (3^{(1/2)}*e*1i)/9 + \\
& (3^{(1/2)}*f*1i)/144 - (3^{(1/2)}*g*1i)/18 + (3^{(1/2)}*h*1i)/288)
\end{aligned}$$

$$3.51 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(1+x^2+x^4)^3} dx$$

Optimal result	555
Rubi [A] (verified)	556
Mathematica [C] (verified)	560
Maple [A] (verified)	561
Fricas [B] (verification not implemented)	562
Sympy [F(-1)]	562
Maxima [A] (verification not implemented)	563
Giac [A] (verification not implemented)	563
Mupad [B] (verification not implemented)	564

### Optimal result

Integrand size = 36, antiderivative size = 269

$$\int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(1+x^2+x^4)^3} dx = \frac{x(d+f-2h-(d-2f+h)x^2)}{12(1+x^2+x^4)^2} + \frac{e-2g+i+(2e-g-i)x^2}{12(1+x^2+x^4)^2} + \frac{(2e-g+i)(1+2x^2)}{12(1+x^2+x^4)} + \frac{x(2d+3f-h-(7d-7f+4h)x^2)}{24(1+x^2+x^4)} - \frac{(13d+2f+h) \arctan\left(\frac{1-2x}{\sqrt{3}}\right)}{48\sqrt{3}} + \frac{(13d+2f+h) \arctan\left(\frac{1+2x}{\sqrt{3}}\right)}{48\sqrt{3}} + \frac{(2e-g+i) \arctan\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{32}(9d-4f+3h) \log(1-x+x^2) + \frac{1}{32}(9d-4f+3h) \log(1+x+x^2)$$

[Out] 1/12\*x\*(d+f-2\*h-(d-2\*f+h)\*x^2)/(x^4+x^2+1)^2+1/12\*(e-2\*g+i+(2\*e-g-i)\*x^2)/(x^4+x^2+1)^2+1/12\*(2\*e-g+i)\*(2\*x^2+1)/(x^4+x^2+1)+1/24\*x\*(2\*d+3\*f-h-(7\*d-7\*f+4\*h)\*x^2)/(x^4+x^2+1)-1/32\*(9\*d-4\*f+3\*h)\*ln(x^2-x+1)+1/32\*(9\*d-4\*f+3\*h)\*ln(x^2+x+1)-1/144\*(13\*d+2\*f+h)\*arctan(1/3\*(1-2\*x)\*3^(1/2))\*3^(1/2)+1/144\*(13

\*d+2\*f+h)\*arctan(1/3\*(1+2\*x)\*3^(1/2))\*3^(1/2)+1/9\*(2\*e-g+i)\*arctan(1/3\*(2\*x^2+1)\*3^(1/2))\*3^(1/2)

## Rubi [A] (verified)

Time = 0.20 (sec) , antiderivative size = 269, normalized size of antiderivative = 1.00, number of steps used = 18, number of rules used = 12,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.333$ , Rules used = {1687, 1692, 1192, 1183, 648, 632, 210, 642, 1677, 1674, 12, 628}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^3} dx = -\frac{\arctan\left(\frac{1-2x}{\sqrt{3}}\right)(13d + 2f + h)}{48\sqrt{3}} + \frac{\arctan\left(\frac{2x+1}{\sqrt{3}}\right)(13d + 2f + h)}{48\sqrt{3}} + \frac{\arctan\left(\frac{2x^2+1}{\sqrt{3}}\right)(2e - g + i)}{3\sqrt{3}} - \frac{1}{32} \log(x^2 - x + 1)(9d - 4f + 3h) + \frac{1}{32} \log(x^2 + x + 1)(9d - 4f + 3h) + \frac{x(-(x^2(7d - 7f + 4h)) + 2d + 3f - h)}{24(x^4 + x^2 + 1)} + \frac{x(-(x^2(d - 2f + h)) + d + f - 2h)}{12(x^4 + x^2 + 1)^2} + \frac{(2x^2 + 1)(2e - g + i)}{12(x^4 + x^2 + 1)} + \frac{x^2(2e - g - i) + e - 2g + i}{12(x^4 + x^2 + 1)^2}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(1 + x^2 + x^4)^3,x]

[Out] (x\*(d + f - 2\*h - (d - 2\*f + h)\*x^2))/(12\*(1 + x^2 + x^4)^2) + (e - 2\*g + i + (2\*e - g - i)\*x^2)/(12\*(1 + x^2 + x^4)^2) + ((2\*e - g + i)\*(1 + 2\*x^2))/(12\*(1 + x^2 + x^4)) + (x\*(2\*d + 3\*f - h - (7\*d - 7\*f + 4\*h)\*x^2))/(24\*(1 + x^2 + x^4)) - ((13\*d + 2\*f + h)\*ArcTan[(1 - 2\*x)/Sqrt[3]])/(48\*Sqrt[3]) + ((13\*d + 2\*f + h)\*ArcTan[(1 + 2\*x)/Sqrt[3]])/(48\*Sqrt[3]) + ((2\*e - g + i)\*ArcTan[(1 + 2\*x^2)/Sqrt[3]])/(3\*Sqrt[3]) - ((9\*d - 4\*f + 3\*h)\*Log[1 - x + x^2])/32 + ((9\*d - 4\*f + 3\*h)\*Log[1 + x + x^2])/32

### Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

Rule 210

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(-Rt[-a, 2]\*Rt[-b, 2])^(-1)\*ArcTan[Rt[-b, 2]\*(x/Rt[-a, 2])], x] /; FreeQ[{a, b}, x] && PosQ[a/b] && (LtQ[a, 0] || LtQ[b, 0])

Rule 628

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p + 1)/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

Rule 632

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

Rule 642

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := Simp[d\*(Log[RemoveContent[a + b\*x + c\*x^2, x]]/b), x] /; FreeQ[{a, b, c, d, e}, x] && EqQ[2\*c\*d - b\*e, 0]

Rule 648

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := Dist[(2\*c\*d - b\*e)/(2\*c), Int[1/(a + b\*x + c\*x^2), x], x] + Dist[e/(2\*c), Int[(b + 2\*c\*x)/(a + b\*x + c\*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && !NiceSqrtQ[b^2 - 4\*a\*c]

Rule 1183

Int[((d\_) + (e\_)\*(x\_)^2)/((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4), x\_Symbol] := With[{q = Rt[a/c, 2]}, With[{r = Rt[2\*q - b/c, 2]}, Dist[1/(2\*c\*q\*r), Int[(d\*r - (d - e\*q)\*x)/(q - r\*x + x^2), x], x] + Dist[1/(2\*c\*q\*r), Int[(d\*r + (d - e\*q)\*x)/(q + r\*x + x^2), x], x]]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && NegQ[b^2 - 4\*a\*c]

Rule 1192

Int[((d\_) + (e\_)\*(x\_)^2)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Simp[x\*(a\*b\*e - d\*(b^2 - 2\*a\*c) - c\*(b\*d - 2\*a\*e)\*x^2)\*((a + b\*x^2 + c\*x^4)^(p + 1)/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c))), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[Simp[(2\*p + 3)\*d\*b^2 - a\*b\*e - 2\*a\*c\*d\*(4\*p + 5) + (4\*p + 7

```
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

#### Rule 1674

```
Int[(Pq_)*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := With[{Q =
PolynomialQuotient[Pq, a + b*x + c*x^2, x], f = Coeff[PolynomialRemainder[P
q, a + b*x + c*x^2, x], x, 0], g = Coeff[PolynomialRemainder[Pq, a + b*x +
c*x^2, x], x, 1]}, Simp[(b*f - 2*a*g + (2*c*f - b*g)*x)*((a + b*x + c*x^2)^(
p + 1)/((p + 1)*(b^2 - 4*a*c))), x] + Dist[1/((p + 1)*(b^2 - 4*a*c)), Int[
(a + b*x + c*x^2)^(p + 1)*ExpandToSum[(p + 1)*(b^2 - 4*a*c)*Q - (2*p + 3)*(
2*c*f - b*g), x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && NeQ[b^2
- 4*a*c, 0] && LtQ[p, -1]
```

#### Rule 1677

```
Int[(Pq_)*(x_)^(m_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] :
> Dist[1/2, Subst[Int[x^((m - 1)/2)*SubstFor[x^2, Pq, x]*(a + b*x + c*x^2)^(
p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x^2] && IntegerQ[
(m - 1)/2]
```

#### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

#### Rule 1692

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := With[{d =
Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[Poly
nomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^
4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b
^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*
x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a
+ b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p
+ 7)*(b*d - 2*a*e)*x^2, x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^
2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1]
```

#### Rubi steps

$$\text{integral} = \int \frac{d + fx^2 + hx^4}{(1 + x^2 + x^4)^3} dx + \int \frac{x(e + gx^2 + ix^4)}{(1 + x^2 + x^4)^3} dx$$

$$\begin{aligned}
&= \frac{x(d+f-2h-(d-2f+h)x^2)}{12(1+x^2+x^4)^2} + \frac{1}{12} \int \frac{11d-f+2h-5(d-2f+h)x^2}{(1+x^2+x^4)^2} dx \\
&\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e+gx+ix^2}{(1+x+x^2)^3} dx, x, x^2 \right) \\
&= \frac{x(d+f-2h-(d-2f+h)x^2)}{12(1+x^2+x^4)^2} + \frac{e-2g+i+(2e-g-i)x^2}{12(1+x^2+x^4)^2} \\
&\quad + \frac{x(2d+3f-h-(7d-7f+4h)x^2)}{24(1+x^2+x^4)} \\
&\quad + \frac{1}{72} \int \frac{15(4d-f+h)-3(7d-7f+4h)x^2}{1+x^2+x^4} dx \\
&\quad + \frac{1}{12} \text{Subst} \left( \int \frac{3(2e-g+i)}{(1+x+x^2)^2} dx, x, x^2 \right) \\
&= \frac{x(d+f-2h-(d-2f+h)x^2)}{12(1+x^2+x^4)^2} + \frac{e-2g+i+(2e-g-i)x^2}{12(1+x^2+x^4)^2} \\
&\quad + \frac{x(2d+3f-h-(7d-7f+4h)x^2)}{24(1+x^2+x^4)} \\
&\quad + \frac{1}{144} \int \frac{15(4d-f+h)-(15(4d-f+h)+3(7d-7f+4h))x}{1-x+x^2} dx \\
&\quad + \frac{1}{144} \int \frac{15(4d-f+h)+(15(4d-f+h)+3(7d-7f+4h))x}{1+x+x^2} dx \\
&\quad + \frac{1}{4}(2e-g+i) \text{Subst} \left( \int \frac{1}{(1+x+x^2)^2} dx, x, x^2 \right) \\
&= \frac{x(d+f-2h-(d-2f+h)x^2)}{12(1+x^2+x^4)^2} + \frac{e-2g+i+(2e-g-i)x^2}{12(1+x^2+x^4)^2} \\
&\quad + \frac{(2e-g+i)(1+2x^2)}{12(1+x^2+x^4)} + \frac{x(2d+3f-h-(7d-7f+4h)x^2)}{24(1+x^2+x^4)} + \frac{1}{32}(-9d+4f \\
&\quad \quad \quad -3h) \int \frac{-1+2x}{1-x+x^2} dx \\
&\quad + \frac{1}{96}(13d+2f+h) \int \frac{1}{1-x+x^2} dx + \frac{1}{96}(13d+2f+h) \int \frac{1}{1+x+x^2} dx \\
&\quad + \frac{1}{32}(9d-4f+3h) \int \frac{1+2x}{1+x+x^2} dx + \frac{1}{6}(2e-g+i) \text{Subst} \left( \int \frac{1}{1+x+x^2} dx, x, x^2 \right)
\end{aligned}$$

$$\begin{aligned}
&= \frac{x(d+f-2h-(d-2f+h)x^2)}{12(1+x^2+x^4)^2} + \frac{e-2g+i+(2e-g-i)x^2}{12(1+x^2+x^4)^2} \\
&+ \frac{(2e-g+i)(1+2x^2)}{12(1+x^2+x^4)} + \frac{x(2d+3f-h-(7d-7f+4h)x^2)}{24(1+x^2+x^4)} \\
&- \frac{1}{32}(9d-4f+3h)\log(1-x+x^2) + \frac{1}{32}(9d-4f+3h)\log(1+x+x^2) \\
&+ \frac{1}{48}(-13d-2f-h)\text{Subst}\left(\int \frac{1}{-3-x^2} dx, x, -1+2x\right) \\
&+ \frac{1}{48}(-13d-2f-h)\text{Subst}\left(\int \frac{1}{-3-x^2} dx, x, 1+2x\right) \\
&+ \frac{1}{3}(-2e+g-i)\text{Subst}\left(\int \frac{1}{-3-x^2} dx, x, 1+2x^2\right) \\
&= \frac{x(d+f-2h-(d-2f+h)x^2)}{12(1+x^2+x^4)^2} + \frac{e-2g+i+(2e-g-i)x^2}{12(1+x^2+x^4)^2} \\
&+ \frac{(2e-g+i)(1+2x^2)}{12(1+x^2+x^4)} + \frac{x(2d+3f-h-(7d-7f+4h)x^2)}{24(1+x^2+x^4)} \\
&- \frac{(13d+2f+h)\tan^{-1}\left(\frac{1-2x}{\sqrt{3}}\right)}{48\sqrt{3}} + \frac{(13d+2f+h)\tan^{-1}\left(\frac{1+2x}{\sqrt{3}}\right)}{48\sqrt{3}} \\
&+ \frac{(2e-g+i)\tan^{-1}\left(\frac{1+2x^2}{\sqrt{3}}\right)}{3\sqrt{3}} - \frac{1}{32}(9d-4f+3h)\log(1-x+x^2) \\
&+ \frac{1}{32}(9d-4f+3h)\log(1+x+x^2)
\end{aligned}$$

**Mathematica [C] (verified)**

Result contains complex when optimal does not.



Time = 0.58 (sec) , antiderivative size = 325, normalized size of antiderivative = 1.21

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^3} dx$$

$$= \frac{1}{144} \left( \frac{12(e + i + dx + fx - 2hx + 2ex^2 - ix^2 - dx^3 + 2fx^3 - hx^3 - g(2 + x^2))}{(1 + x^2 + x^4)^2} \right.$$

$$+ \frac{6(2i + 2dx + 3fx - hx + 4ix^2 - 7dx^3 + 7fx^3 - 4hx^3 - 2g(1 + 2x^2) + e(4 + 8x^2))}{1 + x^2 + x^4}$$

$$- \frac{((-47i + 7\sqrt{3})d + (17i - 7\sqrt{3})f + 2(-7i + 2\sqrt{3})h) \arctan\left(\frac{1}{2}(-i + \sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1 + i\sqrt{3})}}$$

$$- \frac{((47i + 7\sqrt{3})d - (17i + 7\sqrt{3})f + 2(7i + 2\sqrt{3})h) \arctan\left(\frac{1}{2}(i + \sqrt{3})x\right)}{\sqrt{\frac{1}{6}(1 - i\sqrt{3})}}$$

$$\left. - 16\sqrt{3}(2e - g + i) \arctan\left(\frac{\sqrt{3}}{1 + 2x^2}\right) \right)$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(1 + x^2 + x^4)^3,x]

[Out] ((12\*(e + i + d\*x + f\*x - 2\*h\*x + 2\*e\*x^2 - i\*x^2 - d\*x^3 + 2\*f\*x^3 - h\*x^3 - g\*(2 + x^2)))/(1 + x^2 + x^4)^2 + (6\*(2\*i + 2\*d\*x + 3\*f\*x - h\*x + 4\*i\*x^2 - 7\*d\*x^3 + 7\*f\*x^3 - 4\*h\*x^3 - 2\*g\*(1 + 2\*x^2) + e\*(4 + 8\*x^2)))/(1 + x^2 + x^4) - (((-47\*I + 7\*sqrt(3))\*d + (17\*I - 7\*sqrt(3))\*f + 2\*(-7\*I + 2\*sqrt(3))\*h)\*ArcTan[(-I + sqrt(3))\*x/2])/sqrt((1 + I\*sqrt(3))/6) - (((47\*I + 7\*sqrt(3))\*d - (17\*I + 7\*sqrt(3))\*f + 2\*(7\*I + 2\*sqrt(3))\*h)\*ArcTan[(I + sqrt(3))\*x/2])/sqrt((1 - I\*sqrt(3))/6) - 16\*sqrt(3)\*(2\*e - g + i)\*ArcTan[sqrt(3)/(1 + 2\*x^2)]/144

## Maple [A] (verified)

Time = 0.50 (sec) , antiderivative size = 292, normalized size of antiderivative = 1.09

method	result
default	$-\frac{\left(\frac{7d}{3} - \frac{7f}{3} + \frac{4h}{3} - \frac{4e}{3} - \frac{g}{3} + \frac{i}{3}\right)x^3 + (-6d + 4f - 2h + 2g - 2i)x^2 + \left(\frac{20d}{3} - \frac{13f}{3} + \frac{5h}{3} + \frac{e}{3} - \frac{8g}{3} + \frac{7i}{3}\right)x - 4d + \frac{4f}{3} - 2e + 2g - \frac{4i}{3}}{16(x^2 - x + 1)^2} - \frac{(27d - 12f + 9h)}{9}$
risch	Expression too large to display

[In] int((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x,method=\_RETURNVERBOSE)

[Out] -1/16\*((7/3\*d-7/3\*f+4/3\*h-4/3\*e-1/3\*g+1/3\*i)\*x^3+(-6\*d+4\*f-2\*h+2\*g-2\*i)\*x^2+(20/3\*d-13/3\*f+5/3\*h+1/3\*e-8/3\*g+7/3\*i)\*x-4\*d+4/3\*f-2\*e+2\*g-4/3\*i)/(x^2-x+1)^2-1/96\*(27\*d-12\*f+9\*h)\*ln(x^2-x+1)-1/72\*(-13/2\*d-16\*e-f+8\*g-1/2\*h-8\*i)\*3

$$\begin{aligned} & \sqrt[1/2]{\arctan(1/3*(2*x-1)*3^{1/2})+1/16*((-7/3*d+7/3*f-4/3*h-4/3*e-1/3*g+1/3*i)*x^3+(-6*d+4*f-2*h-2*g+2*i)*x^2+(-20/3*d+13/3*f-5/3*h+1/3*e-8/3*g+7/3*i)*x-4*d+4/3*f+2*e-2*g+4/3*i)/(x^2+x+1)^2+1/96*(27*d-12*f+9*h)*\ln(x^2+x+1)+1/72*(13/2*d-16*e+f+8*g+1/2*h-8*i)*\arctan(1/3*(1+2*x)*3^{1/2})} * 3^{1/2} \end{aligned}$$

## Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 521 vs. 2(242) = 484.

Time = 5.49 (sec) , antiderivative size = 521, normalized size of antiderivative = 1.94

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^3} dx = \frac{12(7d - 7f + 4h)x^7 - 48(2e - g + i)x^6 + 60(d - 2f + h)x^5 - 72(2e - g + i)x^4 + 84(d - 2f + h)x^3 - 48(4e - 2g + i)x^2 - 2\sqrt{3}((13d - 32e + 2f + 16g + h - 16i)x^8 + 2(13d - 32e + 2f + 16g + h - 16i)x^6 + 3(13d - 32e + 2f + 16g + h - 16i)x^4 + 2(13d - 32e + 2f + 16g + h - 16i)x^2 + 13d - 32e + 2f + 16g + h - 16i)\arctan(1/3\sqrt{3}(2x + 1)) - 2\sqrt{3}((13d + 32e + 2f - 16g + h + 16i)x^8 + 2(13d + 32e + 2f - 16g + h + 16i)x^6 + 3(13d + 32e + 2f - 16g + h + 16i)x^4 + 2(13d + 32e + 2f - 16g + h + 16i)x^2 + 13d + 32e + 2f - 16g + h + 16i)\arctan(1/3\sqrt{3}(2x - 1)) - 12(4d + 5f - 5h)x - 9((9d - 4f + 3h)x^8 + 2(9d - 4f + 3h)x^6 + 3(9d - 4f + 3h)x^4 + 2(9d - 4f + 3h)x^2 + 9d - 4f + 3h)\log(x^2 + x + 1) + 9((9d - 4f + 3h)x^8 + 2(9d - 4f + 3h)x^6 + 3(9d - 4f + 3h)x^4 + 2(9d - 4f + 3h)x^2 + 9d - 4f + 3h)\log(x^2 - x + 1) - 72e + 72g - 48i)/(x^8 + 2x^6 + 3x^4 + 2x^2 + 1)}$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x, algorithm="fricas")

[Out] -1/288\*(12\*(7\*d - 7\*f + 4\*h)\*x^7 - 48\*(2\*e - g + i)\*x^6 + 60\*(d - 2\*f + h)\*x^5 - 72\*(2\*e - g + i)\*x^4 + 84\*(d - 2\*f + h)\*x^3 - 48\*(4\*e - 2\*g + i)\*x^2 - 2\*sqrt(3)\*((13\*d - 32\*e + 2\*f + 16\*g + h - 16\*i)\*x^8 + 2\*(13\*d - 32\*e + 2\*f + 16\*g + h - 16\*i)\*x^6 + 3\*(13\*d - 32\*e + 2\*f + 16\*g + h - 16\*i)\*x^4 + 2\*(13\*d - 32\*e + 2\*f + 16\*g + h - 16\*i)\*x^2 + 13\*d - 32\*e + 2\*f + 16\*g + h - 16\*i)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) - 2\*sqrt(3)\*((13\*d + 32\*e + 2\*f - 16\*g + h + 16\*i)\*x^8 + 2\*(13\*d + 32\*e + 2\*f - 16\*g + h + 16\*i)\*x^6 + 3\*(13\*d + 32\*e + 2\*f - 16\*g + h + 16\*i)\*x^4 + 2\*(13\*d + 32\*e + 2\*f - 16\*g + h + 16\*i)\*x^2 + 13\*d + 32\*e + 2\*f - 16\*g + h + 16\*i)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) - 12\*(4\*d + 5\*f - 5\*h)\*x - 9\*((9\*d - 4\*f + 3\*h)\*x^8 + 2\*(9\*d - 4\*f + 3\*h)\*x^6 + 3\*(9\*d - 4\*f + 3\*h)\*x^4 + 2\*(9\*d - 4\*f + 3\*h)\*x^2 + 9\*d - 4\*f + 3\*h)\*log(x^2 + x + 1) + 9\*((9\*d - 4\*f + 3\*h)\*x^8 + 2\*(9\*d - 4\*f + 3\*h)\*x^6 + 3\*(9\*d - 4\*f + 3\*h)\*x^4 + 2\*(9\*d - 4\*f + 3\*h)\*x^2 + 9\*d - 4\*f + 3\*h)\*log(x^2 - x + 1) - 72\*e + 72\*g - 48\*i)/(x^8 + 2\*x^6 + 3\*x^4 + 2\*x^2 + 1)

## Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^3} dx = \text{Timed out}$$

[In] integrate((i\*x\*\*5+h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4+x\*\*2+1)\*\*3,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.28 (sec) , antiderivative size = 229, normalized size of antiderivative = 0.85

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^3} dx$$

$$= \frac{1}{144} \sqrt{3}(13d - 32e + 2f + 16g + h - 16i) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right)$$

$$+ \frac{1}{144} \sqrt{3}(13d + 32e + 2f - 16g + h + 16i) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right)$$

$$+ \frac{1}{32} (9d - 4f + 3h) \log(x^2 + x + 1) - \frac{1}{32} (9d - 4f + 3h) \log(x^2 - x + 1)$$

$$- \frac{(7d - 7f + 4h)x^7 - 4(2e - g + i)x^6 + 5(d - 2f + h)x^5 - 6(2e - g + i)x^4 + 7(d - 2f + h)x^3 - 4(4e - 2g + i)x^2 - (4d + 5f - 5h)x - 6e + 6g - 4i}{24(x^8 + 2x^6 + 3x^4 + 2x^2 + 1)}$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x, algorithm="maxima")

[Out] 1/144\*sqrt(3)\*(13\*d - 32\*e + 2\*f + 16\*g + h - 16\*i)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/144\*sqrt(3)\*(13\*d + 32\*e + 2\*f - 16\*g + h + 16\*i)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/32\*(9\*d - 4\*f + 3\*h)\*log(x^2 + x + 1) - 1/32\*(9\*d - 4\*f + 3\*h)\*log(x^2 - x + 1) - 1/24\*((7\*d - 7\*f + 4\*h)\*x^7 - 4\*(2\*e - g + i)\*x^6 + 5\*(d - 2\*f + h)\*x^5 - 6\*(2\*e - g + i)\*x^4 + 7\*(d - 2\*f + h)\*x^3 - 4\*(4\*e - 2\*g + i)\*x^2 - (4\*d + 5\*f - 5\*h)\*x - 6\*e + 6\*g - 4\*i)/(x^8 + 2\*x^6 + 3\*x^4 + 2\*x^2 + 1)

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 249, normalized size of antiderivative = 0.93

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^3} dx$$

$$= \frac{1}{144} \sqrt{3}(13d - 32e + 2f + 16g + h - 16i) \arctan\left(\frac{1}{3} \sqrt{3}(2x + 1)\right)$$

$$+ \frac{1}{144} \sqrt{3}(13d + 32e + 2f - 16g + h + 16i) \arctan\left(\frac{1}{3} \sqrt{3}(2x - 1)\right)$$

$$+ \frac{1}{32} (9d - 4f + 3h) \log(x^2 + x + 1) - \frac{1}{32} (9d - 4f + 3h) \log(x^2 - x + 1)$$

$$- \frac{7dx^7 - 7fx^7 + 4hx^7 - 8ex^6 + 4gx^6 - 4ix^6 + 5dx^5 - 10fx^5 + 5hx^5 - 12ex^4 + 6gx^4 - 6ix^4 + 7dx^3 - 7fx^3 + 4hx^3 - 4ex^2 + 4gx^2 - 4ix^2 - 4ex - 4fx + 4hx - 4e + 4g - 4i}{24(x^4 + x^2 + 1)^2}$$

[In] integrate((i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4+x^2+1)^3,x, algorithm="giac")

[Out] 1/144\*sqrt(3)\*(13\*d - 32\*e + 2\*f + 16\*g + h - 16\*i)\*arctan(1/3\*sqrt(3)\*(2\*x + 1)) + 1/144\*sqrt(3)\*(13\*d + 32\*e + 2\*f - 16\*g + h + 16\*i)\*arctan(1/3\*sqrt(3)\*(2\*x - 1)) + 1/32\*(9\*d - 4\*f + 3\*h)\*log(x^2 + x + 1) - 1/32\*(9\*d - 4\*f + 3\*h)\*log(x^2 - x + 1) - 1/24\*(7\*d\*x^7 - 7\*f\*x^7 + 4\*h\*x^7 - 8\*e\*x^6 + 4\*g\*x^6 - 4\*i\*x^6 + 5\*d\*x^5 - 10\*f\*x^5 + 5\*h\*x^5 - 12\*e\*x^4 + 6\*g\*x^4 - 6\*i\*x^4 + 7\*d\*x^3 - 14\*f\*x^3 + 7\*h\*x^3 - 16\*e\*x^2 + 8\*g\*x^2 - 4\*i\*x^2 - 4\*d\*x - 5\*f\*x + 5\*h\*x - 6\*e + 6\*g - 4\*i)/(x^4 + x^2 + 1)^2

## Mupad [B] (verification not implemented)

Time = 12.84 (sec) , antiderivative size = 1963, normalized size of antiderivative = 7.30

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(1 + x^2 + x^4)^3} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(x^2 + x^4 + 1)^3,x)

[Out] (e/4 - g/4 + i/6 + x\*(d/6 + (5\*f)/24 - (5\*h)/24) - x^7\*((7\*d)/24 - (7\*f)/24 + h/6) - x^5\*((5\*d)/24 - (5\*f)/12 + (5\*h)/24) - x^3\*((7\*d)/24 - (7\*f)/12 + (7\*h)/24) + x^4\*(e/2 - g/4 + i/4) + x^2\*((2\*e)/3 - g/3 + i/6) + x^6\*(e/3 - g/6 + i/6))/(2\*x^2 + 3\*x^4 + 2\*x^6 + x^8 + 1) - log(960\*d\*g - 2763\*d\*f - 1920\*d\*e + 480\*e\*f + 1971\*d\*h - 960\*d\*i - 480\*e\*h - 240\*f\*g - 981\*f\*h + 240\*f\*i + 240\*g\*h - 240\*h\*i + 3^(1/2)\*d^2\*1620i + 3^(1/2)\*f^2\*180i + 3^(1/2)\*h^2\*135i - 3807\*d^2\*x - 612\*f^2\*x - 378\*h^2\*x + 2754\*d^2 + 684\*f^2 + 351\*h^2 + 3^(1/2)\*d\*e\*1088i - 3^(1/2)\*d\*f\*1125i - 3^(1/2)\*d\*g\*544i - 3^(1/2)\*e\*f\*608i + 3^(1/2)\*d\*h\*945i + 3^(1/2)\*d\*i\*544i + 3^(1/2)\*e\*h\*416i + 3^(1/2)\*f\*g\*304i - 3^(1/2)\*f\*h\*315i - 3^(1/2)\*f\*i\*304i - 3^(1/2)\*g\*h\*208i + 3^(1/2)\*h\*i\*208i - 672\*d\*e\*x + 3069\*d\*f\*x + 336\*d\*g\*x + 672\*e\*f\*x - 2403\*d\*h\*x - 336\*d\*i\*x - 384\*e\*h\*x - 336\*f\*g\*x + 963\*f\*h\*x + 336\*f\*i\*x + 192\*g\*h\*x - 192\*h\*i\*x + 3^(1/2)\*d^2\*x\*567i + 3^(1/2)\*f^2\*x\*252i + 3^(1/2)\*h^2\*x\*108i - 3^(1/2)\*d\*f\*x\*819i + 3^(1/2)\*d\*g\*x\*752i + 3^(1/2)\*e\*f\*x\*544i + 3^(1/2)\*d\*h\*x\*513i - 3^(1/2)\*d\*i\*x\*752i - 3^(1/2)\*e\*h\*x\*448i - 3^(1/2)\*f\*g\*x\*272i - 3^(1/2)\*f\*h\*x\*333i + 3^(1/2)\*f\*i\*x\*272i + 3^(1/2)\*g\*h\*x\*224i - 3^(1/2)\*h\*i\*x\*224i - 3^(1/2)\*d\*e\*x\*1504i)\*((9\*d)/32 - f/8 + (3\*h)/32 + (3^(1/2)\*d\*13i)/288 + (3^(1/2)\*e\*1i)/9 + (3^(1/2)\*f\*1i)/144 - (3^(1/2)\*g\*1i)/18 + (3^(1/2)\*h\*1i)/288 + (3^(1/2)\*i\*1i)/18) - log(1920\*d\*e - 2763\*d\*f - 960\*d\*g - 480\*e\*f + 1971\*d\*h + 960\*d\*i + 480\*e\*h + 240\*f\*g - 981\*f\*h - 240\*f\*i - 240\*g\*h + 240\*h\*i - 3^(1/2)\*d^2\*1620i - 3^(1/2)\*f^2\*180i - 3^(1/2)\*h^2\*135i + 3807\*d^2\*x + 612\*f^2\*x + 378\*h^2\*x + 2754\*d^2 + 684\*f^2 + 351\*h^2 + 3^(1/2)\*d\*e\*1088i + 3^(1/2)\*d\*f\*1125i - 3^(1/2)\*d\*g\*544i - 3^(1/2)\*e\*f\*608i - 3^(1/2)\*d\*h\*945i + 3^(1/2)\*d\*i\*544i + 3^(1/2)\*e\*h\*416i + 3^(1/2)\*f\*g\*304i + 3^(1/2)\*f\*h\*315i - 3^(1/2)\*f\*i\*304i - 3^(1/2)\*g\*h\*208i + 3^(1/2)\*h\*i\*208i - 672\*d\*e\*x - 3069\*d\*f\*

$$\begin{aligned}
& x + 336*d*g*x + 672*e*f*x + 2403*d*h*x - 336*d*i*x - 384*e*h*x - 336*f*g*x \\
& - 963*f*h*x + 336*f*i*x + 192*g*h*x - 192*h*i*x + 3^{(1/2)}*d^2*x*567i + 3^{(1/2)}*f^2*x*252i \\
& + 3^{(1/2)}*h^2*x*108i - 3^{(1/2)}*d*f*x*819i - 3^{(1/2)}*d*g*x*752i - 3^{(1/2)}*e*f*x*544i \\
& + 3^{(1/2)}*d*h*x*513i + 3^{(1/2)}*d*i*x*752i + 3^{(1/2)}*e*h*x*448i + 3^{(1/2)}*f*g*x*272i \\
& - 3^{(1/2)}*f*h*x*333i - 3^{(1/2)}*f*i*x*272i - 3^{(1/2)}*g*h*x*224i + 3^{(1/2)}*h*i*x*224i \\
& + 3^{(1/2)}*d*e*x*1504i)*(f/8 - (9*d)/32 - (3*h)/32 + (3^{(1/2)}*d*13i)/288 - (3^{(1/2)}*e*1i)/9 + (3^{(1/2)}*f*1i)/144 \\
& + (3^{(1/2)}*g*1i)/18 + (3^{(1/2)}*h*1i)/288 - (3^{(1/2)}*i*1i)/18) + \log(1920*d*e - 2763*d*f \\
& - 960*d*g - 480*e*f + 1971*d*h + 960*d*i + 480*e*h + 240*f*g - 981*f*h - 240*f*i \\
& - 240*g*h + 240*h*i + 3^{(1/2)}*d^2*1620i + 3^{(1/2)}*f^2*180i + 3^{(1/2)}*h^2*135i \\
& + 3807*d^2*x + 612*f^2*x + 378*h^2*x + 2754*d^2 + 684*f^2 + 351*h^2 - 3^{(1/2)}*d*e*1088i \\
& - 3^{(1/2)}*d*f*1125i + 3^{(1/2)}*d*g*544i + 3^{(1/2)}*e*f*608i + 3^{(1/2)}*d*h*945i - 3^{(1/2)}*d*i*544i \\
& - 3^{(1/2)}*e*h*416i - 3^{(1/2)}*f*g*304i - 3^{(1/2)}*f*h*315i + 3^{(1/2)}*f*i*304i + 3^{(1/2)}*g*h*208i \\
& - 3^{(1/2)}*h*i*208i - 672*d*e*x - 3069*d*f*x + 336*d*g*x + 672*e*f*x + 2403*d*h*x \\
& - 336*d*i*x - 384*e*h*x - 336*f*g*x - 963*f*h*x + 336*f*i*x + 192*g*h*x - 192*h*i*x \\
& - 3^{(1/2)}*d^2*x*567i - 3^{(1/2)}*f^2*x*252i - 3^{(1/2)}*h^2*x*108i + 3^{(1/2)}*d*f*x*819i \\
& + 3^{(1/2)}*d*g*x*752i + 3^{(1/2)}*e*f*x*544i - 3^{(1/2)}*d*h*x*513i - 3^{(1/2)}*d*i*x*752i \\
& - 3^{(1/2)}*e*h*x*448i - 3^{(1/2)}*f*g*x*272i + 3^{(1/2)}*f*h*x*333i + 3^{(1/2)}*f*i*x*272i \\
& + 3^{(1/2)}*g*h*x*224i - 3^{(1/2)}*h*i*x*224i - 3^{(1/2)}*d*e*x*1504i)*((9*d)/32 - f/8 + (3*h)/32 \\
& + (3^{(1/2)}*d*13i)/288 - (3^{(1/2)}*e*1i)/9 + (3^{(1/2)}*f*1i)/144 + (3^{(1/2)}*g*1i)/18 + (3^{(1/2)}*h*1i)/288 \\
& - (3^{(1/2)}*i*1i)/18) + \log(1920*d*e + 2763*d*f - 960*d*g - 480*e*f - 1971*d*h \\
& + 960*d*i + 480*e*h + 240*f*g + 981*f*h - 240*f*i - 240*g*h + 240*h*i + 3^{(1/2)}*d^2*1620i \\
& + 3^{(1/2)}*f^2*180i + 3^{(1/2)}*h^2*135i + 3807*d^2*x + 612*f^2*x + 378*h^2*x - 2754*d^2 - 684*f^2 \\
& - 351*h^2 + 3^{(1/2)}*d*e*1088i - 3^{(1/2)}*d*f*1125i - 3^{(1/2)}*d*g*544i - 3^{(1/2)}*e*f*608i \\
& + 3^{(1/2)}*d*h*945i + 3^{(1/2)}*d*i*544i + 3^{(1/2)}*e*h*416i + 3^{(1/2)}*f*g*304i - 3^{(1/2)}*f*h*315i \\
& - 3^{(1/2)}*f*i*304i - 3^{(1/2)}*g*h*208i + 3^{(1/2)}*h*i*208i + 672*d*e*x - 3069*d*f*x - 336*d*g*x \\
& - 672*e*f*x + 2403*d*h*x + 336*d*i*x + 384*e*h*x + 336*f*g*x - 963*f*h*x - 336*f*i*x \\
& - 192*g*h*x + 192*h*i*x + 3^{(1/2)}*d^2*x*567i + 3^{(1/2)}*f^2*x*252i + 3^{(1/2)}*h^2*x*108i \\
& - 3^{(1/2)}*d*f*x*819i + 3^{(1/2)}*d*g*x*752i + 3^{(1/2)}*e*f*x*544i + 3^{(1/2)}*d*h*x*513i - 3^{(1/2)}*d*i*x*752i \\
& - 3^{(1/2)}*e*h*x*448i - 3^{(1/2)}*f*g*x*272i - 3^{(1/2)}*f*h*x*333i + 3^{(1/2)}*f*i*x*272i \\
& + 3^{(1/2)}*g*h*x*224i - 3^{(1/2)}*h*i*x*224i - 3^{(1/2)}*d*e*x*1504i)*(f/8 - (9*d)/32 - (3*h)/32 \\
& + (3^{(1/2)}*d*13i)/288 + (3^{(1/2)}*e*1i)/9 + (3^{(1/2)}*f*1i)/144 - (3^{(1/2)}*g*1i)/18 + (3^{(1/2)}*h*1i)/288 \\
& + (3^{(1/2)}*i*1i)/18)
\end{aligned}$$

### 3.52 $\int \frac{d+ex}{(a+bx^2+cx^4)^3} dx$

Optimal result	566
Rubi [A] (verified)	567
Mathematica [A] (verified)	571
Maple [C] (verified)	571
Fricas [F(-1)]	572
Sympy [F(-1)]	573
Maxima [F]	573
Giac [B] (verification not implemented)	573
Mupad [B] (verification not implemented)	575

#### Optimal result

Integrand size = 20, antiderivative size = 474

$$\begin{aligned}
 & \int \frac{d+ex}{(a+bx^2+cx^4)^3} dx \\
 &= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{dx(b^2-2ac+bcx^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} \\
 &+ \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} + \frac{dx((b^2-7ac)(3b^2-4ac)+3bc(b^2-8ac)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
 &+ \frac{3\sqrt{c}(b^4-10ab^2c+56a^2c^2+b(b^2-8ac)\sqrt{b^2-4ac})d \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^{5/2}\sqrt{b-\sqrt{b^2-4ac}}} \\
 &+ \frac{3\sqrt{c}\left(b^3-8abc-\frac{b^4-10ab^2c+56a^2c^2}{\sqrt{b^2-4ac}}\right)d \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b+\sqrt{b^2-4ac}}} - \frac{6c^2e \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}}
 \end{aligned}$$

[Out]  $-1/4*e*(2*c*x^2+b)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^2+1/4*d*x*(b*c*x^2-2*a*c+b^2)/a/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^2+3/2*c*e*(2*c*x^2+b)/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)+1/8*d*x*((-7*a*c+b^2)*(-4*a*c+3*b^2)+3*b*c*(-8*a*c+b^2)*x^2)/a^2/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)-6*c^2*e*\operatorname{arctanh}((2*c*x^2+b)/(-4*a*c+b^2)^(1/2))/(-4*a*c+b^2)^(5/2)+3/16*d*\operatorname{arctan}(x^2^(1/2)*c^(1/2)/(b-(-4*a*c+b^2)^(1/2)))^(1/2)*c^(1/2)*(b^4-10*a*b^2*c+56*a^2*c^2+b*(-8*a*c+b^2)*(-4*a*c+b^2)^(1/2))/a^2/(-4*a*c+b^2)^(5/2)*2^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2)+3/16*d*\operatorname{arctan}(x^2^(1/2)*c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2))*c^(1/2)*(b^3-8*a*b*c+(-56*a^2*c^2+10*a*b^2*c-b^4)/(-4*a*c+b^2)^(1/2))/a^2/(-4*a*c+b^2)^2*2^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2)$

**Rubi [A] (verified)**

Time = 1.44 (sec) , antiderivative size = 474, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.500$ , Rules used = {1687, 12, 1106, 1192, 1180, 211, 1121, 628, 632, 212}

$$\int \frac{d + ex}{(a + bx^2 + cx^4)^3} dx$$

$$= \frac{3\sqrt{cd}(56a^2c^2 - 10ab^2c + b(b^2 - 8ac)\sqrt{b^2 - 4ac} + b^4) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^{5/2}\sqrt{b - \sqrt{b^2 - 4ac}}} + \frac{3\sqrt{cd}\left(-\frac{56a^2c^2 - 10ab^2c + b^4}{\sqrt{b^2 - 4ac}} - 8abc + b^3\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2 - 4ac} + b}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{\sqrt{b^2 - 4ac} + b}} + \frac{dx(3bcx^2(b^2 - 8ac) + (b^2 - 7ac)(3b^2 - 4ac))}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} - \frac{6c^2 e \operatorname{arctanh}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{(b^2 - 4ac)^{5/2}} + \frac{dx(-2ac + b^2 + bcx^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} + \frac{3ce(b + 2cx^2)}{2(b^2 - 4ac)^2(a + bx^2 + cx^4)} - \frac{e(b + 2cx^2)}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2}$$

[In] Int[(d + e\*x)/(a + b\*x^2 + c\*x^4)^3,x]

[Out]  $-1/4*(e*(b + 2*c*x^2))/((b^2 - 4*a*c)*(a + b*x^2 + c*x^4)^2) + (d*x*(b^2 - 2*a*c + b*c*x^2))/(4*a*(b^2 - 4*a*c)*(a + b*x^2 + c*x^4)^2) + (3*c*e*(b + 2*c*x^2))/(2*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4)) + (d*x*((b^2 - 7*a*c)*(3*b^2 - 4*a*c) + 3*b*c*(b^2 - 8*a*c)*x^2))/(8*a^2*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4)) + (3*sqrt[c]*(b^4 - 10*a*b^2*c + 56*a^2*c^2 + b*(b^2 - 8*a*c)*sqrt[b^2 - 4*a*c])*d*ArcTan[(sqrt[2]*sqrt[c]*x)/sqrt[b - sqrt[b^2 - 4*a*c]])]/(8*sqrt[2]*a^2*(b^2 - 4*a*c)^(5/2)*sqrt[b - sqrt[b^2 - 4*a*c]]) + (3*sqrt[c]*(b^3 - 8*a*b*c - (b^4 - 10*a*b^2*c + 56*a^2*c^2)/sqrt[b^2 - 4*a*c])*d*ArcTan[(sqrt[2]*sqrt[c]*x)/sqrt[b + sqrt[b^2 - 4*a*c]])]/(8*sqrt[2]*a^2*(b^2 - 4*a*c)^2*sqrt[b + sqrt[b^2 - 4*a*c]]) - (6*c^2*e*ArcTanh[(b + 2*c*x^2)/sqrt[b^2 - 4*a*c]])/(b^2 - 4*a*c)^(5/2)$

Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

Rule 211

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

Rule 212

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

Rule 628

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p + 1)/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

Rule 1106

Int[((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_), x\_Symbol] := Simp[(-x)\*(b^2 - 2\*a\*c + b\*c\*x^2)\*((a + b\*x^2 + c\*x^4)^(p + 1)/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c))), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[(b^2 - 2\*a\*c + 2\*(p + 1)\*(b^2 - 4\*a\*c) + b\*c\*(4\*p + 7)\*x^2)\*(a + b\*x^2 + c\*x^4)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && IntegerQ[2\*p]

Rule 1121

Int[(x\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_.), x\_Symbol] := Dist[1/2, Subst[Int[(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]

Rule 1180

Int[((d\_) + (e\_.)\*(x\_)^2)/((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[e/2 + (2\*c\*d - b\*e)/(2\*q), Int[1/(b/2 - q/2 + c\*x^2), x], x] + Dist[e/2 - (2\*c\*d - b\*e)/(2\*q), Int[1/(b/2 + q/2 + c\*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - a\*e^2, 0] && PosQ[b^2 - 4\*a\*c]

Rule 1192

Int[((d\_) + (e\_.)\*(x\_)^2)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_), x\_Symbol] := Simp[x\*(a\*b\*e - d\*(b^2 - 2\*a\*c) - c\*(b\*d - 2\*a\*e)\*x^2)\*((a + b\*x^2 + c\*x^4)^(p + 1)/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c))), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[Simp[(2\*p + 3)\*d\*b^2 - a\*b\*e - 2\*a\*c\*d\*(4\*p + 5) + (4\*p + 7



)\*(d\*b - 2\*a\*e)\*c\*x^2, x]\*(a + b\*x^2 + c\*x^4)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && LtQ[p, -1] && IntegerQ[2\*p]

### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d}{(a + bx^2 + cx^4)^3} dx + \int \frac{ex}{(a + bx^2 + cx^4)^3} dx \\
 &= d \int \frac{1}{(a + bx^2 + cx^4)^3} dx + e \int \frac{x}{(a + bx^2 + cx^4)^3} dx \\
 &= \frac{dx(b^2 - 2ac + bcx^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} - \frac{d \int \frac{b^2 - 2ac - 4(b^2 - 4ac) - 5bcx^2}{(a + bx^2 + cx^4)^2} dx}{4a(b^2 - 4ac)} \\
 &\quad + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{(a + bx + cx^2)^3} dx, x, x^2 \right) \\
 &= -\frac{e(b + 2cx^2)}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2} + \frac{dx(b^2 - 2ac + bcx^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
 &\quad + \frac{dx((b^2 - 7ac)(3b^2 - 4ac) + 3bc(b^2 - 8ac)x^2)}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
 &\quad + \frac{d \int \frac{3(b^4 - 9ab^2c + 28a^2c^2) + 3bc(b^2 - 8ac)x^2}{a + bx^2 + cx^4} dx}{8a^2(b^2 - 4ac)^2} - \frac{(3ce) \text{Subst} \left( \int \frac{1}{(a + bx + cx^2)^2} dx, x, x^2 \right)}{2(b^2 - 4ac)} \\
 &= -\frac{e(b + 2cx^2)}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2} + \frac{dx(b^2 - 2ac + bcx^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
 &\quad + \frac{3ce(b + 2cx^2)}{2(b^2 - 4ac)^2(a + bx^2 + cx^4)} + \frac{dx((b^2 - 7ac)(3b^2 - 4ac) + 3bc(b^2 - 8ac)x^2)}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
 &\quad - \frac{(3c(b^4 - 10ab^2c + 56a^2c^2 - b(b^2 - 8ac)\sqrt{b^2 - 4ac})d) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{16a^2(b^2 - 4ac)^{5/2}} \\
 &\quad + \frac{(3c(b^4 - 10ab^2c + 56a^2c^2 + b(b^2 - 8ac)\sqrt{b^2 - 4ac})d) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{16a^2(b^2 - 4ac)^{5/2}} \\
 &\quad + \frac{(3c^2e) \text{Subst} \left( \int \frac{1}{a + bx + cx^2} dx, x, x^2 \right)}{(b^2 - 4ac)^2}
 \end{aligned}$$

$$\begin{aligned}
&= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{dx(b^2-2ac+bcx^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} \\
&+ \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} + \frac{dx((b^2-7ac)(3b^2-4ac)+3bc(b^2-8ac)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{3\sqrt{c}(b^4-10ab^2c+56a^2c^2+b(b^2-8ac)\sqrt{b^2-4ac})d \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^{5/2}\sqrt{b-\sqrt{b^2-4ac}}} \\
&- \frac{3\sqrt{c}(b^4-10ab^2c+56a^2c^2-b(b^2-8ac)\sqrt{b^2-4ac})d \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^{5/2}\sqrt{b+\sqrt{b^2-4ac}}} \\
&- \frac{(6c^2e) \text{Subst}\left(\int \frac{1}{b^2-4ac-x^2} dx, x, b+2cx^2\right)}{(b^2-4ac)^2} \\
&= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{dx(b^2-2ac+bcx^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} \\
&+ \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} + \frac{dx((b^2-7ac)(3b^2-4ac)+3bc(b^2-8ac)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{3\sqrt{c}(b^4-10ab^2c+56a^2c^2+b(b^2-8ac)\sqrt{b^2-4ac})d \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^{5/2}\sqrt{b-\sqrt{b^2-4ac}}} \\
&- \frac{3\sqrt{c}(b^4-10ab^2c+56a^2c^2-b(b^2-8ac)\sqrt{b^2-4ac})d \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^{5/2}\sqrt{b+\sqrt{b^2-4ac}}} \\
&- \frac{6c^2e \tanh^{-1}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}}
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 1.14 (sec) , antiderivative size = 488, normalized size of antiderivative = 1.03

$$\begin{aligned}
& \int \frac{d + ex}{(a + bx^2 + cx^4)^3} dx \\
&= \frac{1}{16} \left( \frac{4abe + 8acx(d + ex) - 4bdx(b + cx^2)}{a(-b^2 + 4ac)(a + bx^2 + cx^4)^2} \right. \\
&\quad + \frac{6b^3dx(b + cx^2) - 2abcdx(25b + 24cx^2) + 8a^2c(3be + cx(7d + 6ex))}{a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{3\sqrt{2}\sqrt{c}(b^4 - 10ab^2c + 56a^2c^2 + b^3\sqrt{b^2 - 4ac} - 8abc\sqrt{b^2 - 4ac}) d \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{a^2(b^2 - 4ac)^{5/2}\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad \left. - \frac{3\sqrt{2}\sqrt{c}(b^4 - 10ab^2c + 56a^2c^2 - b^3\sqrt{b^2 - 4ac} + 8abc\sqrt{b^2 - 4ac}) d \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{a^2(b^2 - 4ac)^{5/2}\sqrt{b + \sqrt{b^2 - 4ac}}} \right. \\
&\quad \left. + \frac{48c^2e \log(-b + \sqrt{b^2 - 4ac} - 2cx^2)}{(b^2 - 4ac)^{5/2}} - \frac{48c^2e \log(b + \sqrt{b^2 - 4ac} + 2cx^2)}{(b^2 - 4ac)^{5/2}} \right)
\end{aligned}$$

`[In] Integrate[(d + e*x)/(a + b*x^2 + c*x^4)^3,x]`

```

[Out] ((4*a*b*e + 8*a*c*x*(d + e*x) - 4*b*d*x*(b + c*x^2))/(a*(-b^2 + 4*a*c)*(a +
b*x^2 + c*x^4)^2) + (6*b^3*d*x*(b + c*x^2) - 2*a*b*c*d*x*(25*b + 24*c*x^2)
+ 8*a^2*c*(3*b*e + c*x*(7*d + 6*e*x)))/(a^2*(b^2 - 4*a*c)^2*(a + b*x^2 + c
*x^4)) + (3*Sqrt[2]*Sqrt[c]*(b^4 - 10*a*b^2*c + 56*a^2*c^2 + b^3*Sqrt[b^2 -
4*a*c] - 8*a*b*c*Sqrt[b^2 - 4*a*c])*d*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b -
Sqrt[b^2 - 4*a*c]])/(a^2*(b^2 - 4*a*c)^(5/2)*Sqrt[b - Sqrt[b^2 - 4*a*c]])
- (3*Sqrt[2]*Sqrt[c]*(b^4 - 10*a*b^2*c + 56*a^2*c^2 - b^3*Sqrt[b^2 - 4*a*c]
+ 8*a*b*c*Sqrt[b^2 - 4*a*c])*d*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b + Sqrt[b^
2 - 4*a*c]])/(a^2*(b^2 - 4*a*c)^(5/2)*Sqrt[b + Sqrt[b^2 - 4*a*c]]) + (48*c
^2*e*Log[-b + Sqrt[b^2 - 4*a*c] - 2*c*x^2])/(b^2 - 4*a*c)^(5/2) - (48*c^2*e
*Log[b + Sqrt[b^2 - 4*a*c] + 2*c*x^2])/(b^2 - 4*a*c)^(5/2))/16

```

**Maple [C] (verified)**

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.53 (sec) , antiderivative size = 499, normalized size of antiderivative = 1.05

method	result
risch	$-\frac{3bc^2d(8ac-b^2)x^7}{8a^2(16a^2c^2-8ab^2c+b^4)} + \frac{3c^3ex^6}{16a^2c^2-8ab^2c+b^4} + \frac{cd(28a^2c^2-49ab^2c+6b^4)x^5}{8a^2(16a^2c^2-8ab^2c+b^4)} + \frac{9bc^2ex^4}{2(16a^2c^2-8ab^2c+b^4)} - \frac{bd(4a^2c^2+20ab^2c-3b^4)x^3}{8a^2(16a^2c^2-8ab^2c+b^4)} + \frac{(5ac+b^2)}{16a^2c^2-8ab^2c+b^4} + \frac{1}{(cx^4+bx^2+a)^2}$
default	$64c^3 \left( -\frac{3(24a^2c^2\sqrt{-4ac+b^2}-10ab^2c\sqrt{-4ac+b^2}+b^4\sqrt{-4ac+b^2}+32a^2bc^2-12ab^3c+b^5)dx^3}{64a^2c^3} + \frac{3e(4ac-b^2)x^2}{8c^2} - \frac{d(-20\sqrt{-4ac+b^2}abc+5\sqrt{-4ac+b^2})}{64} \right) \frac{1}{\left(x^2+\frac{b}{2c}-\frac{\sqrt{-4ac+b^2}}{2c}\right)^2}$

[In] `int((e*x+d)/(c*x^4+b*x^2+a)^3,x,method=_RETURNVERBOSE)`

[Out] `(-3/8*b*c^2*d*(8*a*c-b^2)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*x^7+3*c^3*e/(16*a^2*c^2-8*a*b^2*c+b^4)*x^6+1/8/a^2*c*d*(28*a^2*c^2-49*a*b^2*c+6*b^4)/(16*a^2*c^2-8*a*b^2*c+b^4)*x^5+9/2*b*c^2*e/(16*a^2*c^2-8*a*b^2*c+b^4)*x^4-1/8*b*d*(4*a^2*c^2+20*a*b^2*c-3*b^4)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*x^3+(5*a*c+b^2)*c*e/(16*a^2*c^2-8*a*b^2*c+b^4)*x^2+1/8*d*(44*a^2*c^2-37*a*b^2*c+5*b^4)/(16*a^2*c^2-8*a*b^2*c+b^4)/a*x+1/4*b*(10*a*c-b^2)*e/(16*a^2*c^2-8*a*b^2*c+b^4)/(c*x^4+b*x^2+a)^2+3/16*sum((-b*c*d*(8*a*c-b^2)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*_R^2+16*c^2*e/(16*a^2*c^2-8*a*b^2*c+b^4)*_R+d*(28*a^2*c^2-9*a*b^2*c+b^4)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4))/(2*_R^3*c+_R*b)*ln(x-_R),_R=RootOf(_Z^4*c+_Z^2*b+a))`

## Fricas [F(-1)]

Timed out.

$$\int \frac{d+ex}{(a+bx^2+cx^4)^3} dx = \text{Timed out}$$

[In] `integrate((e*x+d)/(c*x^4+b*x^2+a)^3,x, algorithm="fricas")`

[Out] Timed out

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

[In] integrate((e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a)\*\*3,x)

[Out] Timed out

**Maxima [F]**

$$\int \frac{d + ex}{(a + bx^2 + cx^4)^3} dx = \int \frac{ex + d}{(cx^4 + bx^2 + a)^3} dx$$

[In] integrate((e\*x+d)/(c\*x^4+b\*x^2+a)^3,x, algorithm="maxima")

[Out]  $\frac{1}{8}*(24*a^2*c^3*e*x^6 + 36*a^2*b*c^2*e*x^4 + 3*(b^3*c^2 - 8*a*b*c^3)*d*x^7 + (6*b^4*c - 49*a*b^2*c^2 + 28*a^2*c^3)*d*x^5 + (3*b^5 - 20*a*b^3*c - 4*a^2*b*c^2)*d*x^3 + 8*(a^2*b^2*c + 5*a^3*c^2)*e*x^2 + (5*a*b^4 - 37*a^2*b^2*c + 44*a^3*c^2)*d*x - 2*(a^2*b^3 - 10*a^3*b*c)*e)/((a^2*b^4*c^2 - 8*a^3*b^2*c^3 + 16*a^4*c^4)*x^8 + a^4*b^4 - 8*a^5*b^2*c + 16*a^6*c^2 + 2*(a^2*b^5*c - 8*a^3*b^3*c^2 + 16*a^4*b*c^3)*x^6 + (a^2*b^6 - 6*a^3*b^4*c + 32*a^5*c^3)*x^4 + 2*(a^3*b^5 - 8*a^4*b^3*c + 16*a^5*b*c^2)*x^2) - \frac{3}{8}*integrate(-(16*a^2*c^2*e*x + (b^3*c - 8*a*b*c^2)*d*x^2 + (b^4 - 9*a*b^2*c + 28*a^2*c^2)*d)/(c*x^4 + b*x^2 + a), x)/(a^2*b^4 - 8*a^3*b^2*c + 16*a^4*c^2)$

**Giac [B] (verification not implemented)**Leaf count of result is larger than twice the leaf count of optimal. 3389 vs.  $2(420) = 840$ .

Time = 3.11 (sec) , antiderivative size = 3389, normalized size of antiderivative = 7.15

$$\int \frac{d + ex}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

[In] integrate((e\*x+d)/(c\*x^4+b\*x^2+a)^3,x, algorithm="giac")

[Out]  $\frac{3}{32}*(\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*b^8 - 17*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^6*c - 2*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*b^7*c - 2*b^8*c + 116*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c^2 + 26*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^5*c^2 + \sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*b^6*c^2 + 34*a*b^6*c^2 + 2*b^7*c^2 - 368*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^2*c^3 - 128*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^3 - 13*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^4*c^3 -$

$$\begin{aligned}
& 232a^2b^4c^3 - 30ab^5c^3 + 448\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}a^4c^4 + 224\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}a^3b^2c^4 + 64\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}a^2b^3c^4 - 112\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}a^3c^5 - 896a^4c^5 - 352a^3b^2c^5 - \sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}b^7 + 15\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}ab^5c + 2\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}b^6c - 8\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}a^2b^3c^2 - 2\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}ab^4c^2 - \sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}b^5c^2 + 176\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}a^3b^2c^3 + 88\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}a^2b^2c^3 + 11\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}ab^3c^3 - 44\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}a^2b^2c^4 + 2(b^2 - 4ac)b^6c - 26(b^2 - 4ac)ab^4c^2 - 2(b^2 - 4ac)b^5c^2 + 128(b^2 - 4ac)a^2b^2c^3 + 22(b^2 - 4ac)ab^3c^3 - 224(b^2 - 4ac)a^3c^4 - 88(b^2 - 4ac)a^2b^2c^4) * \arctan(2\sqrt{2}\sqrt{c}/\sqrt{(a^2b^5 - 8a^3b^3c + 16a^4b^2c^2 + \sqrt{(a^2b^5 - 8a^3b^3c + 16a^4b^2c^2)^2 - 4(a^3b^4 - 8a^4b^2c + 16a^5c^2)(a^2b^4c - 8a^3b^2c^2 + 16a^4c^3)})))/((a^3b^8 - 16a^4b^6c - 2a^3b^7c + 96a^5b^4c^2 + 24a^4b^5c^2 + a^3b^6c^2 - 256a^6b^2c^3 - 96a^5b^3c^3 - 12a^4b^4c^3 + 256a^7c^4 + 128a^6b^2c^4 + 48a^5b^2c^4 - 64a^6c^5) * \text{abs}(c)) + 3/32(\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}b^8 - 17\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}ab^6c - 2\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}b^7c + 2b^8c + 116\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}a^2b^4c^2 + 26\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}ab^5c^2 + \sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}b^6c^2 - 34ab^6c^2 - 2b^7c^2 - 368\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}a^3b^2c^3 - 128\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}a^2b^3c^3 - 13\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}ab^4c^3 + 232a^2b^4c^3 + 30ab^5c^3 + 448\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}a^4c^4 + 224\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}a^3b^2c^4 + 64\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}a^2b^2c^4 - 736a^3b^2c^4 - 176a^2b^3c^4 - 112\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{c}a^3c^5 + 896a^4c^5 + 352a^3b^2c^5 + \sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}b^7 - 15\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}ab^5c - 2\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}b^6c + 88\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}a^2b^3c^2 + 22\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}ab^4c^2 + \sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}b^5c^2 - 176\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}a^3b^2c^3 - 88\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}a^2b^2c^3 - 11\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}ab^3c^3 + 44\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{b^2 - 4ac}\sqrt{c}a^2b^2c^4 - 2(b^2 - 4ac)b^6c + 26(b^2 - 4ac)ab^4c^2 + 2(b^2 - 4ac)b^5c^2 - 128(b^2 - 4ac)a^2b^2c^3 - 22(b^2 - 4ac)ab^3
\end{aligned}$$

```

*c^3 + 224*(b^2 - 4*a*c)*a^3*c^4 + 88*(b^2 - 4*a*c)*a^2*b*c^4)*d*arctan(2*
sqrt(1/2)*x/sqrt((a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 - sqrt((a^2*b^5 - 8*a
^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^
4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3
)))/((a^3*b^8 - 16*a^4*b^6*c - 2*a^3*b^7*c + 96*a^5*b^4*c^2 + 24*a^4*b^5*c^
2 + a^3*b^6*c^2 - 256*a^6*b^2*c^3 - 96*a^5*b^3*c^3 - 12*a^4*b^4*c^3 + 256*a
^7*c^4 + 128*a^6*b*c^4 + 48*a^5*b^2*c^4 - 64*a^6*c^5)*abs(c)) - 3*(b^2*c^4
- 4*a*c^5 - 2*b*c^5 + c^6)*sqrt(b^2 - 4*a*c)*e*log(x^2 + 1/2*(a^2*b^5 - 8*a
^3*b^3*c + 16*a^4*b*c^2 + sqrt((a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2)^2 - 4
*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c
^3)))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))/((b^8 - 16*a*b^6*c - 2*b^7*c
+ 96*a^2*b^4*c^2 + 24*a*b^5*c^2 + b^6*c^2 - 256*a^3*b^2*c^3 - 96*a^2*b^3*c
^3 - 12*a*b^4*c^3 + 256*a^4*c^4 + 128*a^3*b*c^4 + 48*a^2*b^2*c^4 - 64*a^3*c
^5)*c^2) + 3*(b^2*c^4 - 4*a*c^5 - 2*b*c^5 + c^6)*sqrt(b^2 - 4*a*c)*e*log(x
^2 + 1/2*(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 - sqrt((a^2*b^5 - 8*a^3*b^3*c
+ 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8
*a^3*b^2*c^2 + 16*a^4*c^3)))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))/((b^
8 - 16*a*b^6*c - 2*b^7*c + 96*a^2*b^4*c^2 + 24*a*b^5*c^2 + b^6*c^2 - 256*a^
3*b^2*c^3 - 96*a^2*b^3*c^3 - 12*a*b^4*c^3 + 256*a^4*c^4 + 128*a^3*b*c^4 + 4
8*a^2*b^2*c^4 - 64*a^3*c^5)*c^2) + 1/8*(3*b^3*c^2*d*x^7 - 24*a*b*c^3*d*x^7
+ 24*a^2*c^3*e*x^6 + 6*b^4*c*d*x^5 - 49*a*b^2*c^2*d*x^5 + 28*a^2*c^3*d*x^5
+ 36*a^2*b*c^2*e*x^4 + 3*b^5*d*x^3 - 20*a*b^3*c*d*x^3 - 4*a^2*b*c^2*d*x^3 +
8*a^2*b^2*c*e*x^2 + 40*a^3*c^2*e*x^2 + 5*a*b^4*d*x - 37*a^2*b^2*c*d*x + 44
*a^3*c^2*d*x - 2*a^2*b^3*e + 20*a^3*b*c*e)/((a^2*b^4 - 8*a^3*b^2*c + 16*a^4
*c^2)*(c*x^4 + b*x^2 + a)^2)

```

## Mupad [B] (verification not implemented)

Time = 8.77 (sec) , antiderivative size = 4225, normalized size of antiderivative = 8.91

$$\int \frac{d + ex}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

[In] int((d + e\*x)/(a + b\*x^2 + c\*x^4)^3,x)

```

[Out] symsum(log(root(56371445760*a^11*b^8*c^6*z^4 - 503316480*a^8*b^14*c^3*z^4 +
47185920*a^7*b^16*c^2*z^4 - 171798691840*a^14*b^2*c^9*z^4 + 193273528320*a
^13*b^4*c^8*z^4 - 128849018880*a^12*b^6*c^7*z^4 - 16911433728*a^10*b^10*c^5
*z^4 + 3523215360*a^9*b^12*c^4*z^4 - 2621440*a^6*b^18*c*z^4 + 68719476736*a
^15*c^10*z^4 + 65536*a^5*b^20*z^4 + 6936330240*a^8*b^3*c^8*d^2*z^2 + 246487
4496*a^6*b^7*c^6*d^2*z^2 - 3963617280*a^9*b*c^9*d^2*z^2 - 1509949440*a^9*b^
2*c^8*e^2*z^2 - 5400428544*a^7*b^5*c^7*d^2*z^2 - 94464*a*b^17*c*d^2*z^2 + 7
54974720*a^8*b^4*c^7*e^2*z^2 - 730054656*a^5*b^9*c^5*d^2*z^2 - 188743680*a^
7*b^6*c^6*e^2*z^2 + 146165760*a^4*b^11*c^4*d^2*z^2 + 23592960*a^6*b^8*c^5*e
^2*z^2 - 19860480*a^3*b^13*c^3*d^2*z^2 - 1179648*a^5*b^10*c^4*e^2*z^2 + 177

```

$$\begin{aligned}
& 1776*a^2*b^{15}*c^2*d^2*z^2 + 1207959552*a^{10}*c^9*e^2*z^2 + 2304*b^{19}*d^2*z^2 \\
& - 428544*a*b^{12}*c^3*d^2*e*z + 1022754816*a^6*b^2*c^8*d^2*e*z - 642318336*a^5*b^4*c^7*d^2*e*z + 223395840*a^4*b^6*c^6*d^2*e*z - 46725120*a^3*b^8*c^5*d^2*e*z \\
& + 5930496*a^2*b^{10}*c^4*d^2*e*z - 693633024*a^7*c^9*d^2*e*z + 13824*b^{14}*c^2*d^2*e*z + 34836480*a^4*b*c^8*d^2*e^2 - 435456*a*b^7*c^5*d^2*e^2 - 17418240*a^3*b^3*c^7*d^2*e^2 \\
& + 3919104*a^2*b^5*c^6*d^2*e^2 + 20736*b^9*c^4*d^2*e^2 - 27433728*a^3*b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 - 734832*a*b^6*c^6*d^4 + 49787136*a^4*c^9*d^4 \\
& + 5308416*a^5*c^8*e^4 + 35721*b^8*c^5*d^4, z, k) * (\text{root}(56371445760*a^{11}*b^8*c^6*z^4 - 503316480*a^8*b^{14}*c^3*z^4 + 47185920*a^7*b^{16}*c^2*z^4 - 171798691840*a^{14}*b^2*c^9*z^4 + 193273528320*a^{13}*b^4*c^8*z^4 - 128849018880*a^{12}*b^6*c^7*z^4 - 16911433728*a^{10}*b^{10}*c^5*z^4 + 3523215360*a^9*b^{12}*c^4*z^4 - 2621440*a^6*b^{18}*c*z^4 + 68719476736*a^{15}*c^{10}*z^4 + 65536*a^5*b^{20}*z^4 + 6936330240*a^8*b^3*c^8*d^2*z^2 + 2464874496*a^6*b^7*c^6*d^2*z^2 - 3963617280*a^9*b*c^9*d^2*z^2 - 1509949440*a^9*b^2*c^8*e^2*z^2 - 5400428544*a^7*b^5*c^7*d^2*z^2 - 94464*a*b^{17}*c*d^2*z^2 + 754974720*a^8*b^4*c^7*e^2*z^2 - 730054656*a^5*b^9*c^5*d^2*z^2 - 188743680*a^7*b^6*c^6*e^2*z^2 + 146165760*a^4*b^{11}*c^4*d^2*z^2 + 23592960*a^6*b^8*c^5*e^2*z^2 - 19860480*a^3*b^{13}*c^3*d^2*z^2 - 1179648*a^5*b^{10}*c^4*e^2*z^2 + 1771776*a^2*b^{15}*c^2*d^2*z^2 + 1207959552*a^{10}*c^9*e^2*z^2 + 2304*b^{19}*d^2*z^2 - 428544*a*b^{12}*c^3*d^2*e*z + 1022754816*a^6*b^2*c^8*d^2*e*z - 642318336*a^5*b^4*c^7*d^2*e*z + 223395840*a^4*b^6*c^6*d^2*e*z - 46725120*a^3*b^8*c^5*d^2*e*z + 5930496*a^2*b^{10}*c^4*d^2*e*z - 693633024*a^7*c^9*d^2*e*z + 13824*b^{14}*c^2*d^2*e*z + 34836480*a^4*b*c^8*d^2*e^2 - 435456*a*b^7*c^5*d^2*e^2 - 17418240*a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c^6*d^2*e^2 + 20736*b^9*c^4*d^2*e^2 - 27433728*a^3*b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 - 734832*a*b^6*c^6*d^4 + 49787136*a^4*c^9*d^4 + 5308416*a^5*c^8*e^4 + 35721*b^8*c^5*d^4, z, k) * ((x*(786432*a^9*c^9*e - 768*a^4*b^{10}*c^4*e + 15360*a^5*b^8*c^5*e - 122880*a^6*b^6*c^6*e + 491520*a^7*b^4*c^7*e - 983040*a^8*b^2*c^8*e))/(32*(a^4*b^{12} + 4096*a^{10}*c^6 - 24*a^5*b^{10}*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) - (3*(7340032*a^9*c^9*d - 256*a^2*b^{14}*c^2*d + 7424*a^3*b^{12}*c^3*d - 94208*a^4*b^{10}*c^4*d + 675840*a^5*b^8*c^5*d - 2949120*a^6*b^6*c^6*d + 7798784*a^7*b^4*c^7*d - 11534336*a^8*b^2*c^8*d))/(512*(a^4*b^{12} + 4096*a^{10}*c^6 - 24*a^5*b^{10}*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) + (\text{root}(56371445760*a^{11}*b^8*c^6*z^4 - 503316480*a^8*b^{14}*c^3*z^4 + 47185920*a^7*b^{16}*c^2*z^4 - 171798691840*a^{14}*b^2*c^9*z^4 + 193273528320*a^{13}*b^4*c^8*z^4 - 128849018880*a^{12}*b^6*c^7*z^4 - 16911433728*a^{10}*b^{10}*c^5*z^4 + 3523215360*a^9*b^{12}*c^4*z^4 - 2621440*a^6*b^{18}*c*z^4 + 68719476736*a^{15}*c^{10}*z^4 + 65536*a^5*b^{20}*z^4 + 6936330240*a^8*b^3*c^8*d^2*z^2 + 2464874496*a^6*b^7*c^6*d^2*z^2 - 3963617280*a^9*b*c^9*d^2*z^2 - 1509949440*a^9*b^2*c^8*e^2*z^2 - 5400428544*a^7*b^5*c^7*d^2*z^2 - 94464*a*b^{17}*c*d^2*z^2 + 754974720*a^8*b^4*c^7*e^2*z^2 - 730054656*a^5*b^9*c^5*d^2*z^2 - 188743680*a^7*b^6*c^6*e^2*z^2 + 146165760*a^4*b^{11}*c^4*d^2*z^2 + 23592960*a^6*b^8*c^5*e^2*z^2 - 19860480*a^3*b^{13}*c^3*d^2*z^2 - 1179648*a^5*b^{10}*c^4*e^2*z^2 + 1771776*a^2*b^{15}*c^2*d^2*z^2 + 1207959552*a^{10}*c^9*e^2*z^2 + 2304*b^{19}*d^2*z^2 - 428544*a*b^{12}*c^3*d^2*e*z + 102275
\end{aligned}$$



$$\begin{aligned}
& 4816a^6b^2c^8d^2e^*z - 642318336a^5b^4c^7d^2e^*z + 223395840a^4b^6c^6d^2e^*z - 46725120a^3b^8c^5d^2e^*z + 5930496a^2b^{10}c^4d^2e^*z \\
& - 693633024a^7c^9d^2e^*z + 13824b^{14}c^2d^2e^*z + 34836480a^4b^*c^8d^2e^2 - 435456a*b^7c^5d^2e^2 - 17418240a^3b^3c^7d^2e^2 + 3919104 \\
& a^2b^5c^6d^2e^2 + 20736b^9c^4d^2e^2 - 27433728a^3b^2c^8d^4 + 6446304a^2b^4c^7d^4 - 734832a*b^6c^6d^4 + 49787136a^4c^9d^4 + 5308 \\
& 416a^5c^8e^4 + 35721b^8c^5d^4, z, k) * x * (4194304a^{11}b^*c^9 - 256a^4b^{15}c^2 + 7168a^5b^{13}c^3 - 86016a^6b^{11}c^4 + 573440a^7b^9c^5 - 22 \\
& 93760a^8b^7c^6 + 5505024a^9b^5c^7 - 7340032a^{10}b^3c^8) / (32*(a^4b^{12} + 4096a^{10}c^6 - 24a^5b^{10}c + 240a^6b^8c^2 - 1280a^7b^6c^3 + \\
& 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (3*(1081344a^6b^*c^8d^*e + 1536a^2b^9c^4d^*e - 29184a^3b^7c^5d^*e + 227328a^4b^5c^6d^*e - 811008a^5b^3c^7d^*e)) / (512*(a^4b^{12} + 4096a^{10}c^6 - 24a^5b^{10}c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) - (x*(2257 \\
& 92a^6c^9d^2 + 9b^{12}c^3d^2 - 252a*b^{10}c^4d^2 - 36864a^6b^*c^8e^2 + 3114a^2b^8c^5d^2 - 21312a^3b^6c^6d^2 + 88128a^4b^4c^7d^2 - 21 \\
& 1968a^5b^2c^8d^2 - 2304a^4b^5c^6e^2 + 18432a^5b^3c^7e^2)) / (32*(a^4b^{12} + 4096a^{10}c^6 - 24a^5b^{10}c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (3*(3456a*b^5c^6d^3 - 189b^7c^5d^3 + 56448a^3b^*c^8d^3 + 64512a^4c^8d^*e^2 - 22608a^2b^3c^7d^3 + 2304a^2b^4c^6d^*e^2 - 20736a^3b^2c^7d^*e^2)) / (512*(a^4b^{12} + 4096a^{10}c^6 - 24a^5b^{10}c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (x*(6912a^4c^8e^3 - 27b^7c^5d^2e + 486a*b^5c^6d^2e + 12096a^3b^*c^8d^2e - 3672a^2b^3c^7d^2e)) / (32*(a^4b^{12} + 4096a^{10}c^6 - 24a^5b^{10}c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) * root(56371445760a^{11}b^8c^6z^4 - 503316480a^8b^{14}c^3z^4 + 47185920a^7b^{16}c^2z^4 - 171798691840a^{14}b^2c^9z^4 + 193273528320a^{13}b^4c^8z^4 - 128849018880a^{12}b^6c^7z^4 - 16911433728a^{10}b^{10}c^5z^4 + 3523215360a^9b^{12}c^4z^4 - 2621440a^6b^{18}c^*z^4 + 68719476736a^{15}c^{10}z^4 + 65536a^5b^{20}z^4 + 6936330240a^8b^3c^8d^2z^2 + 2464874496a^6b^7c^6d^2z^2 - 3963617280a^9b^*c^9d^2z^2 - 1509949440a^9b^2c^8e^2z^2 - 5400428544a^7b^5c^7d^2z^2 - 94464a*b^17c^d^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730054656a^5b^9c^5d^2z^2 - 188743680a^7b^6c^6e^2z^2 + 146165760a^4b^{11}c^4d^2z^2 + 23592960a^6b^8c^5e^2z^2 - 19860480a^3b^{13}c^3d^2z^2 - 1179648a^5b^{10}c^4e^2z^2 + 1771776a^2b^{15}c^2d^2z^2 + 1207959552a^{10}c^9e^2z^2 + 2304b^{19}d^2z^2 - 428544a*b^{12}c^3d^2e^*z + 1022754816a^6b^2c^8d^2e^*z - 642318336a^5b^4c^7d^2e^*z + 223395840a^4b^6c^6d^2e^*z - 46725120a^3b^8c^5d^2e^*z + 5930496a^2b^{10}c^4d^2e^*z - 693633024a^7c^9d^2e^*z + 13824b^{14}c^2d^2e^*z + 34836480a^4b^*c^8d^2e^2 - 435456a*b^7c^5d^2e^2 - 17418240a^3b^3c^7d^2e^2 + 3919104a^2b^5c^6d^2e^2 + 20736b^9c^4d^2e^2 - 27433728a^3b^2c^8d^4 + 6446304a^2b^4c^7d^4 - 734832a*b^6c^6d^4 + 49787136a^4c^9d^4 + 5308416a^5c^8e^4 + 35721b^8c^5d^4, z, k), k, 1, 4) + ((x^2*(5a^*c^2e + b^2c^*e)) / (b^4 + 16a^2c^2 - 8a*b^2c) - (b^3e - 10a*b^*c^*e)) / (4*(b^4 + 16a^
\end{aligned}$$

$$\begin{aligned}
& 2*c^2 - 8*a*b^2*c)) + (3*c^3*e*x^6)/(b^4 + 16*a^2*c^2 - 8*a*b^2*c) + (9*b*c \\
& ^2*e*x^4)/(2*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) - (d*x^3*(4*a^2*b*c^2 - 3*b^5 \\
& + 20*a*b^3*c))/(8*a^2*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) + (d*x*(5*b^4 + 44*a^ \\
& 2*c^2 - 37*a*b^2*c))/(8*a*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) + (d*x^5*(6*b^4*c \\
& + 28*a^2*c^3 - 49*a*b^2*c^2))/(8*a^2*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) + (3* \\
& c*d*x^7*(b^3*c - 8*a*b*c^2))/(8*a^2*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)))/(x^4*( \\
& 2*a*c + b^2) + a^2 + c^2*x^8 + 2*a*b*x^2 + 2*b*c*x^6)
\end{aligned}$$

### 3.53 $\int \frac{d+ex+fx^2}{(a+bx^2+cx^4)^3} dx$

Optimal result	579
Rubi [A] (verified)	580
Mathematica [A] (verified)	584
Maple [C] (verified)	585
Fricas [F(-1)]	586
Sympy [F(-1)]	586
Maxima [F]	586
Giac [B] (verification not implemented)	587
Mupad [B] (verification not implemented)	590

#### Optimal result

Integrand size = 25, antiderivative size = 621

$$\int \frac{d+ex+fx^2}{(a+bx^2+cx^4)^3} dx = -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} + \frac{x(3b^4d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} + \frac{\sqrt{c}(3b^4d+b^3(3\sqrt{b^2-4acd}+af)-4abc(6\sqrt{b^2-4acd}+13af)-ab^2(30cd-\sqrt{b^2-4ac}f)+4a^2c(42b^2d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2))}{8\sqrt{2a^2(b^2-4ac)}^{5/2}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf-\frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right)\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2a^2(b^2-4ac)}^2\sqrt{b+\sqrt{b^2-4ac}}} - \frac{6c^2e\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}}$$

```
[Out] -1/4*e*(2*c*x^2+b)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^2+1/4*x*(b^2*d-2*a*c*d-a*b*f+c*(-2*a*f+b*d)*x^2)/a/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^2+3/2*c*e*(2*c*x^2+b)/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)+1/8*x*(3*b^4*d-25*a*b^2*c*d+28*a^2*c^2*d+a*b^3*f+8*a^2*b*c*f+c*(20*a^2*c*f+a*b^2*f-24*a*b*c*d+3*b^3*d)*x^2)/a^2/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)-6*c^2*e*arctanh((2*c*x^2+b)/(-4*a*c+b^2)^(1/2))/(-4*a*c+b^2)^(5/2)+1/16*arctan(x*2^(1/2)*c^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2))*c^(1/2)*(3*b^4*d+b^3*(a*f+3*d*(-4*a*c+b^2)^(1/2))-4*a*b*c*(13*a*f+6*d*(-4*a*c+b^2)^(1/2))-a*b^2*(30*c*d-f*(-4*a*c+b^2)^(1/2))+4*a^2*c*(42*c*d+5*f*(-4*a*c+b^2)^(1/2)))/a^2/(-4*a*c+b^2)^(5/2)*2^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2)+1/16*arctan(x*2^(1/2)*c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2))*c^(1/2)*(3*b
```

$$\frac{-3d-24abc*d+ab^2*f+20a^2*c*f+(52a^2*b*c*f-168a^2*c^2*d-ab^3*f+30a*b^2*c*d-3b^4*d)/(-4a*c+b^2)^{(1/2))}/a^2/(-4a*c+b^2)^{2*2^{(1/2)}}/(b+(-4a*c+b^2)^{(1/2)})^{(1/2)}$$

### Rubi [A] (verified)

Time = 2.93 (sec) , antiderivative size = 621, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.360$ , Rules used = {1687, 1192, 1180, 211, 12, 1121, 628, 632, 212}

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^3} dx$$

$$= \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b^2-4ac+b}}\right) \left(-\frac{-52a^2bcf+168a^2c^2d+ab^3f-30ab^2cd+3b^4d}{\sqrt{b^2-4ac}} + 20a^2cf + ab^2f - 24abcd + 3b^3d\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{\sqrt{b^2-4ac}+b}}$$

$$+ \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) (4a^2c(5f\sqrt{b^2-4ac}+42cd) - ab^2(30cd - f\sqrt{b^2-4ac}) - 4abc(6d\sqrt{b^2-4ac} + 8\sqrt{2}a^2(b^2-4ac)^{5/2}\sqrt{b-\sqrt{b^2-4ac}}))}{8\sqrt{2}a^2(b^2-4ac)^{5/2}\sqrt{b-\sqrt{b^2-4ac}}}$$

$$+ \frac{x(cx^2(20a^2cf + ab^2f - 24abcd + 3b^3d) + 8a^2bcf + 28a^2c^2d + ab^3f - 25ab^2cd + 3b^4d)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)}$$

$$- \frac{6c^2e \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}} + \frac{x(cx^2(bd-2af) - abf - 2acd + b^2d)}{4a(b^2-4ac)(a+bx^2+cx^4)^2}$$

$$+ \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} - \frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2}$$

[In] Int[(d + e\*x + f\*x^2)/(a + b\*x^2 + c\*x^4)^3,x]

[Out]  $-1/4*(e*(b + 2*c*x^2))/((b^2 - 4*a*c)*(a + b*x^2 + c*x^4)^2) + (x*(b^2*d - 2*a*c*d - a*b*f + c*(b*d - 2*a*f)*x^2))/(4*a*(b^2 - 4*a*c)*(a + b*x^2 + c*x^4)^2) + (3*c*e*(b + 2*c*x^2))/(2*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4)) + (x*(3*b^4*d - 25*a*b^2*c*d + 28*a^2*c^2*d + a*b^3*f + 8*a^2*b*c*f + c*(3*b^3*d - 24*a*b*c*d + a*b^2*f + 20*a^2*c*f)*x^2))/(8*a^2*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4)) + (\operatorname{Sqrt}[c]*(3*b^4*d + b^3*(3*\operatorname{Sqrt}[b^2 - 4*a*c]*d + a*f) - 4*a*b*c*(6*\operatorname{Sqrt}[b^2 - 4*a*c]*d + 13*a*f) - a*b^2*(30*c*d - \operatorname{Sqrt}[b^2 - 4*a*c]*f) + 4*a^2*c*(42*c*d + 5*\operatorname{Sqrt}[b^2 - 4*a*c]*f))*\operatorname{ArcTan}[(\operatorname{Sqrt}[2]*\operatorname{Sqrt}[c]*x)/\operatorname{Sqrt}[b - \operatorname{Sqrt}[b^2 - 4*a*c]])]/(8*\operatorname{Sqrt}[2]*a^2*(b^2 - 4*a*c)^{(5/2)}*\operatorname{Sqrt}[b - \operatorname{Sqrt}[b^2 - 4*a*c]]) + (\operatorname{Sqrt}[c]*(3*b^3*d - 24*a*b*c*d + a*b^2*f + 20*a^2*c*f - (3*b^4*d - 30*a*b^2*c*d + 168*a^2*c^2*d + a*b^3*f - 52*a^2*b*c*f)/\operatorname{Sqrt}[b^2 - 4*a*c]))*\operatorname{ArcTan}[(\operatorname{Sqrt}[2]*\operatorname{Sqrt}[c]*x)/\operatorname{Sqrt}[b + \operatorname{Sqrt}[b^2 - 4*a*c]])]/(8*\operatorname{Sqrt}[2]*a^2*(b^2 - 4*a*c)^2*\operatorname{Sqrt}[b + \operatorname{Sqrt}[b^2 - 4*a*c]]) - (6*c^2*e*\operatorname{ArcTanh}[(b + 2*c*x^2)/\operatorname{Sqrt}[b^2 - 4*a*c]])/(b^2 - 4*a*c)^{(5/2)}$

Rule 12

```
Int[(a_)*(u_), x_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !Match
Q[u, (b_)*(v_) /; FreeQ[b, x]]
```

### Rule 211

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] := Simp[(Rt[a/b, 2]/a)*ArcTan[x/R
t[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]
```

### Rule 212

```
Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] := Simp[(1/(Rt[a, 2]*Rt[-b, 2]))*
ArcTanh[Rt[-b, 2]*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])
```

### Rule 628

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := Simp[(b + 2*c*x)
*((a + b*x + c*x^2)^(p + 1)/((p + 1)*(b^2 - 4*a*c))), x] - Dist[2*c*((2*p +
3)/((p + 1)*(b^2 - 4*a*c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; Free
Q[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && Int
egerQ[4*p]
```

### Rule 632

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] := Dist[-2, Subst[I
nt[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]
```

### Rule 1121

```
Int[(x_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol] := Dist[1/2,
Subst[Int[(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]
```

### Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

### Rule 1192

```
Int[((d_) + (e_.)*(x_)^2)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symb
ol] := Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 +
c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2
```

```

- 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7)
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]

```

### Rule 1687

```

Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]

```

### Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{ex}{(a + bx^2 + cx^4)^3} dx + \int \frac{d + fx^2}{(a + bx^2 + cx^4)^3} dx \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad - \frac{\int \frac{-3b^2d + 14acd - abf - 5c(bd - 2af)x^2}{(a + bx^2 + cx^4)^2} dx}{4a(b^2 - 4ac)} + e \int \frac{x}{(a + bx^2 + cx^4)^3} dx \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{x(3b^4d - 25ab^2cd + 28a^2c^2d + ab^3f + 8a^2bcf + c(3b^3d - 24abcd + ab^2f + 20a^2cf)x^2)}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{\int \frac{3b^4d - 27ab^2cd + 84a^2c^2d + ab^3f - 16a^2bcf + c(3b^3d - 24abcd + ab^2f + 20a^2cf)x^2}{a + bx^2 + cx^4} dx}{8a^2(b^2 - 4ac)^2} \\
&\quad + \frac{1}{2}e\text{Subst}\left(\int \frac{1}{(a + bx + cx^2)^3} dx, x, x^2\right)
\end{aligned}$$

$$\begin{aligned}
&= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} \\
&+ \frac{x(3b^4d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&- \frac{(3ce)\text{Subst}\left(\int \frac{1}{(a+bx+cx^2)^2} dx, x, x^2\right)}{2(b^2-4ac)} \\
&+ \frac{\left(c(3b^3d-24abcd+ab^2f+20a^2cf - \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}})\right) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2-4ac}+cx^2} dx}{16a^2(b^2-4ac)^2} \\
&+ \frac{\left(c(3b^3d-24abcd+ab^2f+20a^2cf + \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}})\right) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2-4ac}+cx^2} dx}{16a^2(b^2-4ac)^2} \\
&= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} \\
&+ \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{x(3b^4d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf + \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b-\sqrt{b^2-4ac}}} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf - \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b+\sqrt{b^2-4ac}}} \\
&+ \frac{(3c^2e)\text{Subst}\left(\int \frac{1}{a+bx+cx^2} dx, x, x^2\right)}{(b^2-4ac)^2} \\
&= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} \\
&+ \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{x(3b^4d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf + \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b-\sqrt{b^2-4ac}}} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf - \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b+\sqrt{b^2-4ac}}} \\
&- \frac{(6c^2e)\text{Subst}\left(\int \frac{1}{b^2-4ac-x^2} dx, x, b+2cx^2\right)}{(b^2-4ac)^2}
\end{aligned}$$

$$\begin{aligned}
&= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} \\
&+ \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{x(3b^4d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf+\frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right)\tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b-\sqrt{b^2-4ac}}} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf-\frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right)\tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b+\sqrt{b^2-4ac}}} \\
&- \frac{6c^2e\tanh^{-1}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 1.93 (sec) , antiderivative size = 625, normalized size of antiderivative = 1.01

$$\begin{aligned}
\int \frac{d+ex+fx^2}{(a+bx^2+cx^4)^3} dx &= \frac{1}{16} \left( \frac{4ab(e+fx) - 4bdx(b+cx^2) + 8acx(d+x(e+fx))}{a(-b^2+4ac)(a+bx^2+cx^4)^2} \right. \\
&+ \frac{6b^3dx(b+cx^2) + 2abx(-25bcd+b^2f-24c^2dx^2+bcfx^2) + 8a^2c(b(3e+2fx) + cx(7d+6ex+5fx^2))}{a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{\sqrt{2}\sqrt{c}(3b^4d+b^3(3\sqrt{b^2-4acd}+af) - 4abc(6\sqrt{b^2-4acd}+13af) + ab^2(-30cd+\sqrt{b^2-4ac}f) + 4a^2c)}{a^2(b^2-4ac)^{5/2}\sqrt{b-\sqrt{b^2-4ac}}} \\
&+ \frac{\sqrt{2}\sqrt{c}(-3b^4d+b^3(3\sqrt{b^2-4acd}-af) + 4abc(-6\sqrt{b^2-4acd}+13af) + ab^2(30cd+\sqrt{b^2-4ac}f) + 4a^2c)}{a^2(b^2-4ac)^{5/2}\sqrt{b+\sqrt{b^2-4ac}}} \\
&\left. + \frac{48c^2e \log(-b+\sqrt{b^2-4ac}-2cx^2)}{(b^2-4ac)^{5/2}} - \frac{48c^2e \log(b+\sqrt{b^2-4ac}+2cx^2)}{(b^2-4ac)^{5/2}} \right)
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2)/(a + b\*x^2 + c\*x^4)^3,x]

[Out] ((4\*a\*b\*(e + f\*x) - 4\*b\*d\*x\*(b + c\*x^2) + 8\*a\*c\*x\*(d + x\*(e + f\*x)))/(a\*(-b^2 + 4\*a\*c)\*(a + b\*x^2 + c\*x^4)^2) + (6\*b^3\*d\*x\*(b + c\*x^2) + 2\*a\*b\*x\*(-25\*b\*c\*d + b^2\*f - 24\*c^2\*d\*x^2 + b\*c\*f\*x^2) + 8\*a^2\*c\*(b\*(3\*e + 2\*f\*x) + c\*x\*(7\*d + 6\*e\*x + 5\*f\*x^2)))/(a^2\*(b^2 - 4\*a\*c)^2\*(a + b\*x^2 + c\*x^4)) + (Sqrt[2]\*Sqrt[c]\*(3\*b^4\*d + b^3\*(3\*Sqrt[b^2 - 4\*a\*c]\*d + a\*f) - 4\*a\*b\*c\*(6\*Sqrt[b^2 - 4\*a\*c]\*d + 13\*a\*f) + a\*b^2\*(-30\*c\*d + Sqrt[b^2 - 4\*a\*c]\*f) + 4\*a^2\*c\*(42\*c\*d + 5\*Sqrt[b^2 - 4\*a\*c]\*f))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[



$$\begin{aligned} & (b^2 - 4ac)]]) / (a^2(b^2 - 4ac)^{5/2} \sqrt{b - \sqrt{b^2 - 4ac}}) + (\sqrt{2} \sqrt{c} (-3b^4d + b^3(3\sqrt{b^2 - 4ac})d - af) + 4ab^2c(-6\sqrt{b^2 - 4ac})d + 13af) + ab^2(30cd + \sqrt{b^2 - 4ac})f + 4a^2c(-42cd + 5\sqrt{b^2 - 4ac})f) \operatorname{ArcTan}[\sqrt{2}\sqrt{c}x / \sqrt{b + \sqrt{b^2 - 4ac}}] \\ & + (48c^2e \operatorname{Log}[-b + \sqrt{b^2 - 4ac} - 2cx^2]) / (b^2 - 4ac)^{5/2} - (48c^2e \operatorname{Log}[b + \sqrt{b^2 - 4ac} + 2cx^2]) / (b^2 - 4ac)^{5/2}) / 16 \end{aligned}$$

## Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.65 (sec) , antiderivative size = 607, normalized size of antiderivative = 0.98

method	result
risch	$\frac{c^2(20a^2cf+ab^2f-24abcd+3b^3d)x^7}{8a^2(16a^2c^2-8ab^2c+b^4)} + \frac{3c^3ex^6}{16a^2c^2-8ab^2c+b^4} + \frac{c(28a^2bcf+28a^2c^2d+2ab^3f-49ab^2cd+6db^4)x^5}{8a^2(16a^2c^2-8ab^2c+b^4)} + \frac{9bc^2ex^4}{2(16a^2c^2-8ab^2c+b^4)} + \frac{(36a^3c^2f+5a^2b^2cf-4a^2b^2cd+ab^4f-20ab^3cd+3b^5d)/a^2}{(cx^4+bx^2+a)^3} + \frac{(5ac+b^2)ce}{(cx^4+bx^2+a)^2} + \frac{1}{8} \frac{(16a^2bcf+44a^2c^2d-ab^3f-37ab^2cd+5b^4d)/a^2}{(cx^4+bx^2+a)} + \frac{1}{4} \frac{b(10ac-b^2)e}{(cx^4+bx^2+a)} + \frac{1}{2} \frac{b^2c^2e}{(cx^4+bx^2+a)}$
default	Expression too large to display

[In] `int((f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x,method=_RETURNVERBOSE)`

[Out]  $(1/8c^2(20a^2cf+ab^2f-24ab^2cd+3b^3d)/a^2/(16a^2c^2-8ab^2c+b^4)x^7+3c^3e/(16a^2c^2-8ab^2c+b^4)x^6+1/8/a^2c(28a^2bcf+28a^2c^2d+2ab^3f-49ab^2cd+6db^4)/(16a^2c^2-8ab^2c+b^4)x^5+9/2b^2c^2e/(16a^2c^2-8ab^2c+b^4)x^4+1/8(36a^3c^2f+5a^2b^2cf-4a^2b^2cd+ab^4f-20ab^3cd+3b^5d)/a^2/(16a^2c^2-8ab^2c+b^4)x^3+(5ac+b^2)ce/(16a^2c^2-8ab^2c+b^4)x^2+1/8(16a^2bcf+44a^2c^2d-ab^3f-37ab^2cd+5b^4d)/(16a^2c^2-8ab^2c+b^4)/ax+1/4b(10ac-b^2)e/(16a^2c^2-8ab^2c+b^4))/(cx^4+bx^2+a)^2+1/16\sum((c(20a^2cf+ab^2f-24ab^2cd+3b^3d)/a^2/(16a^2c^2-8ab^2c+b^4)*_R^2+48c^2e/(16a^2c^2-8ab^2c+b^4)*_R-(16a^2bcf-84a^2c^2d-ab^3f+27ab^2cd-3b^4d)/a^2/(16a^2c^2-8ab^2c+b^4))/(2*_R^3c+_Rb)*\ln(x-_R),_R=\operatorname{RootOf}(_Z^4c+_Z^2b+a))$

**Fricas [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

```
[In] integrate((f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x, algorithm="fricas")
```

```
[Out] Timed out
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

```
[In] integrate((f*x**2+e*x+d)/(c*x**4+b*x**2+a)**3,x)
```

```
[Out] Timed out
```

**Maxima [F]**

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^3} dx = \int \frac{fx^2 + ex + d}{(cx^4 + bx^2 + a)^3} dx$$

```
[In] integrate((f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x, algorithm="maxima")
```

```
[Out] 1/8*(24*a^2*c^3*e*x^6 + 36*a^2*b*c^2*e*x^4 + (3*(b^3*c^2 - 8*a*b*c^3)*d + (a*b^2*c^2 + 20*a^2*c^3)*f)*x^7 + ((6*b^4*c - 49*a*b^2*c^2 + 28*a^2*c^3)*d + 2*(a*b^3*c + 14*a^2*b*c^2)*f)*x^5 + 8*(a^2*b^2*c + 5*a^3*c^2)*e*x^2 + ((3*b^5 - 20*a*b^3*c - 4*a^2*b*c^2)*d + (a*b^4 + 5*a^2*b^2*c + 36*a^3*c^2)*f)*x^3 - 2*(a^2*b^3 - 10*a^3*b*c)*e + ((5*a*b^4 - 37*a^2*b^2*c + 44*a^3*c^2)*d - (a^2*b^3 - 16*a^3*b*c)*f)*x)/((a^2*b^4*c^2 - 8*a^3*b^2*c^3 + 16*a^4*c^4)*x^8 + a^4*b^4 - 8*a^5*b^2*c + 16*a^6*c^2 + 2*(a^2*b^5*c - 8*a^3*b^3*c^2 + 16*a^4*b*c^3)*x^6 + (a^2*b^6 - 6*a^3*b^4*c + 32*a^5*c^3)*x^4 + 2*(a^3*b^5 - 8*a^4*b^3*c + 16*a^5*b*c^2)*x^2) + 1/8*integrate((48*a^2*c^2*e*x + (3*(b^3*c - 8*a*b*c^2)*d + (a*b^2*c + 20*a^2*c^2)*f)*x^2 + 3*(b^4 - 9*a*b^2*c + 28*a^2*c^2)*d + (a*b^3 - 16*a^2*b*c)*f)/(c*x^4 + b*x^2 + a), x)/(a^2*b^4 - 8*a^3*b^2*c + 16*a^4*c^2)
```

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 5284 vs. 2(561) = 1122.

Time = 2.44 (sec) , antiderivative size = 5284, normalized size of antiderivative = 8.51

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

[In] integrate((f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^3,x, algorithm="giac")

[Out] 
$$-3*(b^2*c^4 - 4*a*c^5 - 2*b*c^5 + c^6)*\sqrt{b^2 - 4*a*c}*e*\log(x^2 + 1/2*(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 + \sqrt{(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)})))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))/((b^8 - 16*a*b^6*c - 2*b^7*c + 96*a^2*b^4*c^2 + 24*a*b^5*c^2 + b^6*c^2 - 256*a^3*b^2*c^3 - 96*a^2*b^3*c^3 - 12*a*b^4*c^3 + 256*a^4*c^4 + 128*a^3*b*c^4 + 48*a^2*b^2*c^4 - 64*a^3*c^5)*c^2) + 3*(b^2*c^4 - 4*a*c^5 - 2*b*c^5 + c^6)*\sqrt{b^2 - 4*a*c}*e*\log(x^2 + 1/2*(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 - \sqrt{(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)})))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))/((b^8 - 16*a*b^6*c - 2*b^7*c + 96*a^2*b^4*c^2 + 24*a*b^5*c^2 + b^6*c^2 - 256*a^3*b^2*c^3 - 96*a^2*b^3*c^3 - 12*a*b^4*c^3 + 256*a^4*c^4 + 128*a^3*b*c^4 + 48*a^2*b^2*c^4 - 64*a^3*c^5)*c^2) + 1/32*(3*(\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*b^8 - 17*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^6*c - 2*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*b^7*c - 2*b^8*c + 116*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c^2 + 26*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^5*c^2 + \sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*b^6*c^2 + 34*a*b^6*c^2 + 2*b^7*c^2 - 368*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b^2*c^3 - 128*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^3 - 13*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^4*c^3 - 232*a^2*b^4*c^3 - 30*a*b^5*c^3 + 448*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^4*c^4 + 224*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^4 + 64*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^2*c^4 + 736*a^3*b^2*c^4 + 176*a^2*b^3*c^4 - 112*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*c^5 - 896*a^4*c^5 - 352*a^3*b*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*b^7 + 15*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^5*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*b^6*c - 88*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^2 - 22*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^4*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*b^5*c^2 + 176*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^3 + 88*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b^2*c^3 + 11*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a*b^3*c^3 - 44*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2*b*c^4 + 2*(b^2 - 4*a*c)*b^6*c - 26*(b^2 - 4*a*c)*a*b^4*c^2 - 2*(b^2 - 4*a*c)*b^5*c^2 + 128*(b^2 - 4*a*c)*a^2*b^2*c^3 + 22*($$

$$\begin{aligned}
& b^2 - 4ac) * a * b^3 * c^3 - 224 * (b^2 - 4ac) * a^3 * c^4 - 88 * (b^2 - 4ac) * a^2 * b \\
& * c^4) * d + (\sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a * b^7 - 24 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^2 * b^5 * c \\
& - 2 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^3 * b^3 * c^2 + 40 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^2 * b^4 * c^2 + \sqrt{2} \\
& * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a * b^5 * c^2 + 48 * a^2 * b^5 * c^2 + 2 * a * b^6 * c^2 - \\
& 256 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^4 * b * c^3 - 128 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^3 * b^2 * c^3 - 20 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^2 * b^3 * c^3 - 288 * a^3 * b^3 * c^3 - 44 * a^2 * b^4 * c^3 + 64 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^3 * b * c^4 + 512 * a^4 * b * c^4 + 64 * a^3 * b^2 * c^4 + 320 * a^4 * c^5 - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a * b^6 + \\
& 22 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^2 * b^4 * c + 2 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a * b^5 * c - 32 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^3 * b^2 * c^2 - 36 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^2 * b^3 * c^2 - \sqrt{2} \\
& * \sqrt{b^2 - 4ac} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a * b^4 * c^2 - 160 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^4 * c^3 - 80 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^3 * b * c^3 + 18 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^2 * b^2 * c^3 + 40 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c + \sqrt{b^2 - 4ac}} * c) * a^3 * c^4 + 2 * (b^2 - 4ac) * a * b^5 \\
& * c - 40 * (b^2 - 4ac) * a^2 * b^3 * c^2 - 2 * (b^2 - 4ac) * a * b^4 * c^2 + 128 * (b^2 - 4ac) * a^3 * b * c^3 + 36 * (b^2 - 4ac) * a^2 * b^2 * c^3 + 80 * (b^2 - 4ac) * a^3 * c^4) \\
& * f) * \arctan(2 * \sqrt{1/2} * x / \sqrt{(a^2 * b^5 - 8 * a^3 * b^3 * c + 16 * a^4 * b * c^2 + \sqrt{(a^2 * b^5 - 8 * a^3 * b^3 * c + 16 * a^4 * b * c^2)^2 - 4 * (a^3 * b^4 - 8 * a^4 * b^2 * c + 16 * a^5 * c^2) * (a^2 * b^4 * c - 8 * a^3 * b^2 * c^2 + 16 * a^4 * c^3))}) / (a^2 * b^4 * c - 8 * a^3 * b^2 * c^2 + 16 * a^4 * c^3)) / ((a^3 * b^8 - 16 * a^4 * b^6 * c - 2 * a^3 * b^7 * c + 96 * a^5 * b^4 * c^2 + 24 * a^4 * b^5 * c^2 + a^3 * b^6 * c^2 - 256 * a^6 * b^2 * c^3 - 96 * a^5 * b^3 * c^3 - 12 * a^4 * b^4 * c^3 + 256 * a^7 * c^4 + 128 * a^6 * b * c^4 + 48 * a^5 * b^2 * c^4 - 64 * a^6 * c^5) * \text{abs}(c)) \\
& + 1/32 * (3 * (\sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * b^8 - 17 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a * b^6 * c - 2 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^2 * b^4 * c^2 + 26 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a * b^5 * c^2 + \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * b^6 * c^2 - 34 * a * b^6 * c^2 + 2 * b^7 * c^2 - 368 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^3 * b^2 * c^3 - 128 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^2 * b^3 * c^3 - 13 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a * b^4 * c^3 + 232 * a^2 * b^4 * c^3 - 30 * a * b^5 * c^3 + 448 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^3 * b * c^4 + 64 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^2 * b^2 * c^4 - 736 * a^3 * b^2 * c^4 + 176 * a^2 * b^3 * c^4 - 112 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^3 * c^5 + 896 * a^4 * c^5 - 352 * a^3 * b * c^5 - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * b^7 + 15 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a * b^5 * c + 2 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * b^6 * c - 88 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^2 * b^3 * c^2 - 22 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a * b^4 * c^2 - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * b^5 * c^2 + 176 *
\end{aligned}$$

$$\begin{aligned}
& \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^3 c^3 + 88 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^2 c^3 + 11 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a b^3 c^3 - 44 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^4 - 2(b^2 - 4ac) b^6 c + 26(b^2 - 4ac) a b^4 c^2 - 2(b^2 - 4ac) b^5 c^2 - 128(b^2 - 4ac) a^2 b^2 c^3 + 22(b^2 - 4ac) a b^3 c^3 + 224(b^2 - 4ac) a^3 c^4 - 88(b^2 - 4ac) a^2 b^3 c^4) d + (\sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^5 c - 2 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a b^6 c + 2 a b^7 c + 144 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^3 c^2 + 40 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^4 c^2 + \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a b^5 c^2 - 48 a^2 b^5 c^2 + 2 a b^6 c^2 - 256 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^4 b^3 c^3 - 128 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^2 c^3 - 20 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^3 + 288 a^3 b^3 c^3 - 44 a^2 b^4 c^3 + 64 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^3 c^4 - 512 a^4 b^3 c^4 + 64 a^3 b^2 c^4 + 320 a^4 c^5 - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a b^6 + 22 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^4 c + 2 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a b^5 c - 32 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^2 c^2 - 36 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^2 - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a b^4 c^2 - 160 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^4 c^3 - 80 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^3 c^3 + 18 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^2 c^3 + 40 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 c^4 - 2(b^2 - 4ac) a b^5 c + 40(b^2 - 4ac) a^2 b^3 c^2 - 2(b^2 - 4ac) a b^4 c^2 - 128(b^2 - 4ac) a^3 b^3 c^3 + 36(b^2 - 4ac) a^2 b^2 c^3 + 80(b^2 - 4ac) a^3 c^4) f) \arctan(2 \sqrt{1/2} x / \sqrt{(a^2 b^5 - 8 a^3 b^3 c + 16 a^4 b^2 c^2 - \sqrt{(a^2 b^5 - 8 a^3 b^3 c + 16 a^4 b^2 c^2)^2 - 4(a^3 b^4 - 8 a^4 b^2 c + 16 a^5 c^2)}(a^2 b^4 c - 8 a^3 b^2 c^2 + 16 a^4 c^3))} / ((a^3 b^8 - 16 a^4 b^6 c - 2 a^3 b^7 c + 96 a^5 b^4 c^2 + 24 a^4 b^5 c^2 + a^3 b^6 c^2 - 256 a^6 b^2 c^3 - 96 a^5 b^3 c^3 - 12 a^4 b^4 c^3 + 256 a^7 c^4 + 128 a^6 b^3 c^4 + 48 a^5 b^2 c^4 - 64 a^6 c^5) \operatorname{abs}(c)) + 1/8(3 b^3 c^2 d x^7 - 24 a b^3 c^3 d x^7 + a b^2 c^2 f x^7 + 20 a^2 c^3 f x^7 + 24 a^2 c^3 e x^6 + 6 b^4 c d x^5 - 49 a b^2 c^2 d x^5 + 28 a^2 c^3 d x^5 + 2 a b^3 c f x^5 + 28 a^2 b^3 c^2 f x^5 + 36 a^2 b^3 c^2 e x^4 + 3 b^5 d x^3 - 20 a b^3 c d x^3 - 4 a^2 b^3 c^2 d x^3 + a b^4 f x^3 + 5 a^2 b^2 c f x^3 + 36 a^3 c^2 f x^3 + 8 a^2 b^2 c e x^2 + 40 a^3 c^2 e x^2 + 5 a b^4 d x - 37 a^2 b^2 c d x + 44 a^3 c^2 d x - a^2 b^3 f x + 16 a^3 b^3 c f x - 2 a^2 b^3 e + 20 a^3 b^3 c e) / ((a^2 b^4 - 8 a^3 b^2 c + 16 a^4 c^2) (c x^4 + b x^2 + a)^2)
\end{aligned}$$

## Mupad [B] (verification not implemented)

Time = 9.38 (sec) , antiderivative size = 8689, normalized size of antiderivative = 13.99

$$\int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2)/(a + b\*x^2 + c\*x^4)^3,x)

[Out] ((x^2\*(5\*a\*c^2\*e + b^2\*c\*e))/(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c) - (b^3\*e - 10\*a\*b\*c\*e)/(4\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (x^5\*(28\*a^2\*c^3\*d + 6\*b^4\*c\*d + 2\*a\*b^3\*c\*f - 49\*a\*b^2\*c^2\*d + 28\*a^2\*b\*c^2\*f))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (x\*(5\*b^4\*d + 44\*a^2\*c^2\*d - a\*b^3\*f - 37\*a\*b^2\*c\*d + 16\*a^2\*b\*c\*f))/(8\*a\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (3\*c^3\*e\*x^6)/(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c) + (x^3\*(3\*b^5\*d + 36\*a^3\*c^2\*f + a\*b^4\*f - 20\*a\*b^3\*c\*d - 4\*a^2\*b\*c^2\*d + 5\*a^2\*b^2\*c\*f))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (9\*b\*c^2\*e\*x^4)/(2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (c\*x^7\*(20\*a^2\*c^2\*f + 3\*b^3\*c\*d - 24\*a\*b\*c^2\*d + a\*b^2\*c\*f))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)))/(x^4\*(2\*a\*c + b^2) + a^2 + c^2\*x^8 + 2\*a\*b\*x^2 + 2\*b\*c\*x^6) + symsum(log(root(56371445760\*a^11\*b^8\*c^6\*z^4 - 503316480\*a^8\*b^14\*c^3\*z^4 + 47185920\*a^7\*b^16\*c^2\*z^4 - 171798691840\*a^14\*b^2\*c^9\*z^4 + 193273528320\*a^13\*b^4\*c^8\*z^4 - 128849018880\*a^12\*b^6\*c^7\*z^4 - 16911433728\*a^10\*b^10\*c^5\*z^4 + 3523215360\*a^9\*b^12\*c^4\*z^4 - 2621440\*a^6\*b^18\*c\*z^4 + 68719476736\*a^15\*c^10\*z^4 + 65536\*a^5\*b^20\*z^4 - 73728\*a^2\*b^16\*c\*d\*f\*z^2 - 1321205760\*a^9\*b^2\*c^8\*d\*f\*z^2 + 732168192\*a^7\*b^6\*c^6\*d\*f\*z^2 - 366280704\*a^6\*b^8\*c^5\*d\*f\*z^2 - 330301440\*a^8\*b^4\*c^7\*d\*f\*z^2 + 96583680\*a^5\*b^10\*c^4\*d\*f\*z^2 - 15175680\*a^4\*b^12\*c^3\*d\*f\*z^2 + 1428480\*a^3\*b^14\*c^2\*d\*f\*z^2 - 440401920\*a^10\*b\*c^8\*f^2\*z^2 + 1761607680\*a^10\*c^9\*d\*f\*z^2 - 14080\*a^3\*b^15\*c\*f^2\*z^2 + 6936330240\*a^8\*b^3\*c^8\*d^2\*z^2 + 2464874496\*a^6\*b^7\*c^6\*d^2\*z^2 - 3963617280\*a^9\*b\*c^9\*d^2\*z^2 - 1509949440\*a^9\*b^2\*c^8\*e^2\*z^2 - 5400428544\*a^7\*b^5\*c^7\*d^2\*z^2 - 94464\*a\*b^17\*c\*d^2\*z^2 + 754974720\*a^8\*b^4\*c^7\*e^2\*z^2 - 730054656\*a^5\*b^9\*c^5\*d^2\*z^2 + 477102080\*a^9\*b^3\*c^7\*f^2\*z^2 - 174325760\*a^8\*b^5\*c^6\*f^2\*z^2 - 188743680\*a^7\*b^6\*c^6\*e^2\*z^2 + 146165760\*a^4\*b^11\*c^4\*d^2\*z^2 + 1206656\*a^7\*b^7\*c^5\*f^2\*z^2 + 8929280\*a^6\*b^9\*c^4\*f^2\*z^2 + 23592960\*a^6\*b^8\*c^5\*e^2\*z^2 - 2600960\*a^5\*b^11\*c^3\*f^2\*z^2 + 291840\*a^4\*b^13\*c^2\*f^2\*z^2 - 19860480\*a^3\*b^13\*c^3\*d^2\*z^2 - 1179648\*a^5\*b^10\*c^4\*e^2\*z^2 + 1771776\*a^2\*b^15\*c^2\*d^2\*z^2 + 1536\*a\*b^18\*d\*f\*z^2 + 1207959552\*a^10\*c^9\*e^2\*z^2 + 256\*a^2\*b^17\*f^2\*z^2 + 2304\*b^19\*d^2\*z^2 + 169869312\*a^7\*b\*c^8\*d\*e\*f\*z + 9216\*a\*b^13\*c^2\*d\*e\*f\*z - 221773824\*a^6\*b^3\*c^7\*d\*e\*f\*z + 117964800\*a^5\*b^5\*c^6\*d\*e\*f\*z - 32440320\*a^4\*b^7\*c^5\*d\*e\*f\*z + 4792320\*a^3\*b^9\*c^4\*d\*e\*f\*z - 350208\*a^2\*b^11\*c^3\*d\*e\*f\*z - 428544\*a\*b^12\*c^3\*d^2\*e\*z + 1022754816\*a^6\*b^2\*c^8\*d^2\*e\*z - 642318336\*a^5\*b^4\*c^7\*d^2\*e\*z + 223395840\*a^4\*b^6\*c^6\*d^2\*e\*z - 50724864\*a^7\*b^2\*c^7\*e\*f^2\*z + 26542080\*a^6\*b^4\*c^6\*e\*f^2\*z - 46725120\*a^3\*b^8\*c^5\*d^2\*e\*z - 7127040\*a^5\*b^6\*c^5\*e\*f^2\*z + 1013760\*a^4\*b^8\*c^4\*e\*f^2\*z - 69120\*a^3\*b^10\*c^3\*e\*f^2\*z + 1536\*a^2\*b^12\*c^2\*e\*f^2\*z + 5930496\*a^2\*b

$$\begin{aligned}
& ^{10}c^4d^2e^*z - 693633024a^7c^9d^2e^*z + 39321600a^8c^8e^*f^2z + 13 \\
& 824b^{14}c^2d^2e^*z + 13824a^*b^8c^4d^2e^2f - 7741440a^4b^2c^7d^2e^2 \\
& f + 2903040a^3b^4c^6d^2e^2f - 387072a^2b^6c^5d^2e^2f + 37310976a^3 \\
& *b^3c^7d^3f + 3870720a^5b^*c^7e^2f^2 + 34836480a^4b^*c^8d^2e^2 - 8 \\
& 068032a^2b^5c^6d^3f - 5623296a^4b^3c^6d^2f^3 + 1737792a^3b^5c^5 \\
& d^2f^3 - 260190a^*b^8c^4d^2f^2 - 211680a^2b^7c^4d^2f^3 - 435456a^*b^7 \\
& c^5d^2e^2 - 75188736a^4b^*c^8d^3f - 15482880a^5c^8d^2e^2f - 4262400 \\
& *a^5b^*c^7d^2f^3 + 852768a^*b^7c^5d^3f + 7350a^*b^9c^3d^2f^3 + 35525376 \\
& *a^4b^2c^7d^2f^2 + 645120a^4b^3c^6e^2f^2 - 80640a^3b^5c^5e^2f \\
& ^2 + 2304a^2b^7c^4e^2f^2 - 15269184a^3b^4c^6d^2f^2 + 2870784a^2 \\
& b^6c^5d^2f^2 - 17418240a^3b^3c^7d^2e^2 + 3919104a^2b^5c^6d^2e^ \\
& 2 + 11025b^{10}c^3d^2f^2 + 5644800a^5c^8d^2f^2 + 20736b^9c^4d^2e^ \\
& 2 + 492800a^5b^2c^6f^4 + 351456a^4b^4c^5f^4 - 43120a^3b^6c^4f^4 \\
& + 1225a^2b^8c^3f^4 - 27433728a^3b^2c^8d^4 + 6446304a^2b^4c^7d^ \\
& 4 - 39690b^9c^4d^3f - 734832a^*b^6c^6d^4 + 49787136a^4c^9d^4 + 160 \\
& 000a^6c^7f^4 + 5308416a^5c^8e^4 + 35721b^8c^5d^4, z, k)*(root(5637 \\
& 1445760a^{11}b^8c^6z^4 - 503316480a^8b^{14}c^3z^4 + 47185920a^7b^{16}c \\
& ^2z^4 - 171798691840a^{14}b^2c^9z^4 + 193273528320a^{13}b^4c^8z^4 - 12 \\
& 8849018880a^{12}b^6c^7z^4 - 16911433728a^{10}b^{10}c^5z^4 + 3523215360a^ \\
& 9b^{12}c^4z^4 - 2621440a^6b^{18}c^*z^4 + 68719476736a^{15}c^{10}z^4 + 65536 \\
& *a^5b^{20}z^4 - 73728a^2b^{16}c^*d^*f^*z^2 - 1321205760a^9b^2c^8d^*f^*z^2 + \\
& 732168192a^7b^6c^6d^*f^*z^2 - 366280704a^6b^8c^5d^*f^*z^2 - 330301440 \\
& a^8b^4c^7d^*f^*z^2 + 96583680a^5b^{10}c^4d^*f^*z^2 - 15175680a^4b^{12}c^3 \\
& *d^*f^*z^2 + 1428480a^3b^{14}c^2d^*f^*z^2 - 440401920a^{10}b^*c^8f^2z^2 + 17 \\
& 61607680a^{10}c^9d^*f^*z^2 - 14080a^3b^{15}c^*f^2z^2 + 6936330240a^8b^3c \\
& ^8d^2z^2 + 2464874496a^6b^7c^6d^2z^2 - 3963617280a^9b^*c^9d^2z^2 \\
& - 1509949440a^9b^2c^8e^2z^2 - 5400428544a^7b^5c^7d^2z^2 - 94464a^* \\
& *b^{17}c^d^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730054656a^5b^9c^5d^2 \\
& *z^2 + 477102080a^9b^3c^7f^2z^2 - 174325760a^8b^5c^6f^2z^2 - 1887 \\
& 43680a^7b^6c^6e^2z^2 + 146165760a^4b^{11}c^4d^2z^2 + 11206656a^7b \\
& ^7c^5f^2z^2 + 8929280a^6b^9c^4f^2z^2 + 23592960a^6b^8c^5e^2z^2 \\
& - 2600960a^5b^{11}c^3f^2z^2 + 291840a^4b^{13}c^2f^2z^2 - 19860480a^ \\
& 3b^{13}c^3d^2z^2 - 1179648a^5b^{10}c^4e^2z^2 + 1771776a^2b^{15}c^2d^ \\
& 2z^2 + 1536a^*b^{18}d^*f^*z^2 + 1207959552a^{10}c^9e^2z^2 + 256a^2b^{17}f^ \\
& 2z^2 + 2304b^{19}d^2z^2 + 169869312a^7b^*c^8d^*e^*f^*z + 9216a^*b^{13}c^2d \\
& *e^*f^*z - 221773824a^6b^3c^7d^*e^*f^*z + 117964800a^5b^5c^6d^*e^*f^*z - 32 \\
& 440320a^4b^7c^5d^*e^*f^*z + 4792320a^3b^9c^4d^*e^*f^*z - 350208a^2b^{11} \\
& c^3d^*e^*f^*z - 428544a^*b^{12}c^3d^2e^*z + 1022754816a^6b^2c^8d^2e^*z - \\
& 642318336a^5b^4c^7d^2e^*z + 223395840a^4b^6c^6d^2e^*z - 50724864a^ \\
& 7b^2c^7e^*f^2z + 26542080a^6b^4c^6e^*f^2z - 46725120a^3b^8c^5d^2 \\
& *e^*z - 7127040a^5b^6c^5e^*f^2z + 1013760a^4b^8c^4e^*f^2z - 69120a^ \\
& 3b^{10}c^3e^*f^2z + 1536a^2b^{12}c^2e^*f^2z + 5930496a^2b^{10}c^4d^2e \\
& *z - 693633024a^7c^9d^2e^*z + 39321600a^8c^8e^*f^2z + 13824b^{14}c^2 \\
& d^2e^*z + 13824a^*b^8c^4d^2e^2f - 7741440a^4b^2c^7d^2e^2f + 2903040a^ \\
& ^3b^4c^6d^2e^2f - 387072a^2b^6c^5d^2e^2f + 37310976a^3b^3c^7d^3*
\end{aligned}$$

$$\begin{aligned}
& f + 3870720a^5b^7c^7e^2f^2 + 34836480a^4b^7c^8d^2e^2 - 8068032a^2b^7c^6d^3f - 5623296a^4b^3c^6d^3f^3 + 1737792a^3b^5c^5d^3f^3 - 260190a^2b^8c^4d^2f^2 - 211680a^2b^7c^4d^3f^3 - 435456a^2b^7c^5d^2e^2 - 75188736a^4b^7c^8d^3f - 15482880a^5c^8d^2e^2f - 4262400a^5b^7c^7d^3f^3 + 852768a^2b^7c^5d^3f + 7350a^2b^9c^3d^3f^3 + 35525376a^4b^2c^7d^2f^2 + 645120a^4b^3c^6e^2f^2 - 80640a^3b^5c^5e^2f^2 + 2304a^2b^7c^4e^2f^2 - 15269184a^3b^4c^6d^2f^2 + 2870784a^2b^6c^5d^2f^2 - 17418240a^3b^3c^7d^2e^2 + 3919104a^2b^5c^6d^2e^2 + 11025b^10c^3d^2f^2 + 5644800a^5c^8d^2f^2 + 20736b^9c^4d^2e^2 + 492800a^5b^2c^6f^4 + 351456a^4b^4c^5f^4 - 43120a^3b^6c^4f^4 + 1225a^2b^8c^3f^4 - 27433728a^3b^2c^8d^4 + 6446304a^2b^4c^7d^4 - 39690b^9c^4d^3f - 734832a^2b^6c^6d^4 + 49787136a^4c^9d^4 + 160000a^6c^7f^4 + 5308416a^5c^8e^4 + 35721b^8c^5d^4, z, k) * ((768a^2b^14c^2d - 22020096a^9c^9d - 22272a^3b^12c^3d + 282624a^4b^10c^4d - 2027520a^5b^8c^5d + 8847360a^6b^6c^6d - 23396352a^7b^4c^7d + 34603008a^8b^2c^8d + 256a^3b^13c^2f - 9216a^4b^11c^3f + 122880a^5b^9c^4f - 819200a^6b^7c^5f + 2949120a^7b^5c^6f - 5505024a^8b^3c^7f + 4194304a^9b^1c^8f) / (512(a^4b^12 + 4096a^10c^6 - 24a^5b^10c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (x*(786432a^9c^9e - 768a^4b^10c^4e + 15360a^5b^8c^5e - 122880a^6b^6c^6e + 491520a^7b^4c^7e - 983040a^8b^2c^8e)) / (32(a^4b^12 + 4096a^10c^6 - 24a^5b^10c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (root(56371445760a^11b^8c^6z^4 - 503316480a^8b^14c^3z^4 + 47185920a^7b^16c^2z^4 - 171798691840a^14b^2c^9z^4 + 193273528320a^13b^4c^8z^4 - 128849018880a^12b^6c^7z^4 - 16911433728a^10b^10c^5z^4 + 3523215360a^9b^12c^4z^4 - 2621440a^6b^18c^3z^4 + 68719476736a^15c^10z^4 + 65536a^5b^20z^4 - 73728a^2b^16c^3d^2fz^2 - 1321205760a^9b^2c^8d^2fz^2 + 732168192a^7b^6c^6d^2fz^2 - 366280704a^6b^8c^5d^2fz^2 - 330301440a^8b^4c^7d^2fz^2 + 96583680a^5b^10c^4d^2fz^2 - 15175680a^4b^12c^3d^2fz^2 + 1428480a^3b^14c^2d^2fz^2 - 440401920a^10b^10c^8f^2z^2 + 1761607680a^10c^9d^2fz^2 - 14080a^3b^15c^3f^2z^2 + 6936330240a^8b^3c^8d^2z^2 + 2464874496a^6b^7c^6d^2z^2 - 3963617280a^9b^3c^9d^2z^2 - 1509949440a^9b^2c^8e^2z^2 - 5400428544a^7b^5c^7d^2z^2 - 94464a^2b^17c^3d^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730054656a^5b^9c^5d^2z^2 + 477102080a^9b^3c^7f^2z^2 - 174325760a^8b^5c^6f^2z^2 - 188743680a^7b^6c^6e^2z^2 + 146165760a^4b^11c^4d^2z^2 + 11206656a^7b^7c^5f^2z^2 + 8929280a^6b^9c^4f^2z^2 + 23592960a^6b^8c^5e^2z^2 - 2600960a^5b^11c^3f^2z^2 + 291840a^4b^13c^2f^2z^2 - 19860480a^3b^13c^3d^2z^2 - 1179648a^5b^10c^4e^2z^2 + 1771776a^2b^15c^2d^2z^2 + 1536a^2b^18d^2fz^2 + 1207959552a^10c^9e^2z^2 + 256a^2b^17f^2z^2 + 2304b^19d^2z^2 + 169869312a^7b^7c^8d^2efz + 9216a^2b^13c^2d^2efz - 221773824a^6b^3c^7d^2efz + 117964800a^5b^5c^6d^2efz - 32440320a^4b^7c^5d^2efz + 4792320a^3b^9c^4d^2efz - 350208a^2b^11c^3d^2efz - 428544a^2b^12c^3d^2e^2z + 1022754816a^6b^2c^8d^2e^2z - 642318336a^5b^4c^7d^2e^2z
\end{aligned}$$



$$\begin{aligned}
& + 223395840*a^4*b^6*c^6*d^2*e*z - 50724864*a^7*b^2*c^7*e*f^2*z + 26542080*a^6*b^4*c^6*e*f^2*z - 46725120*a^3*b^8*c^5*d^2*e*z - 7127040*a^5*b^6*c^5*e*f^2*z + 1013760*a^4*b^8*c^4*e*f^2*z - 69120*a^3*b^10*c^3*e*f^2*z + 1536*a^2*b^12*c^2*e*f^2*z + 5930496*a^2*b^10*c^4*d^2*e*z - 693633024*a^7*c^9*d^2*e*z + 39321600*a^8*c^8*e*f^2*z + 13824*b^14*c^2*d^2*e*z + 13824*a*b^8*c^4*d*e^2*f - 7741440*a^4*b^2*c^7*d*e^2*f + 2903040*a^3*b^4*c^6*d*e^2*f - 387072*a^2*b^6*c^5*d*e^2*f + 37310976*a^3*b^3*c^7*d^3*f + 3870720*a^5*b*c^7*e^2*f^2 + 34836480*a^4*b*c^8*d^2*e^2 - 8068032*a^2*b^5*c^6*d^3*f - 5623296*a^4*b^3*c^6*d*f^3 + 1737792*a^3*b^5*c^5*d*f^3 - 260190*a*b^8*c^4*d^2*f^2 - 211680*a^2*b^7*c^4*d*f^3 - 435456*a*b^7*c^5*d^2*e^2 - 75188736*a^4*b*c^8*d^3*f - 15482880*a^5*c^8*d*e^2*f - 4262400*a^5*b*c^7*d*f^3 + 852768*a*b^7*c^5*d^3*f + 7350*a*b^9*c^3*d*f^3 + 35525376*a^4*b^2*c^7*d^2*f^2 + 645120*a^4*b^3*c^6*e^2*f^2 - 80640*a^3*b^5*c^5*e^2*f^2 + 2304*a^2*b^7*c^4*e^2*f^2 - 15269184*a^3*b^4*c^6*d^2*f^2 + 2870784*a^2*b^6*c^5*d^2*f^2 - 17418240*a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c^6*d^2*e^2 + 11025*b^10*c^3*d^2*f^2 + 5644800*a^5*c^8*d^2*f^2 + 20736*b^9*c^4*d^2*e^2 + 492800*a^5*b^2*c^6*f^4 + 351456*a^4*b^4*c^5*f^4 - 43120*a^3*b^6*c^4*f^4 + 1225*a^2*b^8*c^3*f^4 - 27433728*a^3*b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 - 39690*b^9*c^4*d^3*f - 734832*a*b^6*c^6*d^4 + 49787136*a^4*c^9*d^4 + 160000*a^6*c^7*f^4 + 5308416*a^5*c^8*e^4 + 35721*b^8*c^5*d^4, z, k)*x*(4194304*a^11*b*c^9 - 256*a^4*b^15*c^2 + 7168*a^5*b^13*c^3 - 86016*a^6*b^11*c^4 + 573440*a^7*b^9*c^5 - 2293760*a^8*b^7*c^6 + 5505024*a^9*b^5*c^7 - 7340032*a^10*b^3*c^8)/(32*(a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) + (3244032*a^6*b*c^8*d*e - 983040*a^7*c^8*e*f + 4608*a^2*b^9*c^4*d*e - 87552*a^3*b^7*c^5*d*e + 681984*a^4*b^5*c^6*d*e - 2433024*a^5*b^3*c^7*d*e + 1536*a^3*b^8*c^4*e*f - 39936*a^4*b^6*c^5*e*f + 184320*a^5*b^4*c^6*e*f + 49152*a^6*b^2*c^7*e*f)/(512*(a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) - (x*(225792*a^6*c^9*d^2 + 9*b^12*c^3*d^2 - 12800*a^7*c^8*f^2 - 252*a*b^10*c^4*d^2 - 36864*a^6*b*c^8*e^2 + 3114*a^2*b^8*c^5*d^2 - 21312*a^3*b^6*c^6*d^2 + 88128*a^4*b^4*c^7*d^2 - 211968*a^5*b^2*c^8*d^2 - 2304*a^4*b^5*c^6*e^2 + 18432*a^5*b^3*c^7*e^2 + a^2*b^10*c^3*f^2 - 42*a^3*b^8*c^4*f^2 + 1760*a^4*b^6*c^5*f^2 - 13120*a^5*b^4*c^6*f^2 + 29952*a^6*b^2*c^7*f^2 + 6*a*b^11*c^3*d*f - 109056*a^6*b*c^8*d*f - 210*a^2*b^9*c^4*d*f + 2496*a^3*b^7*c^5*d*f - 18240*a^4*b^5*c^6*d*f + 72192*a^5*b^3*c^7*d*f))/(32*(a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) - (567*b^7*c^5*d^3 + 8000*a^5*c^7*f^3 - 10368*a*b^5*c^6*d^3 - 169344*a^3*b*c^8*d^3 - 193536*a^4*c^8*d*e^2 + 141120*a^4*c^8*d^2*f - 315*b^8*c^4*d^2*f + 67824*a^2*b^3*c^7*d^3 - 35*a^2*b^6*c^4*f^3 - 84*a^3*b^4*c^5*f^3 + 12720*a^4*b^2*c^6*f^3 + 6237*a*b^6*c^5*d^2*f - 210*a*b^7*c^4*d*f^2 - 116160*a^4*b*c^7*d*f^2 + 36864*a^4*b*c^7*e^2*f - 6912*a^2*b^4*c^6*d*e^2 + 62208*a^3*b^2*c^7*d*e^2 - 42372*a^2*b^4*c^6*d^2*f + 1764*a^2*b^5*c^5*d*f^2 + 96048*a^3*b^2*c^7*d^2*f + 4608*a^3*b^3*c^6*d*f^2 - 2304*a^3*b^3*c^6*e^2*f)/(512*(a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) + (x*(6912*
\end{aligned}$$

$$\begin{aligned}
& a^4c^8e^3 - 27b^7c^5d^2e - 10080a^4c^8d^2e^2f + 486ab^5c^6d^2e \\
& + 12096a^3b^3c^8d^2e + 3120a^4b^3c^7e^2f^2 - 3672a^2b^3c^7d^2e - 3 \\
& * a^2b^5c^5e^2f^2 + 96a^3b^3c^6e^2f^2 - 18ab^6c^5d^2e^2f + 450a^2b^4 \\
& 4c^6d^2e^2f - 2448a^3b^2c^7d^2e^2f)) / (32(a^4b^12 + 4096a^10c^6 - 24a \\
& ^5b^10c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9 \\
& b^2c^5))) * \text{root}(56371445760a^11b^8c^6z^4 - 503316480a^8b^14c^3z^4 \\
& + 47185920a^7b^16c^2z^4 - 171798691840a^14b^2c^9z^4 + 193273528320 \\
& * a^13b^4c^8z^4 - 128849018880a^12b^6c^7z^4 - 16911433728a^10b^10c \\
& ^5z^4 + 3523215360a^9b^12c^4z^4 - 2621440a^6b^18c^2z^4 + 68719476736 \\
& * a^15c^10z^4 + 65536a^5b^20z^4 - 73728a^2b^16c^4d^2f^2z^2 - 1321205760 \\
& * a^9b^2c^8d^2f^2z^2 + 732168192a^7b^6c^6d^2f^2z^2 - 366280704a^6b^8c^5 \\
& d^2f^2z^2 - 330301440a^8b^4c^7d^2f^2z^2 + 96583680a^5b^10c^4d^2f^2z^2 - \\
& 15175680a^4b^12c^3d^2f^2z^2 + 1428480a^3b^14c^2d^2f^2z^2 - 440401920a \\
& ^10b^6c^8f^2z^2 + 1761607680a^10c^9d^2f^2z^2 - 14080a^3b^15c^4f^2z^2 \\
& + 6936330240a^8b^3c^8d^2z^2 + 2464874496a^6b^7c^6d^2z^2 - 3963617 \\
& 280a^9b^3c^9d^2z^2 - 1509949440a^9b^2c^8e^2z^2 - 5400428544a^7b^5 \\
& c^7d^2z^2 - 94464ab^17c^4d^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730 \\
& 054656a^5b^9c^5d^2z^2 + 477102080a^9b^3c^7f^2z^2 - 174325760a^8b \\
& ^5c^6f^2z^2 - 188743680a^7b^6c^6e^2z^2 + 146165760a^4b^11c^4d^2 \\
& z^2 + 11206656a^7b^7c^5f^2z^2 + 8929280a^6b^9c^4f^2z^2 + 235929 \\
& 60a^6b^8c^5e^2z^2 - 2600960a^5b^11c^3f^2z^2 + 291840a^4b^13c^2 \\
& f^2z^2 - 19860480a^3b^13c^3d^2z^2 - 1179648a^5b^10c^4e^2z^2 + 1 \\
& 771776a^2b^15c^2d^2z^2 + 1536ab^18d^2f^2z^2 + 1207959552a^10c^9e^2 \\
& z^2 + 256a^2b^17f^2z^2 + 2304b^19d^2z^2 + 169869312a^7b^3c^8d^2e^2f \\
& * z + 9216ab^13c^2d^2e^2f^2z - 221773824a^6b^3c^7d^2e^2f^2z + 117964800a^ \\
& 5b^5c^6d^2e^2f^2z - 32440320a^4b^7c^5d^2e^2f^2z + 4792320a^3b^9c^4d^2e^2 \\
& f^2z - 350208a^2b^11c^3d^2e^2f^2z - 428544ab^12c^3d^2e^2z + 1022754816a \\
& ^6b^2c^8d^2e^2z - 642318336a^5b^4c^7d^2e^2z + 223395840a^4b^6c^6 \\
& d^2e^2z - 50724864a^7b^2c^7e^2f^2z + 26542080a^6b^4c^6e^2f^2z - 46 \\
& 725120a^3b^8c^5d^2e^2z - 7127040a^5b^6c^5e^2f^2z + 1013760a^4b^8c \\
& ^4e^2f^2z - 69120a^3b^10c^3e^2f^2z + 1536a^2b^12c^2e^2f^2z + 5930 \\
& 496a^2b^10c^4d^2e^2z - 693633024a^7c^9d^2e^2z + 39321600a^8c^8e^2f \\
& ^2z + 13824b^14c^2d^2e^2z + 13824ab^8c^4d^2e^2f - 7741440a^4b^2c \\
& ^7d^2e^2f + 2903040a^3b^4c^6d^2e^2f - 387072a^2b^6c^5d^2e^2f + 373 \\
& 10976a^3b^3c^7d^3f + 3870720a^5b^3c^7e^2f^2 + 34836480a^4b^3c^8d^ \\
& 2e^2 - 8068032a^2b^5c^6d^3f - 5623296a^4b^3c^6d^2f^3 + 1737792a^3 \\
& b^5c^5d^2f^3 - 260190ab^8c^4d^2f^2 - 211680a^2b^7c^4d^2f^3 - 4354 \\
& 56ab^7c^5d^2e^2 - 75188736a^4b^3c^8d^3f - 15482880a^5c^8d^2e^2f \\
& - 4262400a^5b^3c^7d^2f^3 + 852768ab^7c^5d^3f + 7350ab^9c^3d^2f^3 + \\
& 35525376a^4b^2c^7d^2f^2 + 645120a^4b^3c^6e^2f^2 - 80640a^3b^5c \\
& ^5e^2f^2 + 2304a^2b^7c^4e^2f^2 - 15269184a^3b^4c^6d^2f^2 + 287 \\
& 0784a^2b^6c^5d^2f^2 - 17418240a^3b^3c^7d^2e^2 + 3919104a^2b^5c \\
& ^6d^2e^2 + 11025b^10c^3d^2f^2 + 5644800a^5c^8d^2f^2 + 20736b^9c \\
& ^4d^2e^2 + 492800a^5b^2c^6f^4 + 351456a^4b^4c^5f^4 - 43120a^3b^6 \\
& c^4f^4 + 1225a^2b^8c^3f^4 - 27433728a^3b^2c^8d^4 + 6446304a^2b
\end{aligned}$$

$$\begin{aligned} &^4*c^7*d^4 - 39690*b^9*c^4*d^3*f - 734832*a*b^6*c^6*d^4 + 49787136*a^4*c^9* \\ &d^4 + 160000*a^6*c^7*f^4 + 5308416*a^5*c^8*e^4 + 35721*b^8*c^5*d^4, z, k), \\ &k, 1, 4) \end{aligned}$$

$$3.54 \quad \int \frac{d+ex+fx^2+gx^3}{(a+bx^2+cx^4)^3} dx$$

Optimal result	596
Rubi [A] (verified)	597
Mathematica [A] (verified)	601
Maple [C] (verified)	602
Fricas [F(-1)]	603
Sympy [F(-1)]	603
Maxima [F]	603
Giac [B] (verification not implemented)	604
Mupad [B] (verification not implemented)	607

### Optimal result

Integrand size = 30, antiderivative size = 646

$$\int \frac{d+ex+fx^2+gx^3}{(a+bx^2+cx^4)^3} dx = \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} - \frac{be-2ag+(2ce-bg)x^2}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{3(2ce-bg)(b+2cx^2)}{4(b^2-4ac)^2(a+bx^2+cx^4)} + \frac{x(3b^4d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} + \frac{\sqrt{c}(3b^4d+b^3(3\sqrt{b^2-4acd}+af)-4abc(6\sqrt{b^2-4acd}+13af)-ab^2(30cd-\sqrt{b^2-4ac}f)+4a^2c(42cd-3abf))}{8\sqrt{2}a^2(b^2-4ac)^{5/2}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf-\frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right)\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b+\sqrt{b^2-4ac}}} - \frac{3c(2ce-bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}}$$

[Out] 1/4\*x\*(b^2\*d-2\*a\*c\*d-a\*b\*f+c\*(-2\*a\*f+b\*d)\*x^2)/a/(-4\*a\*c+b^2)/(c\*x^4+b\*x^2+a)^2+1/4\*(-b\*e+2\*a\*g-(-b\*g+2\*c\*e)\*x^2)/(-4\*a\*c+b^2)/(c\*x^4+b\*x^2+a)^2+3/4\*(-b\*g+2\*c\*e)\*(2\*c\*x^2+b)/(-4\*a\*c+b^2)^2/(c\*x^4+b\*x^2+a)+1/8\*x\*(3\*b^4\*d-25\*a\*b^2\*c\*d+28\*a^2\*c^2\*d+a\*b^3\*f+8\*a^2\*b\*c\*f+c\*(20\*a^2\*c\*f+a\*b^2\*f-24\*a\*b\*c\*d+3\*b^3\*d)\*x^2)/a^2/(-4\*a\*c+b^2)^2/(c\*x^4+b\*x^2+a)-3\*c\*(-b\*g+2\*c\*e)\*arctanh((2\*c\*x^2+b)/(-4\*a\*c+b^2)^(1/2))/(-4\*a\*c+b^2)^(5/2)+1/16\*arctan(x^2^(1/2)\*c^(1/2)/(b-(-4\*a\*c+b^2)^(1/2))^(1/2))\*c^(1/2)\*(3\*b^4\*d+b^3\*(a\*f+3\*d\*(-4\*a\*c+b^2)^(1/2))-4\*a\*b\*c\*(13\*a\*f+6\*d\*(-4\*a\*c+b^2)^(1/2))-a\*b^2\*(30\*c\*d-f\*(-4\*a\*c+b^2)^(1/2))+4\*a^2\*c\*(42\*c\*d+5\*f\*(-4\*a\*c+b^2)^(1/2)))/a^2/(-4\*a\*c+b^2)^(5/2)\*2^(1/2)/(b-(-4\*a\*c+b^2)^(1/2))^(1/2)+1/16\*arctan(x^2^(1/2)\*c^(1/2)/(b+(-4\*a\*c+b^2)^(1/2))^(1/2))

$$\frac{(c+b^2)^{1/2} \sqrt{c} (3b^3d - 24abc^2d + ab^2f + 20a^2cf + (52a^2b^2cf - 168a^2c^2d - ab^3f + 30ab^2cd - 3b^4d) / (-4ac + b^2)^{1/2}) / a^2 / (-4ac + b^2)^{2 \cdot 1/2} / (b + (-4ac + b^2)^{1/2})^{1/2}}$$

## Rubi [A] (verified)

Time = 2.09 (sec) , antiderivative size = 646, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.300$ , Rules used = {1687, 1192, 1180, 211, 1261, 652, 628, 632, 212}

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^3} dx$$

$$= \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b^2 - 4ac + b}}\right) \left(-\frac{52a^2bcf + 168a^2c^2d + ab^3f - 30ab^2cd + 3b^4d}{\sqrt{b^2 - 4ac}} + 20a^2cf + ab^2f - 24abcd + 3b^3d\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2 \sqrt{\sqrt{b^2 - 4ac} + b}}$$

$$+ \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right) (4a^2c(5f\sqrt{b^2 - 4ac} + 42cd) - ab^2(30cd - f\sqrt{b^2 - 4ac}) - 4abc(6d\sqrt{b^2 - 4ac} + x(cx^2(20a^2cf + ab^2f - 24abcd + 3b^3d) + 8a^2bcf + 28a^2c^2d + ab^3f - 25ab^2cd + 3b^4d))}{8\sqrt{2}a^2(b^2 - 4ac)^{5/2} \sqrt{b - \sqrt{b^2 - 4ac}}}}$$

$$+ \frac{x(cx^2(20a^2cf + ab^2f - 24abcd + 3b^3d) + 8a^2bcf + 28a^2c^2d + ab^3f - 25ab^2cd + 3b^4d)}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)}$$

$$- \frac{3c(2ce - bg) \operatorname{arctanh}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{(b^2 - 4ac)^{5/2}} + \frac{x(cx^2(bd - 2af) - abf - 2acd + b^2d)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2}$$

$$+ \frac{3(b + 2cx^2)(2ce - bg)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} - \frac{-2ag + x^2(2ce - bg) + be}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^3, x]

[Out] (x\*(b^2\*d - 2\*a\*c\*d - a\*b\*f + c\*(b\*d - 2\*a\*f)\*x^2))/(4\*a\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)^2) - (b\*e - 2\*a\*g + (2\*c\*e - b\*g)\*x^2)/(4\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)^2) + (3\*(2\*c\*e - b\*g)\*(b + 2\*c\*x^2))/(4\*(b^2 - 4\*a\*c)^2\*(a + b\*x^2 + c\*x^4)) + (x\*(3\*b^4\*d - 25\*a\*b^2\*c\*d + 28\*a^2\*c^2\*d + a\*b^3\*f + 8\*a^2\*b\*c\*f + c\*(3\*b^3\*d - 24\*a\*b\*c\*d + a\*b^2\*f + 20\*a^2\*c\*f)\*x^2))/(8\*a^2\*(b^2 - 4\*a\*c)^2\*(a + b\*x^2 + c\*x^4)) + (Sqrt[c]\*(3\*b^4\*d + b^3\*(3\*Sqrt[b^2 - 4\*a\*c]\*d + a\*f) - 4\*a\*b\*c\*(6\*Sqrt[b^2 - 4\*a\*c]\*d + 13\*a\*f) - a\*b^2\*(30\*c\*d - Sqrt[b^2 - 4\*a\*c]\*f) + 4\*a^2\*c\*(42\*c\*d + 5\*Sqrt[b^2 - 4\*a\*c]\*f))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]]]/(8\*Sqrt[2]\*a^2\*(b^2 - 4\*a\*c)^(5/2)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + (Sqrt[c]\*(3\*b^3\*d - 24\*a\*b\*c\*d + a\*b^2\*f + 20\*a^2\*c\*f - (3\*b^4\*d - 30\*a\*b^2\*c\*d + 168\*a^2\*c^2\*d + a\*b^3\*f - 52\*a^2\*b\*c\*f)/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]]]/(8\*Sqrt[2]\*a^2\*(b^2 - 4\*a\*c)^2\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) - (3\*c\*(2\*c\*e - b\*g)\*ArcTanh[(b + 2\*c\*x^2)/Sqrt[b^2 - 4\*a\*c]])/(b^2 - 4\*a\*c)^(5/2)

Rule 211

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

### Rule 212

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

### Rule 628

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p + 1)/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

### Rule 632

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

### Rule 652

Int[((d\_) + (e\_)\*(x\_))\*((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[((b\*d - 2\*a\*e + (2\*c\*d - b\*e)\*x)/((p + 1)\*(b^2 - 4\*a\*c)))\*(a + b\*x + c\*x^2)^(p + 1), x] - Dist[(2\*p + 3)\*((2\*c\*d - b\*e)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2]

### Rule 1180

Int[((d\_) + (e\_)\*(x\_)^2)/((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[e/2 + (2\*c\*d - b\*e)/(2\*q), Int[1/(b/2 - q/2 + c\*x^2), x], x] + Dist[e/2 - (2\*c\*d - b\*e)/(2\*q), Int[1/(b/2 + q/2 + c\*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - a\*e^2, 0] && PosQ[b^2 - 4\*a\*c]

### Rule 1192

Int[((d\_) + (e\_)\*(x\_)^2)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Simp[x\*(a\*b\*e - d\*(b^2 - 2\*a\*c) - c\*(b\*d - 2\*a\*e)\*x^2)\*((a + b\*x^2 + c\*x^4)^(p + 1)/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c))), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[Simp[(2\*p + 3)\*d\*b^2 - a\*b\*e - 2\*a\*c\*d\*(4\*p + 5) + (4\*p + 7)\*(d\*b - 2\*a\*e)\*c\*x^2, x]\*(a + b\*x^2 + c\*x^4)^(p + 1), x], x] /; FreeQ[{a,

b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && LtQ[p, -1] && IntegerQ[2\*p]

### Rule 1261

Int[(x\_)\*((d\_) + (e\_)\*(x\_)^2)^(q\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Dist[1/2, Subst[Int[(d + e\*x)^q\*(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]

### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + fx^2}{(a + bx^2 + cx^4)^3} dx + \int \frac{x(e + gx^2)}{(a + bx^2 + cx^4)^3} dx \\
 &= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
 &\quad + \frac{1}{2} \text{Subst}\left(\int \frac{e + gx}{(a + bx + cx^2)^3} dx, x, x^2\right) - \frac{\int \frac{-3b^2d + 14acd - abf - 5c(bd - 2af)x^2}{(a + bx^2 + cx^4)^2} dx}{4a(b^2 - 4ac)} \\
 &= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} - \frac{be - 2ag + (2ce - bg)x^2}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
 &\quad + \frac{x(3b^4d - 25ab^2cd + 28a^2c^2d + ab^3f + 8a^2bcf + c(3b^3d - 24abcd + ab^2f + 20a^2cf)x^2)}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
 &\quad + \frac{\int \frac{3b^4d - 27ab^2cd + 84a^2c^2d + ab^3f - 16a^2bcf + c(3b^3d - 24abcd + ab^2f + 20a^2cf)x^2}{a + bx^2 + cx^4} dx}{8a^2(b^2 - 4ac)^2} \\
 &\quad - \frac{(3(2ce - bg)) \text{Subst}\left(\int \frac{1}{(a + bx + cx^2)^2} dx, x, x^2\right)}{4(b^2 - 4ac)}
 \end{aligned}$$

$$\begin{aligned}
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad - \frac{be - 2ag + (2ce - bg)x^2}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2} + \frac{3(2ce - bg)(b + 2cx^2)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{x(3b^4d - 25ab^2cd + 28a^2c^2d + ab^3f + 8a^2bcf + c(3b^3d - 24abcd + ab^2f + 20a^2cf)x^2)}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{\left(c(3b^3d - 24abcd + ab^2f + 20a^2cf - \frac{3b^4d - 30ab^2cd + 168a^2c^2d + ab^3f - 52a^2bcf}{\sqrt{b^2 - 4ac}})\right) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{16a^2(b^2 - 4ac)^2} \\
&\quad + \frac{\left(c(3b^3d - 24abcd + ab^2f + 20a^2cf + \frac{3b^4d - 30ab^2cd + 168a^2c^2d + ab^3f - 52a^2bcf}{\sqrt{b^2 - 4ac}})\right) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{16a^2(b^2 - 4ac)^2} \\
&\quad + \frac{(3c(2ce - bg))\text{Subst}\left(\int \frac{1}{a + bx + cx^2} dx, x, x^2\right)}{2(b^2 - 4ac)^2} \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad - \frac{be - 2ag + (2ce - bg)x^2}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2} + \frac{3(2ce - bg)(b + 2cx^2)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{x(3b^4d - 25ab^2cd + 28a^2c^2d + ab^3f + 8a^2bcf + c(3b^3d - 24abcd + ab^2f + 20a^2cf)x^2)}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{\sqrt{c}\left(3b^3d - 24abcd + ab^2f + 20a^2cf + \frac{3b^4d - 30ab^2cd + 168a^2c^2d + ab^3f - 52a^2bcf}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\sqrt{c}\left(3b^3d - 24abcd + ab^2f + 20a^2cf - \frac{3b^4d - 30ab^2cd + 168a^2c^2d + ab^3f - 52a^2bcf}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad - \frac{(3c(2ce - bg))\text{Subst}\left(\int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2\right)}{(b^2 - 4ac)^2}
\end{aligned}$$



$$\begin{aligned}
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad - \frac{be - 2ag + (2ce - bg)x^2}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2} + \frac{3(2ce - bg)(b + 2cx^2)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{x(3b^4d - 25ab^2cd + 28a^2c^2d + ab^3f + 8a^2bcf + c(3b^3d - 24abcd + ab^2f + 20a^2cf)x^2)}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{\sqrt{c}\left(3b^3d - 24abcd + ab^2f + 20a^2cf + \frac{3b^4d - 30ab^2cd + 168a^2c^2d + ab^3f - 52a^2bcf}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\sqrt{c}\left(3b^3d - 24abcd + ab^2f + 20a^2cf - \frac{3b^4d - 30ab^2cd + 168a^2c^2d + ab^3f - 52a^2bcf}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad - \frac{3c(2ce - bg) \tanh^{-1}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{(b^2 - 4ac)^{5/2}}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 2.36 (sec) , antiderivative size = 661, normalized size of antiderivative = 1.02

$$\begin{aligned}
&\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^3} dx \\
&= \frac{1}{16} \left( \frac{-8a^2g - 4bdx(b + cx^2) + 8acx(d + x(e + fx)) + 4ab(e + x(f - gx))}{a(-b^2 + 4ac)(a + bx^2 + cx^4)^2} \right. \\
&\quad + \frac{2(3b^3dx(b + cx^2) + abx(-25bcd + b^2f - 24c^2dx^2 + bcfx^2) + a^2(-6b^2g + 4c^2x(7d + 6ex + 5fx^2) + 4bdx^3))}{a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{\sqrt{2}\sqrt{c}(3b^4d + b^3(3\sqrt{b^2 - 4acd} + af) - 4abc(6\sqrt{b^2 - 4acd} + 13af) + ab^2(-30cd + \sqrt{b^2 - 4ac}f) + 4bdx^3)}{a^2(b^2 - 4ac)^{5/2}\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\sqrt{2}\sqrt{c}(-3b^4d + b^3(3\sqrt{b^2 - 4acd} - af) + 4abc(-6\sqrt{b^2 - 4acd} + 13af) + ab^2(30cd + \sqrt{b^2 - 4ac}f) + 4bdx^3)}{a^2(b^2 - 4ac)^{5/2}\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad \left. - \frac{24c(-2ce + bg) \log(-b + \sqrt{b^2 - 4ac} - 2cx^2)}{(b^2 - 4ac)^{5/2}} \right. \\
&\quad \left. + \frac{24c(-2ce + bg) \log(b + \sqrt{b^2 - 4ac} + 2cx^2)}{(b^2 - 4ac)^{5/2}} \right)
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^3,x]

[Out] ((-8\*a^2\*g - 4\*b\*d\*x\*(b + c\*x^2) + 8\*a\*c\*x\*(d + x\*(e + f\*x)) + 4\*a\*b\*(e + x\*(f - g\*x)))/(a\*(-b^2 + 4\*a\*c)\*(a + b\*x^2 + c\*x^4)^2) + (2\*(3\*b^3\*d\*x\*(b +

$$\begin{aligned}
& c*x^2) + a*b*x*(-25*b*c*d + b^2*f - 24*c^2*d*x^2 + b*c*f*x^2) + a^2*(-6*b^2 \\
& *g + 4*c^2*x*(7*d + 6*e*x + 5*f*x^2) + 4*b*c*(3*e + 2*f*x - 3*g*x^2)))/(a^2 \\
& *(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4) + (\text{Sqrt}[2]*\text{Sqrt}[c]*(3*b^4*d + b^3*(3 \\
& *\text{Sqrt}[b^2 - 4*a*c]*d + a*f) - 4*a*b*c*(6*\text{Sqrt}[b^2 - 4*a*c]*d + 13*a*f) + a \\
& *b^2*(-30*c*d + \text{Sqrt}[b^2 - 4*a*c]*f) + 4*a^2*c*(42*c*d + 5*\text{Sqrt}[b^2 - 4*a*c] \\
& *f))*\text{ArcTan}[(\text{Sqrt}[2]*\text{Sqrt}[c]*x)/\text{Sqrt}[b - \text{Sqrt}[b^2 - 4*a*c]])]/(a^2*(b^2 - 4 \\
& *a*c)^{(5/2)*\text{Sqrt}[b - \text{Sqrt}[b^2 - 4*a*c]]) + (\text{Sqrt}[2]*\text{Sqrt}[c]*(-3*b^4*d + b^3 \\
& *(3*\text{Sqrt}[b^2 - 4*a*c]*d - a*f) + 4*a*b*c*(-6*\text{Sqrt}[b^2 - 4*a*c]*d + 13*a*f) \\
& + a*b^2*(30*c*d + \text{Sqrt}[b^2 - 4*a*c]*f) + 4*a^2*c*(-42*c*d + 5*\text{Sqrt}[b^2 - 4 \\
& *a*c]*f))*\text{ArcTan}[(\text{Sqrt}[2]*\text{Sqrt}[c]*x)/\text{Sqrt}[b + \text{Sqrt}[b^2 - 4*a*c]])]/(a^2*(b^2 \\
& - 4*a*c)^{(5/2)*\text{Sqrt}[b + \text{Sqrt}[b^2 - 4*a*c]]) - (24*c*(-2*c*e + b*g)*\text{Log}[-b \\
& + \text{Sqrt}[b^2 - 4*a*c] - 2*c*x^2)]/(b^2 - 4*a*c)^{(5/2)} + (24*c*(-2*c*e + b*g)* \\
& \text{Log}[b + \text{Sqrt}[b^2 - 4*a*c] + 2*c*x^2)]/(b^2 - 4*a*c)^{(5/2)}/16
\end{aligned}$$

### Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.58 (sec) , antiderivative size = 644, normalized size of antiderivative = 1.00

method	result
risch	$ \frac{c^2(20a^2cf+ab^2f-24abcd+3b^3d)x^7}{8a^2(16a^2c^2-8ab^2c+b^4)} - \frac{3(bg-2ec)c^2x^6}{2(16a^2c^2-8ab^2c+b^4)} + \frac{c(28a^2bcf+28a^2c^2d+2ab^3f-49ab^2cd+6db^4)x^5}{8a^2(16a^2c^2-8ab^2c+b^4)} - \frac{9b(bg-2ec)cx^4}{4(16a^2c^2-8ab^2c+b^4)} + \frac{(36a^3}{(cx^4)} $
default	Expression too large to display

[In] int((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^3,x,method=\_RETURNVERBOSE)

[Out] (1/8\*c^2\*(20\*a^2\*c\*f+a\*b^2\*f-24\*a\*b\*c\*d+3\*b^3\*d)/a^2/(16\*a^2\*c^2-8\*a\*b^2\*c+b^4)\*x^7-3/2\*(b\*g-2\*c\*e)\*c^2/(16\*a^2\*c^2-8\*a\*b^2\*c+b^4)\*x^6+1/8/a^2\*c\*(28\*a^2\*b\*c\*f+28\*a^2\*c^2\*d+2\*a\*b^3\*f-49\*a\*b^2\*c\*d+6\*b^4\*d)/(16\*a^2\*c^2-8\*a\*b^2\*c+b^4)\*x^5-9/4\*b\*(b\*g-2\*c\*e)\*c/(16\*a^2\*c^2-8\*a\*b^2\*c+b^4)\*x^4+1/8\*(36\*a^3\*c^2\*f+5\*a^2\*b^2\*c\*f-4\*a^2\*b\*c^2\*d+a\*b^4\*f-20\*a\*b^3\*c\*d+3\*b^5\*d)/a^2/(16\*a^2\*c^2-8\*a\*b^2\*c+b^4)\*x^3-1/2\*(5\*a\*c+b^2)\*(b\*g-2\*c\*e)/(16\*a^2\*c^2-8\*a\*b^2\*c+b^4)\*x^2+1/8\*(16\*a^2\*b\*c\*f+44\*a^2\*c^2\*d-a\*b^3\*f-37\*a\*b^2\*c\*d+5\*b^4\*d)/(16\*a^2\*c^2-8\*a\*b^2\*c+b^4)/a\*x-1/4\*(8\*a^2\*c\*g+a\*b^2\*g-10\*a\*b\*c\*e+b^3\*e)/(16\*a^2\*c^2-8\*a\*b^2\*c+b^4))/(c\*x^4+b\*x^2+a)^2+1/16\*sum((c\*(20\*a^2\*c\*f+a\*b^2\*f-24\*a\*b\*c\*d+3\*b^3\*d)/a^2/(16\*a^2\*c^2-8\*a\*b^2\*c+b^4)\*\_R^2-24\*(b\*g-2\*c\*e)\*c/(16\*a^2\*c^2-8\*a\*b^2\*c+b^4)\*\_R-(16\*a^2\*b\*c\*f-84\*a^2\*c^2\*d-a\*b^3\*f+27\*a\*b^2\*c\*d-3\*b^4\*d)/a^2/(16\*a^2\*c^2-8\*a\*b^2\*c+b^4))/(2\*\_R^3\*c+\_R\*b)\*ln(x-\_R),\_R=RootOf(\_Z^4\*c+\_Z^2\*b+a))

**Fricas [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

```
[In] integrate((g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x, algorithm="fricas")
```

```
[Out] Timed out
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

```
[In] integrate((g*x**3+f*x**2+e*x+d)/(c*x**4+b*x**2+a)**3,x)
```

```
[Out] Timed out
```

**Maxima [F]**

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^3} dx = \int \frac{gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^3} dx$$

```
[In] integrate((g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x, algorithm="maxima")
```

```
[Out] 1/8*((3*(b^3*c^2 - 8*a*b*c^3)*d + (a*b^2*c^2 + 20*a^2*c^3)*f)*x^7 + 12*(2*a^2*c^3*e - a^2*b*c^2*g)*x^6 + ((6*b^4*c - 49*a*b^2*c^2 + 28*a^2*c^3)*d + 2*(a*b^3*c + 14*a^2*b*c^2)*f)*x^5 + 18*(2*a^2*b*c^2*e - a^2*b^2*c*g)*x^4 + ((3*b^5 - 20*a*b^3*c - 4*a^2*b*c^2)*d + (a*b^4 + 5*a^2*b^2*c + 36*a^3*c^2)*f)*x^3 + 4*(2*(a^2*b^2*c + 5*a^3*c^2)*e - (a^2*b^3 + 5*a^3*b*c)*g)*x^2 - 2*(a^2*b^3 - 10*a^3*b*c)*e - 2*(a^3*b^2 + 8*a^4*c)*g + ((5*a*b^4 - 37*a^2*b^2*c + 44*a^3*c^2)*d - (a^2*b^3 - 16*a^3*b*c)*f)*x)/((a^2*b^4*c^2 - 8*a^3*b^2*c^3 + 16*a^4*c^4)*x^8 + a^4*b^4 - 8*a^5*b^2*c + 16*a^6*c^2 + 2*(a^2*b^5*c - 8*a^3*b^3*c^2 + 16*a^4*b*c^3)*x^6 + (a^2*b^6 - 6*a^3*b^4*c + 32*a^5*c^3)*x^4 + 2*(a^3*b^5 - 8*a^4*b^3*c + 16*a^5*b*c^2)*x^2) + 1/8*integrate(((3*(b^3*c - 8*a*b*c^2)*d + (a*b^2*c + 20*a^2*c^2)*f)*x^2 + 3*(b^4 - 9*a*b^2*c + 28*a^2*c^2)*d + (a*b^3 - 16*a^2*b*c)*f + 24*(2*a^2*c^2*e - a^2*b*c*g)*x)/(c*x^4 + b*x^2 + a), x)/(a^2*b^4 - 8*a^3*b^2*c + 16*a^4*c^2)
```

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 5619 vs. 2(586) = 1172.

Time = 2.55 (sec) , antiderivative size = 5619, normalized size of antiderivative = 8.70

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^3,x, algorithm="giac")

[Out] 1/32\*(3\*(sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*b^8 - 17\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^6\*c - 2\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*b^7\*c - 2\*b^8\*c + 116\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^4\*c^2 + 26\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^5\*c^2 + sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*b^6\*c^2 + 34\*a\*b^6\*c^2 - 2\*b^7\*c^2 - 368\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^3\*b^2\*c^3 - 128\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^3\*c^3 - 13\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^4\*c^3 - 232\*a^2\*b^4\*c^3 + 30\*a\*b^5\*c^3 + 448\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^4\*c^4 + 224\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^3\*b\*c^4 + 64\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^2\*c^4 + 736\*a^3\*b^2\*c^4 - 176\*a^2\*b^3\*c^4 - 112\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^3\*c^5 - 896\*a^4\*c^5 + 352\*a^3\*b\*c^5 + sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*b^7 - 15\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^5\*c - 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*b^6\*c + 88\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^3\*c^2 + 22\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^4\*c^2 + sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*b^5\*c^2 - 176\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^3\*b\*c^3 - 88\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^2\*c^3 - 11\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^3\*c^3 + 44\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b\*c^4 + 2\*(b^2 - 4\*a\*c))\*b^6\*c - 26\*(b^2 - 4\*a\*c))\*a\*b^4\*c^2 + 2\*(b^2 - 4\*a\*c))\*b^5\*c^2 + 128\*(b^2 - 4\*a\*c))\*a^2\*b^2\*c^3 - 22\*(b^2 - 4\*a\*c))\*a\*b^3\*c^3 - 224\*(b^2 - 4\*a\*c))\*a^3\*c^4 + 88\*(b^2 - 4\*a\*c))\*a^2\*b\*c^4)\*d + (sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^7 - 24\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^5\*c - 2\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^6\*c - 2\*a\*b^7\*c + 144\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^3\*b^3\*c^2 + 40\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^4\*c^2 + sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^5\*c^2 + 48\*a^2\*b^5\*c^2 - 2\*a\*b^6\*c^2 - 256\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^4\*b\*c^3 - 128\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^3\*b^2\*c^3 - 20\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^3\*c^3 - 288\*a^3\*b^3\*c^3 + 44\*a^2\*b^4\*c^3 + 64\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^3\*b\*c^4 + 512\*a^4\*b\*c^4 - 64\*a^3\*b^2\*c^4 - 320\*a^4\*c^5 + sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a\*b^6 - 22\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c))\*c)\*a^2\*b^4\*c - 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c))\*sqrt(b\*c + sqrt(b^2 -

$$\begin{aligned}
& 4*a*c)*c)*a*b^5*c + 32*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}} \\
& *c)*c)*a^3*b^2*c^2 + 36*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}} \\
& *c)*c)*a^2*b^3*c^2 + \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}} \\
& *c)*a*b^4*c^2 + 160*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}* \\
& c)*a^4*c^3 + 80*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a \\
& ^3*b*c^3 - 18*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^2 \\
& *b^2*c^3 - 40*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*c)*a^3 \\
& *c^4 + 2*(b^2 - 4*a*c)*a*b^5*c - 40*(b^2 - 4*a*c)*a^2*b^3*c^2 + 2*(b^2 - 4* \\
& a*c)*a*b^4*c^2 + 128*(b^2 - 4*a*c)*a^3*b*c^3 - 36*(b^2 - 4*a*c)*a^2*b^2*c^3 \\
& - 80*(b^2 - 4*a*c)*a^3*c^4)*f)*\arctan(2*\sqrt{1/2}*x/\sqrt{(a^2*b^5 - 8*a^3* \\
& b^3*c + 16*a^4*b*c^2 + \sqrt{(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a \\
& ^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)} \\
& ))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))/((a^3*b^8 - 16*a^4*b^6*c - 2* \\
& a^3*b^7*c + 96*a^5*b^4*c^2 + 24*a^4*b^5*c^2 + a^3*b^6*c^2 - 256*a^6*b^2*c^3 \\
& - 96*a^5*b^3*c^3 - 12*a^4*b^4*c^3 + 256*a^7*c^4 + 128*a^6*b*c^4 + 48*a^5*b \\
& ^2*c^4 - 64*a^6*c^5)*\text{abs}(c)) + 1/32*(3*(\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}} \\
& )*c)*b^8 - 17*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^6*c - 2*\sqrt{2}*\sqrt{ \\
& b*c - \sqrt{b^2 - 4*a*c}}*c)*b^7*c + 2*b^8*c + 116*\sqrt{2}*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^2*b^4*c^2 + 26*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)* \\
& a*b^5*c^2 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b^6*c^2 - 34*a*b^6*c^2 \\
& - 2*b^7*c^2 - 368*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^2*c^3 - 128 \\
& *\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^3 - 13*\sqrt{2}*\sqrt{b*c \\
& - \sqrt{b^2 - 4*a*c}}*c)*a*b^4*c^3 + 232*a^2*b^4*c^3 + 30*a*b^5*c^3 + 448*\sqrt{ \\
& 2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*c^4 + 224*\sqrt{2}*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^3*b*c^4 + 64*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2* \\
& b^2*c^4 - 736*a^3*b^2*c^4 - 176*a^2*b^3*c^4 - 112*\sqrt{2}*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^3*c^5 + 896*a^4*c^5 + 352*a^3*b*c^5 + \sqrt{2}*\sqrt{b^2 - 4 \\
& *a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b^7 - 15*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{ \\
& b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^5*c - 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b* \\
& c - \sqrt{b^2 - 4*a*c}}*c)*b^6*c + 88*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^2*b^3*c^2 + 22*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a*b^4*c^2 + \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*b^5*c^2 - 176*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^3*b*c^3 - 88*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^2*b^2*c^3 - 11*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a*b^3*c^3 + 44*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a^2*b*c^4 - 2*(b^2 - 4*a*c)*b^6*c + 26*(b^2 - 4*a*c)*a*b^4*c^2 + 2*( \\
& b^2 - 4*a*c)*b^5*c^2 - 128*(b^2 - 4*a*c)*a^2*b^2*c^3 - 22*(b^2 - 4*a*c)*a*b \\
& ^3*c^3 + 224*(b^2 - 4*a*c)*a^3*c^4 + 88*(b^2 - 4*a*c)*a^2*b*c^4)*d + (\sqrt{ \\
& 2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^7 - 24*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - \\
& 4*a*c}}*c)*a^2*b^5*c - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^6*c + \\
& 2*a*b^7*c + 144*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^3*c^2 + 40*\sqrt{ \\
& 2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c^2 + \sqrt{2}*\sqrt{b*c - \sqrt{ \\
& b^2 - 4*a*c}}*c)*a*b^5*c^2 - 48*a^2*b^5*c^2 - 2*a*b^6*c^2 - 256*\sqrt{2}*\sqrt{ \\
& b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b*c^3 - 128*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 -
\end{aligned}$$

$$\begin{aligned}
& 4*a*c)*c)*a^3*b^2*c^3 - 20*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^2*b^3*c^3 + 288*a^3*b^3*c^3 + 44*a^2*b^4*c^3 + 64*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b*c^4 - 512*a^4*b*c^4 - 64*a^3*b^2*c^4 - 320*a^4*c^5 + \sqrt{2} \\
& *\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a*b^6 - 22*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^2*b^4*c - 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a*b^5*c + 32*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b^2*c^2 + 36*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^2*b^3*c^2 + \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a*b^4*c^2 + 160*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^4*c^3 + 80*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*b*c^3 - 18*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^2*b^2*c^3 - 40*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^3*c^4 - 2*(b^2 - 4*a*c)*a*b^5*c + 40*(b^2 - 4*a*c)*a^2*b^3*c^2 + 2*(b^2 - 4*a*c)*a*b^4*c^2 - 128*(b^2 - 4*a*c)*a^3*b*c^3 - 36*(b^2 - 4*a*c)*a^2*b^2*c^3 - 80*(b^2 - 4*a*c)*a^3*c^4)*f)*\arctan(2*\sqrt{t(1/2)*x/\sqrt{(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 - \sqrt{(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))})/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)))/((a^3*b^8 - 16*a^4*b^6*c - 2*a^3*b^7*c + 96*a^5*b^4*c^2 + 24*a^4*b^5*c^2 + a^3*b^6*c^2 - 256*a^6*b^2*c^3 - 96*a^5*b^3*c^3 - 12*a^4*b^4*c^3 + 256*a^7*c^4 + 128*a^6*b*c^4 + 48*a^5*b^2*c^4 - 64*a^6*c^5)*\text{abs}(c)) + 3/4*(2*(b^5*c^3 - 8*a*b^3*c^4 - 2*b^4*c^4 + 16*a^2*b*c^5 + 8*a*b^2*c^5 + b^3*c^5 - 4*a*b*c^6 + (b^4*c^3 - 6*a*b^2*c^4 - 2*b^3*c^4 + 8*a^2*c^5 + 4*a*b*c^5 + b^2*c^5 - 2*a*c^6)*\sqrt{b^2 - 4*a*c}))*e - (b^6*c^2 - 8*a*b^4*c^3 - 2*b^5*c^3 + 16*a^2*b^2*c^4 + 8*a*b^3*c^4 + b^4*c^4 - 4*a*b^2*c^5 - (b^5*c^2 - 6*a*b^3*c^3 - 2*b^4*c^3 + 8*a^2*b*c^4 + 4*a*b^2*c^4 + b^3*c^4 - 2*a*b*c^5)*\sqrt{b^2 - 4*a*c}))*g)*\log(x^2 + 1/2*(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 + \sqrt{(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)))/((a*b^8 - 16*a^2*b^6*c - 2*a*b^7*c + 96*a^3*b^4*c^2 + 24*a^2*b^5*c^2 + a*b^6*c^2 - 256*a^4*b^2*c^3 - 96*a^3*b^3*c^3 - 12*a^2*b^4*c^3 + 256*a^5*c^4 + 128*a^4*b*c^4 + 48*a^3*b^2*c^4 - 64*a^4*c^5)*c^2) + 3/2*(2*(b^2*c^4 - 4*a*c^5 - 2*b*c^5 + c^6)*\sqrt{b^2 - 4*a*c})*e - (b^3*c^3 - 4*a*b*c^4 - 2*b^2*c^4 + b*c^5)*\sqrt{b^2 - 4*a*c})*g)*\log(x^2 + 1/2*(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 - \sqrt{(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)))/((b^8 - 16*a*b^6*c - 2*b^7*c + 96*a^2*b^4*c^2 + 24*a*b^5*c^2 + b^6*c^2 - 256*a^3*b^2*c^3 - 96*a^2*b^3*c^3 - 12*a*b^4*c^3 + 256*a^4*c^4 + 128*a^3*b*c^4 + 48*a^2*b^2*c^4 - 64*a^3*c^5)*c^2) + 1/8*(3*b^3*c^2*d*x^7 - 24*a*b*c^3*d*x^7 + a*b^2*c^2*f*x^7 + 20*a^2*c^3*f*x^7 + 24*a^2*c^3*e*x^6 - 12*a^2*b*c^2*g*x^6 + 6*b^4*c*d*x^5 - 49*a*b^2*c^2*d*x^5 + 28*a^2*c^3*d*x^5 + 2*a*b^3*c*f*x^5 + 28*a^2*b*c^2*f*x^5 + 36*a^2*b*c^2*e*x^4 - 18*a^2*b^2*c*g*x^4 + 3*b^5*d*x^3 - 20*a*b^3*c*d*x^3 - 4*a^2*b*c^2*d*x^3 + a*b^4*f*x^3 + 5*a^2*b^2*c*f*x^3 + 36*a^3*c^2*f*x^3 + 8*a^2*b^2*c*e*x^2 + 40*a^3*c^2*e*x^2 - 4*a^2*b^3*g*x^2 - 20*a^3*b*c*g*x^2 + 5*a*b^4
\end{aligned}$$

\*d\*x - 37\*a^2\*b^2\*c\*d\*x + 44\*a^3\*c^2\*d\*x - a^2\*b^3\*f\*x + 16\*a^3\*b\*c\*f\*x - 2\*a^2\*b^3\*e + 20\*a^3\*b\*c\*e - 2\*a^3\*b^2\*g - 16\*a^4\*c\*g)/((a^2\*b^4 - 8\*a^3\*b^2\*c + 16\*a^4\*c^2)\*(c\*x^4 + b\*x^2 + a)^2)

## Mupad [B] (verification not implemented)

Time = 10.42 (sec) , antiderivative size = 13431, normalized size of antiderivative = 20.79

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^3,x)

[Out] symsum(log((x\*(13824\*a^4\*c^8\*e^3 - 54\*b^7\*c^5\*d^2\*e + 27\*b^8\*c^4\*d^2\*g - 1728\*a^4\*b^3\*c^5\*g^3 - 20160\*a^4\*c^8\*d\*e\*f + 972\*a\*b^5\*c^6\*d^2\*e + 24192\*a^3\*b\*c^8\*d^2\*e - 486\*a\*b^6\*c^5\*d^2\*g + 6240\*a^4\*b\*c^7\*e\*f^2 - 20736\*a^4\*b\*c^7\*e^2\*g - 7344\*a^2\*b^3\*c^7\*d^2\*e + 3672\*a^2\*b^4\*c^6\*d^2\*g - 6\*a^2\*b^5\*c^5\*e\*f^2 - 12096\*a^3\*b^2\*c^7\*d^2\*g + 192\*a^3\*b^3\*c^6\*e\*f^2 + 10368\*a^4\*b^2\*c^6\*e\*g^2 + 3\*a^2\*b^6\*c^4\*f^2\*g - 96\*a^3\*b^4\*c^5\*f^2\*g - 3120\*a^4\*b^2\*c^6\*f^2\*g - 36\*a\*b^6\*c^5\*d\*e\*f + 18\*a\*b^7\*c^4\*d\*f\*g + 10080\*a^4\*b\*c^7\*d\*f\*g + 900\*a^2\*b^4\*c^6\*d\*e\*f - 4896\*a^3\*b^2\*c^7\*d\*e\*f - 450\*a^2\*b^5\*c^5\*d\*f\*g + 2448\*a^3\*b^3\*c^6\*d\*f\*g))/(64\*(a^4\*b^12 + 4096\*a^10\*c^6 - 24\*a^5\*b^10\*c + 240\*a^6\*b^8\*c^2 - 1280\*a^7\*b^6\*c^3 + 3840\*a^8\*b^4\*c^4 - 6144\*a^9\*b^2\*c^5)) - root(56371445760\*a^11\*b^8\*c^6\*z^4 - 503316480\*a^8\*b^14\*c^3\*z^4 + 47185920\*a^7\*b^16\*c^2\*z^4 - 171798691840\*a^14\*b^2\*c^9\*z^4 + 193273528320\*a^13\*b^4\*c^8\*z^4 - 128849018880\*a^12\*b^6\*c^7\*z^4 - 16911433728\*a^10\*b^10\*c^5\*z^4 + 3523215360\*a^9\*b^12\*c^4\*z^4 - 2621440\*a^6\*b^18\*c\*z^4 + 68719476736\*a^15\*c^10\*z^4 + 65536\*a^5\*b^20\*z^4 - 73728\*a^2\*b^16\*c\*d\*f\*z^2 + 1509949440\*a^9\*b^3\*c^7\*e\*g\*z^2 - 1321205760\*a^9\*b^2\*c^8\*d\*f\*z^2 - 754974720\*a^8\*b^5\*c^6\*e\*g\*z^2 + 732168192\*a^7\*b^6\*c^6\*d\*f\*z^2 - 366280704\*a^6\*b^8\*c^5\*d\*f\*z^2 - 330301440\*a^8\*b^4\*c^7\*d\*f\*z^2 + 188743680\*a^7\*b^7\*c^5\*e\*g\*z^2 + 96583680\*a^5\*b^10\*c^4\*d\*f\*z^2 - 23592960\*a^6\*b^9\*c^4\*e\*g\*z^2 + 1179648\*a^5\*b^11\*c^3\*e\*g\*z^2 - 15175680\*a^4\*b^12\*c^3\*d\*f\*z^2 + 1428480\*a^3\*b^14\*c^2\*d\*f\*z^2 - 1207959552\*a^10\*b\*c^8\*e\*g\*z^2 - 440401920\*a^10\*b\*c^8\*f^2\*z^2 + 1761607680\*a^10\*c^9\*d\*f\*z^2 - 14080\*a^3\*b^15\*c\*f^2\*z^2 + 6936330240\*a^8\*b^3\*c^8\*d^2\*z^2 + 2464874496\*a^6\*b^7\*c^6\*d^2\*z^2 - 3963617280\*a^9\*b\*c^9\*d^2\*z^2 - 1509949440\*a^9\*b^2\*c^8\*e^2\*z^2 - 5400428544\*a^7\*b^5\*c^7\*d^2\*z^2 - 94464\*a\*b^17\*c\*d^2\*z^2 + 754974720\*a^8\*b^4\*c^7\*e^2\*z^2 - 730054656\*a^5\*b^9\*c^5\*d^2\*z^2 + 477102080\*a^9\*b^3\*c^7\*f^2\*z^2 - 377487360\*a^9\*b^4\*c^6\*g^2\*z^2 + 301989888\*a^10\*b^2\*c^7\*g^2\*z^2 + 188743680\*a^8\*b^6\*c^5\*g^2\*z^2 - 174325760\*a^8\*b^5\*c^6\*f^2\*z^2 - 188743680\*a^7\*b^6\*c^6\*e^2\*z^2 + 146165760\*a^4\*b^11\*c^4\*d^2\*z^2 - 47185920\*a^7\*b^8\*c^4\*g^2\*z^2 + 5898240\*a^6\*b^10\*c^3\*g^2\*z^2 - 294912\*a^5\*b^12\*c^2\*g^2\*z^2 + 11206656\*a^7\*b^7\*c^5\*f^2\*z^2 + 8929280\*a^6\*b^9\*c^4\*f^2\*z^2 + 23592960\*a^6\*b^8\*c^5\*e^2\*z^2 - 2600960\*a^5\*b^11\*c^3\*f^2\*z^2 + 291840\*a^4\*b^13\*c^2\*f^2\*z^2 - 19860480\*a^3\*b^13\*c^3\*d^2\*z^2 - 1179648\*a^5\*b^10\*c^4\*e^2\*z^2 + 1771776\*a^2\*b^15\*c^

$$\begin{aligned}
& 2*d^2*z^2 + 1536*a*b^18*d*f*z^2 + 1207959552*a^10*c^9*e^2*z^2 + 256*a^2*b^17*f^2*z^2 + 2304*b^19*d^2*z^2 + 169869312*a^7*b*c^8*d*e*f*z + 9216*a*b^13*c^2*d*e*f*z - 4608*a*b^14*c*d*f*g*z - 221773824*a^6*b^3*c^7*d*e*f*z + 110886912*a^6*b^4*c^6*d*f*g*z - 84934656*a^7*b^2*c^7*d*f*g*z + 117964800*a^5*b^5*c^6*d*e*f*z - 58982400*a^5*b^6*c^5*d*f*g*z + 16220160*a^4*b^8*c^4*d*f*g*z - 2396160*a^3*b^10*c^3*d*f*g*z + 175104*a^2*b^12*c^2*d*f*g*z - 32440320*a^4*b^7*c^5*d*e*f*z + 4792320*a^3*b^9*c^4*d*e*f*z - 350208*a^2*b^11*c^3*d*e*f*z + 346816512*a^7*b*c^8*d^2*g*z - 19660800*a^8*b*c^7*f^2*g*z - 768*a^2*b^13*c*f^2*g*z + 214272*a*b^13*c^2*d^2*g*z - 428544*a*b^12*c^3*d^2*e*z + 1022754816*a^6*b^2*c^8*d^2*e*z - 642318336*a^5*b^4*c^7*d^2*e*z - 511377408*a^6*b^3*c^7*d^2*g*z + 321159168*a^5*b^5*c^6*d^2*g*z + 223395840*a^4*b^6*c^6*d^2*e*z - 111697920*a^4*b^7*c^5*d^2*g*z + 25362432*a^7*b^3*c^6*f^2*g*z - 50724864*a^7*b^2*c^7*e*f^2*z - 13271040*a^6*b^5*c^5*f^2*g*z + 3563520*a^5*b^7*c^4*f^2*g*z - 506880*a^4*b^9*c^3*f^2*g*z + 34560*a^3*b^11*c^2*f^2*g*z + 26542080*a^6*b^4*c^6*e*f^2*z + 23362560*a^3*b^9*c^4*d^2*g*z - 46725120*a^3*b^8*c^5*d^2*e*z - 7127040*a^5*b^6*c^5*e*f^2*z - 2965248*a^2*b^11*c^3*d^2*g*z + 1013760*a^4*b^8*c^4*e*f^2*z - 69120*a^3*b^10*c^3*e*f^2*z + 1536*a^2*b^12*c^2*e*f^2*z + 5930496*a^2*b^10*c^4*d^2*e*z - 693633024*a^7*c^9*d^2*e*z + 39321600*a^8*c^8*e*f^2*z + 13824*b^14*c^2*d^2*e*z - 6912*b^15*c*d^2*g*z + 15482880*a^5*b*c^7*d*e*f*g - 13824*a*b^9*c^3*d*e*f*g + 7741440*a^4*b^3*c^6*d*e*f*g - 2903040*a^3*b^5*c^5*d*e*f*g + 387072*a^2*b^7*c^4*d*e*f*g + 3456*a*b^10*c^2*d*f*g^2 + 435456*a*b^8*c^4*d^2*e*g + 13824*a*b^8*c^4*d*e^2*f - 3870720*a^5*b^2*c^6*e*f^2*g - 34836480*a^4*b^2*c^7*d^2*e*g - 645120*a^4*b^4*c^5*e*f^2*g + 80640*a^3*b^6*c^4*e*f^2*g - 2304*a^2*b^8*c^3*e*f^2*g - 3870720*a^5*b^2*c^6*d*f*g^2 - 1935360*a^4*b^4*c^5*d*f*g^2 + 725760*a^3*b^6*c^4*d*f*g^2 + 17418240*a^3*b^4*c^6*d^2*e*g - 96768*a^2*b^8*c^3*d*f*g^2 - 3919104*a^2*b^6*c^5*d^2*e*g - 7741440*a^4*b^2*c^7*d*e^2*f + 2903040*a^3*b^4*c^6*d*e^2*f - 387072*a^2*b^6*c^5*d*e^2*f + 37310976*a^3*b^3*c^7*d^3*f - 2654208*a^5*b^3*c^5*e*g^3 + 3870720*a^5*b*c^7*e^2*f^2 + 34836480*a^4*b*c^8*d^2*e^2 - 108864*a*b^9*c^3*d^2*g^2 - 8068032*a^2*b^5*c^6*d^3*f - 5623296*a^4*b^3*c^6*d*f^3 + 1737792*a^3*b^5*c^5*d*f^3 - 260190*a*b^8*c^4*d^2*f^2 - 211680*a^2*b^7*c^4*d*f^3 - 435456*a*b^7*c^5*d^2*e^2 - 20736*b^10*c^3*d^2*e*g - 75188736*a^4*b*c^8*d^3*f - 15482880*a^5*c^8*d*e^2*f - 10616832*a^5*b*c^7*e^3*g - 4262400*a^5*b*c^7*d*f^3 + 852768*a*b^7*c^5*d^3*f + 7350*a*b^9*c^3*d*f^3 + 967680*a^5*b^3*c^5*f^2*g^2 + 161280*a^4*b^5*c^4*f^2*g^2 - 20160*a^3*b^7*c^3*f^2*g^2 + 576*a^2*b^9*c^2*f^2*g^2 + 7962624*a^5*b^2*c^6*e^2*g^2 + 35525376*a^4*b^2*c^7*d^2*f^2 + 8709120*a^4*b^3*c^6*d^2*g^2 - 4354560*a^3*b^5*c^5*d^2*g^2 + 979776*a^2*b^7*c^4*d^2*g^2 + 645120*a^4*b^3*c^6*e^2*f^2 - 80640*a^3*b^5*c^5*e^2*f^2 + 2304*a^2*b^7*c^4*e^2*f^2 - 15269184*a^3*b^4*c^6*d^2*f^2 + 2870784*a^2*b^6*c^5*d^2*f^2 - 17418240*a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c^6*d^2*e^2 + 5184*b^11*c^2*d^2*g^2 + 11025*b^10*c^3*d^2*f^2 + 5644800*a^5*c^8*d^2*f^2 + 20736*b^9*c^4*d^2*e^2 + 331776*a^5*b^4*c^4*g^4 + 492800*a^5*b^2*c^6*f^4 + 351456*a^4*b^4*c^5*f^4 - 43120*a^3*b^6*c^4*f^4 + 1225*a^2*b^8*c^3*f^4 - 27433728*a^3*b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 - 39690*b^9*c^4*d^3*f - 734832*a*b^6*c^6*d^4 + 49787136*a^4*c^9*d^4 + 160000*a^6*c^7*f^4 + 5308416
\end{aligned}$$



$$\begin{aligned}
& a^5c^8e^4 + 35721b^8c^5d^4, z, k) * ((983040a^7c^8e^f - 3244032a^6b^8c^8d^e - 491520a^7b^8c^7f^*g - 4608a^2b^9c^4d^e + 87552a^3b^7c^5d^e - 681984a^4b^5c^6d^e + 2433024a^5b^3c^7d^e + 2304a^2b^10c^3d^g - 43776a^3b^8c^4d^g - 1536a^3b^8c^4e^f + 340992a^4b^6c^5d^g + 39936a^4b^6c^5e^f - 1216512a^5b^4c^6d^g - 184320a^5b^4c^6e^f + 1622016a^6b^2c^7d^g - 49152a^6b^2c^7e^f + 768a^3b^9c^3f^*g - 19968a^4b^7c^4f^*g + 92160a^5b^5c^5f^*g + 24576a^6b^3c^6f^*g) / (512(a^4b^12 + 4096a^10c^6 - 24a^5b^10c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) - \text{root}(56371445760a^11b^8c^6z^4 - 503316480a^8b^14c^3z^4 + 47185920a^7b^16c^2z^4 - 171798691840a^14b^2c^9z^4 + 193273528320a^13b^4c^8z^4 - 128849018880a^12b^6c^7z^4 - 16911433728a^10b^10c^5z^4 + 3523215360a^9b^12c^4z^4 - 2621440a^6b^18c^*z^4 + 68719476736a^15c^10z^4 + 65536a^5b^20z^4 - 73728a^2b^16c^*d^*f^*z^2 + 1509949440a^9b^3c^7e^*g^*z^2 - 1321205760a^9b^2c^8d^*f^*z^2 - 754974720a^8b^5c^6e^*g^*z^2 + 732168192a^7b^6c^6d^*f^*z^2 - 366280704a^6b^8c^5d^*f^*z^2 - 330301440a^8b^4c^7d^*f^*z^2 + 188743680a^7b^7c^5e^*g^*z^2 + 96583680a^5b^10c^4d^*f^*z^2 - 23592960a^6b^9c^4e^*g^*z^2 + 1179648a^5b^11c^3e^*g^*z^2 - 15175680a^4b^12c^3d^*f^*z^2 + 1428480a^3b^14c^2d^*f^*z^2 - 1207959552a^10b^*c^8e^*g^*z^2 - 440401920a^10b^*c^8f^2z^2 + 1761607680a^10c^9d^*f^*z^2 - 14080a^3b^15c^*f^2z^2 + 6936330240a^8b^3c^8d^2z^2 + 2464874496a^6b^7c^6d^2z^2 - 3963617280a^9b^*c^9d^2z^2 - 1509949440a^9b^2c^8e^2z^2 - 5400428544a^7b^5c^7d^2z^2 - 94464a^*b^17c^*d^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730054656a^5b^9c^5d^2z^2 + 477102080a^9b^3c^7f^2z^2 - 377487360a^9b^4c^6g^2z^2 + 301989888a^10b^2c^7g^2z^2 + 188743680a^8b^6c^5g^2z^2 - 174325760a^8b^5c^6f^2z^2 - 188743680a^7b^6c^6e^2z^2 + 146165760a^4b^11c^4d^2z^2 - 47185920a^7b^8c^4g^2z^2 + 5898240a^6b^10c^3g^2z^2 - 294912a^5b^12c^2g^2z^2 + 11206656a^7b^7c^5f^2z^2 + 8929280a^6b^9c^4f^2z^2 + 23592960a^6b^8c^5e^2z^2 - 2600960a^5b^11c^3f^2z^2 + 291840a^4b^13c^2f^2z^2 - 19860480a^3b^13c^3d^2z^2 - 1179648a^5b^10c^4e^2z^2 + 1771776a^2b^15c^2d^2z^2 + 1536a^*b^18d^*f^*z^2 + 1207959552a^10c^9e^2z^2 + 256a^2b^17f^2z^2 + 2304a^*b^19d^2z^2 + 169869312a^7b^*c^8d^*e^*f^*z + 9216a^*b^13c^2d^*e^*f^*z - 4608a^*b^14c^*d^*f^*g^*z - 221773824a^6b^3c^7d^*e^*f^*z + 110886912a^6b^4c^6d^*f^*g^*z - 84934656a^7b^2c^7d^*f^*g^*z + 117964800a^5b^5c^6d^*e^*f^*z - 58982400a^5b^6c^5d^*f^*g^*z + 16220160a^4b^8c^4d^*f^*g^*z - 2396160a^3b^10c^3d^*f^*g^*z + 175104a^2b^12c^2d^*f^*g^*z - 32440320a^4b^7c^5d^*e^*f^*z + 4792320a^3b^9c^4d^*e^*f^*z - 350208a^2b^11c^3d^*e^*f^*z + 346816512a^7b^*c^8d^2g^*z - 19660800a^8b^*c^7f^2g^*z - 768a^2b^13c^*f^2g^*z + 214272a^*b^13c^2d^2g^*z - 428544a^*b^12c^3d^2e^*z + 1022754816a^6b^2c^8d^2e^*z - 642318336a^5b^4c^7d^2e^*z - 511377408a^6b^3c^7d^2g^*z + 321159168a^5b^5c^6d^2g^*z + 223395840a^4b^6c^6d^2e^*z - 111697920a^4b^7c^5d^2g^*z + 25362432a^7b^3c^6f^2g^*z - 50724864a^7b^2c^7e^*f^2z - 13271040a^6b^5c^5f^2g^*z + 3563520a^5b^7c^4f^2g^*z - 506880a^4b^9c^3f^2g^*z + 34560a^3b^11c^2f^2g^*z + 26542080a^6b^4c^6e^*f^
\end{aligned}$$

$$\begin{aligned}
& 2*z + 23362560*a^3*b^9*c^4*d^2*g*z - 46725120*a^3*b^8*c^5*d^2*e*z - 7127040 \\
& *a^5*b^6*c^5*e*f^2*z - 2965248*a^2*b^11*c^3*d^2*g*z + 1013760*a^4*b^8*c^4*e \\
& *f^2*z - 69120*a^3*b^10*c^3*e*f^2*z + 1536*a^2*b^12*c^2*e*f^2*z + 5930496*a \\
& ^2*b^10*c^4*d^2*e*z - 693633024*a^7*c^9*d^2*e*z + 39321600*a^8*c^8*e*f^2*z \\
& + 13824*b^14*c^2*d^2*e*z - 6912*b^15*c*d^2*g*z + 15482880*a^5*b*c^7*d*e*f*g \\
& - 13824*a*b^9*c^3*d*e*f*g + 7741440*a^4*b^3*c^6*d*e*f*g - 2903040*a^3*b^5* \\
& c^5*d*e*f*g + 387072*a^2*b^7*c^4*d*e*f*g + 3456*a*b^10*c^2*d*f*g^2 + 435456 \\
& *a*b^8*c^4*d^2*e*g + 13824*a*b^8*c^4*d*e^2*f - 3870720*a^5*b^2*c^6*e*f^2*g \\
& - 34836480*a^4*b^2*c^7*d^2*e*g - 645120*a^4*b^4*c^5*e*f^2*g + 80640*a^3*b^6 \\
& *c^4*e*f^2*g - 2304*a^2*b^8*c^3*e*f^2*g - 3870720*a^5*b^2*c^6*d*f*g^2 - 193 \\
& 5360*a^4*b^4*c^5*d*f*g^2 + 725760*a^3*b^6*c^4*d*f*g^2 + 17418240*a^3*b^4*c^ \\
& 6*d^2*e*g - 96768*a^2*b^8*c^3*d*f*g^2 - 3919104*a^2*b^6*c^5*d^2*e*g - 77414 \\
& 40*a^4*b^2*c^7*d*e^2*f + 2903040*a^3*b^4*c^6*d*e^2*f - 387072*a^2*b^6*c^5*d \\
& *e^2*f + 37310976*a^3*b^3*c^7*d^3*f - 2654208*a^5*b^3*c^5*e*g^3 + 3870720*a \\
& ^5*b*c^7*e^2*f^2 + 34836480*a^4*b*c^8*d^2*e^2 - 108864*a*b^9*c^3*d^2*g^2 - \\
& 8068032*a^2*b^5*c^6*d^3*f - 5623296*a^4*b^3*c^6*d*f^3 + 1737792*a^3*b^5*c^5 \\
& *d*f^3 - 260190*a*b^8*c^4*d^2*f^2 - 211680*a^2*b^7*c^4*d*f^3 - 435456*a*b^7 \\
& *c^5*d^2*e^2 - 20736*b^10*c^3*d^2*e*g - 75188736*a^4*b*c^8*d^3*f - 15482880 \\
& *a^5*c^8*d*e^2*f - 10616832*a^5*b*c^7*e^3*g - 4262400*a^5*b*c^7*d*f^3 + 852 \\
& 768*a*b^7*c^5*d^3*f + 7350*a*b^9*c^3*d*f^3 + 967680*a^5*b^3*c^5*f^2*g^2 + 1 \\
& 61280*a^4*b^5*c^4*f^2*g^2 - 20160*a^3*b^7*c^3*f^2*g^2 + 576*a^2*b^9*c^2*f^2 \\
& *g^2 + 7962624*a^5*b^2*c^6*e^2*g^2 + 35525376*a^4*b^2*c^7*d^2*f^2 + 8709120 \\
& *a^4*b^3*c^6*d^2*g^2 - 4354560*a^3*b^5*c^5*d^2*g^2 + 979776*a^2*b^7*c^4*d^2 \\
& *g^2 + 645120*a^4*b^3*c^6*e^2*f^2 - 80640*a^3*b^5*c^5*e^2*f^2 + 2304*a^2*b^ \\
& 7*c^4*e^2*f^2 - 15269184*a^3*b^4*c^6*d^2*f^2 + 2870784*a^2*b^6*c^5*d^2*f^2 \\
& - 17418240*a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c^6*d^2*e^2 + 5184*b^11*c^ \\
& 2*d^2*g^2 + 11025*b^10*c^3*d^2*f^2 + 5644800*a^5*c^8*d^2*f^2 + 20736*b^9*c^ \\
& 4*d^2*e^2 + 331776*a^5*b^4*c^4*g^4 + 492800*a^5*b^2*c^6*f^4 + 351456*a^4*b^ \\
& 4*c^5*f^4 - 43120*a^3*b^6*c^4*f^4 + 1225*a^2*b^8*c^3*f^4 - 27433728*a^3*b^2 \\
& *c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 - 39690*b^9*c^4*d^3*f - 734832*a*b^6*c^6 \\
& *d^4 + 49787136*a^4*c^9*d^4 + 160000*a^6*c^7*f^4 + 5308416*a^5*c^8*e^4 + 35 \\
& 721*b^8*c^5*d^4, z, k)*((768*a^2*b^14*c^2*d - 22020096*a^9*c^9*d - 22272*a^ \\
& 3*b^12*c^3*d + 282624*a^4*b^10*c^4*d - 2027520*a^5*b^8*c^5*d + 8847360*a^6* \\
& b^6*c^6*d - 23396352*a^7*b^4*c^7*d + 34603008*a^8*b^2*c^8*d + 256*a^3*b^13* \\
& c^2*f - 9216*a^4*b^11*c^3*f + 122880*a^5*b^9*c^4*f - 819200*a^6*b^7*c^5*f + \\
& 2949120*a^7*b^5*c^6*f - 5505024*a^8*b^3*c^7*f + 4194304*a^9*b*c^8*f)/(512* \\
& (a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6* \\
& c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) + (x*(1572864*a^9*c^9*e - 1536* \\
& a^4*b^10*c^4*e + 30720*a^5*b^8*c^5*e - 245760*a^6*b^6*c^6*e + 983040*a^7*b^ \\
& 4*c^7*e - 1966080*a^8*b^2*c^8*e + 768*a^4*b^11*c^3*g - 15360*a^5*b^9*c^4*g \\
& + 122880*a^6*b^7*c^5*g - 491520*a^7*b^5*c^6*g + 983040*a^8*b^3*c^7*g - 7864 \\
& 32*a^9*b*c^8*g))/(64*(a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b^10*c + 240*a^6*b^ \\
& 8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) + (root(56 \\
& 371445760*a^11*b^8*c^6*z^4 - 503316480*a^8*b^14*c^3*z^4 + 47185920*a^7*b^16 \\
& *c^2*z^4 - 171798691840*a^14*b^2*c^9*z^4 + 193273528320*a^13*b^4*c^8*z^4 -
\end{aligned}$$

$$\begin{aligned}
& 128849018880a^{12}b^6c^7z^4 - 16911433728a^{10}b^{10}c^5z^4 + 3523215360a^9b^{12}c^4z^4 - 2621440a^6b^{18}c^3z^4 + 68719476736a^{15}c^{10}z^4 + 65536a^5b^{20}z^4 - 73728a^2b^{16}c^2d^2f^2z^2 + 1509949440a^9b^3c^7e^2g^2z^2 \\
& - 1321205760a^9b^2c^8d^2f^2z^2 - 754974720a^8b^5c^6e^2g^2z^2 + 732168192a^7b^6c^6d^2f^2z^2 - 366280704a^6b^8c^5d^2f^2z^2 - 330301440a^8b^4c^7d^2f^2z^2 + 188743680a^7b^7c^5e^2g^2z^2 + 96583680a^5b^{10}c^4d^2f^2z^2 \\
& - 23592960a^6b^9c^4e^2g^2z^2 + 1179648a^5b^{11}c^3e^2g^2z^2 - 15175680a^4b^{12}c^3d^2f^2z^2 + 1428480a^3b^{14}c^2d^2f^2z^2 - 1207959552a^{10}b^3c^8e^2g^2z^2 - 440401920a^{10}b^3c^8f^2z^2 + 1761607680a^{10}c^9d^2f^2z^2 - 14080a^3b^{15}c^2f^2z^2 + 6936330240a^8b^3c^8d^2z^2 + 2464874496a^6b^7c^6d^2z^2 - 3963617280a^9b^3c^9d^2z^2 - 1509949440a^9b^2c^8e^2z^2 - 5400428544a^7b^5c^7d^2z^2 - 94464a^8b^{17}c^4d^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730054656a^5b^9c^5d^2z^2 + 477102080a^9b^3c^7f^2z^2 - 377487360a^9b^4c^6g^2z^2 + 301989888a^{10}b^2c^7g^2z^2 + 188743680a^8b^6c^5g^2z^2 - 174325760a^8b^5c^6f^2z^2 - 188743680a^7b^6c^6e^2z^2 + 146165760a^4b^{11}c^4d^2z^2 - 47185920a^7b^8c^4g^2z^2 + 5898240a^6b^{10}c^3g^2z^2 - 294912a^5b^{12}c^2g^2z^2 + 11206656a^7b^7c^5f^2z^2 + 8929280a^6b^9c^4f^2z^2 + 23592960a^6b^8c^5e^2z^2 - 2600960a^5b^{11}c^3f^2z^2 + 291840a^4b^{13}c^2f^2z^2 - 19860480a^3b^{13}c^3d^2z^2 - 1179648a^5b^{10}c^4e^2z^2 + 1771776a^2b^{15}c^2d^2z^2 + 1536a^8b^{18}d^2f^2z^2 + 1207959552a^{10}c^9e^2z^2 + 256a^2b^{17}f^2z^2 + 2304b^{19}d^2z^2 + 169869312a^7b^3c^8d^2e^2f^2z^2 + 9216a^2b^{13}c^2d^2e^2f^2z^2 - 4608a^2b^{14}c^2d^2e^2f^2z^2 - 221773824a^6b^3c^7d^2e^2f^2z^2 + 110886912a^6b^4c^6d^2e^2f^2z^2 - 84934656a^7b^2c^7d^2e^2f^2z^2 + 117964800a^5b^5c^6d^2e^2f^2z^2 - 58982400a^5b^6c^5d^2e^2f^2z^2 + 16220160a^4b^8c^4d^2e^2f^2z^2 - 2396160a^3b^{10}c^3d^2e^2f^2z^2 + 175104a^2b^{12}c^2d^2e^2f^2z^2 - 32440320a^4b^7c^5d^2e^2f^2z^2 + 4792320a^3b^9c^4d^2e^2f^2z^2 - 350208a^2b^{11}c^3d^2e^2f^2z^2 + 346816512a^7b^3c^8d^2g^2z^2 - 19660800a^8b^3c^7f^2g^2z^2 - 768a^2b^{13}c^2f^2g^2z^2 + 214272a^2b^{13}c^2d^2g^2z^2 - 428544a^2b^{12}c^3d^2e^2z^2 + 1022754816a^6b^2c^8d^2e^2z^2 - 642318336a^5b^4c^7d^2e^2z^2 - 511377408a^6b^3c^7d^2g^2z^2 + 321159168a^5b^5c^6d^2g^2z^2 + 223395840a^4b^6c^6d^2e^2z^2 - 111697920a^4b^7c^5d^2g^2z^2 + 25362432a^7b^3c^6f^2g^2z^2 - 50724864a^7b^2c^7e^2f^2z^2 - 13271040a^6b^5c^5f^2g^2z^2 + 3563520a^5b^7c^4f^2g^2z^2 - 506880a^4b^9c^3f^2g^2z^2 + 34560a^3b^{11}c^2f^2g^2z^2 + 26542080a^6b^4c^6e^2f^2z^2 + 23362560a^3b^9c^4d^2g^2z^2 - 46725120a^3b^8c^5d^2e^2z^2 - 7127040a^5b^6c^5e^2f^2z^2 - 2965248a^2b^{11}c^3d^2g^2z^2 + 1013760a^4b^8c^4e^2f^2z^2 - 69120a^3b^{10}c^3e^2f^2z^2 + 1536a^2b^{12}c^2e^2f^2z^2 + 5930496a^2b^{10}c^4d^2e^2z^2 - 693633024a^7c^9d^2e^2z^2 + 39321600a^8c^8e^2f^2z^2 + 13824b^{14}c^2d^2e^2z^2 - 6912b^{15}c^2d^2g^2z^2 + 15482880a^5b^3c^7d^2e^2f^2z^2 - 13824a^2b^9c^3d^2e^2f^2z^2 + 7741440a^4b^3c^6d^2e^2f^2z^2 - 2903040a^3b^5c^5d^2e^2f^2z^2 + 387072a^2b^7c^4d^2e^2f^2z^2 + 3456a^2b^{10}c^2d^2e^2f^2z^2 + 435456a^2b^8c^4d^2e^2f^2z^2 + 13824a^2b^8c^4d^2e^2f^2z^2 - 3870720a^5b^2c^6e^2f^2z^2 - 34836480a^4b^2c^7d^2e^2f^2z^2 - 645120a^4b^4c^5e^2f^2z^2 + 80640a^3b^6c^4e^2f^2z^2 - 2304a^2b^8c^3e^2f^2z^2 - 3870720a^5b^2c^6d^2e^2f^2z^2 - 1935360a^4b^4c^5d^2e^2f^2z^2 + 725760a^3b^6c^4d^2e^2f^2z^2 +
\end{aligned}$$

$$\begin{aligned}
& 17418240a^3b^4c^6d^2e^*g - 96768a^2b^8c^3d^*f^*g^2 - 3919104a^2b^6 \\
& *c^5d^2e^*g - 7741440a^4b^2c^7d^*e^2f + 2903040a^3b^4c^6d^*e^2f - \\
& 387072a^2b^6c^5d^*e^2f + 37310976a^3b^3c^7d^3*f - 2654208a^5b^3c \\
& ^5e^*g^3 + 3870720a^5b^*c^7e^2*f^2 + 34836480a^4b^*c^8d^2*e^2 - 108864* \\
& a^b^9*c^3*d^2*g^2 - 8068032a^2b^5*c^6*d^3*f - 5623296a^4b^3*c^6*d^*f^3 + \\
& 1737792a^3b^5*c^5*d^*f^3 - 260190a^*b^8*c^4*d^2*f^2 - 211680a^2b^7*c^4* \\
& d^*f^3 - 435456a^*b^7*c^5*d^2*e^2 - 20736b^10*c^3*d^2*e^*g - 75188736a^4b^* \\
& c^8*d^3*f - 15482880a^5*c^8*d^*e^2*f - 10616832a^5b^*c^7e^3*g - 4262400a \\
& ^5b^*c^7*d^*f^3 + 852768a^*b^7*c^5*d^3*f + 7350a^*b^9*c^3*d^*f^3 + 967680a^5 \\
& *b^3*c^5*f^2*g^2 + 161280a^4b^5*c^4*f^2*g^2 - 20160a^3b^7*c^3*f^2*g^2 + \\
& 576a^2b^9*c^2*f^2*g^2 + 7962624a^5b^2*c^6e^2*g^2 + 35525376a^4b^2*c \\
& ^7*d^2*f^2 + 8709120a^4b^3*c^6*d^2*g^2 - 4354560a^3b^5*c^5*d^2*g^2 + 97 \\
& 9776a^2b^7*c^4*d^2*g^2 + 645120a^4b^3*c^6e^2*f^2 - 80640a^3b^5*c^5e \\
& ^2*f^2 + 2304a^2b^7*c^4e^2*f^2 - 15269184a^3b^4*c^6d^2*f^2 + 2870784* \\
& a^2b^6*c^5d^2*f^2 - 17418240a^3b^3*c^7d^2*e^2 + 3919104a^2b^5*c^6d^ \\
& 2e^2 + 5184b^11*c^2d^2*g^2 + 11025b^10*c^3d^2*f^2 + 5644800a^5*c^8d^ \\
& 2f^2 + 20736b^9*c^4d^2e^2 + 331776a^5b^4*c^4*g^4 + 492800a^5b^2*c^6 \\
& *f^4 + 351456a^4b^4*c^5f^4 - 43120a^3b^6*c^4f^4 + 1225a^2b^8*c^3f^ \\
& 4 - 27433728a^3b^2*c^8d^4 + 6446304a^2b^4*c^7d^4 - 39690b^9*c^4d^3* \\
& f - 734832a^*b^6*c^6*d^4 + 49787136a^4*c^9*d^4 + 160000a^6*c^7*f^4 + 5308 \\
& 416a^5*c^8e^4 + 35721b^8*c^5d^4, z, k)*x*(8388608a^11b^*c^9 - 512a^4* \\
& b^15*c^2 + 14336a^5b^13*c^3 - 172032a^6b^11*c^4 + 1146880a^7b^9*c^5 - \\
& 4587520a^8b^7*c^6 + 11010048a^9b^5*c^7 - 14680064a^10b^3*c^8))/(64*( \\
& a^4b^12 + 4096a^10*c^6 - 24a^5b^10*c + 240a^6b^8*c^2 - 1280a^7b^6*c \\
& ^3 + 3840a^8b^4*c^4 - 6144a^9b^2*c^5))) + (x*(451584a^6*c^9*d^2 + 18*b \\
& ^12*c^3*d^2 - 25600a^7*c^8*f^2 - 504a^*b^10*c^4*d^2 - 73728a^6b^*c^8e^2 \\
& + 6228a^2b^8*c^5*d^2 - 42624a^3b^6*c^6*d^2 + 176256a^4b^4*c^7*d^2 - 4 \\
& 23936a^5b^2*c^8d^2 - 4608a^4b^5*c^6e^2 + 36864a^5b^3*c^7e^2 + 2a^ \\
& 2b^10*c^3f^2 - 84a^3b^8*c^4f^2 + 3520a^4b^6*c^5f^2 - 26240a^5b^4* \\
& c^6f^2 + 59904a^6b^2*c^7f^2 - 1152a^4b^7*c^4g^2 + 9216a^5b^5*c^5g \\
& ^2 - 18432a^6b^3*c^6g^2 + 12a^*b^11*c^3d^*f - 218112a^6b^*c^8d^*f - 420 \\
& *a^2b^9*c^4d^*f + 4992a^3b^7*c^5d^*f - 36480a^4b^5*c^6d^*f + 144384a^ \\
& 5b^3*c^7d^*f + 4608a^4b^6*c^5e^*g - 36864a^5b^4*c^6e^*g + 73728a^6b^ \\
& 2c^7e^*g))/(64*(a^4b^12 + 4096a^10*c^6 - 24a^5b^10*c + 240a^6b^8*c^2 \\
& - 1280a^7b^6*c^3 + 3840a^8b^4*c^4 - 6144a^9b^2*c^5))) - (567b^7*c^5 \\
& *d^3 + 8000a^5*c^7*f^3 - 10368a^*b^5*c^6*d^3 - 169344a^3b^*c^8d^3 - 1935 \\
& 36a^4*c^8d^*e^2 + 141120a^4*c^8d^2*f - 315b^8*c^4*d^2*f + 67824a^2b^3 \\
& *c^7d^3 - 35a^2b^6*c^4f^3 - 84a^3b^4*c^5f^3 + 12720a^4b^2*c^6f^3 \\
& + 6237a^*b^6*c^5d^2*f - 210a^*b^7*c^4d^*f^2 - 116160a^4b^*c^7d^*f^2 + 368 \\
& 64a^4b^*c^7e^2*f - 6912a^2b^4*c^6d^*e^2 + 62208a^3b^2*c^7d^*e^2 - 423 \\
& 72a^2b^4*c^6d^2*f + 1764a^2b^5*c^5d^*f^2 + 96048a^3b^2*c^7d^2*f + 4 \\
& 608a^3b^3*c^6d^*f^2 - 1728a^2b^6*c^4d^*g^2 - 2304a^3b^3*c^6e^2*f + 1 \\
& 5552a^3b^4*c^5d^*g^2 - 48384a^4b^2*c^6d^*g^2 - 576a^3b^5*c^4f^*g^2 + \\
& 9216a^4b^3*c^5f^*g^2 + 193536a^4b^*c^7d^*e^*g + 6912a^2b^5*c^5d^*e^*g - \\
& 62208a^3b^3*c^6d^*e^*g + 2304a^3b^4*c^5e^*f^*g - 36864a^4b^2*c^6e^*f^*g)
\end{aligned}$$

$$\begin{aligned}
&/((512*(a^4*b^{12} + 4096*a^{10}*c^6 - 24*a^5*b^{10}*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)))\text{root}(56371445760*a^{11}*b^8*c^6*z^4 - 503316480*a^8*b^{14}*c^3*z^4 + 47185920*a^7*b^{16}*c^2*z^4 - 171798691840*a^{14}*b^2*c^9*z^4 + 193273528320*a^{13}*b^4*c^8*z^4 - 128849018880*a^{12}*b^6*c^7*z^4 - 16911433728*a^{10}*b^{10}*c^5*z^4 + 3523215360*a^9*b^{12}*c^4*z^4 - 2621440*a^6*b^{18}*c*z^4 + 68719476736*a^{15}*c^{10}*z^4 + 65536*a^5*b^{20}*z^4 - 73728*a^2*b^{16}*c*d*f*z^2 + 1509949440*a^9*b^3*c^7*e*g*z^2 - 1321205760*a^9*b^2*c^8*d*f*z^2 - 754974720*a^8*b^5*c^6*e*g*z^2 + 732168192*a^7*b^6*c^6*d*f*z^2 - 366280704*a^6*b^8*c^5*d*f*z^2 - 330301440*a^8*b^4*c^7*d*f*z^2 + 188743680*a^7*b^7*c^5*e*g*z^2 + 96583680*a^5*b^{10}*c^4*d*f*z^2 - 23592960*a^6*b^9*c^4*e*g*z^2 + 1179648*a^5*b^{11}*c^3*e*g*z^2 - 15175680*a^4*b^{12}*c^3*d*f*z^2 + 1428480*a^3*b^{14}*c^2*d*f*z^2 - 1207959552*a^{10}*b*c^8*e*g*z^2 - 440401920*a^{10}*b*c^8*f^2*z^2 + 1761607680*a^{10}*c^9*d*f*z^2 - 14080*a^3*b^{15}*c*f^2*z^2 + 6936330240*a^8*b^3*c^8*d^2*z^2 + 2464874496*a^6*b^7*c^6*d^2*z^2 - 3963617280*a^9*b*c^9*d^2*z^2 - 1509949440*a^9*b^2*c^8*e^2*z^2 - 5400428544*a^7*b^5*c^7*d^2*z^2 - 94464*a*b^{17}*c*d^2*z^2 + 754974720*a^8*b^4*c^7*e^2*z^2 - 730054656*a^5*b^9*c^5*d^2*z^2 + 477102080*a^9*b^3*c^7*f^2*z^2 - 377487360*a^9*b^4*c^6*g^2*z^2 + 301989888*a^{10}*b^2*c^7*g^2*z^2 + 188743680*a^8*b^6*c^5*g^2*z^2 - 174325760*a^8*b^5*c^6*f^2*z^2 - 188743680*a^7*b^6*c^6*e^2*z^2 + 146165760*a^4*b^{11}*c^4*d^2*z^2 - 47185920*a^7*b^8*c^4*g^2*z^2 + 5898240*a^6*b^{10}*c^3*g^2*z^2 - 294912*a^5*b^{12}*c^2*g^2*z^2 + 11206656*a^7*b^7*c^5*f^2*z^2 + 8929280*a^6*b^9*c^4*f^2*z^2 + 23592960*a^6*b^8*c^5*e^2*z^2 - 2600960*a^5*b^{11}*c^3*f^2*z^2 + 291840*a^4*b^{13}*c^2*f^2*z^2 - 19860480*a^3*b^{13}*c^3*d^2*z^2 - 1179648*a^5*b^{10}*c^4*e^2*z^2 + 1771776*a^2*b^{15}*c^2*d^2*z^2 + 1536*a*b^{18}*d*f*z^2 + 1207959552*a^{10}*c^9*e^2*z^2 + 256*a^2*b^{17}*f^2*z^2 + 2304*b^{19}*d^2*z^2 + 169869312*a^7*b*c^8*d*e*f*z + 9216*a*b^{13}*c^2*d*e*f*z - 4608*a*b^{14}*c*d*f*g*z - 221773824*a^6*b^3*c^7*d*e*f*z + 110886912*a^6*b^4*c^6*d*f*g*z - 84934656*a^7*b^2*c^7*d*f*g*z + 117964800*a^5*b^5*c^6*d*e*f*z - 58982400*a^5*b^6*c^5*d*f*g*z + 16220160*a^4*b^8*c^4*d*f*g*z - 2396160*a^3*b^{10}*c^3*d*f*g*z + 175104*a^2*b^{12}*c^2*d*f*g*z - 32440320*a^4*b^7*c^5*d*e*f*z + 4792320*a^3*b^9*c^4*d*e*f*z - 350208*a^2*b^{11}*c^3*d*e*f*z + 346816512*a^7*b*c^8*d^2*g*z - 19660800*a^8*b*c^7*f^2*g*z - 768*a^2*b^{13}*c*f^2*g*z + 214272*a*b^{13}*c^2*d^2*g*z - 428544*a*b^{12}*c^3*d^2*e*z + 1022754816*a^6*b^2*c^8*d^2*e*z - 642318336*a^5*b^4*c^7*d^2*e*z - 511377408*a^6*b^3*c^7*d^2*g*z + 321159168*a^5*b^5*c^6*d^2*g*z + 223395840*a^4*b^6*c^6*d^2*e*z - 111697920*a^4*b^7*c^5*d^2*g*z + 25362432*a^7*b^3*c^6*f^2*g*z - 50724864*a^7*b^2*c^7*e*f^2*z - 13271040*a^6*b^5*c^5*f^2*g*z + 3563520*a^5*b^7*c^4*f^2*g*z - 506880*a^4*b^9*c^3*f^2*g*z + 34560*a^3*b^{11}*c^2*f^2*g*z + 26542080*a^6*b^4*c^6*e*f^2*z + 23362560*a^3*b^9*c^4*d^2*g*z - 46725120*a^3*b^8*c^5*d^2*e*z - 7127040*a^5*b^6*c^5*e*f^2*z - 2965248*a^2*b^{11}*c^3*d^2*g*z + 1013760*a^4*b^8*c^4*e*f^2*z - 69120*a^3*b^{10}*c^3*e*f^2*z + 1536*a^2*b^{12}*c^2*e*f^2*z + 5930496*a^2*b^{10}*c^4*d^2*e*z - 693633024*a^7*c^9*d^2*e*z + 39321600*a^8*c^8*e*f^2*z + 13824*b^{14}*c^2*d^2*e*z - 6912*b^{15}*c*d^2*g*z + 15482880*a^5*b*c^7*d*e*f*g - 13824*a*b^9*c^3*d*e*f*g + 7741440*a^4*b^3*c^6*d*e*f*g - 2903040*a^3*b^5*c^5*d*e*f*g + 387072*a^2*b^7*c^4*d*e*f*g + 3456*a*b^{10}*c^2*d*f*g^2 + 435
\end{aligned}$$

$$\begin{aligned}
& 456*a*b^8*c^4*d^2*e*g + 13824*a*b^8*c^4*d*e^2*f - 3870720*a^5*b^2*c^6*e*f^2 \\
& *g - 34836480*a^4*b^2*c^7*d^2*e*g - 645120*a^4*b^4*c^5*e*f^2*g + 80640*a^3* \\
& b^6*c^4*e*f^2*g - 2304*a^2*b^8*c^3*e*f^2*g - 3870720*a^5*b^2*c^6*d*f*g^2 - \\
& 1935360*a^4*b^4*c^5*d*f*g^2 + 725760*a^3*b^6*c^4*d*f*g^2 + 17418240*a^3*b^4 \\
& *c^6*d^2*e*g - 96768*a^2*b^8*c^3*d*f*g^2 - 3919104*a^2*b^6*c^5*d^2*e*g - 77 \\
& 41440*a^4*b^2*c^7*d*e^2*f + 2903040*a^3*b^4*c^6*d*e^2*f - 387072*a^2*b^6*c^ \\
& 5*d*e^2*f + 37310976*a^3*b^3*c^7*d^3*f - 2654208*a^5*b^3*c^5*e*g^3 + 387072 \\
& 0*a^5*b*c^7*e^2*f^2 + 34836480*a^4*b*c^8*d^2*e^2 - 108864*a*b^9*c^3*d^2*g^2 \\
& - 8068032*a^2*b^5*c^6*d^3*f - 5623296*a^4*b^3*c^6*d*f^3 + 1737792*a^3*b^5* \\
& c^5*d*f^3 - 260190*a*b^8*c^4*d^2*f^2 - 211680*a^2*b^7*c^4*d*f^3 - 435456*a* \\
& b^7*c^5*d^2*e^2 - 20736*b^10*c^3*d^2*e*g - 75188736*a^4*b*c^8*d^3*f - 15482 \\
& 880*a^5*c^8*d*e^2*f - 10616832*a^5*b*c^7*e^3*g - 4262400*a^5*b*c^7*d*f^3 + \\
& 852768*a*b^7*c^5*d^3*f + 7350*a*b^9*c^3*d*f^3 + 967680*a^5*b^3*c^5*f^2*g^2 \\
& + 161280*a^4*b^5*c^4*f^2*g^2 - 20160*a^3*b^7*c^3*f^2*g^2 + 576*a^2*b^9*c^2* \\
& f^2*g^2 + 7962624*a^5*b^2*c^6*e^2*g^2 + 35525376*a^4*b^2*c^7*d^2*f^2 + 8709 \\
& 120*a^4*b^3*c^6*d^2*g^2 - 4354560*a^3*b^5*c^5*d^2*g^2 + 979776*a^2*b^7*c^4* \\
& d^2*g^2 + 645120*a^4*b^3*c^6*e^2*f^2 - 80640*a^3*b^5*c^5*e^2*f^2 + 2304*a^2 \\
& *b^7*c^4*e^2*f^2 - 15269184*a^3*b^4*c^6*d^2*f^2 + 2870784*a^2*b^6*c^5*d^2*f \\
& ^2 - 17418240*a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c^6*d^2*e^2 + 5184*b^11 \\
& *c^2*d^2*g^2 + 11025*b^10*c^3*d^2*f^2 + 5644800*a^5*c^8*d^2*f^2 + 20736*b^9 \\
& *c^4*d^2*e^2 + 331776*a^5*b^4*c^4*g^4 + 492800*a^5*b^2*c^6*f^4 + 351456*a^4 \\
& *b^4*c^5*f^4 - 43120*a^3*b^6*c^4*f^4 + 1225*a^2*b^8*c^3*f^4 - 27433728*a^3* \\
& b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 - 39690*b^9*c^4*d^3*f - 734832*a*b^6* \\
& c^6*d^4 + 49787136*a^4*c^9*d^4 + 160000*a^6*c^7*f^4 + 5308416*a^5*c^8*e^4 + \\
& 35721*b^8*c^5*d^4, z, k), k, 1, 4) + ((9*x^4*(2*b*c^2*e - b^2*c*g))/(4*(b^ \\
& 4 + 16*a^2*c^2 - 8*a*b^2*c)) - (x^2*(b^3*g - 10*a*c^2*e - 2*b^2*c*e + 5*a*b \\
& *c*g))/(2*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) - (b^3*e + a*b^2*g + 8*a^2*c*g - \\
& 10*a*b*c*e)/(4*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) + (x^5*(28*a^2*c^3*d + 6*b^4 \\
& *c*d + 2*a*b^3*c*f - 49*a*b^2*c^2*d + 28*a^2*b*c^2*f))/(8*a^2*(b^4 + 16*a^2 \\
& *c^2 - 8*a*b^2*c)) + (x*(5*b^4*d + 44*a^2*c^2*d - a*b^3*f - 37*a*b^2*c*d + \\
& 16*a^2*b*c*f))/(8*a*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) + (x^3*(3*b^5*d + 36*a^ \\
& 3*c^2*f + a*b^4*f - 20*a*b^3*c*d - 4*a^2*b*c^2*d + 5*a^2*b^2*c*f))/(8*a^2*( \\
& b^4 + 16*a^2*c^2 - 8*a*b^2*c)) + (3*c^2*x^6*(2*c*e - b*g))/(2*(b^4 + 16*a^2 \\
& *c^2 - 8*a*b^2*c)) + (c*x^7*(20*a^2*c^2*f + 3*b^3*c*d - 24*a*b*c^2*d + a*b^ \\
& 2*c*f))/(8*a^2*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)))/(x^4*(2*a*c + b^2) + a^2 + \\
& c^2*x^8 + 2*a*b*x^2 + 2*b*c*x^6)
\end{aligned}$$

$$3.55 \quad \int \frac{d+ex+fx^2+gx^3+hx^4}{(a+bx^2+cx^4)^3} dx$$

Optimal result	615
Rubi [A] (verified)	616
Mathematica [A] (verified)	621
Maple [C] (verified)	622
Fricas [F(-1)]	622
Sympy [F(-1)]	623
Maxima [F]	623
Giac [B] (verification not implemented)	623
Mupad [B] (verification not implemented)	627

### Optimal result

Integrand size = 35, antiderivative size = 679

$$\begin{aligned} \int \frac{d+ex+fx^2+gx^3+hx^4}{(a+bx^2+cx^4)^3} dx = & -\frac{be-2ag+(2ce-bg)x^2}{4(b^2-4ac)(a+bx^2+cx^4)^2} \\ & + \frac{x(b^2d-abf-2a(cd-ah)+(bcd-2acf+abh)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{3(2ce-bg)(b+2cx^2)}{4(b^2-4ac)^2(a+bx^2+cx^4)} \\ & + \frac{x(3b^4d+ab^3f+8a^2bcf+4a^2c(7cd+ah)-ab^2(25cd+7ah)+c(3b^3d+ab^2f+20a^2cf-12ab(2cd+ah)))}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\ & + \frac{\sqrt{c}\left(3b^3d+ab^2f+20a^2cf-12ab(2cd+ah)+\frac{3b^4d+ab^3f-52a^2bcf-6ab^2(5cd-3ah)+24a^2c(7cd+ah)}{\sqrt{b^2-4ac}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b-\sqrt{b^2-4ac}}}\arctan\left(\frac{\sqrt{c}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \\ & + \frac{\sqrt{c}\left(3b^3d+ab^2f+20a^2cf-12ab(2cd+ah)-\frac{3b^4d+ab^3f-52a^2bcf-6ab^2(5cd-3ah)+24a^2c(7cd+ah)}{\sqrt{b^2-4ac}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b+\sqrt{b^2-4ac}}}\arctan\left(\frac{\sqrt{c}}{\sqrt{b+\sqrt{b^2-4ac}}}\right) \\ & - \frac{3c(2ce-bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}} \end{aligned}$$

```
[Out] 1/4*(-b*e+2*a*g-(-b*g+2*c*e)*x^2)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^2+1/4*x*(b^2*d-a*b*f-2*a*(-a*h+c*d)+(a*b*h-2*a*c*f+b*c*d)*x^2)/a/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^2+3/4*(-b*g+2*c*e)*(2*c*x^2+b)/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)+1/8*x*(3*b^4*d+a*b^3*f+8*a^2*b*c*f+4*a^2*c*(a*h+7*c*d)-a*b^2*(7*a*h+25*c*d)+c*(3*b^3*d+a*b^2*f+20*a^2*c*f-12*a*b*(a*h+2*c*d))*x^2/a^2/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)-3*c*(-b*g+2*c*e)*arctanh((2*c*x^2+b)/(-4*a*c+b^2)^(1/2))/(-4*a*c+b^2)^(5/2)+1/16*arctan(x^2^(1/2)*c^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2))*c^(1/2)*(3*b^3*d+a*b^2*f+20*a^2*c*f-12*a*b*(a*h+2*c*d)+(3*b^4*d+a*b^3*f-52*a^2*b*c*f-6*a*b^2*(-3*a*h+5*c*d)+24*a^2*c*(a*h+7*c*d))/(-4*a*c+b^2)^(1/2))/a^2/(-4*a*c+b^2)^2*2^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2)+1/16*arctan(x^2^(1/2)*c
```

$$\frac{\sqrt{b^2 - 4ac} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right) \left( \frac{-52a^2bcf + 24a^2c(ah + 7cd) + ab^3f - 6ab^2(5cd - 3ah) + 3b^4d}{\sqrt{b^2 - 4ac}} + 20a^2cf + ab^2f - 12ab(ah + 2cd) + \right)}{\sqrt{b^2 - 4ac} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b^2 - 4ac + b}}\right) \left( \frac{-52a^2bcf + 24a^2c(ah + 7cd) + ab^3f - 6ab^2(5cd - 3ah) + 3b^4d}{\sqrt{b^2 - 4ac}} + 20a^2cf + ab^2f - 12ab(ah + 2cd) + \right)} + \frac{8\sqrt{2}a^2(b^2 - 4ac)^2 \sqrt{b - \sqrt{b^2 - 4ac}}}{8\sqrt{2}a^2(b^2 - 4ac)^2 \sqrt{\sqrt{b^2 - 4ac} + b}} + \frac{x(cx^2(20a^2cf + ab^2f - 12ab(ah + 2cd)) + 3b^3d) + 8a^2bcf + 4a^2c(ah + 7cd) + ab^3f - ab^2(7ah + 25cd)}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} - \frac{3c(2ce - bg) \operatorname{arctanh}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{(b^2 - 4ac)^{5/2}} + \frac{x(x^2(abh - 2acf + bcd) - abf - 2a(cd - ah) + b^2d)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} + \frac{3(b + 2cx^2)(2ce - bg)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} - \frac{-2ag + x^2(2ce - bg) + be}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2}$$

## Rubi [A] (verified)

Time = 2.76 (sec) , antiderivative size = 679, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.286$ , Rules used = {1687, 1692, 1192, 1180, 211, 1261, 652, 628, 632, 212}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^3} dx$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(a + b\*x^2 + c\*x^4)^3,x]

[Out]  $-\frac{1}{4}*(b*e - 2*a*g + (2*c*e - b*g)*x^2)/((b^2 - 4*a*c)*(a + b*x^2 + c*x^4)^2) + (x*(b^2*d - a*b*f - 2*a*(c*d - a*h) + (b*c*d - 2*a*c*f + a*b*h)*x^2))/(4*a*(b^2 - 4*a*c)*(a + b*x^2 + c*x^4)^2) + (3*(2*c*e - b*g)*(b + 2*c*x^2))/(4*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4)) + (x*(3*b^4*d + a*b^3*f + 8*a^2*b*c*f + 4*a^2*c*(7*c*d + a*h) - a*b^2*(25*c*d + 7*a*h) + c*(3*b^3*d + a*b^2*f + 20*a^2*c*f - 12*a*b*(2*c*d + a*h))*x^2)/(8*a^2*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4)) + (\text{Sqrt}[c]*(3*b^3*d + a*b^2*f + 20*a^2*c*f - 12*a*b*(2*c*d + a*h) + (3*b^4*d + a*b^3*f - 52*a^2*b*c*f - 6*a*b^2*(5*c*d - 3*a*h) + 24*a^2*c*(7*c*d + a*h))/\text{Sqrt}[b^2 - 4*a*c])*ArcTan[(\text{Sqrt}[2]*\text{Sqrt}[c]*x)/\text{Sqrt}[b - \text{Sqrt}[b^2 - 4*a*c]])]/(8*\text{Sqrt}[2]*a^2*(b^2 - 4*a*c)^2*\text{Sqrt}[b - \text{Sqrt}[b^2 - 4*a*c]]) + (\text{Sqrt}[c]*(3*b^3*d + a*b^2*f + 20*a^2*c*f - 12*a*b*(2*c*d + a*h) - (3*b^4*d + a*b^3*f - 52*a^2*b*c*f - 6*a*b^2*(5*c*d - 3*a*h) + 24*a^2*c*(7*c*d + a*h))/\text{Sqrt}[b^2 - 4*a*c])*ArcTan[(\text{Sqrt}[2]*\text{Sqrt}[c]*x)/\text{Sqrt}[b + \text{Sqrt}[b^2 - 4*a*c]])]/(8*\text{Sqrt}[2]*a^2*(b^2 - 4*a*c)^2*\text{Sqrt}[b + \text{Sqrt}[b^2 - 4*a*c]]) - (3*c*(2*c*e - b*g)*ArcTanh[(b + 2*c*x^2)/\text{Sqrt}[b^2 - 4*a*c]])/(b^2 - 4*a*c)^(5/2)$



Rule 211

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

Rule 212

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

Rule 628

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^(p + 1)/((p + 1)\*(b^2 - 4\*a\*c))), x] - Dist[2\*c\*((2\*p + 3)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && IntegerQ[4\*p]

Rule 632

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

Rule 652

Int[((d\_) + (e\_)\*(x\_))\*((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[((b\*d - 2\*a\*e + (2\*c\*d - b\*e)\*x)/((p + 1)\*(b^2 - 4\*a\*c)))\*(a + b\*x + c\*x^2)^(p + 1), x] - Dist[(2\*p + 3)\*((2\*c\*d - b\*e)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2]

Rule 1180

Int[((d\_) + (e\_)\*(x\_)^2)/((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[e/2 + (2\*c\*d - b\*e)/(2\*q), Int[1/(b/2 - q/2 + c\*x^2), x], x] + Dist[e/2 - (2\*c\*d - b\*e)/(2\*q), Int[1/(b/2 + q/2 + c\*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - a\*e^2, 0] && PosQ[b^2 - 4\*a\*c]

Rule 1192

Int[((d\_) + (e\_)\*(x\_)^2)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Simp[x\*(a\*b\*e - d\*(b^2 - 2\*a\*c) - c\*(b\*d - 2\*a\*e)\*x^2)\*((a + b\*x^2 + c\*x^4)^(p + 1)/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c))), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[Simp[(2\*p + 3)\*d\*b^2 - a\*b\*e - 2\*a\*c\*d\*(4\*p + 5) + (4\*p + 7

```
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

### Rule 1261

```
Int[(x_)*((d_) + (e_)*(x_)^2)^(q_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(
p_), x_Symbol] := Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

### Rule 1692

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := With[{d =
Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[Poly
nomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^
4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b
^2 - 4*a*c)), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*
x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a
+ b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p
+ 7)*(b*d - 2*a*e)*x^2, x], x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^
2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1]
```

### Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{x(e + gx^2)}{(a + bx^2 + cx^4)^3} dx + \int \frac{d + fx^2 + hx^4}{(a + bx^2 + cx^4)^3} dx \\ &= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\ &\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{(a + bx + cx^2)^3} dx, x, x^2 \right) \\ &\quad - \frac{\int \frac{-3b^2d - abf + 2a(7cd + ah) - 5(bcd - 2acf + abh)x^2}{(a + bx^2 + cx^4)^2} dx}{4a(b^2 - 4ac)} \end{aligned}$$

$$\begin{aligned}
&= -\frac{be - 2ag + (2ce - bg)x^2}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{x(3b^4d + ab^3f + 8a^2bcf + 4a^2c(7cd + ah) - ab^2(25cd + 7ah) + c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah)))}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{\int \frac{3b^4d + ab^3f - 16a^2bcf - 3ab^2(9cd - ah) + 12a^2c(7cd + ah) + c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah))x^2}{a + bx^2 + cx^4} dx}{8a^2(b^2 - 4ac)^2} \\
&\quad - \frac{(3(2ce - bg))\text{Subst}\left(\int \frac{1}{(a + bx + cx^2)^2} dx, x, x^2\right)}{4(b^2 - 4ac)} \\
&= -\frac{be - 2ag + (2ce - bg)x^2}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{3(2ce - bg)(b + 2cx^2)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{x(3b^4d + ab^3f + 8a^2bcf + 4a^2c(7cd + ah) - ab^2(25cd + 7ah) + c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah)))}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{(3c(2ce - bg))\text{Subst}\left(\int \frac{1}{a + bx + cx^2} dx, x, x^2\right)}{2(b^2 - 4ac)^2} \\
&\quad + \frac{\left(c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah)) - \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right) \int \frac{1}{\sqrt{b^2 - 4ac}}}{16a^2(b^2 - 4ac)^2} \\
&\quad + \frac{\left(c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah)) + \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right) \int \frac{1}{\sqrt{b^2 - 4ac}}}{16a^2(b^2 - 4ac)^2}
\end{aligned}$$

$$\begin{aligned}
&= -\frac{be - 2ag + (2ce - bg)x^2}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{3(2ce - bg)(b + 2cx^2)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{x(3b^4d + ab^3f + 8a^2bcf + 4a^2c(7cd + ah) - ab^2(25cd + 7ah) + c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) + \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}})}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \tan^{-1} \\
&+ \frac{\sqrt{c}\left(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) - \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}} \tan^{-1} \\
&+ \frac{\sqrt{c}\left(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) - \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}} \tan^{-1} \\
&- \frac{(3c(2ce - bg))\text{Subst}\left(\int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2\right)}{(b^2 - 4ac)^2} \\
&= -\frac{be - 2ag + (2ce - bg)x^2}{4(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{3(2ce - bg)(b + 2cx^2)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{x(3b^4d + ab^3f + 8a^2bcf + 4a^2c(7cd + ah) - ab^2(25cd + 7ah) + c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) + \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}})}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \tan^{-1} \\
&+ \frac{\sqrt{c}\left(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) - \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}} \tan^{-1} \\
&+ \frac{\sqrt{c}\left(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) - \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}} \tan^{-1} \\
&- \frac{3c(2ce - bg) \tanh^{-1}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{(b^2 - 4ac)^{5/2}}
\end{aligned}$$



**Maple [C] (verified)**

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.24 (sec) , antiderivative size = 724, normalized size of antiderivative = 1.07

method	result
risch	$-\frac{c^2(12a^2bh-20a^2cf-ab^2f+24abcd-3b^3d)x^7}{8a^2(16a^2c^2-8ab^2c+b^4)} - \frac{3(bg-2ec)c^2x^6}{2(16a^2c^2-8ab^2c+b^4)} + \frac{c(4a^3ch-19a^2b^2h+28a^2bcf+28a^2c^2d+2ab^3f-49ab^2cd+6db^4)x^5}{8a^2(16a^2c^2-8ab^2c+b^4)} - \frac{4}{4}$
default	Expression too large to display

[In] int((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^3,x,method=\_RETURNVERBOSE)

[Out] 
$$\begin{aligned} & (-1/8*c^2*(12*a^2*b*h-20*a^2*c*f-a*b^2*f+24*a*b*c*d-3*b^3*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*x^7-3/2*(b*g-2*c*e)*c^2/(16*a^2*c^2-8*a*b^2*c+b^4)*x^6+1/8 \\ & /a^2*c*(4*a^3*c*h-19*a^2*b^2*h+28*a^2*b*c*f+28*a^2*c^2*d+2*a*b^3*f-49*a*b^2 \\ & *c*d+6*b^4*d)/(16*a^2*c^2-8*a*b^2*c+b^4)*x^5-9/4*b*(b*g-2*c*e)*c/(16*a^2*c^2-8*a*b^2*c+b^4)*x^4-1/8*(16*a^3*b*c*h-36*a^3*c^2*f+5*a^2*b^3*h-5*a^2*b^2*c \\ & *f+4*a^2*b*c^2*d-a*b^4*f+20*a*b^3*c*d-3*b^5*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*x^3-1/2*(5*a*c+b^2)*(b*g-2*c*e)/(16*a^2*c^2-8*a*b^2*c+b^4)*x^2-1/8*(12*a \\ & ^3*c*h+3*a^2*b^2*h-16*a^2*b*c*f-44*a^2*c^2*d+a*b^3*f+37*a*b^2*c*d-5*b^4*d)/ \\ & (16*a^2*c^2-8*a*b^2*c+b^4)/a*x-1/4*(8*a^2*c*g+a*b^2*g-10*a*b*c*e+b^3*e)/(16 \\ & *a^2*c^2-8*a*b^2*c+b^4)/(c*x^4+b*x^2+a)^2+1/16*sum((-c*(12*a^2*b*h-20*a^2* \\ & c*f-a*b^2*f+24*a*b*c*d-3*b^3*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*_R^2-24*(b*g \\ & -2*c*e)*c/(16*a^2*c^2-8*a*b^2*c+b^4)*_R+(12*a^3*c*h+3*a^2*b^2*h-16*a^2*b*c* \\ & f+84*a^2*c^2*d+a*b^3*f-27*a*b^2*c*d+3*b^4*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4) \\ & )/(2*_R^3*c+_R*b)*ln(x-_R),_R=RootOf(_Z^4*c+_Z^2*b+a)) \end{aligned}$$

**Fricas [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^3,x, algorithm="fricas")

[Out] Timed out

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

[In] integrate((h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a)\*\*3,x)

[Out] Timed out

**Maxima [F]**

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^3} dx = \int \frac{hx^4 + gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^3} dx$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^3,x, algorithm="maxima")

[Out] 
$$\begin{aligned} & -1/8*((12*a^2*b*c^2*h - 3*(b^3*c^2 - 8*a*b*c^3)*d - (a*b^2*c^2 + 20*a^2*c^3) \\ & ) * f) * x^7 - 12*(2*a^2*c^3*e - a^2*b*c^2*g) * x^6 - ((6*b^4*c - 49*a*b^2*c^2 + \\ & 28*a^2*c^3)*d + 2*(a*b^3*c + 14*a^2*b*c^2)*f - (19*a^2*b^2*c - 4*a^3*c^2)*h \\ & ) * x^5 - 18*(2*a^2*b*c^2*e - a^2*b^2*c*g) * x^4 - ((3*b^5 - 20*a*b^3*c - 4*a^2 \\ & *b*c^2)*d + (a*b^4 + 5*a^2*b^2*c + 36*a^3*c^2)*f - (5*a^2*b^3 + 16*a^3*b*c) \\ & ) * h) * x^3 - 4*(2*(a^2*b^2*c + 5*a^3*c^2)*e - (a^2*b^3 + 5*a^3*b*c)*g) * x^2 + 2 \\ & *(a^2*b^3 - 10*a^3*b*c)*e + 2*(a^3*b^2 + 8*a^4*c)*g - ((5*a*b^4 - 37*a^2*b^ \\ & 2*c + 44*a^3*c^2)*d - (a^2*b^3 - 16*a^3*b*c)*f - 3*(a^3*b^2 + 4*a^4*c)*h) * x \\ & ) / ((a^2*b^4*c^2 - 8*a^3*b^2*c^3 + 16*a^4*c^4) * x^8 + a^4*b^4 - 8*a^5*b^2*c + \\ & 16*a^6*c^2 + 2*(a^2*b^5*c - 8*a^3*b^3*c^2 + 16*a^4*b*c^3) * x^6 + (a^2*b^6 - \\ & 6*a^3*b^4*c + 32*a^5*c^3) * x^4 + 2*(a^3*b^5 - 8*a^4*b^3*c + 16*a^5*b*c^2) * x \\ & ^2) - 1/8*integrate(((12*a^2*b*c*h - 3*(b^3*c - 8*a*b*c^2)*d - (a*b^2*c + 2 \\ & 0*a^2*c^2)*f) * x^2 - 3*(b^4 - 9*a*b^2*c + 28*a^2*c^2)*d - (a*b^3 - 16*a^2*b* \\ & c)*f - 3*(a^2*b^2 + 4*a^3*c)*h - 24*(2*a^2*c^2*e - a^2*b*c*g) * x) / (c*x^4 + b \\ & *x^2 + a), x) / (a^2*b^4 - 8*a^3*b^2*c + 16*a^4*c^2) \end{aligned}$$

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 6854 vs. 2(627) = 1254.

Time = 3.09 (sec) , antiderivative size = 6854, normalized size of antiderivative = 10.09

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

[In] integrate((h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^3,x, algorithm="giac")

```
[Out] 1/32*(3*(sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^8 - 17*sqrt(2)*sqrt(b*c
+ sqrt(b^2 - 4*a*c))*a*b^6*c - 2*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*
b^7*c - 2*b^8*c + 116*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*b^4*c^2 +
26*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^5*c^2 + sqrt(2)*sqrt(b*c +
sqrt(b^2 - 4*a*c))*b^6*c^2 + 34*a*b^6*c^2 + 2*b^7*c^2 - 368*sqrt(2)*sqrt(
b*c + sqrt(b^2 - 4*a*c))*a^3*b^2*c^3 - 128*sqrt(2)*sqrt(b*c + sqrt(b^2 -
4*a*c))*a^2*b^3*c^3 - 13*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^4*c^
3 - 232*a^2*b^4*c^3 - 30*a*b^5*c^3 + 448*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*
c))*a^4*c^4 + 224*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^3*b*c^4 + 64*
sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*b^2*c^4 + 736*a^3*b^2*c^4 + 176
*a^2*b^3*c^4 - 112*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^3*c^5 - 896*a^
4*c^5 - 352*a^3*b*c^5 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a
*c))*b^7 + 15*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a
*b^5*c + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^6*c
- 88*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*b^3*c^2
- 22*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^4*c^2 -
sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^5*c^2 + 176*sqr
t(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^3*b*c^3 + 88*sqrt(
2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*b^2*c^3 + 11*sqrt(
2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^3*c^3 - 44*sqrt(2)
*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*b*c^4 + 2*(b^2 - 4*a
*c)*b^6*c - 26*(b^2 - 4*a*c)*a*b^4*c^2 - 2*(b^2 - 4*a*c)*b^5*c^2 + 128*(b^2
- 4*a*c)*a^2*b^2*c^3 + 22*(b^2 - 4*a*c)*a*b^3*c^3 - 224*(b^2 - 4*a*c)*a^3*
c^4 - 88*(b^2 - 4*a*c)*a^2*b*c^4)*d + (sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c)
)*a*b^7 - 24*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*b^5*c - 2*sqrt(2)
)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^6*c - 2*a*b^7*c + 144*sqrt(2)*sqrt(b*
c + sqrt(b^2 - 4*a*c))*a^3*b^3*c^2 + 40*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a
*c))*a^2*b^4*c^2 + sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^5*c^2 + 48
*a^2*b^5*c^2 + 2*a*b^6*c^2 - 256*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^
4*b*c^3 - 128*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^3*b^2*c^3 - 20*sqrt
(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*b^3*c^3 - 288*a^3*b^3*c^3 - 44*a^2*
b^4*c^3 + 64*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^3*b*c^4 + 512*a^4*b*
c^4 + 64*a^3*b^2*c^4 + 320*a^4*c^5 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + s
qrt(b^2 - 4*a*c))*a*b^6 + 22*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^
2 - 4*a*c))*a^2*b^4*c + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 -
4*a*c))*a*b^5*c - 32*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a
*c))*a^3*b^2*c^2 - 36*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a
*c))*a^2*b^3*c^2 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)
)*a*b^4*c^2 - 160*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*
c)*a^4*c^3 - 80*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a
^3*b*c^3 + 18*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2
*b^2*c^3 + 40*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^3
*c^4 + 2*(b^2 - 4*a*c)*a*b^5*c - 40*(b^2 - 4*a*c)*a^2*b^3*c^2 - 2*(b^2 - 4*
a*c)*a*b^4*c^2 + 128*(b^2 - 4*a*c)*a^3*b*c^3 + 36*(b^2 - 4*a*c)*a^2*b^2*c^3
+ 80*(b^2 - 4*a*c)*a^3*c^4)*f + 3*(sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)
```



$$\begin{aligned}
& a^2 b^6 - 4 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} a^3 b^4 c - 2 \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} a^2 b^5 c - 2 a^2 b^6 c - 16 \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} a^4 b^2 c^2 + \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} a^2 b^4 c^2 + 8 a^3 b^4 c^2 + 2 a^2 b^5 c^2 + 64 \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} a^5 c^3 + 32 \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} a^4 b c^3 + 32 a^4 b^2 c^3 + 16 a^3 b^3 c^3 - 16 \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} a^4 c^4 - 128 a^5 c^4 - 96 a^4 b c^4 - \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} a^2 b^5 - 8 \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} \sqrt{bc + \sqrt{b^2 - 4ac}} a^3 b^3 c + 2 \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} \sqrt{bc + \sqrt{b^2 - 4ac}} a^2 b^4 c + 48 \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} \sqrt{bc + \sqrt{b^2 - 4ac}} a^4 b c^2 + 24 \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} \sqrt{bc + \sqrt{b^2 - 4ac}} a^3 b^2 c^2 - \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} \sqrt{bc + \sqrt{b^2 - 4ac}} a^2 b^3 c^2 - 12 \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} \sqrt{bc + \sqrt{b^2 - 4ac}} a^3 b c^3 + 2 (b^2 - 4ac) a^2 b^4 c - 2 (b^2 - 4ac) a^2 b^3 c^2 - 32 (b^2 - 4ac) a^4 c^3 - 24 (b^2 - 4ac) a^3 b c^3) \operatorname{arctan} \left( \frac{2 \sqrt{2} x / \sqrt{(a^2 b^5 - 8 a^3 b^3 c + 16 a^4 b c^2 + \sqrt{(a^2 b^5 - 8 a^3 b^3 c + 16 a^4 b c^2)^2 - 4 (a^3 b^4 - 8 a^4 b^2 c + 16 a^5 c^2) (a^2 b^4 c - 8 a^3 b^2 c^2 + 16 a^4 c^3))}}{(a^2 b^4 c - 8 a^3 b^2 c^2 + 16 a^4 c^3)} \right) / ((a^3 b^8 - 16 a^4 b^6 c - 2 a^3 b^7 c + 96 a^5 b^4 c^2 + 24 a^4 b^5 c^2 + a^3 b^6 c^2 - 256 a^6 b^2 c^3 - 96 a^5 b^3 c^3 - 12 a^4 b^4 c^3 + 256 a^7 c^4 + 128 a^6 b c^4 + 48 a^5 b^2 c^4 - 64 a^6 c^5) \operatorname{abs}(c)) + 1/32 (3 (\sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}}) b^8 - 17 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} a b^6 c - 2 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} a^2 b^4 c^2 + 26 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} a^3 b^2 c^3 - 128 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} a^4 c^4 - 13 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} a^5 b c^4 + 2 32 a^2 b^4 c^3 + 30 a^3 b^5 c^3 + 448 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} a^4 c^4 + 224 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} a^3 b c^4 + 64 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} a^2 b^2 c^4 - 736 a^3 b^2 c^4 - 176 a^2 b^3 c^4 - 112 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} a^3 c^5 + 896 a^4 c^5 + 352 a^3 b c^5 + \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} \sqrt{bc - \sqrt{b^2 - 4ac}} a^2 b^7 - 15 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} \sqrt{bc - \sqrt{b^2 - 4ac}} a^3 b^5 c - 2 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} \sqrt{bc - \sqrt{b^2 - 4ac}} a^4 b^3 c^2 + 22 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} \sqrt{bc - \sqrt{b^2 - 4ac}} a^5 b^4 c^2 + \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} \sqrt{bc - \sqrt{b^2 - 4ac}} a^6 b^5 c^2 - 176 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} \sqrt{bc - \sqrt{b^2 - 4ac}} a^3 b^3 c^3 - 88 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} \sqrt{bc - \sqrt{b^2 - 4ac}} a^2 b^2 c^3 - 11 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} \sqrt{bc - \sqrt{b^2 - 4ac}} a^3 b^3 c^3 + 44 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}} \sqrt{bc - \sqrt{b^2 - 4ac}} a^2 b^4 c^4 - 2 (b^2 - 4ac) b^6 c + 26 (b^2 - 4ac) a b^4 c^2 + 2 (b^2 - 4ac) b^5 c^2 - 128 (b^2 - 4ac) a^2 b^2 c^3 - 22 (b^2 - 4ac) a^3 b^3 c^3 + 224 (b^2 - 4ac) a^3 c^4 + 88 (b^2 - 4ac) a^2 b c^4) d + (\sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}}) a
\end{aligned}$$

$$\begin{aligned}
& *b^7 - 24*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^5*c - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^6*c + 2*a*b^7*c + 144*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^3*c^2 + 40*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c^2 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^5*c^2 - 48*a^2*b^5*c^2 - 2*a*b^6*c^2 - 256*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b*c^3 - 128*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^2*c^3 - 20*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^3 + 288*a^3*b^3*c^3 + 44*a^2*b^4*c^3 + 64*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^4 - 512*a^4*b*c^4 - 64*a^3*b^2*c^4 - 320*a^4*c^5 + \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^6 - 22*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c - 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^5*c + 32*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^2*c^2 + 36*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^2 + \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^4*c^2 + 160*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*c^3 + 80*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^3 - 18*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^2*c^3 - 40*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*c^4 - 2*(b^2 - 4*a*c)*a*b^5*c + 40*(b^2 - 4*a*c)*a^2*b^3*c^2 + 2*(b^2 - 4*a*c)*a*b^4*c^2 - 128*(b^2 - 4*a*c)*a^3*b*c^3 - 36*(b^2 - 4*a*c)*a^2*b^2*c^3 - 80*(b^2 - 4*a*c)*a^3*c^4)*f + 3*(\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^6 - 4*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^4*c - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^5*c + 2*a^2*b^6*c - 16*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b^2*c^2 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c^2 - 8*a^3*b^4*c^2 - 2*a^2*b^5*c^2 + 64*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*c^3 + 32*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b*c^3 - 32*a^4*b^2*c^3 - 16*a^3*b^3*c^3 - 16*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*c^4 + 128*a^5*c^4 + 96*a^4*b*c^4 + \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^5 + 8*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^3*c - 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c - 48*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b*c^2 - 24*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^2*c^2 + \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^2 + 12*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^3 - 2*(b^2 - 4*a*c)*a^2*b^4*c + 2*(b^2 - 4*a*c)*a^2*b^3*c^2 + 32*(b^2 - 4*a*c)*a^4*c^3 + 24*(b^2 - 4*a*c)*a^3*b*c^3)*h)*\arctan(2*\sqrt{1/2}*x/\sqrt{(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 - \sqrt{(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))})/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)))/((a^3*b^8 - 16*a^4*b^6*c - 2*a^3*b^7*c + 96*a^5*b^4*c^2 + 24*a^4*b^5*c^2 + a^3*b^6*c^2 - 256*a^6*b^2*c^3 - 96*a^5*b^3*c^3 - 12*a^4*b^4*c^3 + 256*a^7*c^4 + 128*a^6*b*c^4 + 48*a^5*b^2*c^4 - 64*a^6*c^5)*\text{abs}(c)) - 3/2*(2*(b^2*c^4 - 4*a*c^5 - 2*b*c^5 + c^6)*\sqrt{b^2 - 4*a*c})*e + (b^3*c^3 - 4*a*b*c^4 - 2*b^2*c^4 + b*c^5)*\sqrt{b^2 - 4*a*c})*g)*\log(x^2 + 1/2*(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 + \sqrt{(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^
\end{aligned}$$

$$\begin{aligned}
& 3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)) \\
& )/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))/((b^8 - 16*a*b^6*c - 2*b^7*c + \\
& 96*a^2*b^4*c^2 + 24*a*b^5*c^2 + b^6*c^2 - 256*a^3*b^2*c^3 - 96*a^2*b^3*c^3 \\
& - 12*a*b^4*c^3 + 256*a^4*c^4 + 128*a^3*b*c^4 + 48*a^2*b^2*c^4 - 64*a^3*c^5) \\
& *c^2) + 3/2*(2*(b^2*c^4 - 4*a*c^5 - 2*b*c^5 + c^6)*sqrt(b^2 - 4*a*c)*e - (b \\
& ^3*c^3 - 4*a*b*c^4 - 2*b^2*c^4 + b*c^5)*sqrt(b^2 - 4*a*c)*g)*log(x^2 + 1/2* \\
& (a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 - sqrt((a^2*b^5 - 8*a^3*b^3*c + 16*a^ \\
& 4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2* \\
& c^2 + 16*a^4*c^3)))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))/((b^8 - 16*a* \\
& b^6*c - 2*b^7*c + 96*a^2*b^4*c^2 + 24*a*b^5*c^2 + b^6*c^2 - 256*a^3*b^2*c^3 \\
& - 96*a^2*b^3*c^3 - 12*a*b^4*c^3 + 256*a^4*c^4 + 128*a^3*b*c^4 + 48*a^2*b^2* \\
& *c^4 - 64*a^3*c^5)*c^2) + 1/8*(3*b^3*c^2*d*x^7 - 24*a*b*c^3*d*x^7 + a*b^2*c \\
& ^2*f*x^7 + 20*a^2*c^3*f*x^7 - 12*a^2*b*c^2*h*x^7 + 24*a^2*c^3*e*x^6 - 12*a^ \\
& 2*b*c^2*g*x^6 + 6*b^4*c*d*x^5 - 49*a*b^2*c^2*d*x^5 + 28*a^2*c^3*d*x^5 + 2*a \\
& *b^3*c*f*x^5 + 28*a^2*b*c^2*f*x^5 - 19*a^2*b^2*c*h*x^5 + 4*a^3*c^2*h*x^5 + \\
& 36*a^2*b*c^2*e*x^4 - 18*a^2*b^2*c*g*x^4 + 3*b^5*d*x^3 - 20*a*b^3*c*d*x^3 - \\
& 4*a^2*b*c^2*d*x^3 + a*b^4*f*x^3 + 5*a^2*b^2*c*f*x^3 + 36*a^3*c^2*f*x^3 - 5* \\
& a^2*b^3*h*x^3 - 16*a^3*b*c*h*x^3 + 8*a^2*b^2*c*e*x^2 + 40*a^3*c^2*e*x^2 - 4 \\
& *a^2*b^3*g*x^2 - 20*a^3*b*c*g*x^2 + 5*a*b^4*d*x - 37*a^2*b^2*c*d*x + 44*a^3 \\
& *c^2*d*x - a^2*b^3*f*x + 16*a^3*b*c*f*x - 3*a^3*b^2*h*x - 12*a^4*c*h*x - 2* \\
& a^2*b^3*e + 20*a^3*b*c*e - 2*a^3*b^2*g - 16*a^4*c*g)/(a^2*b^4 - 8*a^3*b^2* \\
& c + 16*a^4*c^2)*(c*x^4 + b*x^2 + a)^2)
\end{aligned}$$

### Mupad [B] (verification not implemented)

Time = 10.96 (sec) , antiderivative size = 23811, normalized size of antiderivative = 35.07

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4)/(a + b\*x^2 + c\*x^4)^3,x)

[Out] ((9\*x^4\*(2\*b\*c^2\*e - b^2\*c\*g))/(4\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) - (x^2\*(b^3\*g - 10\*a\*c^2\*e - 2\*b^2\*c\*e + 5\*a\*b\*c\*g))/(2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) - (b^3\*e + a\*b^2\*g + 8\*a^2\*c\*g - 10\*a\*b\*c\*e)/(4\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (x^5\*(28\*a^2\*c^3\*d + 4\*a^3\*c^2\*h + 6\*b^4\*c\*d + 2\*a\*b^3\*c\*f - 49\*a\*b^2\*c^2\*d + 28\*a^2\*b\*c^2\*f - 19\*a^2\*b^2\*c\*h))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (x^3\*(3\*b^5\*d + 36\*a^3\*c^2\*f - 5\*a^2\*b^3\*h + a\*b^4\*f - 20\*a\*b^3\*c\*d - 16\*a^3\*b\*c\*h - 4\*a^2\*b\*c^2\*d + 5\*a^2\*b^2\*c\*f))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) - (x\*(3\*a^2\*b^2\*h - 44\*a^2\*c^2\*d - 5\*b^4\*d + a\*b^3\*f + 12\*a^3\*c\*h + 37\*a\*b^2\*c\*d - 16\*a^2\*b\*c\*f))/(8\*a\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (3\*c^2\*x^6\*(2\*c\*e - b\*g))/(2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (c\*x^7\*(20\*a^2\*c^2\*f + 3\*b^3\*c\*d - 24\*a\*b\*c^2\*d + a\*b^2\*c\*f - 12\*a^2\*b\*c\*h))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)))/(x^4\*(2\*a\*c + b^2) + a^2 + c^2\*x^8 + 2\*a\*b\*x^2 + 2\*b\*c\*x^6) + symsum(log((10368\*a\*b^5\*c^6\*d^3 - 8000\*a^5\*c^7\*f^3

$$\begin{aligned}
& - 567*b^7*c^5*d^3 + 169344*a^3*b*c^8*d^3 + 193536*a^4*c^8*d*e^2 - 141120*a^4*c^8*d^2*f + 1728*a^6*b*c^5*h^3 + 315*b^8*c^4*d^2*f + 27648*a^5*c^7*e^2*h \\
& - 135*b^9*c^3*d^2*h - 2880*a^6*c^6*f*h^2 - 67824*a^2*b^3*c^7*d^3 + 35*a^2*b^6*c^4*f^3 + 84*a^3*b^4*c^5*f^3 - 12720*a^4*b^2*c^6*f^3 + 540*a^4*b^5*c^3*h^3 \\
& + 4320*a^5*b^3*c^4*h^3 - 40320*a^5*c^7*d*f*h - 6237*a*b^6*c^5*d^2*f + 210*a*b^7*c^4*d*f^2 + 116160*a^4*b*c^7*d*f^2 - 36864*a^4*b*c^7*e^2*f + 2430*a*b^7*c^4*d^2*h + 133056*a^4*b*c^7*d^2*h + 27648*a^5*b*c^6*d*h^2 + 26880*a^5*b*c^6*f^2*h + 6912*a^2*b^4*c^6*d*e^2 - 62208*a^3*b^2*c^7*d*e^2 + 42372*a^2*b^4*c^6*d^2*f - 1764*a^2*b^5*c^5*d*f^2 - 96048*a^3*b^2*c^7*d^2*f - 4608*a^3*b^3*c^6*d*f^2 + 1728*a^2*b^6*c^4*d*g^2 + 2304*a^3*b^3*c^6*e^2*f - 15552*a^3*b^4*c^5*d*g^2 + 48384*a^4*b^2*c^6*d*g^2 - 13716*a^2*b^5*c^5*d^2*h + 405*a^2*b^7*c^3*d*h^2 + 12096*a^3*b^3*c^6*d^2*h - 5400*a^3*b^5*c^4*d*h^2 + 28944*a^4*b^3*c^5*d*h^2 + 576*a^3*b^5*c^4*f*g^2 + 6912*a^4*b^2*c^6*e^2*h - 9216*a^4*b^3*c^5*f*g^2 - 15*a^2*b^7*c^3*f^2*h - 360*a^3*b^5*c^4*f^2*h + 135*a^3*b^6*c^3*f*h^2 + 15696*a^4*b^3*c^5*f^2*h - 5580*a^4*b^4*c^4*f*h^2 - 20592*a^5*b^2*c^5*f*h^2 + 1728*a^4*b^4*c^4*g^2*h + 6912*a^5*b^2*c^5*g^2*h - 193536*a^4*b*c^7*d*e*g - 90*a*b^8*c^3*d*f*h - 27648*a^5*b*c^6*e*g*h - 6912*a^2*b^5*c^5*d*e*g + 62208*a^3*b^3*c^6*d*e*g - 270*a^2*b^6*c^4*d*f*h + 16056*a^3*b^4*c^5*d*f*h - 2304*a^3*b^4*c^5*e*f*g - 127008*a^4*b^2*c^6*d*f*h + 36864*a^4*b^2*c^6*e*f*g - 6912*a^4*b^3*c^5*e*g*h)/(512*(a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) - \text{root}(56371445760*a^11*b^8*c^6*z^4 - 503316480*a^8*b^14*c^3*z^4 + 47185920*a^7*b^16*c^2*z^4 - 171798691840*a^14*b^2*c^9*z^4 + 193273528320*a^13*b^4*c^8*z^4 - 128849018880*a^12*b^6*c^7*z^4 - 16911433728*a^10*b^10*c^5*z^4 + 3523215360*a^9*b^12*c^4*z^4 - 2621440*a^6*b^18*c*z^4 + 68719476736*a^15*c^10*z^4 + 65536*a^5*b^20*z^4 - 46080*a^4*b^14*c*f*h*z^2 - 105984*a^3*b^15*c*d*h*z^2 - 73728*a^2*b^16*c*d*f*z^2 + 2548039680*a^9*b^3*c^7*d*h*z^2 + 1509949440*a^9*b^3*c^7*e*g*z^2 - 1401421824*a^8*b^5*c^6*d*h*z^2 - 1321205760*a^9*b^2*c^8*d*f*z^2 - 754974720*a^8*b^5*c^6*e*g*z^2 + 732168192*a^7*b^6*c^6*d*f*z^2 - 456130560*a^9*b^4*c^6*f*h*z^2 + 390463488*a^7*b^7*c^5*d*h*z^2 - 366280704*a^6*b^8*c^5*d*f*z^2 - 330301440*a^8*b^4*c^7*d*f*z^2 + 254017536*a^8*b^6*c^5*f*h*z^2 - 1887436800*a^10*b*c^8*d*h*z^2 + 188743680*a^10*b^2*c^7*f*h*z^2 + 188743680*a^7*b^7*c^5*e*g*z^2 - 61931520*a^7*b^8*c^4*f*h*z^2 + 96583680*a^5*b^10*c^4*d*f*z^2 - 51609600*a^6*b^9*c^4*d*h*z^2 + 614000*a^6*b^10*c^3*f*h*z^2 + 61440*a^5*b^12*c^2*f*h*z^2 - 23592960*a^6*b^9*c^4*e*g*z^2 + 1179648*a^5*b^11*c^3*e*g*z^2 + 829440*a^4*b^13*c^2*d*h*z^2 + 368640*a^5*b^11*c^3*d*h*z^2 - 15175680*a^4*b^12*c^3*d*f*z^2 + 1428480*a^3*b^14*c^2*d*f*z^2 - 1207959552*a^10*b*c^8*e*g*z^2 - 440401920*a^10*b*c^8*f^2*z^2 - 188743680*a^11*b*c^7*h^2*z^2 + 1761607680*a^10*c^9*d*f*z^2 + 46080*a^5*b^13*c*h^2*z^2 - 14080*a^3*b^15*c*f^2*z^2 + 6936330240*a^8*b^3*c^8*d^2*z^2 + 2464874496*a^6*b^7*c^6*d^2*z^2 - 3963617280*a^9*b*c^9*d^2*z^2 - 150994940*a^9*b^2*c^8*e^2*z^2 + 251658240*a^11*c^8*f*h*z^2 + 1536*a^3*b^16*f*h*z^2 + 4608*a^2*b^17*d*h*z^2 - 5400428544*a^7*b^5*c^7*d^2*z^2 - 94464*a*b^17*c*d^2*z^2 + 754974720*a^8*b^4*c^7*e^2*z^2 - 730054656*a^5*b^9*c^5*d^2*z^2 + 477102080*a^9*b^3*c^7*f^2*z^2 - 377487360*a^9*b^4*c^6*g^2*z^2 + 301989888*a^
\end{aligned}$$

$$\begin{aligned}
& 10*b^2*c^7*g^2*z^2 + 188743680*a^8*b^6*c^5*g^2*z^2 + 141557760*a^10*b^3*c^6 \\
& *h^2*z^2 - 174325760*a^8*b^5*c^6*f^2*z^2 - 188743680*a^7*b^6*c^6*e^2*z^2 + \\
& 146165760*a^4*b^11*c^4*d^2*z^2 - 47185920*a^7*b^8*c^4*g^2*z^2 - 26542080*a^ \\
& 8*b^7*c^4*h^2*z^2 + 9584640*a^7*b^9*c^3*h^2*z^2 - 2359296*a^9*b^5*c^5*h^2*z \\
& ^2 - 1290240*a^6*b^11*c^2*h^2*z^2 + 5898240*a^6*b^10*c^3*g^2*z^2 - 294912*a \\
& ^5*b^12*c^2*g^2*z^2 + 11206656*a^7*b^7*c^5*f^2*z^2 + 8929280*a^6*b^9*c^4*f^ \\
& 2*z^2 + 23592960*a^6*b^8*c^5*e^2*z^2 - 2600960*a^5*b^11*c^3*f^2*z^2 + 29184 \\
& 0*a^4*b^13*c^2*f^2*z^2 - 19860480*a^3*b^13*c^3*d^2*z^2 - 1179648*a^5*b^10*c \\
& ^4*e^2*z^2 + 1771776*a^2*b^15*c^2*d^2*z^2 + 1536*a*b^18*d*f*z^2 + 120795955 \\
& 2*a^10*c^9*e^2*z^2 + 2304*a^4*b^15*h^2*z^2 + 256*a^2*b^17*f^2*z^2 + 2304*b^ \\
& 19*d^2*z^2 + 169869312*a^7*b*c^8*d*e*f*z + 99090432*a^8*b*c^7*d*g*h*z - 460 \\
& 8*a^3*b^12*c*f*g*h*z - 9437184*a^8*b*c^7*e*f*h*z - 13824*a^2*b^13*c*d*g*h*z \\
& + 9216*a*b^13*c^2*d*e*f*z - 4608*a*b^14*c*d*f*g*z + 219414528*a^7*b^2*c^7* \\
& d*e*h*z - 221773824*a^6*b^3*c^7*d*e*f*z - 109707264*a^7*b^3*c^6*d*g*h*z + 1 \\
& 10886912*a^6*b^4*c^6*d*f*g*z - 88473600*a^6*b^4*c^6*d*e*h*z - 84934656*a^7* \\
& b^2*c^7*d*f*g*z + 117964800*a^5*b^5*c^6*d*e*f*z + 44236800*a^6*b^5*c^5*d*g* \\
& h*z - 5898240*a^7*b^4*c^5*f*g*h*z + 4718592*a^8*b^2*c^6*f*g*h*z + 2949120*a \\
& ^6*b^6*c^4*f*g*h*z - 737280*a^5*b^8*c^3*f*g*h*z + 92160*a^4*b^10*c^2*f*g*h* \\
& z - 58982400*a^5*b^6*c^5*d*f*g*z + 11796480*a^7*b^3*c^6*e*f*h*z - 6635520*a \\
& ^5*b^7*c^4*d*g*h*z - 5898240*a^6*b^5*c^5*e*f*h*z + 1474560*a^5*b^7*c^4*e*f* \\
& h*z - 276480*a^4*b^9*c^3*d*g*h*z - 184320*a^4*b^9*c^3*e*f*h*z + 179712*a^3* \\
& b^11*c^2*d*g*h*z + 9216*a^3*b^11*c^2*e*f*h*z + 16220160*a^4*b^8*c^4*d*f*g*z \\
& + 13271040*a^5*b^6*c^5*d*e*h*z - 2396160*a^3*b^10*c^3*d*f*g*z + 552960*a^4 \\
& *b^8*c^4*d*e*h*z - 359424*a^3*b^10*c^3*d*e*h*z + 175104*a^2*b^12*c^2*d*f*g* \\
& z + 27648*a^2*b^12*c^2*d*e*h*z - 32440320*a^4*b^7*c^5*d*e*f*z + 4792320*a^3 \\
& *b^9*c^4*d*e*f*z - 350208*a^2*b^11*c^3*d*e*f*z + 346816512*a^7*b*c^8*d^2*g* \\
& z + 7077888*a^9*b*c^6*g*h^2*z - 6912*a^4*b^11*c*g*h^2*z - 19660800*a^8*b*c^ \\
& 7*f^2*g*z - 768*a^2*b^13*c*f^2*g*z + 214272*a*b^13*c^2*d^2*g*z - 428544*a*b \\
& ^12*c^3*d^2*e*z - 198180864*a^8*c^8*d*e*h*z + 1022754816*a^6*b^2*c^8*d^2*e* \\
& z - 642318336*a^5*b^4*c^7*d^2*e*z - 511377408*a^6*b^3*c^7*d^2*g*z + 3211591 \\
& 68*a^5*b^5*c^6*d^2*g*z + 223395840*a^4*b^6*c^6*d^2*e*z - 111697920*a^4*b^7* \\
& c^5*d^2*g*z - 8847360*a^8*b^3*c^5*g*h^2*z + 4423680*a^7*b^5*c^4*g*h^2*z - 1 \\
& 105920*a^6*b^7*c^3*g*h^2*z + 138240*a^5*b^9*c^2*g*h^2*z + 25362432*a^7*b^3* \\
& c^6*f^2*g*z + 17694720*a^8*b^2*c^6*e*h^2*z - 50724864*a^7*b^2*c^7*e*f^2*z - \\
& 13271040*a^6*b^5*c^5*f^2*g*z - 8847360*a^7*b^4*c^5*e*h^2*z + 3563520*a^5*b \\
& ^7*c^4*f^2*g*z + 2211840*a^6*b^6*c^4*e*h^2*z - 506880*a^4*b^9*c^3*f^2*g*z - \\
& 276480*a^5*b^8*c^3*e*h^2*z + 34560*a^3*b^11*c^2*f^2*g*z + 13824*a^4*b^10*c \\
& ^2*e*h^2*z + 26542080*a^6*b^4*c^6*e*f^2*z + 23362560*a^3*b^9*c^4*d^2*g*z - \\
& 46725120*a^3*b^8*c^5*d^2*e*z - 7127040*a^5*b^6*c^5*e*f^2*z - 2965248*a^2*b^ \\
& 11*c^3*d^2*g*z + 1013760*a^4*b^8*c^4*e*f^2*z - 69120*a^3*b^10*c^3*e*f^2*z + \\
& 1536*a^2*b^12*c^2*e*f^2*z + 5930496*a^2*b^10*c^4*d^2*e*z - 693633024*a^7*c \\
& ^9*d^2*e*z - 14155776*a^9*c^7*e*h^2*z + 39321600*a^8*c^8*e*f^2*z + 13824*b^ \\
& 14*c^2*d^2*e*z - 6912*b^15*c*d^2*g*z + 2211840*a^6*b*c^6*e*f*g*h + 15482880 \\
& *a^5*b*c^7*d*e*f*g - 13824*a*b^9*c^3*d*e*f*g + 4423680*a^5*b^3*c^5*e*f*g*h \\
& + 138240*a^4*b^5*c^4*e*f*g*h - 13824*a^3*b^7*c^3*e*f*g*h - 16588800*a^5*b^2
\end{aligned}$$

$$\begin{aligned}
& *c^6*d*e*g*h + 1658880*a^4*b^4*c^5*d*e*g*h + 124416*a^3*b^6*c^4*d*e*g*h - 4 \\
& 1472*a^2*b^8*c^3*d*e*g*h + 7741440*a^4*b^3*c^6*d*e*f*g - 2903040*a^3*b^5*c^ \\
& 5*d*e*f*g + 387072*a^2*b^7*c^4*d*e*f*g - 37062144*a^5*b*c^7*d^2*f*h - 59857 \\
& 92*a^6*b*c^6*d*f*h^2 + 206010*a*b^9*c^3*d^2*f*h - 6300*a*b^10*c^2*d*f^2*h + \\
& 16588800*a^5*b*c^7*d*e^2*h + 3456*a*b^10*c^2*d*f*g^2 + 435456*a*b^8*c^4*d^ \\
& 2*e*g + 13824*a*b^8*c^4*d*e^2*f + 1350*a*b^11*c*d*f*h^2 - 1105920*a^5*b^4*c \\
& ^4*f*g^2*h - 552960*a^6*b^2*c^5*f*g^2*h - 34560*a^4*b^6*c^3*f*g^2*h + 3456* \\
& a^3*b^8*c^2*f*g^2*h - 1658880*a^6*b^2*c^5*e*g*h^2 - 829440*a^5*b^4*c^4*e*g* \\
& h^2 - 20736*a^4*b^6*c^3*e*g*h^2 - 4423680*a^5*b^2*c^6*e^2*f*h + 4147200*a^5 \\
& *b^3*c^5*d*g^2*h - 414720*a^4*b^5*c^4*d*g^2*h - 138240*a^4*b^4*c^5*e^2*f*h \\
& - 31104*a^3*b^7*c^3*d*g^2*h + 13824*a^3*b^6*c^4*e^2*f*h + 10368*a^2*b^9*c^2 \\
& *d*g^2*h + 15630336*a^5*b^2*c^6*d*f^2*h - 14459904*a^4*b^3*c^6*d^2*f*h + 96 \\
& 30144*a^3*b^5*c^5*d^2*f*h - 8764416*a^5*b^3*c^5*d*f*h^2 - 3870720*a^5*b^2*c \\
& ^6*e*f^2*g + 2867328*a^4*b^4*c^5*d*f^2*h - 2095200*a^2*b^7*c^4*d^2*f*h - 14 \\
& 14080*a^3*b^6*c^4*d*f^2*h - 34836480*a^4*b^2*c^7*d^2*e*g - 645120*a^4*b^4*c \\
& ^5*e*f^2*g + 306720*a^3*b^7*c^3*d*f*h^2 + 197820*a^2*b^8*c^3*d*f^2*h + 1468 \\
& 80*a^4*b^5*c^4*d*f*h^2 + 80640*a^3*b^6*c^4*e*f^2*g - 55350*a^2*b^9*c^2*d*f* \\
& h^2 - 2304*a^2*b^8*c^3*e*f^2*g - 3870720*a^5*b^2*c^6*d*f*g^2 - 1935360*a^4* \\
& b^4*c^5*d*f*g^2 - 1658880*a^4*b^3*c^6*d*e^2*h + 725760*a^3*b^6*c^4*d*f*g^2 \\
& + 17418240*a^3*b^4*c^6*d^2*e*g - 124416*a^3*b^5*c^5*d*e^2*h - 96768*a^2*b^8 \\
& *c^3*d*f*g^2 + 41472*a^2*b^7*c^4*d*e^2*h - 3919104*a^2*b^6*c^5*d^2*e*g - 77 \\
& 41440*a^4*b^2*c^7*d*e^2*f + 2903040*a^3*b^4*c^6*d*e^2*f - 387072*a^2*b^6*c^ \\
& 5*d*e^2*f - 1648128*a^5*b^3*c^5*f^3*h - 898560*a^6*b^3*c^4*f*h^3 - 354240*a \\
& ^5*b^5*c^3*f*h^3 - 354240*a^4*b^5*c^4*f^3*h + 43680*a^3*b^7*c^3*f^3*h - 216 \\
& 00*a^4*b^7*c^2*f*h^3 - 1050*a^2*b^9*c^2*f^3*h + 225*a^2*b^10*c*f^2*h^2 + 16 \\
& 58880*a^6*b*c^6*e^2*h^2 + 16547328*a^4*b^2*c^7*d^3*h - 12306816*a^3*b^4*c^6 \\
& *d^3*h + 37310976*a^3*b^3*c^7*d^3*f + 3037824*a^2*b^6*c^5*d^3*h - 2654208*a \\
& ^5*b^3*c^5*e*g^3 + 1949184*a^6*b^2*c^5*d*h^3 + 1296000*a^5*b^4*c^4*d*h^3 - \\
& 155520*a^4*b^6*c^3*d*h^3 - 40500*a*b^10*c^2*d^2*h^2 - 8100*a^3*b^8*c^2*d*h^ \\
& 3 + 3870720*a^5*b*c^7*e^2*f^2 + 34836480*a^4*b*c^8*d^2*e^2 - 108864*a*b^9*c \\
& ^3*d^2*g^2 - 8068032*a^2*b^5*c^6*d^3*f - 5623296*a^4*b^3*c^6*d*f^3 + 173779 \\
& 2*a^3*b^5*c^5*d*f^3 - 260190*a*b^8*c^4*d^2*f^2 - 211680*a^2*b^7*c^4*d*f^3 - \\
& 435456*a*b^7*c^5*d^2*e^2 - 2211840*a^6*c^7*e^2*f*h - 9450*b^11*c^2*d^2*f*h \\
& + 1612800*a^6*c^7*d*f^2*h - 20736*b^10*c^3*d^2*e*g - 75188736*a^4*b*c^8*d^ \\
& 3*f - 883200*a^6*b*c^6*f^3*h - 317952*a^7*b*c^5*f*h^3 + 1350*a^3*b^9*c*f*h^ \\
& 3 - 15482880*a^5*c^8*d*e^2*f - 10616832*a^5*b*c^7*e^3*g - 345060*a*b^8*c^4* \\
& d^3*h + 4050*a^2*b^10*c*d*h^3 - 4262400*a^5*b*c^7*d*f^3 + 852768*a*b^7*c^5* \\
& d^3*f + 7350*a*b^9*c^3*d*f^3 + 414720*a^6*b^3*c^4*g^2*h^2 + 207360*a^5*b^5* \\
& c^3*g^2*h^2 + 5184*a^4*b^7*c^2*g^2*h^2 + 1684224*a^6*b^2*c^5*f^2*h^2 + 1264 \\
& 320*a^5*b^4*c^4*f^2*h^2 + 126720*a^4*b^6*c^3*f^2*h^2 - 13950*a^3*b^8*c^2*f^ \\
& 2*h^2 + 967680*a^5*b^3*c^5*f^2*g^2 + 829440*a^5*b^3*c^5*e^2*h^2 + 161280*a^ \\
& 4*b^5*c^4*f^2*g^2 + 20736*a^4*b^5*c^4*e^2*h^2 - 20160*a^3*b^7*c^3*f^2*g^2 + \\
& 576*a^2*b^9*c^2*f^2*g^2 + 11487744*a^5*b^2*c^6*d^2*h^2 + 7962624*a^5*b^2*c \\
& ^6*e^2*g^2 + 35525376*a^4*b^2*c^7*d^2*f^2 - 1412640*a^3*b^6*c^4*d^2*h^2 + 4 \\
& 61376*a^4*b^4*c^5*d^2*h^2 + 375030*a^2*b^8*c^3*d^2*h^2 + 8709120*a^4*b^3*c^
\end{aligned}$$

$$\begin{aligned}
& 6*d^2*g^2 - 4354560*a^3*b^5*c^5*d^2*g^2 + 979776*a^2*b^7*c^4*d^2*g^2 + 6451 \\
& 20*a^4*b^3*c^6*e^2*f^2 - 80640*a^3*b^5*c^5*e^2*f^2 + 2304*a^2*b^7*c^4*e^2*f \\
& ^2 - 15269184*a^3*b^4*c^6*d^2*f^2 + 2870784*a^2*b^6*c^5*d^2*f^2 - 17418240* \\
& a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c^6*d^2*e^2 + 115200*a^7*c^6*f^2*h^2 \\
& + 6096384*a^6*c^7*d^2*h^2 + 5184*b^11*c^2*d^2*g^2 + 11025*b^10*c^3*d^2*f^2 \\
& + 5644800*a^5*c^8*d^2*f^2 + 142560*a^6*b^4*c^3*h^4 + 103680*a^7*b^2*c^4*h^4 \\
& + 32400*a^5*b^6*c^2*h^4 + 20736*b^9*c^4*d^2*e^2 + 331776*a^5*b^4*c^4*g^4 + \\
& 492800*a^5*b^2*c^6*f^4 + 351456*a^4*b^4*c^5*f^4 - 43120*a^3*b^6*c^4*f^4 + \\
& 1225*a^2*b^8*c^3*f^4 - 27433728*a^3*b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 + \\
& 28449792*a^5*c^8*d^3*h + 17010*b^10*c^3*d^3*h + 2025*b^12*c*d^2*h^2 + 5806 \\
& 08*a^7*c^6*d*h^3 - 39690*b^9*c^4*d^3*f + 2025*a^4*b^8*c*h^4 - 734832*a*b^6* \\
& c^6*d^4 + 20736*a^8*c^5*h^4 + 49787136*a^4*c^9*d^4 + 160000*a^6*c^7*f^4 + 5 \\
& 308416*a^5*c^8*e^4 + 35721*b^8*c^5*d^4, z, k)*((983040*a^7*c^8*e*f - 324403 \\
& 2*a^6*b*c^8*d*e - 884736*a^7*b*c^7*e*h - 491520*a^7*b*c^7*f*g - 4608*a^2*b^ \\
& 9*c^4*d*e + 87552*a^3*b^7*c^5*d*e - 681984*a^4*b^5*c^6*d*e + 2433024*a^5*b^ \\
& 3*c^7*d*e + 2304*a^2*b^10*c^3*d*g - 43776*a^3*b^8*c^4*d*g - 1536*a^3*b^8*c^ \\
& 4*e*f + 340992*a^4*b^6*c^5*d*g + 39936*a^4*b^6*c^5*e*f - 1216512*a^5*b^4*c^ \\
& 6*d*g - 184320*a^5*b^4*c^6*e*f + 1622016*a^6*b^2*c^7*d*g - 49152*a^6*b^2*c^ \\
& 7*e*f + 768*a^3*b^9*c^3*f*g - 4608*a^4*b^7*c^4*e*h - 19968*a^4*b^7*c^4*f*g \\
& - 18432*a^5*b^5*c^5*e*h + 92160*a^5*b^5*c^5*f*g + 368640*a^6*b^3*c^6*e*h + \\
& 24576*a^6*b^3*c^6*f*g + 2304*a^4*b^8*c^3*g*h + 9216*a^5*b^6*c^4*g*h - 18432 \\
& 0*a^6*b^4*c^5*g*h + 442368*a^7*b^2*c^6*g*h)/(512*(a^4*b^12 + 4096*a^10*c^6 \\
& - 24*a^5*b^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6 \\
& 144*a^9*b^2*c^5)) - \text{root}(56371445760*a^11*b^8*c^6*z^4 - 503316480*a^8*b^14* \\
& c^3*z^4 + 47185920*a^7*b^16*c^2*z^4 - 171798691840*a^14*b^2*c^9*z^4 + 19327 \\
& 3528320*a^13*b^4*c^8*z^4 - 128849018880*a^12*b^6*c^7*z^4 - 16911433728*a^10 \\
& *b^10*c^5*z^4 + 3523215360*a^9*b^12*c^4*z^4 - 2621440*a^6*b^18*c*z^4 + 6871 \\
& 9476736*a^15*c^10*z^4 + 65536*a^5*b^20*z^4 - 46080*a^4*b^14*c*f*h*z^2 - 105 \\
& 984*a^3*b^15*c*d*h*z^2 - 73728*a^2*b^16*c*d*f*z^2 + 2548039680*a^9*b^3*c^7* \\
& d*h*z^2 + 1509949440*a^9*b^3*c^7*e*g*z^2 - 1401421824*a^8*b^5*c^6*d*h*z^2 - \\
& 1321205760*a^9*b^2*c^8*d*f*z^2 - 754974720*a^8*b^5*c^6*e*g*z^2 + 732168192 \\
& *a^7*b^6*c^6*d*f*z^2 - 456130560*a^9*b^4*c^6*f*h*z^2 + 390463488*a^7*b^7*c^ \\
& 5*d*h*z^2 - 366280704*a^6*b^8*c^5*d*f*z^2 - 330301440*a^8*b^4*c^7*d*f*z^2 + \\
& 254017536*a^8*b^6*c^5*f*h*z^2 - 1887436800*a^10*b*c^8*d*h*z^2 + 188743680* \\
& a^10*b^2*c^7*f*h*z^2 + 188743680*a^7*b^7*c^5*e*g*z^2 - 61931520*a^7*b^8*c^4 \\
& *f*h*z^2 + 96583680*a^5*b^10*c^4*d*f*z^2 - 51609600*a^6*b^9*c^4*d*h*z^2 + 6 \\
& 144000*a^6*b^10*c^3*f*h*z^2 + 61440*a^5*b^12*c^2*f*h*z^2 - 23592960*a^6*b^9 \\
& *c^4*e*g*z^2 + 1179648*a^5*b^11*c^3*e*g*z^2 + 829440*a^4*b^13*c^2*d*h*z^2 + \\
& 368640*a^5*b^11*c^3*d*h*z^2 - 15175680*a^4*b^12*c^3*d*f*z^2 + 1428480*a^3* \\
& b^14*c^2*d*f*z^2 - 1207959552*a^10*b*c^8*e*g*z^2 - 440401920*a^10*b*c^8*f^2 \\
& *z^2 - 188743680*a^11*b*c^7*h^2*z^2 + 1761607680*a^10*c^9*d*f*z^2 + 46080*a \\
& ^5*b^13*c*h^2*z^2 - 14080*a^3*b^15*c*f^2*z^2 + 6936330240*a^8*b^3*c^8*d^2*z \\
& ^2 + 2464874496*a^6*b^7*c^6*d^2*z^2 - 3963617280*a^9*b*c^9*d^2*z^2 - 150994 \\
& 9440*a^9*b^2*c^8*e^2*z^2 + 251658240*a^11*c^8*f*h*z^2 + 1536*a^3*b^16*f*h*z \\
& ^2 + 4608*a^2*b^17*d*h*z^2 - 5400428544*a^7*b^5*c^7*d^2*z^2 - 94464*a*b^17*
\end{aligned}$$

$c^d^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730054656a^5b^9c^5d^2z^2 +$   
 $477102080a^9b^3c^7f^2z^2 - 377487360a^9b^4c^6g^2z^2 + 301989888a^$   
 $a^{10}b^2c^7g^2z^2 + 188743680a^8b^6c^5g^2z^2 + 141557760a^{10}b^3c^$   
 $^6h^2z^2 - 174325760a^8b^5c^6f^2z^2 - 188743680a^7b^6c^6e^2z^2$   
 $+ 146165760a^4b^{11}c^4d^2z^2 - 47185920a^7b^8c^4g^2z^2 - 26542080a^$   
 $a^8b^7c^4h^2z^2 + 9584640a^7b^9c^3h^2z^2 - 2359296a^9b^5c^5h^2$   
 $z^2 - 1290240a^6b^{11}c^2h^2z^2 + 5898240a^6b^{10}c^3g^2z^2 - 294912$   
 $a^5b^{12}c^2g^2z^2 + 11206656a^7b^7c^5f^2z^2 + 8929280a^6b^9c^4f^$   
 $f^2z^2 + 23592960a^6b^8c^5e^2z^2 - 2600960a^5b^{11}c^3f^2z^2 + 291$   
 $840a^4b^{13}c^2f^2z^2 - 19860480a^3b^{13}c^3d^2z^2 - 1179648a^5b^{10}$   
 $c^4e^2z^2 + 1771776a^2b^{15}c^2d^2z^2 + 1536a^*b^{18}d^*f^*z^2 + 1207959$   
 $552a^{10}c^9e^2z^2 + 2304a^4b^{15}h^2z^2 + 256a^2b^{17}f^2z^2 + 2304*$   
 $b^{19}d^2z^2 + 169869312a^7b^*c^8d^*e^*f^*z + 99090432a^8b^*c^7d^*g^*h^*z - 4$   
 $608a^3b^{12}c^*f^*g^*h^*z - 9437184a^8b^*c^7e^*f^*h^*z - 13824a^2b^{13}c^*d^*g^*h^*$   
 $*z + 9216a^*b^{13}c^2d^*e^*f^*z - 4608a^*b^{14}c^*d^*f^*g^*z + 219414528a^7b^2c^$   
 $7d^*e^*h^*z - 221773824a^6b^3c^7d^*e^*f^*z - 109707264a^7b^3c^6d^*g^*h^*z +$   
 $110886912a^6b^4c^6d^*f^*g^*z - 88473600a^6b^4c^6d^*e^*h^*z - 84934656a^$   
 $7b^2c^7d^*f^*g^*z + 117964800a^5b^5c^6d^*e^*f^*z + 44236800a^6b^5c^5d^*$   
 $g^*h^*z - 5898240a^7b^4c^5f^*g^*h^*z + 4718592a^8b^2c^6f^*g^*h^*z + 2949120$   
 $a^6b^6c^4f^*g^*h^*z - 737280a^5b^8c^3f^*g^*h^*z + 92160a^4b^{10}c^2f^*g^*$   
 $h^*z - 58982400a^5b^6c^5d^*f^*g^*z + 11796480a^7b^3c^6e^*f^*h^*z - 6635520$   
 $a^5b^7c^4d^*g^*h^*z - 5898240a^6b^5c^5e^*f^*h^*z + 1474560a^5b^7c^4e^*$   
 $f^*h^*z - 276480a^4b^9c^3d^*g^*h^*z - 184320a^4b^9c^3e^*f^*h^*z + 179712a^$   
 $3b^{11}c^2d^*g^*h^*z + 9216a^3b^{11}c^2e^*f^*h^*z + 16220160a^4b^8c^4d^*f^*g^*$   
 $*z + 13271040a^5b^6c^5d^*e^*h^*z - 2396160a^3b^{10}c^3d^*f^*g^*z + 552960a^$   
 $^4b^8c^4d^*e^*h^*z - 359424a^3b^{10}c^3d^*e^*h^*z + 175104a^2b^{12}c^2d^*f^*$   
 $g^*z + 27648a^2b^{12}c^2d^*e^*h^*z - 32440320a^4b^7c^5d^*e^*f^*z + 4792320a^$   
 $^3b^9c^4d^*e^*f^*z - 350208a^2b^{11}c^3d^*e^*f^*z + 346816512a^7b^*c^8d^2*$   
 $g^*z + 7077888a^9b^*c^6g^*h^2z - 6912a^4b^{11}c^*g^*h^2z - 19660800a^8b^*$   
 $c^7f^2g^*z - 768a^2b^{13}c^*f^2g^*z + 214272a^*b^{13}c^2d^2g^*z - 428544a^*$   
 $b^{12}c^3d^2e^*z - 198180864a^8c^8d^*e^*h^*z + 1022754816a^6b^2c^8d^2*$   
 $e^*z - 642318336a^5b^4c^7d^2e^*z - 511377408a^6b^3c^7d^2g^*z + 32115$   
 $9168a^5b^5c^6d^2g^*z + 223395840a^4b^6c^6d^2e^*z - 111697920a^4b^$   
 $7c^5d^2g^*z - 8847360a^8b^3c^5g^*h^2z + 4423680a^7b^5c^4g^*h^2z -$   
 $1105920a^6b^7c^3g^*h^2z + 138240a^5b^9c^2g^*h^2z + 25362432a^7b^$   
 $3c^6f^2g^*z + 17694720a^8b^2c^6e^*h^2z - 50724864a^7b^2c^7e^*f^2z$   
 $- 13271040a^6b^5c^5f^2g^*z - 8847360a^7b^4c^5e^*h^2z + 3563520a^5$   
 $b^7c^4f^2g^*z + 2211840a^6b^6c^4e^*h^2z - 506880a^4b^9c^3f^2g^*z$   
 $- 276480a^5b^8c^3e^*h^2z + 34560a^3b^{11}c^2f^2g^*z + 13824a^4b^{10}$   
 $c^2e^*h^2z + 26542080a^6b^4c^6e^*f^2z + 23362560a^3b^9c^4d^2g^*z$   
 $- 46725120a^3b^8c^5d^2e^*z - 7127040a^5b^6c^5e^*f^2z - 2965248a^2*$   
 $b^{11}c^3d^2g^*z + 1013760a^4b^8c^4e^*f^2z - 69120a^3b^{10}c^3e^*f^2z$   
 $+ 1536a^2b^{12}c^2e^*f^2z + 5930496a^2b^{10}c^4d^2e^*z - 693633024a^7$   
 $c^9d^2e^*z - 14155776a^9c^7e^*h^2z + 39321600a^8c^8e^*f^2z + 13824*$   
 $b^{14}c^2d^2e^*z - 6912b^{15}c^*d^2g^*z + 2211840a^6b^*c^6e^*f^*g^*h + 154828$



$$\begin{aligned}
& 80a^5b^7c^7d^7e^7f^7g^7h^7 - 13824a^5b^9c^3d^7e^7f^7g^7h^7 + 4423680a^5b^3c^5e^7f^7g^7h^7 \\
& + 138240a^4b^5c^4e^7f^7g^7h^7 - 13824a^3b^7c^3e^7f^7g^7h^7 - 16588800a^5b^2c^6d^7e^7g^7h^7 \\
& + 1658880a^4b^4c^5d^7e^7g^7h^7 + 124416a^3b^6c^4d^7e^7g^7h^7 - 41472a^2b^8c^3d^7e^7g^7h^7 \\
& + 7741440a^4b^3c^6d^7e^7f^7g^7h^7 - 2903040a^3b^5c^5d^7e^7f^7g^7h^7 + 387072a^2b^7c^4d^7e^7f^7g^7h^7 \\
& - 37062144a^5b^7c^7d^2f^7h^7 - 5985792a^6b^7c^6d^7f^7h^7 + 206010a^5b^9c^3d^2f^7h^7 - 6300a^5b^10c^2d^7f^7h^7 \\
& + 16588800a^5b^7c^7d^7e^2h^7 + 3456a^5b^10c^2d^7f^7g^2h^7 + 435456a^5b^8c^4d^2e^7g^7h^7 \\
& + 13824a^5b^8c^4d^7e^2f^7h^7 + 1350a^5b^11c^2d^7f^7h^7 - 1105920a^5b^4c^4f^7g^2h^7 \\
& - 552960a^6b^2c^5f^7g^2h^7 - 34560a^4b^6c^3f^7g^2h^7 + 3456a^3b^8c^2f^7g^2h^7 \\
& - 1658880a^6b^2c^5e^7g^7h^7 - 829440a^5b^4c^4e^7g^7h^7 - 20736a^4b^6c^3e^7g^7h^7 \\
& - 4423680a^5b^2c^6e^2f^7h^7 + 4147200a^5b^3c^5d^7g^2h^7 - 414720a^4b^5c^4d^7g^2h^7 \\
& - 138240a^4b^4c^5e^2f^7h^7 - 31104a^3b^7c^3d^7g^2h^7 + 13824a^3b^6c^4e^2f^7h^7 \\
& + 10368a^2b^9c^2d^7g^2h^7 + 15630336a^5b^2c^6d^7f^2h^7 - 14459904a^4b^3c^6d^2f^7h^7 \\
& + 9630144a^3b^5c^5d^2f^7h^7 - 8764416a^5b^3c^5d^7f^7h^7 - 3870720a^5b^2c^6e^7f^2g^7h^7 \\
& + 2867328a^4b^4c^5d^7f^2h^7 - 2095200a^2b^7c^4d^2f^7h^7 - 1414080a^3b^6c^4d^7f^2h^7 \\
& - 34836480a^4b^2c^7d^2e^7g^7h^7 - 645120a^4b^4c^5e^7f^2g^7h^7 + 306720a^3b^7c^3d^7f^7h^7 \\
& + 197820a^2b^8c^3d^7f^2h^7 + 146880a^4b^5c^4d^7f^7h^7 + 80640a^3b^6c^4e^7f^2g^7h^7 \\
& - 55350a^2b^9c^2d^7f^7h^7 - 2304a^2b^8c^3e^7f^2g^7h^7 - 3870720a^5b^2c^6d^7f^7g^2h^7 \\
& - 1935360a^4b^4c^5d^7f^7g^2h^7 - 1658880a^4b^3c^6d^7e^2h^7 + 725760a^3b^6c^4d^7f^7g^2h^7 \\
& + 17418240a^3b^4c^6d^2e^7g^7h^7 - 124416a^3b^5c^5d^7e^2h^7 - 96768a^2b^8c^3d^7f^7g^2h^7 \\
& + 41472a^2b^7c^4d^7e^2h^7 - 3919104a^2b^6c^5d^2e^7g^7h^7 - 7741440a^4b^2c^7d^7e^2f^7h^7 \\
& + 2903040a^3b^4c^6d^7e^2f^7h^7 - 387072a^2b^6c^5d^7e^2f^7h^7 - 1648128a^5b^3c^5f^3h^7 \\
& - 898560a^6b^3c^4f^7h^7 - 354240a^5b^5c^3f^7h^7 - 354240a^4b^5c^4f^3h^7 + 43680a^3b^7c^3f^3h^7 \\
& - 21600a^4b^7c^2f^7h^7 - 1050a^2b^9c^2f^3h^7 + 225a^2b^10c^2f^7h^7 + 1658880a^6b^7c^6e^2h^7 \\
& + 16547328a^4b^2c^7d^3h^7 - 12306816a^3b^4c^6d^3h^7 + 37310976a^3b^3c^7d^3f^7h^7 \\
& + 3037824a^2b^6c^5d^3h^7 - 2654208a^5b^3c^5e^7g^3h^7 + 1949184a^6b^2c^5d^7h^7 + 1296000a^5b^4c^4d^7h^7 \\
& - 155520a^4b^6c^3d^7h^7 - 40500a^5b^10c^2d^2h^7 - 8100a^3b^8c^2d^7h^7 + 3870720a^5b^7c^7e^2f^2h^7 \\
& + 34836480a^4b^7c^8d^2e^2h^7 - 108864a^5b^9c^3d^2g^2h^7 - 8068032a^2b^5c^6d^3f^7h^7 \\
& - 5623296a^4b^3c^6d^7f^3h^7 + 1737792a^3b^5c^5d^7f^3h^7 - 260190a^5b^8c^4d^2f^2h^7 - 211680a^2b^7c^4d^7f^3h^7 \\
& - 435456a^5b^7c^5d^2e^2h^7 - 2211840a^6c^7e^2f^7h^7 - 9450b^11c^2d^2f^7h^7 \\
& + 1612800a^6c^7d^7f^2h^7 - 20736b^10c^3d^2e^7g^7h^7 - 75188736a^4b^7c^8d^3f^7h^7 \\
& - 883200a^6b^7c^6f^3h^7 - 317952a^7b^7c^5f^7h^7 + 1350a^3b^9c^3f^7h^7 - 15482880a^5c^8d^7e^2f^7h^7 \\
& - 10616832a^5b^7c^7e^3g^7h^7 - 345060a^5b^8c^4d^3h^7 + 4050a^2b^10c^2d^7h^7 - 4262400a^5b^7c^7d^7f^3h^7 \\
& + 852768a^5b^7c^5d^3f^7h^7 + 7350a^5b^9c^3d^7f^3h^7 + 414720a^6b^3c^4g^2h^7 + 207360a^5b^5c^3g^2h^7 \\
& + 5184a^4b^7c^2g^2h^7 + 1684224a^6b^2c^5f^2h^7 + 1264320a^5b^4c^4f^2h^7 + 126720a^4b^6c^3f^2h^7 \\
& - 13950a^3b^8c^2f^2h^7 + 967680a^5b^3c^5f^2g^2h^7 + 829440a^5b^3c^5e^2h^7 + 161280a^4b^5c^4f^2g^2h^7 \\
& + 20736a^4b^5c^4e^2h^7 - 20160a^3b^7c^3f^2g^2h^7 + 576a^2b^9c^2f^2g^2h^7 + 11487744a^5b^2c^6d^2h^7 \\
& + 7962624a^5b^2
\end{aligned}$$

$$\begin{aligned}
& *c^6e^2g^2 + 35525376a^4b^2c^7d^2f^2 - 1412640a^3b^6c^4d^2h^2 + \\
& 461376a^4b^4c^5d^2h^2 + 375030a^2b^8c^3d^2h^2 + 8709120a^4b^3c^6d^2g^2 - 4354560a^3b^5c^5d^2g^2 + 979776a^2b^7c^4d^2g^2 + 64 \\
& 5120a^4b^3c^6e^2f^2 - 80640a^3b^5c^5e^2f^2 + 2304a^2b^7c^4e^2f^2 - 15269184a^3b^4c^6d^2f^2 + 2870784a^2b^6c^5d^2f^2 - 1741824 \\
& 0a^3b^3c^7d^2e^2 + 3919104a^2b^5c^6d^2e^2 + 115200a^7c^6f^2h^2 + 6096384a^6c^7d^2h^2 + 5184b^11c^2d^2g^2 + 11025b^10c^3d^2f^2 \\
& 2 + 5644800a^5c^8d^2f^2 + 142560a^6b^4c^3h^4 + 103680a^7b^2c^4h^4 + 32400a^5b^6c^2h^4 + 20736b^9c^4d^2e^2 + 331776a^5b^4c^4g^4 \\
& + 492800a^5b^2c^6f^4 + 351456a^4b^4c^5f^4 - 43120a^3b^6c^4f^4 + 1225a^2b^8c^3f^4 - 27433728a^3b^2c^8d^4 + 6446304a^2b^4c^7d^4 \\
& + 28449792a^5c^8d^3h + 17010b^10c^3d^3h + 2025b^12c^d^2h^2 + 580608a^7c^6d^3h^3 - 39690b^9c^4d^3f + 2025a^4b^8c^h^4 - 734832a^b^6c^6d^4 + 20736a^8c^5h^4 + 49787136a^4c^9d^4 + 160000a^6c^7f^4 + 5308416a^5c^8e^4 + 35721b^8c^5d^4, z, k) * ((768a^2b^14c^2d - 3145728a^10c^8h - 22020096a^9c^9d - 22272a^3b^12c^3d + 282624a^4b^10c^4d - 2027520a^5b^8c^5d + 8847360a^6b^6c^6d - 23396352a^7b^4c^7d + 34603008a^8b^2c^8d + 256a^3b^13c^2f - 9216a^4b^11c^3f + 122880a^5b^9c^4f - 819200a^6b^7c^5f + 2949120a^7b^5c^6f - 5505024a^8b^3c^7f + 768a^4b^12c^2h - 12288a^5b^10c^3h + 61440a^6b^8c^4h - 983040a^8b^4c^6h + 3145728a^9b^2c^7h + 4194304a^9b^c^8f) / (512*(a^4b^12 + 4096a^10c^6 - 24a^5b^10c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (x*(1572864a^9c^9e - 1536a^4b^10c^4e + 30720a^5b^8c^5e - 245760a^6b^6c^6e + 983040a^7b^4c^7e - 1966080a^8b^2c^8e + 768a^4b^11c^3g - 15360a^5b^9c^4g + 122880a^6b^7c^5g - 491520a^7b^5c^6g + 983040a^8b^3c^7g - 786432a^9b^c^8g)) / (64*(a^4b^12 + 4096a^10c^6 - 24a^5b^10c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (root(56371445760a^11b^8c^6z^4 - 503316480a^8b^14c^3z^4 + 47185920a^7b^16c^2z^4 - 171798691840a^14b^2c^9z^4 + 193273528320a^13b^4c^8z^4 - 128849018880a^12b^6c^7z^4 - 16911433728a^10b^10c^5z^4 + 3523215360a^9b^12c^4z^4 - 2621440a^6b^18c^z^4 + 68719476736a^15c^10z^4 + 65536a^5b^20z^4 - 46080a^4b^14c^f^h^z^2 - 105984a^3b^15c^d^h^z^2 - 73728a^2b^16c^d^f^z^2 + 2548039680a^9b^3c^7d^h^z^2 + 150994940a^9b^3c^7e^g^z^2 - 1401421824a^8b^5c^6d^h^z^2 - 1321205760a^9b^2c^8d^f^z^2 - 754974720a^8b^5c^6e^g^z^2 + 732168192a^7b^6c^6d^f^z^2 - 456130560a^9b^4c^6f^h^z^2 + 390463488a^7b^7c^5d^h^z^2 - 366280704a^6b^8c^5d^f^z^2 - 330301440a^8b^4c^7d^f^z^2 + 254017536a^8b^6c^5f^h^z^2 - 1887436800a^10b^c^8d^h^z^2 + 188743680a^10b^2c^7f^h^z^2 + 188743680a^7b^7c^5e^g^z^2 - 61931520a^7b^8c^4f^h^z^2 + 96583680a^5b^10c^4d^f^z^2 - 51609600a^6b^9c^4d^h^z^2 + 6144000a^6b^10c^3f^h^z^2 + 61440a^5b^12c^2f^h^z^2 - 23592960a^6b^9c^4e^g^z^2 + 1179648a^5b^11c^3e^g^z^2 + 829440a^4b^13c^2d^h^z^2 + 368640a^5b^11c^3d^h^z^2 - 15175680a^4b^12c^3d^f^z^2 + 1428480a^3b^14c^2d^f^z^2 - 1207959552a^10b^c^8e^g^z^2 - 440401920a^10b^c^8f^2z^2 - 188743680a
\end{aligned}$$

$$\begin{aligned}
& ^{11}b^7c^7h^2z^2 + 1761607680a^{10}c^9d^2f^2z^2 + 46080a^5b^{13}c^8h^2z^2 \\
& - 14080a^3b^{15}c^8f^2z^2 + 6936330240a^8b^3c^8d^2z^2 + 2464874496a^6b^7c^6d^2z^2 - 3963617280a^9b^3c^9d^2z^2 - 1509949440a^9b^2c^8e^2z^2 + 251658240a^{11}c^8f^2h^2z^2 + 1536a^3b^{16}f^2h^2z^2 + 4608a^2b^{17}d^2h^2z^2 - 5400428544a^7b^5c^7d^2z^2 - 94464a^2b^{17}c^6d^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730054656a^5b^9c^5d^2z^2 + 477102080a^9b^3c^7f^2z^2 - 377487360a^9b^4c^6g^2z^2 + 301989888a^{10}b^2c^7g^2z^2 + 188743680a^8b^6c^5g^2z^2 + 141557760a^{10}b^3c^6h^2z^2 - 174325760a^8b^5c^6f^2z^2 - 188743680a^7b^6c^6e^2z^2 + 146165760a^4b^{11}c^4d^2z^2 - 47185920a^7b^8c^4g^2z^2 - 26542080a^8b^7c^4h^2z^2 + 9584640a^7b^9c^3h^2z^2 - 2359296a^9b^5c^5h^2z^2 - 1290240a^6b^{11}c^2h^2z^2 + 5898240a^6b^{10}c^3g^2z^2 - 294912a^5b^{12}c^2g^2z^2 + 11206656a^7b^7c^5f^2z^2 + 8929280a^6b^9c^4f^2z^2 + 23592960a^6b^8c^5e^2z^2 - 2600960a^5b^{11}c^3f^2z^2 + 291840a^4b^{13}c^2f^2z^2 - 19860480a^3b^{13}c^3d^2z^2 - 1179648a^5b^{10}c^4e^2z^2 + 1771776a^2b^{15}c^2d^2z^2 + 1536a^2b^{18}d^2f^2z^2 + 1207959552a^{10}c^9e^2z^2 + 2304a^4b^{15}h^2z^2 + 256a^2b^{17}f^2z^2 + 2304b^{19}d^2z^2 + 169869312a^7b^3c^8d^2e^2f^2z^2 + 99090432a^8b^3c^7d^2g^2h^2z^2 - 4608a^3b^{12}c^2f^2g^2h^2z^2 - 9437184a^8b^3c^7e^2f^2h^2z^2 - 13824a^2b^{13}c^2d^2g^2h^2z^2 + 9216a^2b^{13}c^2d^2e^2f^2z^2 - 4608a^2b^{14}c^2d^2f^2g^2z^2 + 219414528a^7b^2c^7d^2e^2h^2z^2 - 221773824a^6b^3c^7d^2e^2f^2z^2 - 109707264a^7b^3c^6d^2g^2h^2z^2 + 110886912a^6b^4c^6d^2f^2g^2z^2 - 88473600a^6b^4c^6d^2e^2h^2z^2 - 84934656a^7b^2c^7d^2f^2g^2z^2 + 117964800a^5b^5c^6d^2e^2f^2z^2 + 44236800a^6b^5c^5d^2g^2h^2z^2 - 5898240a^7b^4c^5f^2g^2h^2z^2 + 4718592a^8b^2c^6f^2g^2h^2z^2 + 2949120a^6b^6c^4f^2g^2h^2z^2 - 737280a^5b^8c^3f^2g^2h^2z^2 + 92160a^4b^{10}c^2f^2g^2h^2z^2 - 58982400a^5b^6c^5d^2f^2g^2z^2 + 11796480a^7b^3c^6e^2f^2h^2z^2 - 6635520a^5b^7c^4d^2g^2h^2z^2 - 5898240a^6b^5c^5e^2f^2h^2z^2 + 1474560a^5b^7c^4e^2f^2h^2z^2 - 276480a^4b^9c^3d^2g^2h^2z^2 - 184320a^4b^9c^3e^2f^2h^2z^2 + 179712a^3b^{11}c^2d^2g^2h^2z^2 + 9216a^3b^{11}c^2e^2f^2h^2z^2 + 16220160a^4b^8c^4d^2f^2g^2z^2 + 13271040a^5b^6c^5d^2e^2h^2z^2 - 2396160a^3b^{10}c^3d^2f^2g^2z^2 + 552960a^4b^8c^4d^2e^2h^2z^2 - 359424a^3b^{10}c^3d^2e^2h^2z^2 + 175104a^2b^{12}c^2d^2f^2g^2z^2 + 27648a^2b^{12}c^2d^2e^2h^2z^2 - 32440320a^4b^7c^5d^2e^2f^2z^2 + 4792320a^3b^9c^4d^2e^2f^2z^2 - 350208a^2b^{11}c^3d^2e^2f^2z^2 + 346816512a^7b^3c^8d^2g^2z^2 + 7077888a^9b^3c^6g^2h^2z^2 - 6912a^4b^{11}c^3g^2h^2z^2 - 19660800a^8b^3c^7f^2g^2z^2 - 768a^2b^{13}c^2f^2g^2z^2 + 214272a^2b^{13}c^2d^2g^2z^2 - 428544a^2b^{12}c^3d^2e^2z^2 - 198180864a^8c^8d^2e^2h^2z^2 + 1022754816a^6b^2c^8d^2e^2z^2 - 642318336a^5b^4c^7d^2e^2z^2 - 511377408a^6b^3c^7d^2g^2z^2 + 321159168a^5b^5c^6d^2g^2z^2 + 223395840a^4b^6c^6d^2e^2z^2 - 111697920a^4b^7c^5d^2g^2z^2 - 8847360a^8b^3c^5g^2h^2z^2 + 4423680a^7b^5c^4g^2h^2z^2 - 1105920a^6b^7c^3g^2h^2z^2 + 138240a^5b^9c^2g^2h^2z^2 + 25362432a^7b^3c^6f^2g^2z^2 + 17694720a^8b^2c^6e^2h^2z^2 - 50724864a^7b^2c^7e^2f^2z^2 - 13271040a^6b^5c^5f^2g^2z^2 - 8847360a^7b^4c^5e^2h^2z^2 + 3563520a^5b^7c^4f^2g^2z^2 + 2211840a^6b^6c^4e^2h^2z^2 - 506880a^4b^9c^3f^2g^2z^2 - 276480a^5b^8c^3e^2h^2z^2 + 34560a^3b^{11}c^2f^2g^2z^2 + 13824a^4b^{10}c^2e^2h^2z^2 + 26542080a^6b^4c^6e^2f^2z^2 + 23362560a^3b^9c^4d^2g^2z^2 - 46725120a^3b^8
\end{aligned}$$

$$\begin{aligned}
& *c^5*d^2*e*z - 7127040*a^5*b^6*c^5*e*f^2*z - 2965248*a^2*b^11*c^3*d^2*g*z + \\
& 1013760*a^4*b^8*c^4*e*f^2*z - 69120*a^3*b^10*c^3*e*f^2*z + 1536*a^2*b^12*c^2*e*f^2*z + 5930496*a^2*b^10*c^4*d^2*e*z - 693633024*a^7*c^9*d^2*e*z - 141 \\
& 55776*a^9*c^7*e*h^2*z + 39321600*a^8*c^8*e*f^2*z + 13824*b^14*c^2*d^2*e*z - \\
& 6912*b^15*c*d^2*g*z + 2211840*a^6*b*c^6*e*f*g*h + 15482880*a^5*b*c^7*d*e*f \\
& *g - 13824*a*b^9*c^3*d*e*f*g + 4423680*a^5*b^3*c^5*e*f*g*h + 138240*a^4*b^5 \\
& *c^4*e*f*g*h - 13824*a^3*b^7*c^3*e*f*g*h - 16588800*a^5*b^2*c^6*d*e*g*h + 1 \\
& 658880*a^4*b^4*c^5*d*e*g*h + 124416*a^3*b^6*c^4*d*e*g*h - 41472*a^2*b^8*c^3 \\
& *d*e*g*h + 7741440*a^4*b^3*c^6*d*e*f*g - 2903040*a^3*b^5*c^5*d*e*f*g + 3870 \\
& 72*a^2*b^7*c^4*d*e*f*g - 37062144*a^5*b*c^7*d^2*f*h - 5985792*a^6*b*c^6*d*f \\
& *h^2 + 206010*a*b^9*c^3*d^2*f*h - 6300*a*b^10*c^2*d*f^2*h + 16588800*a^5*b* \\
& c^7*d*e^2*h + 3456*a*b^10*c^2*d*f*g^2 + 435456*a*b^8*c^4*d^2*e*g + 13824*a* \\
& b^8*c^4*d*e^2*f + 1350*a*b^11*c*d*f*h^2 - 1105920*a^5*b^4*c^4*f*g^2*h - 552 \\
& 960*a^6*b^2*c^5*f*g^2*h - 34560*a^4*b^6*c^3*f*g^2*h + 3456*a^3*b^8*c^2*f*g^2 \\
& *h - 1658880*a^6*b^2*c^5*e*g*h^2 - 829440*a^5*b^4*c^4*e*g*h^2 - 20736*a^4* \\
& b^6*c^3*e*g*h^2 - 4423680*a^5*b^2*c^6*e^2*f*h + 4147200*a^5*b^3*c^5*d*g^2*h \\
& - 414720*a^4*b^5*c^4*d*g^2*h - 138240*a^4*b^4*c^5*e^2*f*h - 31104*a^3*b^7* \\
& c^3*d*g^2*h + 13824*a^3*b^6*c^4*e^2*f*h + 10368*a^2*b^9*c^2*d*g^2*h + 15630 \\
& 336*a^5*b^2*c^6*d*f^2*h - 14459904*a^4*b^3*c^6*d^2*f*h + 9630144*a^3*b^5*c^5 \\
& *d^2*f*h - 8764416*a^5*b^3*c^5*d*f*h^2 - 3870720*a^5*b^2*c^6*e*f^2*g + 286 \\
& 7328*a^4*b^4*c^5*d*f^2*h - 2095200*a^2*b^7*c^4*d^2*f*h - 1414080*a^3*b^6*c^4 \\
& *d*f^2*h - 34836480*a^4*b^2*c^7*d^2*e*g - 645120*a^4*b^4*c^5*e*f^2*g + 306 \\
& 720*a^3*b^7*c^3*d*f*h^2 + 197820*a^2*b^8*c^3*d*f^2*h + 146880*a^4*b^5*c^4*d \\
& *f*h^2 + 80640*a^3*b^6*c^4*e*f^2*g - 55350*a^2*b^9*c^2*d*f*h^2 - 2304*a^2*b^8 \\
& *c^3*e*f^2*g - 3870720*a^5*b^2*c^6*d*f*g^2 - 1935360*a^4*b^4*c^5*d*f*g^2 \\
& - 1658880*a^4*b^3*c^6*d*e^2*h + 725760*a^3*b^6*c^4*d*f*g^2 + 17418240*a^3*b^4 \\
& *c^6*d^2*e*g - 124416*a^3*b^5*c^5*d*e^2*h - 96768*a^2*b^8*c^3*d*f*g^2 + 4 \\
& 1472*a^2*b^7*c^4*d*e^2*h - 3919104*a^2*b^6*c^5*d^2*e*g - 7741440*a^4*b^2*c^7 \\
& *d*e^2*f + 2903040*a^3*b^4*c^6*d*e^2*f - 387072*a^2*b^6*c^5*d*e^2*f - 1648 \\
& 128*a^5*b^3*c^5*f^3*h - 898560*a^6*b^3*c^4*f*h^3 - 354240*a^5*b^5*c^3*f*h^3 \\
& - 354240*a^4*b^5*c^4*f^3*h + 43680*a^3*b^7*c^3*f^3*h - 21600*a^4*b^7*c^2*f \\
& *h^3 - 1050*a^2*b^9*c^2*f^3*h + 225*a^2*b^10*c*f^2*h^2 + 1658880*a^6*b*c^6* \\
& e^2*h^2 + 16547328*a^4*b^2*c^7*d^3*h - 12306816*a^3*b^4*c^6*d^3*h + 3731097 \\
& 6*a^3*b^3*c^7*d^3*f + 3037824*a^2*b^6*c^5*d^3*h - 2654208*a^5*b^3*c^5*e*g^3 \\
& + 1949184*a^6*b^2*c^5*d*h^3 + 1296000*a^5*b^4*c^4*d*h^3 - 155520*a^4*b^6*c^3 \\
& *d*h^3 - 40500*a*b^10*c^2*d^2*h^2 - 8100*a^3*b^8*c^2*d*h^3 + 3870720*a^5* \\
& b*c^7*e^2*f^2 + 34836480*a^4*b*c^8*d^2*e^2 - 108864*a*b^9*c^3*d^2*g^2 - 806 \\
& 8032*a^2*b^5*c^6*d^3*f - 5623296*a^4*b^3*c^6*d*f^3 + 1737792*a^3*b^5*c^5*d* \\
& f^3 - 260190*a*b^8*c^4*d^2*f^2 - 211680*a^2*b^7*c^4*d*f^3 - 435456*a*b^7*c^5 \\
& *d^2*e^2 - 2211840*a^6*c^7*e^2*f*h - 9450*b^11*c^2*d^2*f*h + 1612800*a^6*c^7 \\
& *d*f^2*h - 20736*b^10*c^3*d^2*e*g - 75188736*a^4*b*c^8*d^3*f - 883200*a^6 \\
& *b*c^6*f^3*h - 317952*a^7*b*c^5*f*h^3 + 1350*a^3*b^9*c*f*h^3 - 15482880*a^5 \\
& *c^8*d*e^2*f - 10616832*a^5*b*c^7*e^3*g - 345060*a*b^8*c^4*d^3*h + 4050*a^2 \\
& *b^10*c*d*h^3 - 4262400*a^5*b*c^7*d*f^3 + 852768*a*b^7*c^5*d^3*f + 7350*a*b^9 \\
& *c^3*d*f^3 + 414720*a^6*b^3*c^4*g^2*h^2 + 207360*a^5*b^5*c^3*g^2*h^2 + 51
\end{aligned}$$

$$\begin{aligned}
& 84a^4b^7c^2g^2h^2 + 1684224a^6b^2c^5f^2h^2 + 1264320a^5b^4c^4f^2h^2 + 126720a^4b^6c^3f^2h^2 - 13950a^3b^8c^2f^2h^2 + 967680a^5b^3c^5f^2g^2 + 829440a^5b^3c^5e^2h^2 + 161280a^4b^5c^4f^2g^2 \\
& + 20736a^4b^5c^4e^2h^2 - 20160a^3b^7c^3f^2g^2 + 576a^2b^9c^2f^2g^2 + 11487744a^5b^2c^6d^2h^2 + 7962624a^5b^2c^6e^2g^2 + 35525376a^4b^2c^7d^2f^2 - 1412640a^3b^6c^4d^2h^2 + 461376a^4b^4c^5d^2h^2 + 375030a^2b^8c^3d^2h^2 + 8709120a^4b^3c^6d^2g^2 - 4354560a^3b^5c^5d^2g^2 + 979776a^2b^7c^4d^2g^2 + 645120a^4b^3c^6e^2f^2 - 80640a^3b^5c^5e^2f^2 + 2304a^2b^7c^4e^2f^2 - 15269184a^3b^4c^6d^2f^2 + 2870784a^2b^6c^5d^2f^2 - 17418240a^3b^3c^7d^2e^2 + 3919104a^2b^5c^6d^2e^2 + 115200a^7c^6f^2h^2 + 6096384a^6c^7d^2h^2 + 5184b^11c^2d^2g^2 + 11025b^10c^3d^2f^2 + 5644800a^5c^8d^2f^2 + 142560a^6b^4c^3h^4 + 103680a^7b^2c^4h^4 + 32400a^5b^6c^2h^4 + 20736b^9c^4d^2e^2 + 331776a^5b^4c^4g^4 + 492800a^5b^2c^6f^4 + 351456a^4b^4c^5f^4 - 43120a^3b^6c^4f^4 + 1225a^2b^8c^3f^4 - 27433728a^3b^2c^8d^4 + 6446304a^2b^4c^7d^4 + 28449792a^5c^8d^3h + 17010b^10c^3d^3h + 2025b^12c^d^2h^2 + 580608a^7c^6d^3h^3 - 39690b^9c^4d^3f + 2025a^4b^8c^h^4 - 734832a^b^6c^6d^4 + 20736a^8c^5h^4 + 49787136a^4c^9d^4 + 160000a^6c^7f^4 + 5308416a^5c^8e^4 + 35721b^8c^5d^4, z, k) * x * (8388608a^11b^c^9 - 512a^4b^15c^2 + 14336a^5b^13c^3 - 172032a^6b^11c^4 + 1146880a^7b^9c^5 - 4587520a^8b^7c^6 + 11010048a^9b^5c^7 - 14680064a^10b^3c^8) / (64*(a^4b^12 + 4096a^10c^6 - 24a^5b^10c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (x*(451584a^6c^9d^2 + 18b^12c^3d^2 - 25600a^7c^8f^2 + 9216a^8c^7h^2 - 504a^b^10c^4d^2 - 73728a^6b^c^8e^2 + 6228a^2b^8c^5d^2 - 42624a^3b^6c^6d^2 + 176256a^4b^4c^7d^2 - 423936a^5b^2c^8d^2 - 4608a^4b^5c^6e^2 + 36864a^5b^3c^7e^2 + 2a^2b^10c^3f^2 - 84a^3b^8c^4f^2 + 3520a^4b^6c^5f^2 - 26240a^5b^4c^6f^2 + 59904a^6b^2c^7f^2 - 1152a^4b^7c^4g^2 + 9216a^5b^5c^5g^2 - 18432a^6b^3c^6g^2 + 468a^4b^8c^3h^2 - 3456a^5b^6c^4h^2 + 5760a^6b^4c^5h^2 + 129024a^7c^8d^3h + 12a^b^11c^3d^3f - 218112a^6b^c^8d^3f - 9216a^7b^c^7f^3h - 420a^2b^9c^4d^3f + 4992a^3b^7c^5d^3f - 36480a^4b^5c^6d^3f + 144384a^5b^3c^7d^3f + 36a^2b^10c^3d^3h - 360a^3b^8c^4d^3h + 3456a^4b^6c^5d^3h + 4608a^4b^6c^5e^3g - 11520a^5b^4c^6d^3h - 36864a^5b^4c^6e^3g - 27648a^6b^2c^7d^3h + 73728a^6b^2c^7e^3g + 12a^3b^9c^3f^3h - 2304a^4b^7c^4f^3h + 17280a^5b^5c^5f^3h - 30720a^6b^3c^6f^3h) / (64*(a^4b^12 + 4096a^10c^6 - 24a^5b^10c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (x*(13824a^4c^8e^3 - 54b^7c^5d^2e + 27b^8c^4d^2g - 1728a^4b^3c^5g^3 - 20160a^4c^8d^2e^2f - 2880a^5c^7e^2f^2h + 972a^b^5c^6d^2e + 24192a^3b^c^8d^2e - 486a^b^6c^5d^2g + 6240a^4b^c^7e^2f^2 - 20736a^4b^c^7e^2g + 1728a^5b^c^6e^2h^2 - 7344a^2b^3c^7d^2e + 3672a^2b^4c^6d^2g - 6a^2b^5c^5e^2f^2 - 12096a^3b^2c^7d^2g + 192a^3b^3c^6e^2f^2 + 10368a^4b^2c^6e^2g^2 + 3a^2b^6c^4f^2g - 96a^3b^4c^5f^2g - 3120a^4b^2c^6f^2g + 1296a^4b^3c^5e^2h^2 - 648a
\end{aligned}$$

$$\begin{aligned}
& ^4b^4c^4g^2h^2 - 864a^5b^2c^5g^2h^2 - 36a^6b^2c^5d^2ef + 18a^7b^2c^4d^2efg + 15552a^4b^2c^7d^2efg + 10080a^4b^2c^7d^2efg + 1440a^5b^2c^6d^2efg \\
& + 900a^2b^4c^6d^2efg - 4896a^3b^2c^7d^2efg - 108a^2b^5c^5d^2efg - 450a^2b^5c^5d^2efg + 2448a^3b^3c^6d^2efg + 54a^2b^6c^4d^2efg - \\
& 36a^3b^4c^5d^2efg - 7776a^4b^2c^6d^2efg - 6048a^4b^2c^6d^2efg + 18a^3b^5c^4d^2efg + 3024a^4b^3c^5d^2efg) / (64(a^4b^12 + 4096a^10c^6 \\
& - 24a^5b^10c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) * \text{root}(56371445760a^{11}b^8c^6z^4 - 503316480a^8b^14 \\
& c^3z^4 + 47185920a^7b^16c^2z^4 - 171798691840a^{14}b^2c^9z^4 + 193273528320a^{13}b^4c^8z^4 - 128849018880a^{12}b^6c^7z^4 - 16911433728a^{10}b^10c^5z^4 + 3523215360a^9b^12c^4z^4 - 2621440a^6b^18c^3z^4 + 687 \\
& 19476736a^{15}c^{10}z^4 + 65536a^5b^{20}z^4 - 46080a^4b^{14}c^2f^2h^2z^2 - 105984a^3b^{15}c^2d^2h^2z^2 - 73728a^2b^{16}c^2d^2f^2z^2 + 2548039680a^9b^3c^7 \\
& d^2h^2z^2 + 1509949440a^9b^3c^7e^2g^2z^2 - 1401421824a^8b^5c^6d^2h^2z^2 - 1321205760a^9b^2c^8d^2f^2z^2 - 754974720a^8b^5c^6e^2g^2z^2 + 73216819 \\
& 2a^7b^6c^6d^2f^2z^2 - 456130560a^9b^4c^6f^2h^2z^2 + 390463488a^7b^7c^5d^2h^2z^2 - 366280704a^6b^8c^5d^2f^2z^2 - 330301440a^8b^4c^7d^2f^2z^2 \\
& + 254017536a^8b^6c^5f^2h^2z^2 - 1887436800a^{10}b^2c^8d^2h^2z^2 + 188743680a^{10}b^2c^7f^2h^2z^2 + 188743680a^7b^7c^5e^2g^2z^2 - 61931520a^7b^8c^4 \\
& f^2h^2z^2 + 96583680a^5b^{10}c^4d^2f^2z^2 - 51609600a^6b^9c^4d^2h^2z^2 + 6144000a^6b^{10}c^3f^2h^2z^2 + 61440a^5b^{12}c^2f^2h^2z^2 - 23592960a^6b^9 \\
& c^4e^2g^2z^2 + 1179648a^5b^{11}c^3e^2g^2z^2 + 829440a^4b^{13}c^2d^2h^2z^2 + 368640a^5b^{11}c^3d^2h^2z^2 - 15175680a^4b^{12}c^3d^2f^2z^2 + 1428480a^3 \\
& b^{14}c^2d^2f^2z^2 - 1207959552a^{10}b^2c^8e^2g^2z^2 - 440401920a^{10}b^2c^8f^2z^2 - 188743680a^{11}b^2c^7h^2z^2 + 1761607680a^{10}c^9d^2f^2z^2 + 46080a^5 \\
& b^{13}c^2h^2z^2 - 14080a^3b^{15}c^2f^2z^2 + 6936330240a^8b^3c^8d^2z^2 + 2464874496a^6b^7c^6d^2z^2 - 3963617280a^9b^2c^9d^2z^2 - 15099 \\
& 49440a^9b^2c^8e^2z^2 + 251658240a^{11}c^8f^2h^2z^2 + 1536a^3b^{16}f^2h^2z^2 + 4608a^2b^{17}d^2h^2z^2 - 5400428544a^7b^5c^7d^2z^2 - 94464a^2b^{17} \\
& c^2d^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730054656a^5b^9c^5d^2z^2 + 477102080a^9b^3c^7f^2z^2 - 377487360a^9b^4c^6g^2z^2 + 301989888 \\
& a^{10}b^2c^7g^2z^2 + 188743680a^8b^6c^5g^2z^2 + 141557760a^{10}b^3c^6h^2z^2 - 174325760a^8b^5c^6f^2z^2 - 188743680a^7b^6c^6e^2z^2 \\
& + 146165760a^4b^{11}c^4d^2z^2 - 47185920a^7b^8c^4g^2z^2 - 26542080a^8b^7c^4h^2z^2 + 9584640a^7b^9c^3h^2z^2 - 2359296a^9b^5c^5h^2 \\
& z^2 - 1290240a^6b^{11}c^2h^2z^2 + 5898240a^6b^{10}c^3g^2z^2 - 294912a^5b^{12}c^2g^2z^2 + 11206656a^7b^7c^5f^2z^2 + 8929280a^6b^9c^4 \\
& f^2z^2 + 23592960a^6b^8c^5e^2z^2 - 2600960a^5b^{11}c^3f^2z^2 + 291840a^4b^{13}c^2f^2z^2 - 19860480a^3b^{13}c^3d^2z^2 - 1179648a^5b^{10}c^4e^2z^2 \\
& + 1771776a^2b^{15}c^2d^2z^2 + 1536a^2b^{18}d^2f^2z^2 + 1207959552a^{10}c^9e^2z^2 + 2304a^4b^{15}h^2z^2 + 256a^2b^{17}f^2z^2 + 2304 \\
& b^{19}d^2z^2 + 169869312a^7b^2c^8d^2ef^2z + 99090432a^8b^2c^7d^2ef^2z - 4608a^3b^{12}c^2f^2g^2h^2z - 9437184a^8b^2c^7e^2f^2h^2z - 13824a^2b^{13}c^2d^2g^2 \\
& h^2z + 9216a^2b^{13}c^2d^2ef^2z - 4608a^2b^{14}c^2d^2ef^2g^2z + 219414528a^7b^2c^7d^2ef^2h^2z - 221773824a^6b^3c^7d^2ef^2z - 109707264a^7b^3c^6d^2ef^2h^2z
\end{aligned}$$

$$\begin{aligned}
& + 110886912a^6b^4c^6d^6f^6g^6z - 88473600a^6b^4c^6d^6e^6h^6z - 84934656a^7b^2c^7d^6f^6g^6z + 117964800a^5b^5c^6d^6e^6f^6z + 44236800a^6b^5c^5d^6g^6h^6z - 5898240a^7b^4c^5f^6g^6h^6z + 4718592a^8b^2c^6f^6g^6h^6z + 2949120a^6b^6c^4f^6g^6h^6z - 737280a^5b^8c^3f^6g^6h^6z + 92160a^4b^10c^2f^6g^6h^6z - 58982400a^5b^6c^5d^6f^6g^6z + 11796480a^7b^3c^6e^6f^6h^6z - 6635520a^5b^7c^4d^6g^6h^6z - 5898240a^6b^5c^5e^6f^6h^6z + 1474560a^5b^7c^4e^6f^6h^6z - 276480a^4b^9c^3d^6g^6h^6z - 184320a^4b^9c^3e^6f^6h^6z + 179712a^3b^11c^2d^6g^6h^6z + 9216a^3b^11c^2e^6f^6h^6z + 16220160a^4b^8c^4d^6f^6g^6z + 13271040a^5b^6c^5d^6e^6h^6z - 2396160a^3b^10c^3d^6f^6g^6z + 552960a^4b^8c^4d^6e^6h^6z - 359424a^3b^10c^3d^6e^6h^6z + 175104a^2b^12c^2d^6f^6g^6z + 27648a^2b^12c^2d^6e^6h^6z - 32440320a^4b^7c^5d^6e^6f^6z + 4792320a^3b^9c^4d^6e^6f^6z - 350208a^2b^11c^3d^6e^6f^6z + 346816512a^7b^6c^8d^2g^6z + 7077888a^9b^6c^6g^6h^2z - 6912a^4b^11c^6g^6h^2z - 19660800a^8b^6c^7f^2g^6z - 768a^2b^13c^6f^2g^6z + 214272a^6b^13c^2d^2g^6z - 428544a^6b^12c^3d^2e^6z - 198180864a^8c^8d^6e^6h^6z + 1022754816a^6b^2c^8d^2e^6z - 642318336a^5b^4c^7d^2e^6z - 511377408a^6b^3c^7d^2g^6z + 321159168a^5b^5c^6d^2g^6z + 223395840a^4b^6c^6d^2e^6z - 111697920a^4b^7c^5d^2g^6z - 8847360a^8b^3c^5g^6h^2z + 4423680a^7b^5c^4g^6h^2z - 1105920a^6b^7c^3g^6h^2z + 138240a^5b^9c^2g^6h^2z + 25362432a^7b^3c^6f^2g^6z + 17694720a^8b^2c^6e^6h^2z - 50724864a^7b^2c^7e^6f^2z - 13271040a^6b^5c^5f^2g^6z - 8847360a^7b^4c^5e^6h^2z + 3563520a^5b^7c^4f^2g^6z + 2211840a^6b^6c^4e^6h^2z - 506880a^4b^9c^3f^2g^6z - 276480a^5b^8c^3e^6h^2z + 34560a^3b^11c^2f^2g^6z + 13824a^4b^10c^2e^6h^2z + 26542080a^6b^4c^6e^6f^2z + 23362560a^3b^9c^4d^2g^6z - 46725120a^3b^8c^5d^2e^6z - 7127040a^5b^6c^5e^6f^2z - 2965248a^2b^11c^3d^2g^6z + 1013760a^4b^8c^4e^6f^2z - 69120a^3b^10c^3e^6f^2z + 1536a^2b^12c^2e^6f^2z + 5930496a^2b^10c^4d^2e^6z - 693633024a^7c^9d^2e^6z - 14155776a^9c^7e^6h^2z + 39321600a^8c^8e^6f^2z + 13824b^14c^2d^2e^6z - 6912b^15c^d^2g^6z + 2211840a^6b^6c^6e^6f^6g^6h + 15482880a^5b^6c^7d^6e^6f^6g - 13824a^6b^9c^3d^6e^6f^6g + 4423680a^5b^3c^5e^6f^6g^6h + 138240a^4b^5c^4e^6f^6g^6h - 13824a^3b^7c^3e^6f^6g^6h - 16588800a^5b^2c^6d^6e^6g^6h + 1658880a^4b^4c^5d^6e^6g^6h + 124416a^3b^6c^4d^6e^6g^6h - 41472a^2b^8c^3d^6e^6g^6h + 7741440a^4b^3c^6d^6e^6f^6g - 2903040a^3b^5c^5d^6e^6f^6g + 387072a^2b^7c^4d^6e^6f^6g - 37062144a^5b^6c^7d^2f^6h - 5985792a^6b^6c^6d^6f^6h^2 + 206010a^6b^9c^3d^2f^6h - 6300a^6b^10c^2d^6f^2h + 16588800a^5b^6c^7d^6e^2h + 3456a^6b^10c^2d^6f^6g^2 + 435456a^6b^8c^4d^2e^6g + 13824a^6b^8c^4d^6e^2f + 1350a^6b^11c^d^6f^6h^2 - 1105920a^5b^4c^4f^6g^2h - 552960a^6b^2c^5f^6g^2h - 34560a^4b^6c^3f^6g^2h + 3456a^3b^8c^2f^6g^2h - 1658880a^6b^2c^5e^6g^6h^2 - 829440a^5b^4c^4e^6g^6h^2 - 20736a^4b^6c^3e^6g^6h^2 - 4423680a^5b^2c^6e^2f^6h + 4147200a^5b^3c^5d^6g^2h - 414720a^4b^5c^4d^6g^2h - 138240a^4b^4c^5e^2f^6h - 31104a^3b^7c^3d^6g^2h + 13824a^3b^6c^4e^2f^6h + 10368a^2b^9c^2d^6g^2h + 15630336a^5b^2c^6d^6f^2h - 14459904a^4b^3c^6d^2f^6h + 9630144a^3b^5c^5d^2f^6h - 8764416a^5b^3c^5d^6f^6h^2 - 3870720a^5b^2c^6e^6f^2g + 2867328a^4b^4c^5d^6f^2h - 2095200a^2b^7c^4d^2f^6h -
\end{aligned}$$

$$\begin{aligned}
& 1414080a^3b^6c^4d^2f^2h - 34836480a^4b^2c^7d^2e^2g - 645120a^4b^4c^5e^2f^2g + 306720a^3b^7c^3d^2f^2h^2 + 197820a^2b^8c^3d^2f^2h + 146880a^4b^5c^4d^2f^2h^2 + 80640a^3b^6c^4e^2f^2g - 55350a^2b^9c^2d^2f^2h^2 - 2304a^2b^8c^3e^2f^2g - 3870720a^5b^2c^6d^2f^2g^2 - 1935360a^4b^4c^5d^2f^2g^2 - 1658880a^4b^3c^6d^2e^2h + 725760a^3b^6c^4d^2f^2g^2 + 17418240a^3b^4c^6d^2e^2g - 124416a^3b^5c^5d^2e^2h - 96768a^2b^8c^3d^2f^2g^2 + 41472a^2b^7c^4d^2e^2h - 3919104a^2b^6c^5d^2e^2g - 7741440a^4b^2c^7d^2e^2f + 2903040a^3b^4c^6d^2e^2f - 387072a^2b^6c^5d^2e^2f - 1648128a^5b^3c^5f^3h - 898560a^6b^3c^4f^3h^3 - 354240a^5b^5c^3f^3h^3 - 354240a^4b^5c^4f^3h^3 + 43680a^3b^7c^3f^3h - 21600a^4b^7c^2f^3h^3 - 1050a^2b^9c^2f^3h^3 + 225a^2b^10c^2f^2h^2 + 1658880a^6b^3c^6e^2h^2 + 16547328a^4b^2c^7d^3h - 12306816a^3b^4c^6d^3h + 37310976a^3b^3c^7d^3f + 3037824a^2b^6c^5d^3h - 2654208a^5b^3c^5e^2g^3 + 1949184a^6b^2c^5d^3h^3 + 1296000a^5b^4c^4d^3h^3 - 155520a^4b^6c^3d^3h^3 - 40500a^6b^10c^2d^2h^2 - 8100a^3b^8c^2d^3h^3 + 3870720a^5b^3c^7e^2f^2 + 34836480a^4b^3c^8d^2e^2 - 108864a^3b^9c^3d^2g^2 - 8068032a^2b^5c^6d^3f - 5623296a^4b^3c^6d^2f^3 + 1737792a^3b^5c^5d^2f^3 - 260190a^6b^8c^4d^2f^2 - 211680a^2b^7c^4d^2f^3 - 435456a^6b^7c^5d^2e^2 - 2211840a^6c^7e^2f^2h - 9450b^11c^2d^2f^2h + 1612800a^6c^7d^2f^2h - 20736b^10c^3d^2e^2g - 75188736a^4b^3c^8d^3f - 883200a^6b^3c^6f^3h - 317952a^7b^3c^5f^3h^3 + 1350a^3b^9c^3f^3h^3 - 15482880a^5c^8d^2e^2f - 10616832a^5b^3c^7e^3g - 345060a^6b^8c^4d^3h + 4050a^2b^10c^3d^3h^3 - 4262400a^5b^3c^7d^2f^3 + 852768a^6b^7c^5d^3f + 7350a^6b^9c^3d^2f^3 + 414720a^6b^3c^4g^2h^2 + 207360a^5b^5c^3g^2h^2 + 5184a^4b^7c^2g^2h^2 + 1684224a^6b^2c^5f^2h^2 + 1264320a^5b^4c^4f^2h^2 + 126720a^4b^6c^3f^2h^2 - 13950a^3b^8c^2f^2h^2 + 967680a^5b^3c^5f^2g^2 + 829440a^5b^3c^5e^2h^2 + 161280a^4b^5c^4f^2g^2 + 20736a^4b^5c^4e^2h^2 - 20160a^3b^7c^3f^2g^2 + 576a^2b^9c^2f^2g^2 + 11487744a^5b^2c^6d^2h^2 + 7962624a^5b^2c^6e^2g^2 + 35525376a^4b^2c^7d^2f^2 - 1412640a^3b^6c^4d^2h^2 + 461376a^4b^4c^5d^2h^2 + 375030a^2b^8c^3d^2h^2 + 8709120a^4b^3c^6d^2g^2 - 4354560a^3b^5c^5d^2g^2 + 979776a^2b^7c^4d^2g^2 + 645120a^4b^3c^6e^2f^2 - 80640a^3b^5c^5e^2f^2 + 2304a^2b^7c^4e^2f^2 - 15269184a^3b^4c^6d^2f^2 + 2870784a^2b^6c^5d^2f^2 - 17418240a^3b^3c^7d^2e^2 + 3919104a^2b^5c^6d^2e^2 + 115200a^7c^6f^2h^2 + 6096384a^6c^7d^2h^2 + 5184b^11c^2d^2g^2 + 11025b^10c^3d^2f^2 + 5644800a^5c^8d^2f^2 + 142560a^6b^4c^3h^4 + 103680a^7b^2c^4h^4 + 32400a^5b^6c^2h^4 + 20736b^9c^4d^2e^2 + 331776a^5b^4c^4g^4 + 492800a^5b^2c^6f^4 + 351456a^4b^4c^5f^4 - 43120a^3b^6c^4f^4 + 1225a^2b^8c^3f^4 - 27433728a^3b^2c^8d^4 + 6446304a^2b^4c^7d^4 + 28449792a^5c^8d^3h + 17010b^10c^3d^3h + 2025b^12c^2d^2h^2 + 580608a^7c^6d^3h^3 - 39690b^9c^4d^3f + 2025a^4b^8c^3h^4 - 734832a^6c^6d^4 + 20736a^8c^5h^4 + 49787136a^4c^9d^4 + 160000a^6c^7f^4 + 5308416a^5c^8e^4 + 35721b^8c^5d^4, z, k), k, 1, 4)
\end{aligned}$$



$$3.56 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(a+bx^2+cx^4)^3} dx$$

Optimal result	641
Rubi [A] (verified)	642
Mathematica [A] (verified)	647
Maple [C] (verified)	648
Fricas [F(-1)]	649
Sympy [F(-1)]	649
Maxima [F]	649
Giac [B] (verification not implemented)	650
Mupad [B] (verification not implemented)	654

### Optimal result

Integrand size = 40, antiderivative size = 728

$$\begin{aligned} & \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(a+bx^2+cx^4)^3} dx \\ &= \frac{x(b^2d-abf-2a(cd-ah)+(bcd-2acf+abh)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} \\ &+ \frac{2acg-b(ce+ai)-(2c^2e-bcg+b^2i-2aci)x^2}{4c(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{(6ce-3bg+2ai+\frac{b^2i}{c})(b+2cx^2)}{4(b^2-4ac)^2(a+bx^2+cx^4)} \\ &+ \frac{x(3b^4d+ab^3f+8a^2bcf+4a^2c(7cd+ah)-ab^2(25cd+7ah)+c(3b^3d+ab^2f+20a^2cf-12ab(2cd+ah)))}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\ &+ \frac{\sqrt{c}\left(3b^3d+ab^2f+20a^2cf-12ab(2cd+ah)+\frac{3b^4d+ab^3f-52a^2bcf-6ab^2(5cd-3ah)+24a^2c(7cd+ah)}{\sqrt{b^2-4ac}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b-\sqrt{b^2-4ac}}}\arctan\left(\frac{\sqrt{c}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \\ &+ \frac{\sqrt{c}\left(3b^3d+ab^2f+20a^2cf-12ab(2cd+ah)-\frac{3b^4d+ab^3f-52a^2bcf-6ab^2(5cd-3ah)+24a^2c(7cd+ah)}{\sqrt{b^2-4ac}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b+\sqrt{b^2-4ac}}}\arctan\left(\frac{\sqrt{c}}{\sqrt{b+\sqrt{b^2-4ac}}}\right) \\ &- \frac{(6c^2e-3bcg+b^2i+2aci)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}} \end{aligned}$$

```
[Out] 1/4*x*(b^2*d-a*b*f-2*a*(-a*h+c*d)+(a*b*h-2*a*c*f+b*c*d)*x^2)/a/(-4*a*c+b^2)
/(c*x^4+b*x^2+a)^2+1/4*(2*a*c*g-b*(a*i+c*e)-(-2*a*c*i+b^2*i-b*c*g+2*c^2*e)*
x^2)/c/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^2+1/4*(6*c*e-3*b*g+2*a*i+b^2*i/c)*(2*c*
x^2+b)/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)+1/8*x*(3*b^4*d+a*b^3*f+8*a^2*b*c*f+4*
a^2*c*(a*h+7*c*d)-a*b^2*(7*a*h+25*c*d)+c*(3*b^3*d+a*b^2*f+20*a^2*c*f-12*a*b
*(a*h+2*c*d))*x^2)/a^2/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)-2*a*c*i+b^2*i-3*b*c*
g+6*c^2*e)*arctanh((2*c*x^2+b)/(-4*a*c+b^2)^(1/2))/(-4*a*c+b^2)^(5/2)+1/16*
```

$$\arctan(x^{1/2}c^{1/2}/(b-(-4ac+b^2)^{1/2}))^{1/2}c^{1/2}(3b^3d+ab^2f+20a^2cf-12ab(a+h+2cd)+(3b^4d+ab^3f-52a^2b^2cf-6ab^2(-3ah+5cd)+24a^2c(a+h+7cd))/(-4ac+b^2)^{1/2})/a^2/(-4ac+b^2)^{2*2^{1/2}}/((b-(-4ac+b^2)^{1/2})^{1/2}+1/16\arctan(x^{1/2}c^{1/2}/(b+(-4ac+b^2)^{1/2}))^{1/2}c^{1/2}(3b^3d+ab^2f+20a^2cf-12ab(a+h+2cd)+(-3b^4d-ab^3f+52a^2b^2cf+6ab^2(-3ah+5cd)-24a^2c(a+h+7cd))/(-4ac+b^2)^{1/2})/a^2/(-4ac+b^2)^{2*2^{1/2}}/((b+(-4ac+b^2)^{1/2})^{1/2}))^{1/2}$$

## Rubi [A] (verified)

Time = 1.85 (sec) , antiderivative size = 728, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 11,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.275$ , Rules used = {1687, 1692, 1192, 1180, 211, 1677, 1674, 12, 628, 632, 212}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^3} dx$$

$$= \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{-52a^2bcf+24a^2c(ah+7cd)+ab^3f-6ab^2(5cd-3ah)+3b^4d}{\sqrt{b^2-4ac}} + 20a^2cf + ab^2f - 12ab(ah + 2cd) + \frac{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b-\sqrt{b^2-4ac}}}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{\sqrt{b^2-4ac}+b}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{\sqrt{b^2-4ac}+b}}$$

$$+ \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left(-\frac{52a^2bcf+24a^2c(ah+7cd)+ab^3f-6ab^2(5cd-3ah)+3b^4d}{\sqrt{b^2-4ac}} + 20a^2cf + ab^2f - 12ab(ah + 2cd) + \frac{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b-\sqrt{b^2-4ac}}}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{\sqrt{b^2-4ac}+b}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b-\sqrt{b^2-4ac}}}$$

$$+ \frac{x(cx^2(20a^2cf + ab^2f - 12ab(ah + 2cd) + 3b^3d) + 8a^2bcf + 4a^2c(ah + 7cd) + ab^3f - ab^2(7ah + 25cd) + 8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4))}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)}$$

$$- \frac{\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right) (2aci + b^2i - 3bcg + 6c^2e)}{(b^2 - 4ac)^{5/2}}$$

$$+ \frac{-(x^2(-2aci + b^2i - bcg + 2c^2e)) - b(ai + ce) + 2acg}{4c(b^2 - 4ac)(a + bx^2 + cx^4)^2}$$

$$+ \frac{x(x^2(abh - 2acf + bcd) - abf - 2a(cd - ah) + b^2d)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2}$$

$$+ \frac{(b + 2cx^2) \left(2ai + \frac{b^2i}{c} - 3bg + 6ce\right)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(a + b\*x^2 + c\*x^4)^3,x]

[Out] (x\*(b^2\*d - a\*b\*f - 2\*a\*(c\*d - a\*h) + (b\*c\*d - 2\*a\*c\*f + a\*b\*h)\*x^2))/(4\*a\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)^2) + (2\*a\*c\*g - b\*(c\*e + a\*i) - (2\*c^2\*e - b\*c\*g + b^2\*i - 2\*a\*c\*i)\*x^2)/(4\*c\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)^2) + ((6\*c\*e - 3\*b\*g + 2\*a\*i + (b^2\*i)/c)\*(b + 2\*c\*x^2))/(4\*(b^2 - 4\*a\*c)^2\*(a + b\*x^2 + c\*x^4)) + (x\*(3\*b^4\*d + a\*b^3\*f + 8\*a^2\*b\*c\*f + 4\*a^2\*c\*(7\*c\*d + a\*h) - a\*b^2\*(25\*c\*d + 7\*a\*h) + c\*(3\*b^3\*d + a\*b^2\*f + 20\*a^2\*c\*f - 12\*a\*b\*

$$\begin{aligned} & ((2cd + ah)x^2) / (8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)) + (\sqrt{c} \\ & * (3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) + (3b^4d + ab^3f \\ & - 52a^2b*cf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)) / \sqrt{b \\ & ^2 - 4ac}) * \text{ArcTan}[(\sqrt{2} * \sqrt{c} * x) / \sqrt{b - \sqrt{b^2 - 4ac}})] / (8\sqrt{2} \\ & * a^2(b^2 - 4ac)^2 * \sqrt{b - \sqrt{b^2 - 4ac}}) + (\sqrt{c} * (3b^3d \\ & + ab^2f + 20a^2cf - 12ab(2cd + ah) - (3b^4d + ab^3f - 52a^2 \\ & * b*cf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)) / \sqrt{b^2 - 4ac} \\ & ) * \text{ArcTan}[(\sqrt{2} * \sqrt{c} * x) / \sqrt{b + \sqrt{b^2 - 4ac}})] / (8\sqrt{2} * a^2 \\ & (b^2 - 4ac)^2 * \sqrt{b + \sqrt{b^2 - 4ac}}) - ((6c^2e - 3b*cg + b^2i \\ & + 2a*ci) * \text{ArcTanh}[(b + 2cx^2) / \sqrt{b^2 - 4ac}]) / (b^2 - 4ac)^{5/2} \end{aligned}$$

### Rule 12

$$\text{Int}[(a_*)(u_), x\_Symbol] \rightarrow \text{Dist}[a, \text{Int}[u, x], x] \text{ ; FreeQ}[a, x] \ \&\& \ \text{!Match} \\ \text{Q}[u, (b_*)(v_)] \text{ ; FreeQ}[b, x]$$

### Rule 211

$$\text{Int}[(a_*) + (b_*)(x_)^2)^{-1}, x\_Symbol] \rightarrow \text{Simp}[(\text{Rt}[a/b, 2]/a) * \text{ArcTan}[x/\text{Rt} \\ [a/b, 2]], x] \text{ ; FreeQ}[\{a, b\}, x] \ \&\& \ \text{PosQ}[a/b]$$

### Rule 212

$$\text{Int}[(a_*) + (b_*)(x_)^2)^{-1}, x\_Symbol] \rightarrow \text{Simp}[(1/(\text{Rt}[a, 2] * \text{Rt}[-b, 2])) * \\ \text{ArcTanh}[\text{Rt}[-b, 2] * (x/\text{Rt}[a, 2])], x] \text{ ; FreeQ}[\{a, b\}, x] \ \&\& \ \text{NegQ}[a/b] \ \&\& \ (\text{Gt} \\ \text{Q}[a, 0] \ || \ \text{LtQ}[b, 0])$$

### Rule 628

$$\text{Int}[(a_*) + (b_*)(x_) + (c_*)(x_)^2)^{(p_)}, x\_Symbol] \rightarrow \text{Simp}[(b + 2cx) \\ * ((a + bx + cx^2)^{(p+1}) / ((p+1)(b^2 - 4ac))), x] - \text{Dist}[2c * ((2p + \\ 3) / ((p+1)(b^2 - 4ac))), \text{Int}[(a + bx + cx^2)^{(p+1)}, x], x] \text{ ; Free} \\ \text{Q}[\{a, b, c\}, x] \ \&\& \ \text{NeQ}[b^2 - 4ac, 0] \ \&\& \ \text{LtQ}[p, -1] \ \&\& \ \text{NeQ}[p, -3/2] \ \&\& \ \text{Int} \\ \text{egerQ}[4*p]$$

### Rule 632

$$\text{Int}[(a_*) + (b_*)(x_) + (c_*)(x_)^2)^{-1}, x\_Symbol] \rightarrow \text{Dist}[-2, \text{Subst}[\text{I} \\ \text{nt}[1/\text{Simp}[b^2 - 4ac - x^2, x], x], x, b + 2cx], x] \text{ ; FreeQ}[\{a, b, c\}, \\ x] \ \&\& \ \text{NeQ}[b^2 - 4ac, 0]$$

### Rule 1180

$$\text{Int}[(d_*) + (e_*)(x_)^2) / ((a_*) + (b_*)(x_)^2 + (c_*)(x_)^4), x\_Symbol] \text{ :} \\ > \text{With}[\{q = \text{Rt}[b^2 - 4ac, 2]\}, \text{Dist}[e/2 + (2cd - b*e)/(2*q), \text{Int}[1/(b/2 \\ - q/2 + cx^2), x], x] + \text{Dist}[e/2 - (2cd - b*e)/(2*q), \text{Int}[1/(b/2 + q/2 \\ + cx^2), x], x]] \text{ ; FreeQ}[\{a, b, c, d, e\}, x] \ \&\& \ \text{NeQ}[b^2 - 4ac, 0] \ \&\& \ \text{Ne}$$

$Q[c*d^2 - a*e^2, 0] \ \&\& \ \text{PosQ}[b^2 - 4*a*c]$

### Rule 1192

$\text{Int}[(d) + (e)*(x)^2]*((a) + (b)*(x)^2 + (c)*(x)^4)^{(p)}, x\_Symbol] \rightarrow \text{Simp}[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 + c*x^4)^{(p+1})/(2*a*(p+1)*(b^2 - 4*a*c))), x] + \text{Dist}[1/(2*a*(p+1)*(b^2 - 4*a*c)), \text{Int}[\text{Simp}[(2*p+3)*d*b^2 - a*b*e - 2*a*c*d*(4*p+5) + (4*p+7)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^{(p+1)}, x], x] /; \text{FreeQ}\{a, b, c, d, e\}, x] \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0] \ \&\& \ \text{NeQ}[c*d^2 - b*d*e + a*e^2, 0] \ \&\& \ \text{LtQ}[p, -1] \ \&\& \ \text{IntegerQ}[2*p]$

### Rule 1674

$\text{Int}[(Pq)*((a) + (b)*(x) + (c)*(x)^2)^{(p)}, x\_Symbol] \rightarrow \text{With}\{Q = \text{PolynomialQuotient}[Pq, a + b*x + c*x^2, x], f = \text{Coeff}[\text{PolynomialRemainder}[Pq, a + b*x + c*x^2, x], x, 0], g = \text{Coeff}[\text{PolynomialRemainder}[Pq, a + b*x + c*x^2, x], x, 1]\}, \text{Simp}[(b*f - 2*a*g + (2*c*f - b*g)*x)*((a + b*x + c*x^2)^{(p+1})/((p+1)*(b^2 - 4*a*c))), x] + \text{Dist}[1/((p+1)*(b^2 - 4*a*c)), \text{Int}[(a + b*x + c*x^2)^{(p+1)}*\text{ExpandToSum}[(p+1)*(b^2 - 4*a*c)*Q - (2*p+3)*(2*c*f - b*g), x], x], x] /; \text{FreeQ}\{a, b, c\}, x] \ \&\& \ \text{PolyQ}[Pq, x] \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0] \ \&\& \ \text{LtQ}[p, -1]$

### Rule 1677

$\text{Int}[(Pq)*(x)^{(m)}]*((a) + (b)*(x)^2 + (c)*(x)^4)^{(p)}, x\_Symbol] \rightarrow \text{Dist}[1/2, \text{Subst}[\text{Int}[x^{((m-1)/2)}*\text{SubstFor}[x^2, Pq, x]*(a + b*x + c*x^2)^p, x], x, x^2], x] /; \text{FreeQ}\{a, b, c, p\}, x] \ \&\& \ \text{PolyQ}[Pq, x^2] \ \&\& \ \text{IntegerQ}[(m-1)/2]$

### Rule 1687

$\text{Int}[(Pq)*((a) + (b)*(x)^2 + (c)*(x)^4)^{(p)}, x\_Symbol] \rightarrow \text{Module}\{q = \text{Expon}[Pq, x], k\}, \text{Int}[\text{Sum}[\text{Coeff}[Pq, x, 2*k]*x^{(2*k)}, \{k, 0, q/2\}]*((a + b*x^2 + c*x^4)^p, x) + \text{Int}[x*\text{Sum}[\text{Coeff}[Pq, x, 2*k+1]*x^{(2*k)}, \{k, 0, (q-1)/2\}]*((a + b*x^2 + c*x^4)^p, x)] /; \text{FreeQ}\{a, b, c, p\}, x] \ \&\& \ \text{PolyQ}[Pq, x] \ \&\& \ \text{!PolyQ}[Pq, x^2]$

### Rule 1692

$\text{Int}[(Pq)*((a) + (b)*(x)^2 + (c)*(x)^4)^{(p)}, x\_Symbol] \rightarrow \text{With}\{d = \text{Coeff}[\text{PolynomialRemainder}[Pq, a + b*x^2 + c*x^4, x], x, 0], e = \text{Coeff}[\text{PolynomialRemainder}[Pq, a + b*x^2 + c*x^4, x], x, 2]\}, \text{Simp}[x*(a + b*x^2 + c*x^4)^{(p+1)}*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p+1)*(b^2 - 4*a*c))), x] + \text{Dist}[1/(2*a*(p+1)*(b^2 - 4*a*c)), \text{Int}[(a + b*x^2 + c*x^4)^{(p+1)}*\text{ExpandToSum}[2*a*(p+1)*(b^2 - 4*a*c)*\text{PolynomialQuotient}[Pq, a$

+ b\*x^2 + c\*x^4, x] + b^2\*d\*(2\*p + 3) - 2\*a\*c\*d\*(4\*p + 5) - a\*b\*e + c\*(4\*p + 7)\*(b\*d - 2\*a\*e)\*x^2, x], x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1]

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d + fx^2 + hx^4}{(a + bx^2 + cx^4)^3} dx + \int \frac{x(e + gx^2 + ix^4)}{(a + bx^2 + cx^4)^3} dx \\
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx + ix^2}{(a + bx + cx^2)^3} dx, x, x^2 \right) \\
&\quad - \frac{\int \frac{-3b^2d - abf + 2a(7cd + ah) - 5(bcd - 2acf + abh)x^2}{(a + bx^2 + cx^4)^2} dx}{4a(b^2 - 4ac)} \\
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{2acg - b(ce + ai) - (2c^2e - bcg + b^2i - 2aci)x^2}{4c(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{x(3b^4d + ab^3f + 8a^2bcf + 4a^2c(7cd + ah) - ab^2(25cd + 7ah) + c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah)))}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{\int \frac{3b^4d + ab^3f - 16a^2bcf - 3ab^2(9cd - ah) + 12a^2c(7cd + ah) + c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah))x^2}{a + bx^2 + cx^4} dx}{8a^2(b^2 - 4ac)^2} \\
&\quad - \frac{\text{Subst} \left( \int \frac{6ce - 3bg + 2ai + \frac{b^2i}{c}}{(a + bx + cx^2)^2} dx, x, x^2 \right)}{4(b^2 - 4ac)} \\
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{2acg - b(ce + ai) - (2c^2e - bcg + b^2i - 2aci)x^2}{4c(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{x(3b^4d + ab^3f + 8a^2bcf + 4a^2c(7cd + ah) - ab^2(25cd + 7ah) + c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah)))}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{\left( c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah)) - \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}} \right) \int \frac{1}{\sqrt{b^2 - 4ac}}}{16a^2(b^2 - 4ac)^2} \\
&\quad + \frac{\left( c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah)) + \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}} \right) \int \frac{1}{\sqrt{b^2 - 4ac}}}{16a^2(b^2 - 4ac)^2} \\
&\quad - \frac{\left( 6ce - 3bg + 2ai + \frac{b^2i}{c} \right) \text{Subst} \left( \int \frac{1}{(a + bx + cx^2)^2} dx, x, x^2 \right)}{4(b^2 - 4ac)}
\end{aligned}$$

$$\begin{aligned}
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{2acg - b(ce + ai) - (2c^2e - bcg + b^2i - 2aci)x^2}{4c(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{\left(6ce - 3bg + 2ai + \frac{b^2i}{c}\right)(b + 2cx^2)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{x(3b^4d + ab^3f + 8a^2bcf + 4a^2c(7cd + ah) - ab^2(25cd + 7ah) + c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) + \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}) \tan^{-1}}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{\sqrt{c}\left(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) - \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&+ \frac{\sqrt{c}\left(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) - \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&+ \frac{(6c^2e - 3bcg + b^2i + 2aci) \text{Subst}\left(\int \frac{1}{a + bx + cx^2} dx, x, x^2\right)}{2(b^2 - 4ac)^2} \\
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{2acg - b(ce + ai) - (2c^2e - bcg + b^2i - 2aci)x^2}{4c(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{\left(6ce - 3bg + 2ai + \frac{b^2i}{c}\right)(b + 2cx^2)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{x(3b^4d + ab^3f + 8a^2bcf + 4a^2c(7cd + ah) - ab^2(25cd + 7ah) + c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) + \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}) \tan^{-1}}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{\sqrt{c}\left(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) + \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&+ \frac{\sqrt{c}\left(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) - \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&- \frac{(6c^2e - 3bcg + b^2i + 2aci) \text{Subst}\left(\int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2\right)}{(b^2 - 4ac)^2}
\end{aligned}$$

$$\begin{aligned}
&= \frac{x(b^2d - abf - 2a(cd - ah) + (bcd - 2acf + abh)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{2acg - b(ce + ai) - (2c^2e - bcg + b^2i - 2aci)x^2}{4c(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{\left(6ce - 3bg + 2ai + \frac{b^2i}{c}\right)(b + 2cx^2)}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{x(3b^4d + ab^3f + 8a^2bcf + 4a^2c(7cd + ah) - ab^2(25cd + 7ah) + c(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah))}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{\sqrt{c}\left(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) + \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{b + \sqrt{b^2 - 4ac}}{\sqrt{b^2 - 4ac}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&+ \frac{\sqrt{c}\left(3b^3d + ab^2f + 20a^2cf - 12ab(2cd + ah) - \frac{3b^4d + ab^3f - 52a^2bcf - 6ab^2(5cd - 3ah) + 24a^2c(7cd + ah)}{\sqrt{b^2 - 4ac}}\right) \tan^{-1}\left(\frac{b - \sqrt{b^2 - 4ac}}{\sqrt{b^2 - 4ac}}\right)}{8\sqrt{2}a^2(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&- \frac{(6c^2e - 3bcg + b^2i + 2aci) \tanh^{-1}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{(b^2 - 4ac)^{5/2}}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 5.35 (sec) , antiderivative size = 821, normalized size of antiderivative = 1.13

$$\begin{aligned}
&\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^3} dx \\
&= \frac{1}{16} \left( \frac{2(3b^3cdx(b + cx^2) + 4a^3c(bi + cx(h + 2ix)) + abcx(b^2f - 24c^2dx^2 + bc(-25d + fx^2)) + a^2(2b^3i + 4acg - b(ce + ai) - (2c^2e - bcg + b^2i - 2aci)x^2))}{a^2c(b^2 - 4ac)^2(a + bx^2 + cx^4)^2} \right. \\
&+ \frac{4(-bcdx(b + cx^2) + a^2(bi - 2c(g + x(h + ix))) + a(b^2ix^2 + 2c^2x(d + x(e + fx)) + bc(e + x(f - x(g + hx^2 + ix^3))))}{ac(-b^2 + 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{\sqrt{2}\sqrt{c}(3b^4d + b^3(3\sqrt{b^2 - 4acd} + af) + 4a^2c(42cd + 5\sqrt{b^2 - 4ac}f + 6ah) + ab^2(-30cd + \sqrt{b^2 - 4ac}f - 2cx^2))}{a^2(b^2 - 4ac)^{5/2}\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&- \frac{\sqrt{2}\sqrt{c}(3b^4d + b^3(-3\sqrt{b^2 - 4acd} + af) + 4a^2c(42cd - 5\sqrt{b^2 - 4ac}f + 6ah) + ab^2(-30cd - \sqrt{b^2 - 4ac}f - 2cx^2))}{a^2(b^2 - 4ac)^{5/2}\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\left. + \frac{8(6c^2e - 3bcg + b^2i + 2aci) \log(-b + \sqrt{b^2 - 4ac} - 2cx^2)}{(b^2 - 4ac)^{5/2}} - \frac{8(6c^2e - 3bcg + b^2i + 2aci) \log(b + \sqrt{b^2 - 4ac} + 2cx^2)}{(b^2 - 4ac)^{5/2}} \right)
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(a + b\*x^2 + c\*x^4)^3,x  
]

```
[Out] ((2*(3*b^3*c*d*x*(b + c*x^2) + 4*a^3*c*(b*i + c*x*(h + 2*i*x)) + a*b*c*x*(b^2*f - 24*c^2*d*x^2 + b*c*(-25*d + f*x^2)) + a^2*(2*b^3*i + 4*c^3*x*(7*d + x*(6*e + 5*f*x)) + b^2*c*(-6*g + x*(-7*h + 4*i*x)) + 4*b*c^2*(3*e + x*(2*f - 3*x*(g + h*x)))))/(a^2*c*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4)) + (4*(-(b*c*d*x*(b + c*x^2)) + a^2*(b*i - 2*c*(g + x*(h + i*x))) + a*(b^2*i*x^2 + 2*c^2*x*(d + x*(e + f*x)) + b*c*(e + x*(f - x*(g + h*x)))))/(a*c*(-b^2 + 4*a*c)*(a + b*x^2 + c*x^4)^2) + (Sqrt[2]*Sqrt[c]*(3*b^4*d + b^3*(3*Sqrt[b^2 - 4*a*c]*d + a*f) + 4*a^2*c*(42*c*d + 5*Sqrt[b^2 - 4*a*c]*f + 6*a*h) + a*b^2*(-30*c*d + Sqrt[b^2 - 4*a*c]*f + 18*a*h) - 4*a*b*(6*c*Sqrt[b^2 - 4*a*c]*d + 13*a*c*f + 3*a*Sqrt[b^2 - 4*a*c]*h))*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b - Sqrt[b^2 - 4*a*c]]]/(a^2*(b^2 - 4*a*c)^(5/2)*Sqrt[b - Sqrt[b^2 - 4*a*c]]) - (Sqrt[2]*Sqrt[c]*(3*b^4*d + b^3*(-3*Sqrt[b^2 - 4*a*c]*d + a*f) + 4*a^2*c*(42*c*d - 5*Sqrt[b^2 - 4*a*c]*f + 6*a*h) + a*b^2*(-30*c*d - Sqrt[b^2 - 4*a*c]*f + 18*a*h) + 4*a*b*(6*c*Sqrt[b^2 - 4*a*c]*d - 13*a*c*f + 3*a*Sqrt[b^2 - 4*a*c]*h))*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b + Sqrt[b^2 - 4*a*c]]]/(a^2*(b^2 - 4*a*c)^(5/2)*Sqrt[b + Sqrt[b^2 - 4*a*c]]) + (8*(6*c^2*e - 3*b*c*g + b^2*i + 2*a*c*i)*Log[-b + Sqrt[b^2 - 4*a*c] - 2*c*x^2])/(b^2 - 4*a*c)^(5/2) - (8*(6*c^2*e - 3*b*c*g + b^2*i + 2*a*c*i)*Log[b + Sqrt[b^2 - 4*a*c] + 2*c*x^2])/(b^2 - 4*a*c)^(5/2))/16
```

## Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.30 (sec) , antiderivative size = 795, normalized size of antiderivative = 1.09

method	result
risch	$-\frac{c^2(12a^2bh-20a^2cf-a^2b^2f+24abcd-3b^3d)x^7}{8a^2(16a^2c^2-8ab^2c+b^4)} + \frac{c(2aci+b^2i-3gbc+6ec^2)x^6}{32a^2c^2-16ab^2c+2b^4} + \frac{c(4a^3ch-19a^2b^2h+28a^2bcf+28a^2c^2d+2ab^3f-49ab^2cd+6db^4)x^5}{8a^2(16a^2c^2-8ab^2c+b^4)}$
default	Expression too large to display

```
[In] int((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x,method=_RETURNVERBOSE)
```

```
[Out] (-1/8*c^2*(12*a^2*b*h-20*a^2*c*f-a*b^2*f+24*a*b*c*d-3*b^3*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*x^7+1/2*c*(2*a*c*i+b^2*i-3*b*c*g+6*c^2*e)/(16*a^2*c^2-8*a*b^2*c+b^4)*x^6+1/8/a^2*c*(4*a^3*c*h-19*a^2*b^2*h+28*a^2*b*c*f+28*a^2*c^2*d+2*a*b^3*f-49*a*b^2*c*d+6*b^4*d)/(16*a^2*c^2-8*a*b^2*c+b^4)*x^5+3/4*b*(2*a*c*i+b^2*i-3*b*c*g+6*c^2*e)/(16*a^2*c^2-8*a*b^2*c+b^4)*x^4-1/8*(16*a^3*b*c*h-36*a^3*c^2*f+5*a^2*b^3*h-5*a^2*b^2*c*f+4*a^2*b*c^2*d-a*b^4*f+20*a*b^3*c*d-3*b^5*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*x^3-1/2*(2*a^2*c*i-5*a*b^2*i+5*a*b*c*g-10*a*c^2*e+b^3*g-2*b^2*c*e)/(16*a^2*c^2-8*a*b^2*c+b^4)*x^2-1/8*(12*a^3*c
```



```
*h+3*a^2*b^2*h-16*a^2*b*c*f-44*a^2*c^2*d+a*b^3*f+37*a*b^2*c*d-5*b^4*d)/(16*
a^2*c^2-8*a*b^2*c+b^4)/a*x+1/4*(6*a^2*b*i-8*a^2*c*g-a*b^2*g+10*a*b*c*e-b^3*
e)/(16*a^2*c^2-8*a*b^2*c+b^4))/(c*x^4+b*x^2+a)^2+1/16*sum((-c*(12*a^2*b*h-2
0*a^2*c*f-a*b^2*f+24*a*b*c*d-3*b^3*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*_R^2+8
*(2*a*c*i+b^2*i-3*b*c*g+6*c^2*e)/(16*a^2*c^2-8*a*b^2*c+b^4)*_R+(12*a^3*c*h+
3*a^2*b^2*h-16*a^2*b*c*f+84*a^2*c^2*d+a*b^3*f-27*a*b^2*c*d+3*b^4*d)/a^2/(16
*a^2*c^2-8*a*b^2*c+b^4))/(2*_R^3*c+_R*b)*ln(x-_R),_R=RootOf(_Z^4*c+_Z^2*b+a
))
```

## Fricas [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x, algorithm="f
ricas")
```

```
[Out] Timed out
```

## Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

```
[In] integrate((i*x**5+h*x**4+g*x**3+f*x**2+e*x+d)/(c*x**4+b*x**2+a)**3,x)
```

```
[Out] Timed out
```

## Maxima [F]

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^3} dx = \int \frac{ix^5 + hx^4 + gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^3} dx$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x, algorithm="m
axima")
```

```
[Out] -1/8*((12*a^2*b*c^2*h - 3*(b^3*c^2 - 8*a*b*c^3)*d - (a*b^2*c^2 + 20*a^2*c^3
)*f)*x^7 - 4*(6*a^2*c^3*e - 3*a^2*b*c^2*g + (a^2*b^2*c + 2*a^3*c^2)*i)*x^6
- 12*a^4*b*i - ((6*b^4*c - 49*a*b^2*c^2 + 28*a^2*c^3)*d + 2*(a*b^3*c + 14*a
^2*b*c^2)*f - (19*a^2*b^2*c - 4*a^3*c^2)*h)*x^5 - 6*(6*a^2*b*c^2*e - 3*a^2*
b^2*c*g + (a^2*b^3 + 2*a^3*b*c)*i)*x^4 - ((3*b^5 - 20*a*b^3*c - 4*a^2*b*c^2
```

```
) * d + (a * b^4 + 5 * a^2 * b^2 * c + 36 * a^3 * c^2) * f - (5 * a^2 * b^3 + 16 * a^3 * b * c) * h) * x^
3 - 4 * (2 * (a^2 * b^2 * c + 5 * a^3 * c^2) * e - (a^2 * b^3 + 5 * a^3 * b * c) * g + (5 * a^3 * b^2 -
2 * a^4 * c) * i) * x^2 + 2 * (a^2 * b^3 - 10 * a^3 * b * c) * e + 2 * (a^3 * b^2 + 8 * a^4 * c) * g - (
(5 * a * b^4 - 37 * a^2 * b^2 * c + 44 * a^3 * c^2) * d - (a^2 * b^3 - 16 * a^3 * b * c) * f - 3 * (a^3
* b^2 + 4 * a^4 * c) * h) * x) / ((a^2 * b^4 * c^2 - 8 * a^3 * b^2 * c^3 + 16 * a^4 * c^4) * x^8 + a^4
* b^4 - 8 * a^5 * b^2 * c + 16 * a^6 * c^2 + 2 * (a^2 * b^5 * c - 8 * a^3 * b^3 * c^2 + 16 * a^4 * b * c
^3) * x^6 + (a^2 * b^6 - 6 * a^3 * b^4 * c + 32 * a^5 * c^3) * x^4 + 2 * (a^3 * b^5 - 8 * a^4 * b^3
* c + 16 * a^5 * b * c^2) * x^2) - 1/8 * integrate(((12 * a^2 * b * c * h - 3 * (b^3 * c - 8 * a * b * c
^2) * d - (a * b^2 * c + 20 * a^2 * c^2) * f) * x^2 - 3 * (b^4 - 9 * a * b^2 * c + 28 * a^2 * c^2) * d
- (a * b^3 - 16 * a^2 * b * c) * f - 3 * (a^2 * b^2 + 4 * a^3 * c) * h - 8 * (6 * a^2 * c^2 * e - 3 * a^2
* b * c * g + (a^2 * b^2 + 2 * a^3 * c) * i) * x) / (c * x^4 + b * x^2 + a), x) / (a^2 * b^4 - 8 * a^3
* b^2 * c + 16 * a^4 * c^2)
```

### Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 7340 vs. 2(676) = 1352.

Time = 3.38 (sec) , antiderivative size = 7340, normalized size of antiderivative = 10.08

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

```
[In] integrate((i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x, algorithm="g
iac")
```

```
[Out] 1/32*(3*(sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*b^8 - 17*sqrt(2)*sqrt(b*c
+ sqrt(b^2 - 4*a*c))*c)*a*b^6*c - 2*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*
b^7*c - 2*b^8*c + 116*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*a^2*b^4*c^2 +
26*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*a*b^5*c^2 + sqrt(2)*sqrt(b*c +
sqrt(b^2 - 4*a*c))*c)*b^6*c^2 + 34*a*b^6*c^2 - 2*b^7*c^2 - 368*sqrt(2)*sqrt(
b*c + sqrt(b^2 - 4*a*c))*c)*a^3*b^2*c^3 - 128*sqrt(2)*sqrt(b*c + sqrt(b^2 -
4*a*c))*c)*a^2*b^3*c^3 - 13*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*a*b^4*c^
3 - 232*a^2*b^4*c^3 + 30*a*b^5*c^3 + 448*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*
c))*c)*a^4*c^4 + 224*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*a^3*b*c^4 + 64*
sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*a^2*b^2*c^4 + 736*a^3*b^2*c^4 - 176
*a^2*b^3*c^4 - 112*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*a^3*c^5 - 896*a^
4*c^5 + 352*a^3*b*c^5 + sqrt(2)*sqrt(b^2 - 4*a*c))*sqrt(b*c + sqrt(b^2 - 4*a
*c))*c)*b^7 - 15*sqrt(2)*sqrt(b^2 - 4*a*c))*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*
a*b^5*c - 2*sqrt(2)*sqrt(b^2 - 4*a*c))*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*b^6*c
+ 88*sqrt(2)*sqrt(b^2 - 4*a*c))*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*a^2*b^3*c^2
+ 22*sqrt(2)*sqrt(b^2 - 4*a*c))*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*a*b^4*c^2 +
sqrt(2)*sqrt(b^2 - 4*a*c))*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*b^5*c^2 - 176*sq
rt(2)*sqrt(b^2 - 4*a*c))*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*a^3*b*c^3 - 88*sqrt(
2)*sqrt(b^2 - 4*a*c))*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*a^2*b^2*c^3 - 11*sqrt(
2)*sqrt(b^2 - 4*a*c))*sqrt(b*c + sqrt(b^2 - 4*a*c))*c)*a*b^3*c^3 + 44*sqrt(2)
```

$$\begin{aligned}
& \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^4 c^4 + 2(b^2 - 4ac) b^6 c - 26(b^2 - 4ac) a b^4 c^2 + 2(b^2 - 4ac) b^5 c^2 + 128(b^2 - 4ac) a^2 b^2 c^3 - 22(b^2 - 4ac) a b^3 c^3 - 224(b^2 - 4ac) a^3 c^4 + 88(b^2 - 4ac) a^2 b^4 c^4) d + (\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a b^7 - 24\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^5 c - 2\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a b^6 c - 2a b^7 c + 144\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^3 b^3 c^2 + 40\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^4 c^2 + \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a b^5 c^2 + 48 a^2 b^5 c^2 - 2a b^6 c^2 - 256\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^4 b^3 c^3 - 128\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^3 b^2 c^3 - 20\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^3 c^3 - 288a^3 b^3 c^3 + 44a^2 b^4 c^3 + 64\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^3 b^4 c^4 + 512a^4 b^4 c^4 - 64a^3 b^2 c^4 - 320a^4 c^5 + \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a b^6 - 22\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^4 c - 2\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a b^5 c + 32\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^3 b^2 c^2 + 36\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^3 c^2 + \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a b^4 c^2 + 160\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^4 c^3 + 80\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^3 b^3 c^3 - 18\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^2 c^3 - 40\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^3 c^4 + 2(b^2 - 4ac) a b^5 c - 40(b^2 - 4ac) a^2 b^3 c^2 + 2(b^2 - 4ac) a b^4 c^2 + 128(b^2 - 4ac) a^3 b^3 c^3 - 36(b^2 - 4ac) a^2 b^2 c^3 - 80(b^2 - 4ac) a^3 c^4) f + 3(\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^6 - 4\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^3 b^4 c - 2\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^5 c - 2a^2 b^6 c - 16\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^4 b^2 c^2 + \sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^4 c^2 + 8a^3 b^4 c^2 - 2a^2 b^5 c^2 + 64\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^5 c^3 + 32\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^4 b^3 c^3 + 32a^4 b^2 c^3 - 16a^3 b^3 c^3 - 16\sqrt{2} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^4 c^4 - 128a^5 c^4 + 96a^4 b^4 c^4 + \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^5 + 8\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^3 b^3 c - 2\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^4 c - 48\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^4 b^2 c^2 - 24\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^3 b^2 c^2 + \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^2 b^3 c^2 + 12\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}} c) a^3 b^3 c^3 + 2(b^2 - 4ac) a^2 b^4 c + 2(b^2 - 4ac) a^2 b^3 c^2 - 32(b^2 - 4ac) a^4 c^3 + 24(b^2 - 4ac) a^3 b^3 c^3) h) \arctan(2\sqrt{1/2} x / \sqrt{(a^2 b^5 - 8a^3 b^3 c + 16a^4 b^2 c^2 + \sqrt{(a^2 b^5 - 8a^3 b^3 c + 16a^4 b^2 c^2)^2 - 4(a^3 b^4 - 8a^4 b^2 c + 16a^5 c^2)(a^2 b^4 c - 8a^3 b^2 c^2 + 16a^4 c^3)})}) / (a^2 b^4 c - 8a^3 b^2 c^2 + 16a^4 c^3)) / ((a^3 b^8 - 16a^4 b^6 c - 2a^3 b^7 c + 96a^5 b^4 c^2 + 24a^4 b^5 c^2 + a^3 b^6 c^2 - 256a^6 b^2 c^3 - 96a^5 b^3 c^3 - 12a^4 b^4 c^3 +
\end{aligned}$$

$$\begin{aligned}
& 256*a^7*c^4 + 128*a^6*b*c^4 + 48*a^5*b^2*c^4 - 64*a^6*c^5)*abs(c)) + 1/32* \\
& (3*(sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*b^8 - 17*sqrt(2)*sqrt(b*c - sqrt \\
& (b^2 - 4*a*c))*c)*a*b^6*c - 2*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*b^7*c \\
& + 2*b^8*c + 116*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^4*c^2 + 26*s \\
& qrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a*b^5*c^2 + sqrt(2)*sqrt(b*c - sqrt( \\
& b^2 - 4*a*c))*c)*b^6*c^2 - 34*a*b^6*c^2 - 2*b^7*c^2 - 368*sqrt(2)*sqrt(b*c - \\
& sqrt(b^2 - 4*a*c))*c)*a^3*b^2*c^3 - 128*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c \\
& )*c)*a^2*b^3*c^3 - 13*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a*b^4*c^3 + 2 \\
& 32*a^2*b^4*c^3 + 30*a*b^5*c^3 + 448*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c) \\
& *a^4*c^4 + 224*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b*c^4 + 64*sqrt( \\
& 2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^2*c^4 - 736*a^3*b^2*c^4 - 176*a^2* \\
& b^3*c^4 - 112*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*c^5 + 896*a^4*c^5 \\
& + 352*a^3*b*c^5 + sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c \\
& )*b^7 - 15*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a*b^5* \\
& c - 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*b^6*c + 88* \\
& sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^3*c^2 + 22* \\
& sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a*b^4*c^2 + sqrt( \\
& 2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*b^5*c^2 - 176*sqrt(2)* \\
& sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b*c^3 - 88*sqrt(2)*sq \\
& rt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^2*c^3 - 11*sqrt(2)*sq \\
& rt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a*b^3*c^3 + 44*sqrt(2)*sqrt \\
& (b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b*c^4 - 2*(b^2 - 4*a*c)*b \\
& ^6*c + 26*(b^2 - 4*a*c)*a*b^4*c^2 + 2*(b^2 - 4*a*c)*b^5*c^2 - 128*(b^2 - 4* \\
& a*c)*a^2*b^2*c^3 - 22*(b^2 - 4*a*c)*a*b^3*c^3 + 224*(b^2 - 4*a*c)*a^3*c^4 + \\
& 88*(b^2 - 4*a*c)*a^2*b*c^4)*d + (sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a \\
& *b^7 - 24*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^5*c - 2*sqrt(2)*sq \\
& rt(b*c - sqrt(b^2 - 4*a*c))*c)*a*b^6*c + 2*a*b^7*c + 144*sqrt(2)*sqrt(b*c - s \\
& qrt(b^2 - 4*a*c))*c)*a^3*b^3*c^2 + 40*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c \\
& )*a^2*b^4*c^2 + sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a*b^5*c^2 - 48*a^2* \\
& b^5*c^2 - 2*a*b^6*c^2 - 256*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^4*b*c \\
& ^3 - 128*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b^2*c^3 - 20*sqrt(2)*s \\
& qrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^3*c^3 + 288*a^3*b^3*c^3 + 44*a^2*b^4*c \\
& ^3 + 64*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b*c^4 - 512*a^4*b*c^4 - \\
& 64*a^3*b^2*c^4 - 320*a^4*c^5 + sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b \\
& ^2 - 4*a*c))*c)*a*b^6 - 22*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4 \\
& *a*c))*c)*a^2*b^4*c - 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a* \\
& c))*c)*a*b^5*c + 32*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c \\
& )*a^3*b^2*c^2 + 36*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c \\
& )*a^2*b^3*c^2 + sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a \\
& *b^4*c^2 + 160*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^ \\
& 4*c^3 + 80*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*b* \\
& c^3 - 18*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^2*b^2* \\
& c^3 - 40*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*c)*a^3*c^4 \\
& - 2*(b^2 - 4*a*c)*a*b^5*c + 40*(b^2 - 4*a*c)*a^2*b^3*c^2 + 2*(b^2 - 4*a*c)* \\
& a*b^4*c^2 - 128*(b^2 - 4*a*c)*a^3*b*c^3 - 36*(b^2 - 4*a*c)*a^2*b^2*c^3 - 80
\end{aligned}$$

$$\begin{aligned}
&*(b^2 - 4*a*c)*a^3*c^4)*f + 3*(\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*a^2* \\
&b^6 - 4*\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*a^3*b^4*c - 2*\text{sqrt}(2)*\text{sqrt}( \\
&b*c - \text{sqrt}(b^2 - 4*a*c))*a^2*b^5*c + 2*a^2*b^6*c - 16*\text{sqrt}(2)*\text{sqrt}(b*c - \\
&\text{sqrt}(b^2 - 4*a*c))*a^4*b^2*c^2 + \text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))* \\
&a^2*b^4*c^2 - 8*a^3*b^4*c^2 - 2*a^2*b^5*c^2 + 64*\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^ \\
&2 - 4*a*c))*a^5*c^3 + 32*\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*a^4*b*c^ \\
&3 - 32*a^4*b^2*c^3 - 16*a^3*b^3*c^3 - 16*\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a* \\
&c))*a^4*c^4 + 128*a^5*c^4 + 96*a^4*b*c^4 + \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt} \\
&(b*c - \text{sqrt}(b^2 - 4*a*c))*a^2*b^5 + 8*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c \\
&- \text{sqrt}(b^2 - 4*a*c))*a^3*b^3*c - 2*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c - s \\
&\text{qrt}(b^2 - 4*a*c))*a^2*b^4*c - 48*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c - s \\
&\text{qrt}(b^2 - 4*a*c))*a^4*b*c^2 - 24*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c - \text{sqrt}( \\
&b^2 - 4*a*c))*a^3*b^2*c^2 + \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c - \text{sqrt}(b^2 \\
&- 4*a*c))*a^2*b^3*c^2 + 12*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c - \text{sqrt}(b^2 \\
&- 4*a*c))*a^3*b*c^3 - 2*(b^2 - 4*a*c)*a^2*b^4*c + 2*(b^2 - 4*a*c)*a^2*b^ \\
&3*c^2 + 32*(b^2 - 4*a*c)*a^4*c^3 + 24*(b^2 - 4*a*c)*a^3*b*c^3)*h)*\arctan(2* \\
&\text{sqrt}(1/2)*x/\text{sqrt}((a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 - \text{sqrt}((a^2*b^5 - 8* \\
&a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b \\
&^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^ \\
&3)))/((a^3*b^8 - 16*a^4*b^6*c - 2*a^3*b^7*c + 96*a^5*b^4*c^2 + 24*a^4*b^5*c \\
&^2 + a^3*b^6*c^2 - 256*a^6*b^2*c^3 - 96*a^5*b^3*c^3 - 12*a^4*b^4*c^3 + 256* \\
&a^7*c^4 + 128*a^6*b*c^4 + 48*a^5*b^2*c^4 - 64*a^6*c^5)*\text{abs}(c)) + 1/2*(6*(b^ \\
&2*c^4 - 4*a*c^5 - 2*b*c^5 + c^6)*\text{sqrt}(b^2 - 4*a*c)*e + 3*(b^3*c^3 - 4*a*b*c \\
&^4 - 2*b^2*c^4 + b*c^5)*\text{sqrt}(b^2 - 4*a*c)*g - (b^4*c^2 - 2*a*b^2*c^3 - 2*b^ \\
&3*c^3 - 8*a^2*c^4 - 4*a*b*c^4 + b^2*c^4 + 2*a*c^5)*\text{sqrt}(b^2 - 4*a*c)*i)*\log \\
&(x^2 + 1/2*(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 + \text{sqrt}((a^2*b^5 - 8*a^3*b^ \\
&3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - \\
&8*a^3*b^2*c^2 + 16*a^4*c^3)))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))/(( \\
&b^8 - 16*a*b^6*c - 2*b^7*c + 96*a^2*b^4*c^2 + 24*a*b^5*c^2 + b^6*c^2 - 256* \\
&a^3*b^2*c^3 - 96*a^2*b^3*c^3 - 12*a*b^4*c^3 + 256*a^4*c^4 + 128*a^3*b*c^4 + \\
&48*a^2*b^2*c^4 - 64*a^3*c^5)*c^2) + 1/4*(6*(b^5*c^3 - 8*a*b^3*c^4 - 2*b^4*c \\
&^4 + 16*a^2*b*c^5 + 8*a*b^2*c^5 + b^3*c^5 - 4*a*b*c^6 - (b^4*c^3 - 6*a*b^2 \\
&*c^4 - 2*b^3*c^4 + 8*a^2*c^5 + 4*a*b*c^5 + b^2*c^5 - 2*a*c^6)*\text{sqrt}(b^2 - 4* \\
&a*c))*e - 3*(b^6*c^2 - 8*a*b^4*c^3 - 2*b^5*c^3 + 16*a^2*b^2*c^4 + 8*a*b^3*c \\
&^4 + b^4*c^4 - 4*a*b^2*c^5 - (b^5*c^2 - 6*a*b^3*c^3 - 2*b^4*c^3 + 8*a^2*b*c \\
&^4 + 4*a*b^2*c^4 + b^3*c^4 - 2*a*b*c^5)*\text{sqrt}(b^2 - 4*a*c))*g + (b^7*c - 6*a \\
&*b^5*c^2 - 2*b^6*c^2 + 4*a*b^4*c^3 + b^5*c^3 + 32*a^3*b*c^4 + 16*a^2*b^2*c^ \\
&4 - 2*a*b^3*c^4 - 8*a^2*b*c^5 - (b^6*c - 4*a*b^4*c^2 - 2*b^5*c^2 - 4*a^2*b^ \\
&2*c^3 + b^4*c^3 + 16*a^3*c^4 + 8*a^2*b*c^4 - 4*a^2*c^5)*\text{sqrt}(b^2 - 4*a*c))* \\
&i)*\log(x^2 + 1/2*(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 - \text{sqrt}((a^2*b^5 - 8* \\
&a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b \\
&^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^ \\
&3)))/((a*b^8 - 16*a^2*b^6*c - 2*a*b^7*c + 96*a^3*b^4*c^2 + 24*a^2*b^5*c^2 + \\
&a*b^6*c^2 - 256*a^4*b^2*c^3 - 96*a^3*b^3*c^3 - 12*a^2*b^4*c^3 + 256*a^5*c^4 \\
&+ 128*a^4*b*c^4 + 48*a^3*b^2*c^4 - 64*a^4*c^5)*c^2) + 1/8*(3*b^3*c^2*d*x^7
\end{aligned}$$

$$\begin{aligned}
& - 24*a*b*c^3*d*x^7 + a*b^2*c^2*f*x^7 + 20*a^2*c^3*f*x^7 - 12*a^2*b*c^2*h*x \\
& ^7 + 24*a^2*c^3*e*x^6 - 12*a^2*b*c^2*g*x^6 + 4*a^2*b^2*c*i*x^6 + 8*a^3*c^2* \\
& i*x^6 + 6*b^4*c*d*x^5 - 49*a*b^2*c^2*d*x^5 + 28*a^2*c^3*d*x^5 + 2*a*b^3*c*f \\
& *x^5 + 28*a^2*b*c^2*f*x^5 - 19*a^2*b^2*c*h*x^5 + 4*a^3*c^2*h*x^5 + 36*a^2*b \\
& *c^2*e*x^4 - 18*a^2*b^2*c*g*x^4 + 6*a^2*b^3*i*x^4 + 12*a^3*b*c*i*x^4 + 3*b^ \\
& 5*d*x^3 - 20*a*b^3*c*d*x^3 - 4*a^2*b*c^2*d*x^3 + a*b^4*f*x^3 + 5*a^2*b^2*c* \\
& f*x^3 + 36*a^3*c^2*f*x^3 - 5*a^2*b^3*h*x^3 - 16*a^3*b*c*h*x^3 + 8*a^2*b^2*c \\
& *e*x^2 + 40*a^3*c^2*e*x^2 - 4*a^2*b^3*g*x^2 - 20*a^3*b*c*g*x^2 + 20*a^3*b^2 \\
& *i*x^2 - 8*a^4*c*i*x^2 + 5*a*b^4*d*x - 37*a^2*b^2*c*d*x + 44*a^3*c^2*d*x - \\
& a^2*b^3*f*x + 16*a^3*b*c*f*x - 3*a^3*b^2*h*x - 12*a^4*c*h*x - 2*a^2*b^3*e \\
& + 20*a^3*b*c*e - 2*a^3*b^2*g - 16*a^4*c*g + 12*a^4*b*i)/(a^2*b^4 - 8*a^3*b^ \\
& 2*c + 16*a^4*c^2)*(c*x^4 + b*x^2 + a)^2
\end{aligned}$$

## Mupad [B] (verification not implemented)

Time = 12.37 (sec) , antiderivative size = 36653, normalized size of antiderivative = 50.35

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5)/(a + b\*x^2 + c\*x^4)^3,x)

[Out] ((x^5\*(28\*a^2\*c^3\*d + 4\*a^3\*c^2\*h + 6\*b^4\*c\*d + 2\*a\*b^3\*c\*f - 49\*a\*b^2\*c^2\*d + 28\*a^2\*b\*c^2\*f - 19\*a^2\*b^2\*c\*h))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) - (x^2\*(b^3\*g - 10\*a\*c^2\*e - 2\*b^2\*c\*e - 5\*a\*b^2\*i + 2\*a^2\*c\*i + 5\*a\*b\*c\*g))/(2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) - (b^3\*e + a\*b^2\*g + 8\*a^2\*c\*g - 6\*a^2\*b\*i - 10\*a\*b\*c\*e)/(4\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (3\*b\*x^4\*(6\*c^2\*e + b^2\*i - 3\*b\*c\*g + 2\*a\*c\*i))/(4\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (c\*x^6\*(6\*c^2\*e + b^2\*i - 3\*b\*c\*g + 2\*a\*c\*i))/(2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (x^3\*(3\*b^5\*d + 36\*a^3\*c^2\*f - 5\*a^2\*b^3\*h + a\*b^4\*f - 20\*a\*b^3\*c\*d - 16\*a^3\*b\*c\*h - 4\*a^2\*b\*c^2\*d + 5\*a^2\*b^2\*c\*f))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) - (x\*(3\*a^2\*b^2\*h - 44\*a^2\*c^2\*d - 5\*b^4\*d + a\*b^3\*f + 12\*a^3\*c\*h + 37\*a\*b^2\*c\*d - 16\*a^2\*b\*c\*f))/(8\*a\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (c\*x^7\*(20\*a^2\*c^2\*f + 3\*b^3\*c\*d - 24\*a\*b\*c^2\*d + a\*b^2\*c\*f - 12\*a^2\*b\*c\*h))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)))/(x^4\*(2\*a\*c + b^2) + a^2 + c^2\*x^8 + 2\*a\*b\*x^2 + 2\*b\*c\*x^6) + symsum(log((10368\*a\*b^5\*c^6\*d^3 - 8000\*a^5\*c^7\*f^3 - 567\*b^7\*c^5\*d^3 + 169344\*a^3\*b\*c^8\*d^3 + 193536\*a^4\*c^8\*d\*e^2 - 141120\*a^4\*c^8\*d^2\*f + 1728\*a^6\*b\*c^5\*h^3 + 315\*b^8\*c^4\*d^2\*f + 27648\*a^5\*c^7\*e^2\*h + 21504\*a^6\*c^6\*d\*i^2 - 135\*b^9\*c^3\*d^2\*h - 2880\*a^6\*c^6\*f\*h^2 + 3072\*a^7\*c^5\*h\*i^2 - 67824\*a^2\*b^3\*c^7\*d^3 + 35\*a^2\*b^6\*c^4\*f^3 + 84\*a^3\*b^4\*c^5\*f^3 - 12720\*a^4\*b^2\*c^6\*f^3 + 540\*a^4\*b^5\*c^3\*h^3 + 4320\*a^5\*b^3\*c^4\*h^3 + 12902\*4\*a^5\*c^7\*d\*e\*i - 40320\*a^5\*c^7\*d\*f\*h + 18432\*a^6\*c^6\*e\*h\*i - 6237\*a\*b^6\*c^5\*d^2\*f + 210\*a\*b^7\*c^4\*d\*f^2 + 116160\*a^4\*b\*c^7\*d\*f^2 - 36864\*a^4\*b\*c^7\*e^2\*f + 2430\*a\*b^7\*c^4\*d^2\*h + 133056\*a^4\*b\*c^7\*d^2\*h + 27648\*a^5\*b\*c^6\*d\*h^2 + 26880\*a^5\*b\*c^6\*f^2\*h - 4096\*a^6\*b\*c^5\*f\*i^2 + 6912\*a^2\*b^4\*c^6\*d\*e^2 -

$$\begin{aligned}
& 62208a^3b^2c^7d^2e^2 + 42372a^2b^4c^6d^2f - 1764a^2b^5c^5d^2f^2 \\
& - 96048a^3b^2c^7d^2f - 4608a^3b^3c^6d^2f^2 + 1728a^2b^6c^4d^2g^2 \\
& + 2304a^3b^3c^6e^2f - 15552a^3b^4c^5d^2g^2 + 48384a^4b^2c^6d^2g \\
& ^2 - 13716a^2b^5c^5d^2h + 405a^2b^7c^3d^2h^2 + 12096a^3b^3c^6d^2 \\
& ^2h - 5400a^3b^5c^4d^2h^2 + 28944a^4b^3c^5d^2h^2 + 192a^2b^8c^2d^2 \\
& ^2i + 576a^3b^5c^4f^2g^2 - 960a^3b^6c^3d^2i^2 + 6912a^4b^2c^6e^2 \\
& ^2h - 9216a^4b^3c^5f^2g^2 - 768a^4b^4c^4d^2i^2 + 14592a^5b^2c^5d^2i^2 \\
& - 15a^2b^7c^3f^2h - 360a^3b^5c^4f^2h + 135a^3b^6c^3f^2h^2 + \\
& 15696a^4b^3c^5f^2h - 5580a^4b^4c^4f^2h^2 - 20592a^5b^2c^5f^2h^2 \\
& + 64a^3b^7c^2f^2i^2 + 1728a^4b^4c^4g^2h - 768a^4b^5c^3f^2i^2 + 6 \\
& 912a^5b^2c^5g^2h - 3840a^5b^3c^4f^2i^2 + 192a^4b^6c^2h^2i^2 + 15 \\
& 36a^5b^4c^3h^2i^2 + 3840a^6b^2c^4h^2i^2 - 193536a^4b^2c^7d^2e^2g - 90 \\
& ^2a^5b^8c^3d^2f^2h - 64512a^5b^2c^6d^2g^2i - 24576a^5b^2c^6e^2f^2i - 27648a^5 \\
& ^2b^6c^6e^2g^2h - 9216a^6b^2c^5g^2h^2i - 6912a^2b^5c^5d^2e^2g + 62208a^3b \\
& ^3c^6d^2e^2g + 2304a^2b^6c^4d^2e^2i - 270a^2b^6c^4d^2f^2h - 16128a^3b \\
& ^4c^5d^2e^2i + 16056a^3b^4c^5d^2f^2h - 2304a^3b^4c^5e^2f^2g + 23040a^4 \\
& ^2b^2c^6d^2e^2i - 127008a^4b^2c^6d^2f^2h + 36864a^4b^2c^6e^2f^2g - 1152 \\
& ^2a^2b^7c^3d^2g^2i + 8064a^3b^5c^4d^2g^2i + 768a^3b^5c^4e^2f^2i - 11520 \\
& ^2a^4b^3c^5d^2g^2i - 10752a^4b^3c^5e^2f^2i - 6912a^4b^3c^5e^2g^2h - 384 \\
& ^2a^3b^6c^3f^2g^2i + 2304a^4b^4c^4e^2h^2i + 5376a^4b^4c^4f^2g^2i + 13824 \\
& ^2a^5b^2c^5e^2h^2i + 12288a^5b^2c^5f^2g^2i - 1152a^4b^5c^3g^2h^2i - 691 \\
& ^2a^5b^3c^4g^2h^2i)/(512(a^4b^12 + 4096a^10c^6 - 24a^5b^10c + 240a^ \\
& ^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + roo \\
& t(56371445760a^11b^8c^6z^4 - 503316480a^8b^14c^3z^4 + 47185920a^7 \\
& ^2b^16c^2z^4 - 171798691840a^14b^2c^9z^4 + 193273528320a^13b^4c^8z^ \\
& ^4 - 128849018880a^12b^6c^7z^4 - 16911433728a^10b^10c^5z^4 + 3523215 \\
& 360a^9b^12c^4z^4 - 2621440a^6b^18c^2z^4 + 68719476736a^15c^10z^4 + \\
& 65536a^5b^20z^4 + 196608a^5b^13c^2g^2i^2z^2 - 46080a^4b^14c^2f^2h^2z^2 \\
& - 105984a^3b^15c^2d^2h^2z^2 - 73728a^2b^16c^2d^2f^2z^2 + 2548039680a^9b^3 \\
& ^2c^7d^2h^2z^2 + 1509949440a^9b^3c^7e^2g^2z^2 - 1401421824a^8b^5c^6d^2h^2 \\
& ^2z^2 - 1321205760a^9b^2c^8d^2f^2z^2 - 754974720a^8b^5c^6e^2g^2z^2 + 7321 \\
& 68192a^7b^6c^6d^2f^2z^2 - 603979776a^10b^2c^7e^2i^2z^2 - 456130560a^9 \\
& ^2b^4c^6f^2h^2z^2 + 390463488a^7b^7c^5d^2h^2z^2 + 301989888a^10b^3c^6g^2 \\
& ^2i^2z^2 - 366280704a^6b^8c^5d^2f^2z^2 - 330301440a^8b^4c^7d^2f^2z^2 + 254 \\
& 017536a^8b^6c^5f^2h^2z^2 - 1887436800a^10b^2c^8d^2h^2z^2 + 188743680a^10 \\
& ^2b^2c^7f^2h^2z^2 + 188743680a^7b^7c^5e^2g^2z^2 + 125829120a^8b^6c^5e^2 \\
& ^2i^2z^2 - 62914560a^8b^7c^4g^2i^2z^2 - 61931520a^7b^8c^4f^2h^2z^2 + 23592 \\
& 960a^7b^9c^3g^2i^2z^2 - 47185920a^7b^8c^4e^2i^2z^2 - 3538944a^6b^11c^ \\
& ^2g^2i^2z^2 + 96583680a^5b^10c^4d^2f^2z^2 - 51609600a^6b^9c^4d^2h^2z^2 + \\
& 7077888a^6b^10c^3e^2i^2z^2 + 6144000a^6b^10c^3f^2h^2z^2 - 393216a^5b^ \\
& ^12c^2e^2i^2z^2 + 61440a^5b^12c^2f^2h^2z^2 - 23592960a^6b^9c^4e^2g^2z^2 \\
& + 1179648a^5b^11c^3e^2g^2z^2 + 829440a^4b^13c^2d^2h^2z^2 + 368640a^5 \\
& ^2b^11c^3d^2h^2z^2 - 15175680a^4b^12c^3d^2f^2z^2 + 1428480a^3b^14c^2d^2f^ \\
& ^2z^2 - 1207959552a^10b^2c^8e^2g^2z^2 - 402653184a^11b^2c^7g^2i^2z^2 - 44040 \\
& 1920a^10b^2c^8f^2z^2 - 188743680a^11b^2c^7h^2z^2 + 1761607680a^10c^
\end{aligned}$$

$9*d*f*z^2 + 524288*a^6*b^12*c*i^2*z^2 + 46080*a^5*b^13*c*h^2*z^2 - 14080*a^3*b^15*c*f^2*z^2 + 6936330240*a^8*b^3*c^8*d^2*z^2 + 2464874496*a^6*b^7*c^6*d^2*z^2 - 3963617280*a^9*b*c^9*d^2*z^2 + 805306368*a^11*c^8*e*i*z^2 - 1509949440*a^9*b^2*c^8*e^2*z^2 + 251658240*a^11*c^8*f*h*z^2 + 1536*a^3*b^16*f*h*z^2 + 4608*a^2*b^17*d*h*z^2 - 5400428544*a^7*b^5*c^7*d^2*z^2 - 94464*a*b^17*c*d^2*z^2 + 754974720*a^8*b^4*c^7*e^2*z^2 - 730054656*a^5*b^9*c^5*d^2*z^2 + 477102080*a^9*b^3*c^7*f^2*z^2 - 377487360*a^9*b^4*c^6*g^2*z^2 + 301989888*a^10*b^2*c^7*g^2*z^2 + 188743680*a^8*b^6*c^5*g^2*z^2 + 141557760*a^10*b^3*c^6*h^2*z^2 - 174325760*a^8*b^5*c^6*f^2*z^2 - 188743680*a^7*b^6*c^6*e^2*z^2 + 146165760*a^4*b^11*c^4*d^2*z^2 - 50331648*a^10*b^4*c^5*i^2*z^2 - 33554432*a^11*b^2*c^6*i^2*z^2 + 20971520*a^9*b^6*c^4*i^2*z^2 - 47185920*a^7*b^8*c^4*g^2*z^2 - 26542080*a^8*b^7*c^4*h^2*z^2 - 2752512*a^7*b^10*c^2*i^2*z^2 + 2621440*a^8*b^8*c^3*i^2*z^2 + 9584640*a^7*b^9*c^3*h^2*z^2 - 2359296*a^9*b^5*c^5*h^2*z^2 - 1290240*a^6*b^11*c^2*h^2*z^2 + 5898240*a^6*b^10*c^3*g^2*z^2 - 294912*a^5*b^12*c^2*g^2*z^2 + 11206656*a^7*b^7*c^5*f^2*z^2 + 8929280*a^6*b^9*c^4*f^2*z^2 + 23592960*a^6*b^8*c^5*e^2*z^2 - 2600960*a^5*b^11*c^3*f^2*z^2 + 291840*a^4*b^13*c^2*f^2*z^2 - 19860480*a^3*b^13*c^3*d^2*z^2 - 1179648*a^5*b^10*c^4*e^2*z^2 + 1771776*a^2*b^15*c^2*d^2*z^2 + 1536*a*b^18*d*f*z^2 + 1207959552*a^10*c^9*e^2*z^2 + 134217728*a^12*c^7*i^2*z^2 - 32768*a^5*b^14*i^2*z^2 + 2304*a^4*b^15*h^2*z^2 + 256*a^2*b^17*f^2*z^2 + 2304*b^19*d^2*z^2 + 169869312*a^7*b*c^8*d*e*f*z + 99090432*a^8*b*c^7*d*g*h*z - 3145728*a^9*b*c^6*f*h*i*z - 27648*a^4*b^11*c*f*h*i*z + 56623104*a^8*b*c^7*d*f*i*z - 50688*a^3*b^12*c*d*h*i*z - 4608*a^3*b^12*c*f*g*h*z - 9437184*a^8*b*c^7*e*f*h*z - 55296*a^2*b^13*c*d*f*i*z - 13824*a^2*b^13*c*d*g*h*z + 9216*a*b^13*c^2*d*e*f*z - 4608*a*b^14*c*d*f*g*z + 219414528*a^7*b^2*c^7*d*e*h*z - 221773824*a^6*b^3*c^7*d*e*f*z - 109707264*a^7*b^3*c^6*d*g*h*z + 110886912*a^6*b^4*c^6*d*f*g*z + 40108032*a^8*b^2*c^6*d*h*i*z + 2359296*a^8*b^3*c^5*f*h*i*z - 491520*a^6*b^7*c^3*f*h*i*z + 184320*a^5*b^9*c^2*f*h*i*z - 88473600*a^6*b^4*c^6*d*e*h*z - 84934656*a^7*b^2*c^7*d*f*g*z + 117964800*a^5*b^5*c^6*d*e*f*z - 45613056*a^7*b^3*c^6*d*f*i*z + 44236800*a^6*b^5*c^5*d*g*h*z - 10321920*a^6*b^6*c^4*d*h*i*z + 7077888*a^7*b^4*c^5*d*h*i*z - 5898240*a^7*b^4*c^5*f*g*h*z + 4718592*a^8*b^2*c^6*f*g*h*z + 2949120*a^6*b^6*c^4*f*g*h*z + 2396160*a^5*b^8*c^3*d*h*i*z - 737280*a^5*b^8*c^3*f*g*h*z + 92160*a^4*b^10*c^2*f*g*h*z - 27648*a^4*b^10*c^2*d*h*i*z - 58982400*a^5*b^6*c^5*d*f*g*z + 11796480*a^7*b^3*c^6*e*f*h*z + 8847360*a^5*b^7*c^4*d*f*i*z - 6635520*a^5*b^7*c^4*d*g*h*z - 5898240*a^6*b^5*c^5*e*f*h*z - 3809280*a^4*b^9*c^3*d*f*i*z + 2359296*a^6*b^5*c^5*d*f*i*z + 1474560*a^5*b^7*c^4*e*f*h*z + 681984*a^3*b^11*c^2*d*f*i*z - 276480*a^4*b^9*c^3*d*g*h*z - 184320*a^4*b^9*c^3*e*f*h*z + 179712*a^3*b^11*c^2*d*g*h*z + 9216*a^3*b^11*c^2*e*f*h*z + 16220160*a^4*b^8*c^4*d*f*g*z + 13271040*a^5*b^6*c^5*d*e*h*z - 2396160*a^3*b^10*c^3*d*f*g*z + 552960*a^4*b^8*c^4*d*e*h*z - 359424*a^3*b^10*c^3*d*e*h*z + 175104*a^2*b^12*c^2*d*f*g*z + 27648*a^2*b^12*c^2*d*e*h*z - 32440320*a^4*b^7*c^5*d*e*f*z + 4792320*a^3*b^9*c^4*d*e*f*z - 350208*a^2*b^11*c^3*d*e*f*z + 346816512*a^7*b*c^8*d^2*g*z - 41472*a^5*b^10*c^h^2*i*z + 7077888*a^9*b*c^6*g^h^2*z - 11008*a^3*b^12*c*f^2*i*z - 6912*a^4*b^11*c*g^h^2*z - 19660800*a^8*b*c^7*f^2*g*z - 768*a^2*b^13*c*f^2$



$*g*z + 214272*a*b^{13}*c^2*d^2*g*z - 428544*a*b^{12}*c^3*d^2*e*z - 198180864*a^8*c^8*d*e*h*z - 66060288*a^9*c^7*d*h*i*z + 1536*a^3*b^{13}*f*h*i*z + 4608*a^2*b^{14}*d*h*i*z - 66816*a*b^{14}*c*d^2*i*z + 1022754816*a^6*b^2*c^8*d^2*e*z - 642318336*a^5*b^4*c^7*d^2*e*z - 511377408*a^6*b^3*c^7*d^2*g*z + 321159168*a^5*b^5*c^6*d^2*g*z + 225312768*a^7*b^2*c^7*d^2*i*z + 223395840*a^4*b^6*c^6*d^2*e*z - 111697920*a^4*b^7*c^5*d^2*g*z + 3538944*a^9*b^2*c^5*h^2*i*z - 737280*a^7*b^6*c^3*h^2*i*z + 276480*a^6*b^8*c^2*h^2*i*z - 10354688*a^8*b^2*c^6*f^2*i*z - 43646976*a^6*b^4*c^6*d^2*i*z - 8847360*a^8*b^3*c^5*g*h^2*z + 4423680*a^7*b^5*c^4*g*h^2*z + 2048000*a^6*b^6*c^4*f^2*i*z - 1105920*a^6*b^7*c^3*g*h^2*z - 849920*a^5*b^8*c^3*f^2*i*z + 393216*a^7*b^4*c^5*f^2*i*z + 145920*a^4*b^{10}*c^2*f^2*i*z + 138240*a^5*b^9*c^2*g*h^2*z - 32587776*a^5*b^6*c^5*d^2*i*z + 25362432*a^7*b^3*c^6*f^2*g*z + 21657600*a^4*b^8*c^4*d^2*i*z + 17694720*a^8*b^2*c^6*e*h^2*z - 50724864*a^7*b^2*c^7*e*f^2*z - 13271040*a^6*b^5*c^5*f^2*g*z - 8847360*a^7*b^4*c^5*e*h^2*z - 5810688*a^3*b^{10}*c^3*d^2*i*z + 3563520*a^5*b^7*c^4*f^2*g*z + 2211840*a^6*b^6*c^4*e*h^2*z + 845568*a^2*b^{12}*c^2*d^2*i*z - 506880*a^4*b^9*c^3*f^2*g*z - 276480*a^5*b^8*c^3*e*h^2*z + 34560*a^3*b^{11}*c^2*f^2*g*z + 13824*a^4*b^{10}*c^2*e*h^2*z + 26542080*a^6*b^4*c^6*e*f^2*z + 23362560*a^3*b^9*c^4*d^2*g*z - 46725120*a^3*b^8*c^5*d^2*e*z - 7127040*a^5*b^6*c^5*e*f^2*z - 2965248*a^2*b^{11}*c^3*d^2*g*z + 1013760*a^4*b^8*c^4*e*f^2*z - 69120*a^3*b^{10}*c^3*e*f^2*z + 1536*a^2*b^{12}*c^2*e*f^2*z + 5930496*a^2*b^{10}*c^4*d^2*e*z + 1536*a*b^{15}*d*f*i*z - 693633024*a^7*c^9*d^2*e*z - 231211008*a^8*c^8*d^2*i*z - 4718592*a^{10}*c^6*h^2*i*z + 2304*a^4*b^{12}*h^2*i*z + 13107200*a^9*c^7*f^2*i*z + 256*a^2*b^{14}*f^2*i*z - 14155776*a^9*c^7*e*h^2*z + 39321600*a^8*c^8*e*f^2*z + 13824*b^{14}*c^2*d^2*e*z - 6912*b^{15}*c*d^2*g*z + 2304*b^{16}*d^2*i*z + 737280*a^7*b*c^5*f*g*h*i - 2304*a^3*b^9*c*f*g*h*i - 6912*a^2*b^{10}*c*d*g*h*i + 11059200*a^6*b*c^6*d*e*h*i + 5160960*a^6*b*c^6*d*f*g*i + 2211840*a^6*b*c^6*e*f*g*h + 4608*a*b^{10}*c^2*d*e*f*i + 15482880*a^5*b*c^7*d*e*f*g - 13824*a*b^9*c^3*d*e*f*g - 2304*a*b^{11}*c*d*f*g*i + 1843200*a^6*b^3*c^4*f*g*h*i + 783360*a^5*b^5*c^3*f*g*h*i + 18432*a^4*b^7*c^2*f*g*h*i - 5529600*a^6*b^2*c^5*d*g*h*i - 3686400*a^6*b^2*c^5*e*f*h*i - 2211840*a^5*b^4*c^4*d*g*h*i - 1566720*a^5*b^4*c^4*e*f*h*i + 317952*a^4*b^6*c^3*d*g*h*i - 36864*a^4*b^6*c^3*e*f*h*i + 6912*a^3*b^8*c^2*d*g*h*i + 4608*a^3*b^8*c^2*e*f*h*i + 5160960*a^5*b^3*c^5*d*f*g*i + 4423680*a^5*b^3*c^5*e*f*g*h + 4423680*a^5*b^3*c^5*d*e*h*i - 635904*a^4*b^5*c^4*d*e*h*i - 354816*a^3*b^7*c^3*d*f*g*i + 322560*a^4*b^5*c^4*d*f*g*i + 138240*a^4*b^5*c^4*e*f*g*h + 59904*a^2*b^9*c^2*d*f*g*i - 13824*a^3*b^7*c^3*e*f*g*h - 13824*a^3*b^7*c^3*d*e*h*i + 13824*a^2*b^9*c^2*d*e*h*i - 16588800*a^5*b^2*c^6*d*e*g*h - 10321920*a^5*b^2*c^6*d*e*f*i + 1658880*a^4*b^4*c^5*d*e*g*h + 709632*a^3*b^6*c^4*d*e*f*i - 645120*a^4*b^4*c^5*d*e*f*i + 124416*a^3*b^6*c^4*d*e*g*h - 119808*a^2*b^8*c^3*d*e*f*i - 41472*a^2*b^8*c^3*d*e*g*h + 7741440*a^4*b^3*c^6*d*e*f*g - 2903040*a^3*b^5*c^5*d*e*f*g + 387072*a^2*b^7*c^4*d*e*f*g - 3456*a^4*b^8*c*g*h^2*i - 2304*a^4*b^8*c*f*h*i^2 + 1105920*a^7*b*c^5*e*h^2*i - 384*a^2*b^{10}*c*f^2*g*i - 10616832*a^6*b*c^6*e^2*g*i - 3538944*a^7*b*c^5*e*g*i^2 + 1843200*a^7*b*c^5*d*h*i^2 + 1152*a^3*b^9*c*d*h*i^2 - 37062144*a^5*b*c^7*d^2*f*h + 2580480*a^6*b*c^6*e*f^2*i + 65664*a*b^{10}*c^2*d^2*g*i + 23224320*a^5*b*c^7*d^$

$2e^i - 9216a^2b^{10}c^d f^i h^2 - 5985792a^6b^c^6 d f^i h^2 + 206010a^*b^9c^3 d^2 f^i h - 131328a^*b^9c^3 d^2 e^i - 6300a^*b^{10}c^2 d f^2 h + 16588800a^5 b^c^7 d e^2 h + 3456a^*b^{10}c^2 d f^i g^2 + 435456a^*b^8 c^4 d^2 e^i g + 13824a^*b^8 c^4 d e^2 f - 1474560a^7 c^6 e f^i h^i - 10321920a^6 c^7 d e f^i + 1350a^*b^{11}c^d f^i h^2 - 552960a^7 b^2 c^4 g^i h^2 - 552960a^6 b^4 c^3 g^i h^2 - 145152a^5 b^6 c^2 g^i h^2 - 737280a^7 b^2 c^4 f^i h^i - 568320a^6 b^4 c^3 f^i h^i - 136704a^5 b^6 c^2 f^i h^i - 1290240a^6 b^2 c^5 f^2 g^i + 1105920a^6 b^3 c^4 e^i h^2 - 860160a^5 b^4 c^4 f^2 g^i + 290304a^5 b^5 c^3 e^i h^2 - 80640a^4 b^6 c^3 f^2 g^i + 12672a^3 b^8 c^2 f^2 g^i + 6912a^4 b^7 c^2 e^i h^2 + 5308416a^6 b^2 c^5 e^i g^2 - 5308416a^5 b^3 c^5 e^2 g^i - 3538944a^6 b^3 c^4 e^i g^i - 2654208a^5 b^4 c^4 e^i g^2 + 1658880a^6 b^3 c^4 d^i h^i - 1105920a^5 b^4 c^4 f^i g^2 h - 884736a^5 b^5 c^3 e^i g^i - 552960a^6 b^2 c^5 f^i g^2 h + 262656a^5 b^5 c^3 d^i h^i - 552960a^4 b^7 c^2 d^i h^i - 34560a^4 b^6 c^3 f^i g^2 h + 3456a^3 b^8 c^2 f^i g^2 h - 11612160a^5 b^2 c^6 d^2 g^i + 1720320a^5 b^3 c^5 e^i f^2 - 1658880a^6 b^2 c^5 e^i g^i h^2 + 1596672a^3 b^6 c^4 d^2 g^i - 829440a^5 b^4 c^4 e^i g^i h^2 - 508032a^2 b^8 c^3 d^2 g^i + 161280a^4 b^5 c^4 e^i f^2 - 25344a^3 b^7 c^3 e^i f^2 - 20736a^4 b^6 c^3 e^i g^i h^2 + 768a^2 b^9 c^2 e^i f^2 - 4423680a^5 b^2 c^6 e^2 f^i h + 4147200a^5 b^3 c^5 d^i g^2 h - 2580480a^6 b^2 c^5 d^i f^i - 967680a^5 b^4 c^4 d^i f^i - 414720a^4 b^5 c^4 d^i g^2 h - 138240a^4 b^4 c^5 e^2 f^i h + 64512a^4 b^6 c^3 d^i f^i + 39168a^3 b^8 c^2 d^i f^i - 31104a^3 b^7 c^3 d^i g^2 h + 13824a^3 b^6 c^4 e^2 f^i h + 10368a^2 b^9 c^2 d^i g^2 h + 15630336a^5 b^2 c^6 d^i f^2 h - 14459904a^4 b^3 c^6 d^2 f^i h + 9630144a^3 b^5 c^5 d^2 f^i h - 8764416a^5 b^3 c^5 d^i f^i h^2 - 3870720a^5 b^2 c^6 e^i f^2 g - 3193344a^3 b^5 c^5 d^2 e^i + 2867328a^4 b^4 c^5 d^i f^2 h - 2095200a^2 b^7 c^4 d^2 f^i h - 1414080a^3 b^6 c^4 d^i f^2 h - 34836480a^4 b^2 c^7 d^2 e^i g + 1016064a^2 b^7 c^4 d^2 e^i - 645120a^4 b^4 c^5 e^i f^2 g + 306720a^3 b^7 c^3 d^i f^i h^2 + 197820a^2 b^8 c^3 d^i f^2 h + 146880a^4 b^5 c^4 d^i f^i h^2 + 80640a^3 b^6 c^4 e^i f^2 g - 55350a^2 b^9 c^2 d^i f^i h^2 - 2304a^2 b^8 c^3 e^i f^2 g - 3870720a^5 b^2 c^6 d^i f^i g^2 - 1935360a^4 b^4 c^5 d^i f^i g^2 - 1658880a^4 b^3 c^6 d^i e^2 h + 725760a^3 b^6 c^4 d^i f^i g^2 + 17418240a^3 b^4 c^6 d^2 e^i g - 124416a^3 b^5 c^5 d^i e^2 h - 96768a^2 b^8 c^3 d^i f^i g^2 + 41472a^2 b^7 c^4 d^i e^2 h - 3919104a^2 b^6 c^5 d^2 e^i g - 7741440a^4 b^2 c^7 d^i e^2 f + 2903040a^3 b^4 c^6 d^i e^2 f - 387072a^2 b^6 c^5 d^i e^2 f + 184320a^8 b^c^4 h^2 i^2 + 25344a^5 b^7 c^h^2 i^2 - 884736a^6 b^3 c^4 g^3 i - 589824a^7 b^3 c^3 g^i^3 - 442368a^5 b^5 c^3 g^3 i - 294912a^6 b^5 c^2 g^i^3 + 430080a^7 b^c^5 f^2 i^2 - 1984a^3 b^9 c^f^2 i^2 + 3538944a^5 b^2 c^6 e^3 i - 1648128a^5 b^3 c^5 f^3 h + 1179648a^7 b^2 c^4 e^i^3 - 898560a^6 b^3 c^4 f^i h^3 + 589824a^6 b^4 c^3 e^i^3 - 354240a^5 b^5 c^3 f^i h^3 - 354240a^4 b^5 c^4 f^3 h + 98304a^5 b^6 c^2 e^i^3 + 43680a^3 b^7 c^3 f^3 h - 21600a^4 b^7 c^2 f^i h^3 - 1050a^2 b^9 c^2 f^3 h + 225a^2 b^10 c^f^2 h^2 + 3870720a^6 b^c^6 d^2 i^2 + 1658880a^6 b^c^6 e^2 h^2 + 16547328a^4 b^2 c^7 d^3 h - 12306816a^3 b^4 c^6 d^3 h + 37310976a^3 b^3 c^7 d^3 f + 3037824a^2 b^6 c^5 d^3 h - 2654208a^5 b^3 c^5 e^i g^3 + 1949184a^6 b^2 c^5 d^i h^3 + 1296000a^5 b^4 c^4 d^i h^3 - 155520a^4 b^6 c^3 d^i h^3 - 40500a^*b^{10}c^$

$2*d^2*h^2 - 8100*a^3*b^8*c^2*d*h^3 + 3870720*a^5*b*c^7*e^2*f^2 + 34836480*a^4*b*c^8*d^2*e^2 - 108864*a*b^9*c^3*d^2*g^2 - 8068032*a^2*b^5*c^6*d^3*f - 5623296*a^4*b^3*c^6*d*f^3 + 1737792*a^3*b^5*c^5*d*f^3 - 260190*a*b^8*c^4*d^2*f^2 - 211680*a^2*b^7*c^4*d*f^3 - 435456*a*b^7*c^5*d^2*e^2 - 245760*a^8*c^5*f*h*i^2 + 384*a^3*b^10*f*h*i^2 + 1152*a^2*b^11*d*h*i^2 - 2211840*a^6*c^7*e^2*f*h - 1720320*a^7*c^6*d*f*i^2 - 9450*b^11*c^2*d^2*f*h + 6912*b^11*c^2*d^2*e*i + 1612800*a^6*c^7*d*f^2*h - 393216*a^8*b*c^4*g*i^3 - 49152*a^5*b^7*c*g*i^3 - 20736*b^10*c^3*d^2*e*g - 75188736*a^4*b*c^8*d^3*f - 883200*a^6*b*c^6*f^3*h - 317952*a^7*b*c^5*f*h^3 + 1350*a^3*b^9*c*f*h^3 - 15482880*a^5*c^8*d*e^2*f - 9792*a*b^11*c*d^2*i^2 - 10616832*a^5*b*c^7*e^3*g - 345060*a*b^8*c^4*d^3*h + 4050*a^2*b^10*c*d*h^3 - 4262400*a^5*b*c^7*d*f^3 + 852768*a*b^7*c^5*d^3*f + 7350*a*b^9*c^3*d*f^3 + 276480*a^7*b^3*c^3*h^2*i^2 + 140544*a^6*b^5*c^2*h^2*i^2 + 884736*a^7*b^2*c^4*g^2*i^2 + 884736*a^6*b^4*c^3*g^2*i^2 + 221184*a^5*b^6*c^2*g^2*i^2 + 501760*a^6*b^3*c^4*f^2*i^2 + 414720*a^6*b^3*c^4*g^2*h^2 + 207360*a^5*b^5*c^3*g^2*h^2 + 170240*a^5*b^5*c^3*f^2*i^2 + 9216*a^4*b^7*c^2*f^2*i^2 + 5184*a^4*b^7*c^2*g^2*h^2 + 3538944*a^6*b^2*c^5*e^2*i^2 + 1684224*a^6*b^2*c^5*f^2*h^2 + 1264320*a^5*b^4*c^4*f^2*h^2 + 884736*a^5*b^4*c^4*e^2*i^2 + 126720*a^4*b^6*c^3*f^2*h^2 - 13950*a^3*b^8*c^2*f^2*h^2 + 1935360*a^5*b^3*c^5*d^2*i^2 + 967680*a^5*b^3*c^5*f^2*g^2 + 829440*a^5*b^3*c^5*e^2*h^2 - 532224*a^4*b^5*c^4*d^2*i^2 + 161280*a^4*b^5*c^4*f^2*g^2 - 96768*a^3*b^7*c^3*d^2*i^2 + 62784*a^2*b^9*c^2*d^2*i^2 + 20736*a^4*b^5*c^4*e^2*h^2 - 20160*a^3*b^7*c^3*f^2*g^2 + 576*a^2*b^9*c^2*f^2*g^2 + 11487744*a^5*b^2*c^6*d^2*h^2 + 7962624*a^5*b^2*c^6*e^2*g^2 + 35525376*a^4*b^2*c^7*d^2*f^2 - 1412640*a^3*b^6*c^4*d^2*h^2 + 461376*a^4*b^4*c^5*d^2*h^2 + 375030*a^2*b^8*c^3*d^2*h^2 + 8709120*a^4*b^3*c^6*d^2*g^2 - 4354560*a^3*b^5*c^5*d^2*g^2 + 979776*a^2*b^7*c^4*d^2*g^2 + 645120*a^4*b^3*c^6*e^2*f^2 - 80640*a^3*b^5*c^5*e^2*f^2 + 2304*a^2*b^7*c^4*e^2*f^2 - 15269184*a^3*b^4*c^6*d^2*f^2 + 2870784*a^2*b^6*c^5*d^2*f^2 - 17418240*a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c^6*d^2*e^2 - 3456*b^12*c*d^2*g*i + 384*a*b^12*d*f*i^2 + 576*a^4*b^9*h^2*i^2 + 3538944*a^7*c^6*e^2*i^2 + 115200*a^7*c^6*f^2*h^2 + 64*a^2*b^11*f^2*i^2 + 6096384*a^6*c^7*d^2*h^2 + 5184*b^11*c^2*d^2*g^2 + 131072*a^8*b^2*c^3*i^4 + 98304*a^7*b^4*c^2*i^4 + 11025*b^10*c^3*d^2*f^2 + 5644800*a^5*c^8*d^2*f^2 + 142560*a^6*b^4*c^3*h^4 + 103680*a^7*b^2*c^4*h^4 + 32400*a^5*b^6*c^2*h^4 + 20736*b^9*c^4*d^2*e^2 + 331776*a^5*b^4*c^4*g^4 + 492800*a^5*b^2*c^6*f^4 + 351456*a^4*b^4*c^5*f^4 - 43120*a^3*b^6*c^4*f^4 + 1225*a^2*b^8*c^3*f^4 - 27433728*a^3*b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 + 7077888*a^6*c^7*e^3*i + 786432*a^8*c^5*e*i^3 + 28449792*a^5*c^8*d^3*h + 17010*b^10*c^3*d^3*h + 2025*b^12*c*d^2*h^2 + 580608*a^7*c^6*d*h^3 - 39690*b^9*c^4*d^3*f + 32768*a^6*b^6*c*i^4 + 2025*a^4*b^8*c*h^4 - 734832*a*b^6*c^6*d^4 + 576*b^13*d^2*i^2 + 65536*a^9*c^4*i^4 + 20736*a^8*c^5*h^4 + 4096*a^5*b^8*i^4 + 49787136*a^4*c^9*d^4 + 160000*a^6*c^7*f^4 + 5308416*a^5*c^8*e^4 + 35721*b^8*c^5*d^4, z, 1)*(root(56371445760*a^11*b^8*c^6*z^4 - 503316480*a^8*b^14*c^3*z^4 + 47185920*a^7*b^16*c^2*z^4 - 171798691840*a^14*b^2*c^9*z^4 + 193273528320*a^13*b^4*c^8*z^4 - 128849018880*a^12*b^6*c^7*z^4 - 16911433728*a^10*b^10*c^5*z^4 + 3523215360*a^9*b^12*c^4*z^4 - 2621440*a^6*b^18*c*z^4 + 68719476736*a^15*c^10*z^4 + 655$

$$\begin{aligned}
& 36a^5b^{20}z^4 + 196608a^5b^{13}c^*g^*i^*z^2 - 46080a^4b^{14}c^*f^*h^*z^2 - 10 \\
& 5984a^3b^{15}c^*d^*h^*z^2 - 73728a^2b^{16}c^*d^*f^*z^2 + 2548039680a^9b^3c^7 \\
& *d^*h^*z^2 + 1509949440a^9b^3c^7e^*g^*z^2 - 1401421824a^8b^5c^6d^*h^*z^2 \\
& - 1321205760a^9b^2c^8d^*f^*z^2 - 754974720a^8b^5c^6e^*g^*z^2 + 73216819 \\
& 2a^7b^6c^6d^*f^*z^2 - 603979776a^10b^2c^7e^*i^*z^2 - 456130560a^9b^4c^6 \\
& *f^*h^*z^2 + 390463488a^7b^7c^5d^*h^*z^2 + 301989888a^10b^3c^6g^*i^*z^2 \\
& - 366280704a^6b^8c^5d^*f^*z^2 - 330301440a^8b^4c^7d^*f^*z^2 + 2540175 \\
& 36a^8b^6c^5f^*h^*z^2 - 1887436800a^10b^*c^8d^*h^*z^2 + 188743680a^10b^2 \\
& *c^7f^*h^*z^2 + 188743680a^7b^7c^5e^*g^*z^2 + 125829120a^8b^6c^5e^*i^*z^2 \\
& - 62914560a^8b^7c^4g^*i^*z^2 - 61931520a^7b^8c^4f^*h^*z^2 + 23592960* \\
& a^7b^9c^3g^*i^*z^2 - 47185920a^7b^8c^4e^*i^*z^2 - 3538944a^6b^{11}c^2g^* \\
& *i^*z^2 + 96583680a^5b^{10}c^4d^*f^*z^2 - 51609600a^6b^9c^4d^*h^*z^2 + 707 \\
& 7888a^6b^{10}c^3e^*i^*z^2 + 6144000a^6b^{10}c^3f^*h^*z^2 - 393216a^5b^{12}c^2 \\
& *e^*i^*z^2 + 61440a^5b^{12}c^2f^*h^*z^2 - 23592960a^6b^9c^4e^*g^*z^2 + 1 \\
& 179648a^5b^{11}c^3e^*g^*z^2 + 829440a^4b^{13}c^2d^*h^*z^2 + 368640a^5b^{11} \\
& *c^3d^*h^*z^2 - 15175680a^4b^{12}c^3d^*f^*z^2 + 1428480a^3b^{14}c^2d^*f^*z^2 \\
& - 1207959552a^10b^*c^8e^*g^*z^2 - 402653184a^11b^*c^7g^*i^*z^2 - 440401920 \\
& *a^10b^*c^8f^2z^2 - 188743680a^11b^*c^7h^2z^2 + 1761607680a^10c^9d^* \\
& f^z^2 + 524288a^6b^{12}c^i^2z^2 + 46080a^5b^{13}c^h^2z^2 - 14080a^3b^ \\
& 15c^f^2z^2 + 6936330240a^8b^3c^8d^2z^2 + 2464874496a^6b^7c^6d^2* \\
& z^2 - 3963617280a^9b^*c^9d^2z^2 + 805306368a^11c^8e^*i^*z^2 - 150994944 \\
& 0a^9b^2c^8e^2z^2 + 251658240a^11c^8f^*h^*z^2 + 1536a^3b^{16}f^*h^*z^2 \\
& + 4608a^2b^{17}d^*h^*z^2 - 5400428544a^7b^5c^7d^2z^2 - 94464a^*b^{17}c^d \\
& ^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730054656a^5b^9c^5d^2z^2 + 47 \\
& 7102080a^9b^3c^7f^2z^2 - 377487360a^9b^4c^6g^2z^2 + 301989888a^1 \\
& 0b^2c^7g^2z^2 + 188743680a^8b^6c^5g^2z^2 + 141557760a^10b^3c^6* \\
& h^2z^2 - 174325760a^8b^5c^6f^2z^2 - 188743680a^7b^6c^6e^2z^2 + 1 \\
& 46165760a^4b^{11}c^4d^2z^2 - 50331648a^10b^4c^5i^2z^2 - 33554432a^ \\
& 11b^2c^6i^2z^2 + 20971520a^9b^6c^4i^2z^2 - 47185920a^7b^8c^4g^ \\
& 2z^2 - 26542080a^8b^7c^4h^2z^2 - 2752512a^7b^{10}c^2i^2z^2 + 26214 \\
& 40a^8b^8c^3i^2z^2 + 9584640a^7b^9c^3h^2z^2 - 2359296a^9b^5c^5* \\
& h^2z^2 - 1290240a^6b^{11}c^2h^2z^2 + 5898240a^6b^{10}c^3g^2z^2 - 294 \\
& 912a^5b^{12}c^2g^2z^2 + 11206656a^7b^7c^5f^2z^2 + 8929280a^6b^9c^ \\
& ^4f^2z^2 + 23592960a^6b^8c^5e^2z^2 - 2600960a^5b^{11}c^3f^2z^2 + \\
& 291840a^4b^{13}c^2f^2z^2 - 19860480a^3b^{13}c^3d^2z^2 - 1179648a^5b^ \\
& ^{10}c^4e^2z^2 + 1771776a^2b^{15}c^2d^2z^2 + 1536a^*b^{18}d^*f^*z^2 + 1207 \\
& 959552a^10c^9e^2z^2 + 134217728a^12c^7i^2z^2 - 32768a^5b^{14}i^2z^ \\
& ^2 + 2304a^4b^{15}h^2z^2 + 256a^2b^{17}f^2z^2 + 2304b^{19}d^2z^2 + 169 \\
& 869312a^7b^*c^8d^*e^*f^*z + 99090432a^8b^*c^7d^*g^*h^*z - 3145728a^9b^*c^6f^* \\
& *h^*i^*z - 27648a^4b^{11}c^*f^*h^*i^*z + 56623104a^8b^*c^7d^*f^*i^*z - 50688a^3* \\
& b^{12}c^*d^*h^*i^*z - 4608a^3b^{12}c^*f^*g^*h^*z - 9437184a^8b^*c^7e^*f^*h^*z - 5529 \\
& 6a^2b^{13}c^*d^*f^*i^*z - 13824a^2b^{13}c^*d^*g^*h^*z + 9216a^*b^{13}c^2d^*e^*f^*z - \\
& 4608a^*b^{14}c^*d^*f^*g^*z + 219414528a^7b^2c^7d^*e^*h^*z - 221773824a^6b^3* \\
& c^7d^*e^*f^*z - 109707264a^7b^3c^6d^*g^*h^*z + 110886912a^6b^4c^6d^*f^*g^*z \\
& + 40108032a^8b^2c^6d^*h^*i^*z + 2359296a^8b^3c^5f^*h^*i^*z - 491520a^6*
\end{aligned}$$

$b^7c^3f^*h^*i^*z + 184320a^5b^9c^2f^*h^*i^*z - 88473600a^6b^4c^6d^*e^*h^*z$   
 $- 84934656a^7b^2c^7d^*f^*g^*z + 117964800a^5b^5c^6d^*e^*f^*z - 45613056a^7b^3c^6d^*f^*i^*z + 44236800a^6b^5c^5d^*g^*h^*z - 10321920a^6b^6c^4d^*$   
 $*h^*i^*z + 7077888a^7b^4c^5d^*h^*i^*z - 5898240a^7b^4c^5f^*g^*h^*z + 4718592a^8b^2c^6f^*g^*h^*z + 2949120a^6b^6c^4f^*g^*h^*z + 2396160a^5b^8c^3d^*$   
 $*h^*i^*z - 737280a^5b^8c^3f^*g^*h^*z + 92160a^4b^10c^2f^*g^*h^*z - 27648a^4b^10c^2d^*h^*i^*z - 58982400a^5b^6c^5d^*f^*g^*z + 11796480a^7b^3c^6e^*$   
 $f^*h^*z + 8847360a^5b^7c^4d^*f^*i^*z - 6635520a^5b^7c^4d^*g^*h^*z - 5898240a^6b^5c^5e^*f^*h^*z - 3809280a^4b^9c^3d^*f^*i^*z + 2359296a^6b^5c^5d^*$   
 $f^*i^*z + 1474560a^5b^7c^4e^*f^*h^*z + 681984a^3b^11c^2d^*f^*i^*z - 276480a^4b^9c^3d^*g^*h^*z - 184320a^4b^9c^3e^*f^*h^*z + 179712a^3b^11c^2d^*g^*$   
 $h^*z + 9216a^3b^11c^2e^*f^*h^*z + 16220160a^4b^8c^4d^*f^*g^*z + 13271040a^5b^6c^5d^*e^*h^*z - 2396160a^3b^10c^3d^*f^*g^*z + 552960a^4b^8c^4d^*e^*$   
 $h^*z - 359424a^3b^10c^3d^*e^*h^*z + 175104a^2b^12c^2d^*f^*g^*z + 27648a^2b^12c^2d^*e^*h^*z - 32440320a^4b^7c^5d^*e^*f^*z + 4792320a^3b^9c^4d^*e^*$   
 $f^*z - 350208a^2b^11c^3d^*e^*f^*z + 346816512a^7b^*c^8d^2g^*z - 41472a^5b^10c^*h^2i^*z + 7077888a^9b^*c^6g^*h^2z - 11008a^3b^12c^*f^2i^*z - 69$   
 $12a^4b^11c^*g^*h^2z - 19660800a^8b^*c^7f^2g^*z - 768a^2b^13c^*f^2g^*z + 214272a^*b^13c^2d^2g^*z - 428544a^*b^12c^3d^2e^*z - 198180864a^8c^$   
 $8d^*e^*h^*z - 66060288a^9c^7d^*h^*i^*z + 1536a^3b^13f^*h^*i^*z + 4608a^2b^14d^*h^*i^*z - 66816a^*b^14c^*d^2i^*z + 1022754816a^6b^2c^8d^2e^*z - 64231$   
 $8336a^5b^4c^7d^2e^*z - 511377408a^6b^3c^7d^2g^*z + 321159168a^5b^5c^6d^2g^*z + 225312768a^7b^2c^7d^2i^*z + 223395840a^4b^6c^6d^2e^*$   
 $*z - 111697920a^4b^7c^5d^2g^*z + 3538944a^9b^2c^5h^2i^*z - 737280a^7b^6c^3h^2i^*z + 276480a^6b^8c^2h^2i^*z - 10354688a^8b^2c^6f^2i^*$   
 $*z - 43646976a^6b^4c^6d^2i^*z - 8847360a^8b^3c^5g^*h^2z + 4423680a^7b^5c^4g^*h^2z + 2048000a^6b^6c^4f^2i^*z - 1105920a^6b^7c^3g^*h^$   
 $^2z - 849920a^5b^8c^3f^2i^*z + 393216a^7b^4c^5f^2i^*z + 145920a^4b^10c^2f^2i^*z + 138240a^5b^9c^2g^*h^2z - 32587776a^5b^6c^5d^2i^*$   
 $*z + 25362432a^7b^3c^6f^2g^*z + 21657600a^4b^8c^4d^2i^*z + 17694720a^8b^2c^6e^*h^2z - 50724864a^7b^2c^7e^*f^2z - 13271040a^6b^5c^5f^2g^*$   
 $*z - 8847360a^7b^4c^5e^*h^2z - 5810688a^3b^10c^3d^2i^*z + 3563520a^5b^7c^4f^2g^*z + 2211840a^6b^6c^4e^*h^2z + 845568a^2b^12c^2d^2i^*z - 506880a^4b^9c^3f^2g^*z - 276480a^5b^8c^3e^*h^2z + 34560a^3b^11c^2f^2g^*z + 13824a^4b^10c^2e^*h^2z + 26542080a^6b^4c^6e^*f^2z + 23362560a^3b^9c^4d^2g^*z - 46725120a^3b^8c^5d^2e^*z - 7127040a^5b^6c^5e^*f^2z - 2965248a^2b^11c^3d^2g^*z + 1013760a^4b^8c^4e^*f^2z - 69120a^3b^10c^3e^*f^2z + 1536a^2b^12c^2e^*f^2z + 5930496a^2b^10c^4d^2e^*z + 1536a^*b^15d^*f^*i^*z - 693633024a^7c^9d^2e^*z - 231211008a^8c^8d^2i^*z - 4718592a^10c^6h^2i^*z + 2304a^4b^12h^2i^*z + 13107200a^9c^7f^2i^*z + 256a^2b^14f^2i^*z - 14155776a^9c^7e^*h^2z + 39321600a^8c^8e^*f^2z + 13824b^14c^2d^2e^*z - 6912b^15c^*d^2g^*z + 2304b^16d^2i^*z + 737280a^7b^*c^5f^*g^*h^*i - 2304a^3b^9c^*f^*g^*h^*i - 6912a^2b^10c^*d^*g^*h^*i + 11059200a^6b^*c^6d^*e^*h^*i + 5160960a^6b^*c^6d^*f^*g^*i + 2211840a^6b^*c^6e^*f^*g^*h + 4608a^*b^10c^2d^*e^*f^*i + 15482880a^5$

$$\begin{aligned}
& *b*c^7*d*e*f*g - 13824*a*b^9*c^3*d*e*f*g - 2304*a*b^{11}*c*d*f*g*i + 1843200* \\
& a^6*b^3*c^4*f*g*h*i + 783360*a^5*b^5*c^3*f*g*h*i + 18432*a^4*b^7*c^2*f*g*h* \\
& i - 5529600*a^6*b^2*c^5*d*g*h*i - 3686400*a^6*b^2*c^5*e*f*h*i - 2211840*a^5 \\
& *b^4*c^4*d*g*h*i - 1566720*a^5*b^4*c^4*e*f*h*i + 317952*a^4*b^6*c^3*d*g*h*i \\
& - 36864*a^4*b^6*c^3*e*f*h*i + 6912*a^3*b^8*c^2*d*g*h*i + 4608*a^3*b^8*c^2* \\
& e*f*h*i + 5160960*a^5*b^3*c^5*d*f*g*i + 4423680*a^5*b^3*c^5*e*f*g*h + 44236 \\
& 80*a^5*b^3*c^5*d*e*h*i - 635904*a^4*b^5*c^4*d*e*h*i - 354816*a^3*b^7*c^3*d* \\
& f*g*i + 322560*a^4*b^5*c^4*d*f*g*i + 138240*a^4*b^5*c^4*e*f*g*h + 59904*a^2 \\
& *b^9*c^2*d*f*g*i - 13824*a^3*b^7*c^3*e*f*g*h - 13824*a^3*b^7*c^3*d*e*h*i + \\
& 13824*a^2*b^9*c^2*d*e*h*i - 16588800*a^5*b^2*c^6*d*e*g*h - 10321920*a^5*b^2 \\
& *c^6*d*e*f*i + 1658880*a^4*b^4*c^5*d*e*g*h + 709632*a^3*b^6*c^4*d*e*f*i - 6 \\
& 45120*a^4*b^4*c^5*d*e*f*i + 124416*a^3*b^6*c^4*d*e*g*h - 119808*a^2*b^8*c^3 \\
& *d*e*f*i - 41472*a^2*b^8*c^3*d*e*g*h + 7741440*a^4*b^3*c^6*d*e*f*g - 290304 \\
& 0*a^3*b^5*c^5*d*e*f*g + 387072*a^2*b^7*c^4*d*e*f*g - 3456*a^4*b^8*c*g*h^2*i \\
& - 2304*a^4*b^8*c*f*h*i^2 + 1105920*a^7*b*c^5*e*h^2*i - 384*a^2*b^10*c*f^2* \\
& g*i - 10616832*a^6*b*c^6*e^2*g*i - 3538944*a^7*b*c^5*e*g*i^2 + 1843200*a^7* \\
& b*c^5*d*h*i^2 + 1152*a^3*b^9*c*d*h*i^2 - 37062144*a^5*b*c^7*d^2*f*h + 25804 \\
& 80*a^6*b*c^6*e*f^2*i + 65664*a*b^10*c^2*d^2*g*i + 23224320*a^5*b*c^7*d^2*e* \\
& i - 9216*a^2*b^10*c*d*f*i^2 - 5985792*a^6*b*c^6*d*f*h^2 + 206010*a*b^9*c^3* \\
& d^2*f*h - 131328*a*b^9*c^3*d^2*e*i - 6300*a*b^10*c^2*d*f^2*h + 16588800*a^5 \\
& *b*c^7*d*e^2*h + 3456*a*b^10*c^2*d*f*g^2 + 435456*a*b^8*c^4*d^2*e*g + 13824 \\
& *a*b^8*c^4*d*e^2*f - 1474560*a^7*c^6*e*f*h*i - 10321920*a^6*c^7*d*e*f*i + 1 \\
& 350*a*b^11*c*d*f*h^2 - 552960*a^7*b^2*c^4*g*h^2*i - 552960*a^6*b^4*c^3*g*h^ \\
& 2*i - 145152*a^5*b^6*c^2*g*h^2*i - 737280*a^7*b^2*c^4*f*h*i^2 - 568320*a^6* \\
& b^4*c^3*f*h*i^2 - 136704*a^5*b^6*c^2*f*h*i^2 - 1290240*a^6*b^2*c^5*f^2*g*i \\
& + 1105920*a^6*b^3*c^4*e*h^2*i - 860160*a^5*b^4*c^4*f^2*g*i + 290304*a^5*b^5 \\
& *c^3*e*h^2*i - 80640*a^4*b^6*c^3*f^2*g*i + 12672*a^3*b^8*c^2*f^2*g*i + 6912 \\
& *a^4*b^7*c^2*e*h^2*i + 5308416*a^6*b^2*c^5*e*g^2*i - 5308416*a^5*b^3*c^5*e^ \\
& 2*g*i - 3538944*a^6*b^3*c^4*e*g*i^2 + 2654208*a^5*b^4*c^4*e*g^2*i + 1658880 \\
& *a^6*b^3*c^4*d*h*i^2 - 1105920*a^5*b^4*c^4*f*g^2*h - 884736*a^5*b^5*c^3*e*g \\
& *i^2 - 552960*a^6*b^2*c^5*f*g^2*h + 262656*a^5*b^5*c^3*d*h*i^2 - 55296*a^4* \\
& b^7*c^2*d*h*i^2 - 34560*a^4*b^6*c^3*f*g^2*h + 3456*a^3*b^8*c^2*f*g^2*h - 11 \\
& 612160*a^5*b^2*c^6*d^2*g*i + 1720320*a^5*b^3*c^5*e*f^2*i - 1658880*a^6*b^2* \\
& c^5*e*g*h^2 + 1596672*a^3*b^6*c^4*d^2*g*i - 829440*a^5*b^4*c^4*e*g*h^2 - 50 \\
& 8032*a^2*b^8*c^3*d^2*g*i + 161280*a^4*b^5*c^4*e*f^2*i - 25344*a^3*b^7*c^3*e \\
& *f^2*i - 20736*a^4*b^6*c^3*e*g*h^2 + 768*a^2*b^9*c^2*e*f^2*i - 4423680*a^5* \\
& b^2*c^6*e^2*f*h + 4147200*a^5*b^3*c^5*d*g^2*h - 2580480*a^6*b^2*c^5*d*f*i^2 \\
& - 967680*a^5*b^4*c^4*d*f*i^2 - 414720*a^4*b^5*c^4*d*g^2*h - 138240*a^4*b^4 \\
& *c^5*e^2*f*h + 64512*a^4*b^6*c^3*d*f*i^2 + 39168*a^3*b^8*c^2*d*f*i^2 - 3110 \\
& 4*a^3*b^7*c^3*d*g^2*h + 13824*a^3*b^6*c^4*e^2*f*h + 10368*a^2*b^9*c^2*d*g^2 \\
& *h + 15630336*a^5*b^2*c^6*d*f^2*h - 14459904*a^4*b^3*c^6*d^2*f*h + 9630144* \\
& a^3*b^5*c^5*d^2*f*h - 8764416*a^5*b^3*c^5*d*f*h^2 - 3870720*a^5*b^2*c^6*e*f \\
& ^2*g - 3193344*a^3*b^5*c^5*d^2*e*i + 2867328*a^4*b^4*c^5*d*f^2*h - 2095200* \\
& a^2*b^7*c^4*d^2*f*h - 1414080*a^3*b^6*c^4*d*f^2*h - 34836480*a^4*b^2*c^7*d^ \\
& 2*e*g + 1016064*a^2*b^7*c^4*d^2*e*i - 645120*a^4*b^4*c^5*e*f^2*g + 306720*a
\end{aligned}$$

$$\begin{aligned}
&^3b^7c^3d^*f^*h^2 + 197820a^2b^8c^3d^*f^2h + 146880a^4b^5c^4d^*f^*h^2 \\
&+ 80640a^3b^6c^4e^*f^2g - 55350a^2b^9c^2d^*f^*h^2 - 2304a^2b^8c^3e^*f^2g \\
&- 3870720a^5b^2c^6d^*f^*g^2 - 1935360a^4b^4c^5d^*f^*g^2 - 1658880a^4b^3c^6d^*e^2h \\
&+ 725760a^3b^6c^4d^*f^*g^2 + 17418240a^3b^4c^6d^2e^*g - 124416a^3b^5c^5d^*e^2h \\
&- 96768a^2b^8c^3d^*f^*g^2 + 41472a^2b^7c^4d^*e^2h - 3919104a^2b^6c^5d^2e^*g - 7741440a^4b^2c^7d^*e^2f \\
&+ 2903040a^3b^4c^6d^*e^2f - 387072a^2b^6c^5d^*e^2f + 184320a^8b^*c^4h^2i^2 + 25344a^5b^7c^*h^2i^2 \\
&- 884736a^6b^3c^4g^3i - 589824a^7b^3c^3g^*i^3 - 442368a^5b^5c^3g^3i - 294912a^6b^5c^2g^*i^3 \\
&+ 430080a^7b^*c^5f^2i^2 - 1984a^3b^9c^*f^2i^2 + 3538944a^5b^2c^6e^3i - 1648128a^5b^3c^5f^3h \\
&+ 1179648a^7b^2c^4e^*i^3 - 898560a^6b^3c^4f^*h^3 + 589824a^6b^4c^3e^*i^3 - 354240a^5b^5c^3f^*h^3 \\
&- 354240a^4b^5c^4f^3h + 98304a^5b^6c^2e^*i^3 + 43680a^3b^7c^3f^3h - 21600a^4b^7c^2f^*h^3 \\
&- 1050a^2b^9c^2f^3h + 225a^2b^10c^*f^2h^2 + 3870720a^6b^*c^6d^2i^2 + 1658880a^6b^*c^6e^2h^2 \\
&+ 16547328a^4b^2c^7d^3h - 12306816a^3b^4c^6d^3h + 37310976a^3b^3c^7d^3f + 3037824a^2b^6c^5d^3h \\
&- 2654208a^5b^3c^5e^*g^3 + 1949184a^6b^2c^5d^*h^3 + 1296000a^5b^4c^4d^*h^3 - 155520a^4b^6c^3d^*h^3 \\
&- 40500a^*b^10c^2d^2h^2 - 8100a^3b^8c^2d^*h^3 + 3870720a^5b^*c^7e^2f^2 + 34836480a^4b^*c^8d^2e^2 \\
&- 108864a^*b^9c^3d^2g^2 - 8068032a^2b^5c^6d^3f - 5623296a^4b^3c^6d^*f^3 + 1737792a^3b^5c^5d^*f^3 - 260190a^*b^8c^4d^2f^2 \\
&- 211680a^2b^7c^4d^*f^3 - 435456a^*b^7c^5d^2e^2 - 245760a^8c^5f^*h^2 + 384a^3b^10f^*h^i^2 \\
&+ 1152a^2b^11d^*h^i^2 - 2211840a^6c^7e^2f^*h - 1720320a^7c^6d^*f^i^2 - 9450b^11c^2d^2f^*h \\
&+ 6912b^11c^2d^2e^*i + 1612800a^6c^7d^*f^2h - 393216a^8b^*c^4g^*i^3 - 49152a^5b^7c^*g^*i^3 \\
&- 20736b^10c^3d^2e^*g - 75188736a^4b^*c^8d^3f - 883200a^6b^*c^6f^3h - 317952a^7b^*c^5f^*h^3 \\
&+ 1350a^3b^9c^*f^h^3 - 15482880a^5c^8d^*e^2f - 9792a^*b^11c^d^2i^2 - 10616832a^5b^*c^7e^3g \\
&- 345060a^*b^8c^4d^3h + 4050a^2b^10c^*d^*h^3 - 4262400a^5b^*c^7d^*f^3 + 852768a^*b^7c^5d^3f \\
&+ 7350a^*b^9c^3d^*f^3 + 276480a^7b^3c^3h^2i^2 + 140544a^6b^5c^2h^2i^2 + 884736a^7b^2c^4g^2i^2 \\
&+ 884736a^6b^4c^3g^2i^2 + 221184a^5b^6c^2g^2i^2 + 501760a^6b^3c^4f^2i^2 + 414720a^6b^3c^4g^2h^2 \\
&+ 207360a^5b^5c^3g^2h^2 + 170240a^5b^5c^3f^2i^2 + 9216a^4b^7c^2f^2i^2 + 5184a^4b^7c^2g^2h^2 \\
&+ 3538944a^6b^2c^5e^2i^2 + 1684224a^6b^2c^5f^2h^2 + 1264320a^5b^4c^4f^2h^2 + 884736a^5b^4c^4e^2i^2 \\
&+ 126720a^4b^6c^3f^2h^2 - 13950a^3b^8c^2f^2h^2 + 1935360a^5b^3c^5d^2i^2 + 967680a^5b^3c^5f^2g^2 + 829440a^5b^3c^5e^2h^2 \\
&- 532224a^4b^5c^4d^2i^2 + 161280a^4b^5c^4f^2g^2 - 96768a^3b^7c^3d^2i^2 + 62784a^2b^9c^2d^2i^2 \\
&+ 20736a^4b^5c^4e^2h^2 - 20160a^3b^7c^3f^2g^2 + 576a^2b^9c^2f^2g^2 + 11487744a^5b^2c^6d^2h^2 \\
&+ 7962624a^5b^2c^6e^2g^2 + 35525376a^4b^2c^7d^2f^2 - 1412640a^3b^6c^4d^2h^2 \\
&+ 461376a^4b^4c^5d^2h^2 + 375030a^2b^8c^3d^2h^2 + 8709120a^4b^3c^6d^2g^2 - 4354560a^3b^5c^5d^2g^2 \\
&+ 979776a^2b^7c^4d^2g^2 + 645120a^4b^3c^6e^2f^2 - 80640a^3b^5c^5e^2f^2 + 2304a^2b^7c^4e^2f^2 \\
&- 15269184a^3b^4c^6d^2f^2 + 2870784a^2
\end{aligned}$$

$$\begin{aligned}
& *b^6*c^5*d^2*f^2 - 17418240*a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c^6*d^2*e^2 \\
& - 3456*b^12*c*d^2*g*i + 384*a*b^12*d*f*i^2 + 576*a^4*b^9*h^2*i^2 + 35389 \\
& 44*a^7*c^6*e^2*i^2 + 115200*a^7*c^6*f^2*h^2 + 64*a^2*b^11*f^2*i^2 + 6096384 \\
& *a^6*c^7*d^2*h^2 + 5184*b^11*c^2*d^2*g^2 + 131072*a^8*b^2*c^3*i^4 + 98304*a \\
& ^7*b^4*c^2*i^4 + 11025*b^10*c^3*d^2*f^2 + 5644800*a^5*c^8*d^2*f^2 + 142560* \\
& a^6*b^4*c^3*h^4 + 103680*a^7*b^2*c^4*h^4 + 32400*a^5*b^6*c^2*h^4 + 20736*b^ \\
& 9*c^4*d^2*e^2 + 331776*a^5*b^4*c^4*g^4 + 492800*a^5*b^2*c^6*f^4 + 351456*a^ \\
& 4*b^4*c^5*f^4 - 43120*a^3*b^6*c^4*f^4 + 1225*a^2*b^8*c^3*f^4 - 27433728*a^3 \\
& *b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 + 7077888*a^6*c^7*e^3*i + 786432*a^8 \\
& *c^5*e*i^3 + 28449792*a^5*c^8*d^3*h + 17010*b^10*c^3*d^3*h + 2025*b^12*c*d^ \\
& 2*h^2 + 580608*a^7*c^6*d*h^3 - 39690*b^9*c^4*d^3*f + 32768*a^6*b^6*c*i^4 + \\
& 2025*a^4*b^8*c*h^4 - 734832*a*b^6*c^6*d^4 + 576*b^13*d^2*i^2 + 65536*a^9*c^ \\
& 4*i^4 + 20736*a^8*c^5*h^4 + 4096*a^5*b^8*i^4 + 49787136*a^4*c^9*d^4 + 16000 \\
& 0*a^6*c^7*f^4 + 5308416*a^5*c^8*e^4 + 35721*b^8*c^5*d^4, z, 1)*((768*a^2*b^ \\
& 14*c^2*d - 3145728*a^10*c^8*h - 22020096*a^9*c^9*d - 22272*a^3*b^12*c^3*d + \\
& 282624*a^4*b^10*c^4*d - 2027520*a^5*b^8*c^5*d + 8847360*a^6*b^6*c^6*d - 23 \\
& 396352*a^7*b^4*c^7*d + 34603008*a^8*b^2*c^8*d + 256*a^3*b^13*c^2*f - 9216*a \\
& ^4*b^11*c^3*f + 122880*a^5*b^9*c^4*f - 819200*a^6*b^7*c^5*f + 2949120*a^7*b \\
& ^5*c^6*f - 5505024*a^8*b^3*c^7*f + 768*a^4*b^12*c^2*h - 12288*a^5*b^10*c^3* \\
& h + 61440*a^6*b^8*c^4*h - 983040*a^8*b^4*c^6*h + 3145728*a^9*b^2*c^7*h + 41 \\
& 94304*a^9*b*c^8*f)/(512*(a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b^10*c + 240*a^6 \\
& *b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) + (x*(1 \\
& 572864*a^9*c^9*e + 524288*a^10*c^8*i - 1536*a^4*b^10*c^4*e + 30720*a^5*b^8* \\
& c^5*e - 245760*a^6*b^6*c^6*e + 983040*a^7*b^4*c^7*e - 1966080*a^8*b^2*c^8*e \\
& + 768*a^4*b^11*c^3*g - 15360*a^5*b^9*c^4*g + 122880*a^6*b^7*c^5*g - 491520 \\
& *a^7*b^5*c^6*g + 983040*a^8*b^3*c^7*g - 256*a^4*b^12*c^2*i + 4608*a^5*b^10* \\
& c^3*i - 30720*a^6*b^8*c^4*i + 81920*a^7*b^6*c^5*i - 393216*a^9*b^2*c^7*i - \\
& 786432*a^9*b*c^8*g))/(64*(a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b^10*c + 240*a^ \\
& 6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) + (roo \\
& t(56371445760*a^11*b^8*c^6*z^4 - 503316480*a^8*b^14*c^3*z^4 + 47185920*a^7* \\
& b^16*c^2*z^4 - 171798691840*a^14*b^2*c^9*z^4 + 193273528320*a^13*b^4*c^8*z^ \\
& 4 - 128849018880*a^12*b^6*c^7*z^4 - 16911433728*a^10*b^10*c^5*z^4 + 3523215 \\
& 360*a^9*b^12*c^4*z^4 - 2621440*a^6*b^18*c*z^4 + 68719476736*a^15*c^10*z^4 + \\
& 65536*a^5*b^20*z^4 + 196608*a^5*b^13*c*g*i*z^2 - 46080*a^4*b^14*c*f*h*z^2 \\
& - 105984*a^3*b^15*c*d*h*z^2 - 73728*a^2*b^16*c*d*f*z^2 + 2548039680*a^9*b^3 \\
& *c^7*d*h*z^2 + 1509949440*a^9*b^3*c^7*e*g*z^2 - 1401421824*a^8*b^5*c^6*d*h* \\
& z^2 - 1321205760*a^9*b^2*c^8*d*f*z^2 - 754974720*a^8*b^5*c^6*e*g*z^2 + 7321 \\
& 68192*a^7*b^6*c^6*d*f*z^2 - 603979776*a^10*b^2*c^7*e*i*z^2 - 456130560*a^9* \\
& b^4*c^6*f*h*z^2 + 390463488*a^7*b^7*c^5*d*h*z^2 + 301989888*a^10*b^3*c^6*g* \\
& i*z^2 - 366280704*a^6*b^8*c^5*d*f*z^2 - 330301440*a^8*b^4*c^7*d*f*z^2 + 254 \\
& 017536*a^8*b^6*c^5*f*h*z^2 - 1887436800*a^10*b*c^8*d*h*z^2 + 188743680*a^10 \\
& *b^2*c^7*f*h*z^2 + 188743680*a^7*b^7*c^5*e*g*z^2 + 125829120*a^8*b^6*c^5*e* \\
& i*z^2 - 62914560*a^8*b^7*c^4*g*i*z^2 - 61931520*a^7*b^8*c^4*f*h*z^2 + 23592 \\
& 960*a^7*b^9*c^3*g*i*z^2 - 47185920*a^7*b^8*c^4*e*i*z^2 - 3538944*a^6*b^11*c \\
& ^2*g*i*z^2 + 96583680*a^5*b^10*c^4*d*f*z^2 - 51609600*a^6*b^9*c^4*d*h*z^2 +
\end{aligned}$$



$$\begin{aligned}
& 7077888a^6b^{10}c^3eiz^2 + 6144000a^6b^{10}c^3f*hz^2 - 393216a^5b^{12}c^2eiz^2 + 61440a^5b^{12}c^2f*hz^2 - 23592960a^6b^9c^4e*gz^2 \\
& + 1179648a^5b^{11}c^3e*gz^2 + 829440a^4b^{13}c^2d*hz^2 + 368640a^5b^{11}c^3d*hz^2 - 15175680a^4b^{12}c^3d*f*gz^2 + 1428480a^3b^{14}c^2d*f*gz^2 \\
& - 1207959552a^{10}b*c^8e*gz^2 - 402653184a^{11}b*c^7g*iz^2 - 440401920a^{10}b*c^8f^2z^2 - 188743680a^{11}b*c^7h^2z^2 + 1761607680a^{10}c^9d*f*gz^2 + 524288a^6b^{12}c^3i^2z^2 + 46080a^5b^{13}c^3h^2z^2 - 14080a^3b^{15}c^3f^2z^2 + 6936330240a^8b^3c^8d^2z^2 + 2464874496a^6b^7c^6d^2z^2 - 3963617280a^9b*c^9d^2z^2 + 805306368a^{11}c^8e*iz^2 - 1509949440a^9b^2c^8e^2z^2 + 251658240a^{11}c^8f*hz^2 + 1536a^3b^{16}f*hz^2 + 4608a^2b^{17}d*hz^2 - 5400428544a^7b^5c^7d^2z^2 - 94464a^8b^{17}c^3d^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730054656a^5b^9c^5d^2z^2 + 477102080a^9b^3c^7f^2z^2 - 377487360a^9b^4c^6g^2z^2 + 301989888a^{10}b^2c^7g^2z^2 + 188743680a^8b^6c^5g^2z^2 + 141557760a^{10}b^3c^6h^2z^2 - 174325760a^8b^5c^6f^2z^2 - 188743680a^7b^6c^6e^2z^2 + 146165760a^4b^{11}c^4d^2z^2 - 50331648a^{10}b^4c^5i^2z^2 - 33554432a^{11}b^2c^6i^2z^2 + 20971520a^9b^6c^4i^2z^2 - 47185920a^7b^8c^4g^2z^2 - 26542080a^8b^7c^4h^2z^2 - 2752512a^7b^{10}c^2i^2z^2 + 2621440a^8b^8c^3i^2z^2 + 9584640a^7b^9c^3h^2z^2 - 2359296a^9b^5c^5h^2z^2 - 1290240a^6b^{11}c^2h^2z^2 + 5898240a^6b^{10}c^3g^2z^2 - 294912a^5b^{12}c^2g^2z^2 + 11206656a^7b^7c^5f^2z^2 + 8929280a^6b^9c^4f^2z^2 + 23592960a^6b^8c^5e^2z^2 - 2600960a^5b^{11}c^3f^2z^2 + 291840a^4b^{13}c^2f^2z^2 - 19860480a^3b^{13}c^3d^2z^2 - 1179648a^5b^{10}c^4e^2z^2 + 1771776a^2b^{15}c^2d^2z^2 + 1536a^8b^{18}d*f*gz^2 + 1207959552a^{10}c^9e^2z^2 + 134217728a^{12}c^7i^2z^2 - 32768a^5b^{14}i^2z^2 + 2304a^4b^{15}h^2z^2 + 256a^2b^{17}f^2z^2 + 2304b^{19}d^2z^2 + 169869312a^7b*c^8d*e*f*gz + 99090432a^8b*c^7d*g*h*gz - 3145728a^9b*c^6f*h*iz - 27648a^4b^{11}c^3f*h*iz + 56623104a^8b*c^7d*f*iz - 50688a^3b^{12}c^3d*h*iz - 4608a^3b^{12}c^3f*g*h*gz - 9437184a^8b*c^7e*f*h*gz - 55296a^2b^{13}c^3d*f*iz - 13824a^2b^{13}c^3d*g*h*gz + 9216a^8b^{13}c^2d*e*f*gz - 4608a^8b^{14}c^3d*f*g*gz + 219414528a^7b^2c^7d*e*h*gz - 221773824a^6b^3c^7d*e*f*gz - 109707264a^7b^3c^6d*g*h*gz + 110886912a^6b^4c^6d*f*g*gz + 40108032a^8b^2c^6d*h*iz + 2359296a^8b^3c^5f*h*iz - 491520a^6b^7c^3f*h*iz + 184320a^5b^9c^2f*h*iz - 88473600a^6b^4c^6d*e*h*gz - 84934656a^7b^2c^7d*f*g*gz + 117964800a^5b^5c^6d*e*f*gz - 45613056a^7b^3c^6d*f*iz + 44236800a^6b^5c^5d*g*h*gz - 10321920a^6b^6c^4d*h*iz + 7077888a^7b^4c^5d*h*iz - 5898240a^7b^4c^5f*g*h*gz + 4718592a^8b^2c^6f*g*h*gz + 2949120a^6b^6c^4f*g*h*gz + 2396160a^5b^8c^3d*h*iz - 737280a^5b^8c^3f*g*h*gz + 92160a^4b^{10}c^2f*g*h*gz - 27648a^4b^{10}c^2d*h*iz - 58982400a^5b^6c^5d*f*g*gz + 11796480a^7b^3c^6e*f*h*gz + 8847360a^5b^7c^4d*f*iz - 6635520a^5b^7c^4d*g*h*gz - 5898240a^6b^5c^5e*f*h*gz - 3809280a^4b^9c^3d*f*iz + 2359296a^6b^5c^5d*f*iz + 1474560a^5b^7c^4e*f*h*gz + 681984a^3b^{11}c^2d*f*iz - 276480a^4b^9c^3d*g*h*gz - 184320a^4b^9c^3e*f*h*gz + 179712a^3b^{11}c^2d*g*h*gz + 9216a^3b^{11}c^2e*f*h*gz + 16220160a^4b^8c^4d*f*g*gz + 132710
\end{aligned}$$

$$\begin{aligned}
& 40a^5b^6c^5d^5e^5h^5z - 2396160a^3b^{10}c^3d^5f^5g^5z + 552960a^4b^8c^4d^5e^5h^5z - 359424a^3b^{10}c^3d^5e^5h^5z + 175104a^2b^{12}c^2d^5f^5g^5z + 27648 \\
& a^2b^{12}c^2d^5e^5h^5z - 32440320a^4b^7c^5d^5e^5f^5z + 4792320a^3b^9c^4d^5e^5f^5z - 350208a^2b^{11}c^3d^5e^5f^5z + 346816512a^7b^8c^8d^2g^5z - 41472 \\
& a^5b^{10}c^8h^2i^5z + 7077888a^9b^8c^6g^5h^2z - 11008a^3b^{12}c^3f^2i^5z - 6912a^4b^{11}c^3g^5h^2z - 19660800a^8b^8c^7f^2g^5z - 768a^2b^{13}c^3f^2 \\
& g^5z + 214272a^3b^{13}c^2d^2g^5z - 428544a^3b^{12}c^3d^2e^5z - 198180864a^8c^8d^5e^5h^5z - 66060288a^9c^7d^5h^5i^5z + 1536a^3b^{13}f^5h^5i^5z + 4608a^2 \\
& b^{14}d^5h^5i^5z - 66816a^3b^{14}c^4d^2i^5z + 1022754816a^6b^2c^8d^2e^5z - 642318336a^5b^4c^7d^2e^5z - 511377408a^6b^3c^7d^2g^5z + 321159168a^5 \\
& b^5c^6d^2g^5z + 225312768a^7b^2c^7d^2i^5z + 223395840a^4b^6c^6d^2e^5z - 111697920a^4b^7c^5d^2g^5z + 3538944a^9b^2c^5h^2i^5z - 7372 \\
& 80a^7b^6c^3h^2i^5z + 276480a^6b^8c^2h^2i^5z - 10354688a^8b^2c^6f^2i^5z - 43646976a^6b^4c^6d^2i^5z - 8847360a^8b^3c^5g^5h^2z + 4423 \\
& 680a^7b^5c^4g^5h^2z + 2048000a^6b^6c^4f^2i^5z - 1105920a^6b^7c^3g^5h^2z - 849920a^5b^8c^3f^2i^5z + 393216a^7b^4c^5f^2i^5z + 145920 \\
& a^4b^{10}c^2f^2i^5z + 138240a^5b^9c^2g^5h^2z - 32587776a^5b^6c^5d^2i^5z + 25362432a^7b^3c^6f^2g^5z + 21657600a^4b^8c^4d^2i^5z + 1769 \\
& 4720a^8b^2c^6e^5h^2z - 50724864a^7b^2c^7e^5f^2z - 13271040a^6b^5c^5f^2g^5z - 8847360a^7b^4c^5e^5h^2z - 5810688a^3b^{10}c^3d^2i^5z + \\
& 3563520a^5b^7c^4f^2g^5z + 2211840a^6b^6c^4e^5h^2z + 845568a^2b^{12}c^2d^2i^5z - 506880a^4b^9c^3f^2g^5z - 276480a^5b^8c^3e^5h^2z + 34 \\
& 560a^3b^{11}c^2f^2g^5z + 13824a^4b^{10}c^2e^5h^2z + 26542080a^6b^4c^6e^5f^2z + 23362560a^3b^9c^4d^2g^5z - 46725120a^3b^8c^5d^2e^5z - 7 \\
& 127040a^5b^6c^5e^5f^2z - 2965248a^2b^{11}c^3d^2g^5z + 1013760a^4b^8c^4e^5f^2z - 69120a^3b^{10}c^3e^5f^2z + 1536a^2b^{12}c^2e^5f^2z + 593 \\
& 0496a^2b^{10}c^4d^2e^5z + 1536a^3b^{15}d^5f^5i^5z - 693633024a^7c^9d^2e^5z - 231211008a^8c^8d^2i^5z - 4718592a^{10}c^6h^2i^5z + 2304a^4b^{12}h^2 \\
& i^5z + 13107200a^9c^7f^2i^5z + 256a^2b^{14}f^2i^5z - 14155776a^9c^7e^5h^2z + 39321600a^8c^8e^5f^2z + 13824b^{14}c^2d^2e^5z - 6912b^{15}c^3d^2 \\
& g^5z + 2304b^{16}d^2i^5z + 737280a^7b^8c^5f^5g^5h^5i^5 - 2304a^3b^9c^3f^5g^5h^5i^5 - 6912a^2b^{10}c^3d^5g^5h^5i^5 + 11059200a^6b^8c^6d^5e^5h^5i^5 + 5160960a^6b^8c^6 \\
& d^5f^5g^5i^5 + 2211840a^6b^8c^6e^5f^5g^5h^5 + 4608a^3b^{10}c^2d^5e^5f^5i^5 + 15482880a^5b^8c^7d^5e^5f^5g^5 - 13824a^3b^9c^3d^5e^5f^5g^5 - 2304a^3b^{11}c^3d^5f^5g^5i^5 + 1843 \\
& 200a^6b^3c^4f^5g^5h^5i^5 + 783360a^5b^5c^3f^5g^5h^5i^5 + 18432a^4b^7c^2f^5g^5h^5i^5 - 5529600a^6b^2c^5d^5g^5h^5i^5 - 3686400a^6b^2c^5e^5f^5h^5i^5 - 2211840 \\
& a^5b^4c^4d^5g^5h^5i^5 - 1566720a^5b^4c^4e^5f^5h^5i^5 + 317952a^4b^6c^3d^5g^5h^5i^5 - 36864a^4b^6c^3e^5f^5h^5i^5 + 6912a^3b^8c^2d^5g^5h^5i^5 + 4608a^3b^8c^2 \\
& e^5f^5h^5i^5 + 5160960a^5b^3c^5d^5f^5g^5i^5 + 4423680a^5b^3c^5e^5f^5g^5h^5 + 4423680a^5b^3c^5d^5e^5h^5i^5 - 635904a^4b^5c^4d^5e^5h^5i^5 - 354816a^3b^7c^3 \\
& d^5f^5g^5i^5 + 322560a^4b^5c^4d^5f^5g^5i^5 + 138240a^4b^5c^4e^5f^5g^5h^5 + 59904a^2b^9c^2d^5f^5g^5i^5 - 13824a^3b^7c^3e^5f^5g^5h^5 - 13824a^3b^7c^3d^5e^5h^5 \\
& i^5 + 13824a^2b^9c^2d^5e^5h^5i^5 - 16588800a^5b^2c^6d^5e^5g^5h^5 - 10321920a^5b^2c^6d^5e^5f^5i^5 + 1658880a^4b^4c^5d^5e^5g^5h^5 + 709632a^3b^6c^4d^5e^5f^5i^5 \\
& - 645120a^4b^4c^5d^5e^5f^5i^5 + 124416a^3b^6c^4d^5e^5g^5h^5 - 119808a^2b^8
\end{aligned}$$

$c^3 d e f i - 41472 a^2 b^8 c^3 d e g h + 7741440 a^4 b^3 c^6 d e f g - 29$   
 $03040 a^3 b^5 c^5 d e f g + 387072 a^2 b^7 c^4 d e f g - 3456 a^4 b^8 c g h$   
 $^2 i - 2304 a^4 b^8 c f h i^2 + 1105920 a^7 b c^5 e h^2 i - 384 a^2 b^{10} c$   
 $f^2 g i - 10616832 a^6 b c^6 e^2 g i - 3538944 a^7 b c^5 e g i^2 + 1843200$   
 $a^7 b c^5 d h i^2 + 1152 a^3 b^9 c d h i^2 - 37062144 a^5 b c^7 d^2 f h + 2$   
 $580480 a^6 b c^6 e f^2 i + 65664 a b^{10} c^2 d^2 g i + 23224320 a^5 b c^7 d^$   
 $2 e i - 9216 a^2 b^{10} c d f i^2 - 5985792 a^6 b c^6 d f h^2 + 206010 a b^9$   
 $c^3 d^2 f h - 131328 a b^9 c^3 d^2 e i - 6300 a b^{10} c^2 d f^2 h + 16588800$   
 $a^5 b c^7 d e^2 h + 3456 a b^{10} c^2 d f g^2 + 435456 a b^8 c^4 d^2 e g + 1$   
 $3824 a b^8 c^4 d e^2 f - 1474560 a^7 c^6 e f h i - 10321920 a^6 c^7 d e f i$   
 $+ 1350 a b^{11} c d f h^2 - 552960 a^7 b^2 c^4 g h^2 i - 552960 a^6 b^4 c^3$   
 $g h^2 i - 145152 a^5 b^6 c^2 g h^2 i - 737280 a^7 b^2 c^4 f h i^2 - 568320$   
 $a^6 b^4 c^3 f h i^2 - 136704 a^5 b^6 c^2 f h i^2 - 1290240 a^6 b^2 c^5 f^2$   
 $g i + 1105920 a^6 b^3 c^4 e h^2 i - 860160 a^5 b^4 c^4 f^2 g i + 290304 a^5$   
 $b^5 c^3 e h^2 i - 80640 a^4 b^6 c^3 f^2 g i + 12672 a^3 b^8 c^2 f^2 g i +$   
 $6912 a^4 b^7 c^2 e h^2 i + 5308416 a^6 b^2 c^5 e g^2 i - 5308416 a^5 b^3 c^$   
 $5 e^2 g i - 3538944 a^6 b^3 c^4 e g i^2 + 2654208 a^5 b^4 c^4 e g^2 i + 165$   
 $8880 a^6 b^3 c^4 d h i^2 - 1105920 a^5 b^4 c^4 f g^2 h - 884736 a^5 b^5 c^3$   
 $e g i^2 - 552960 a^6 b^2 c^5 f g^2 h + 262656 a^5 b^5 c^3 d h i^2 - 55296$   
 $a^4 b^7 c^2 d h i^2 - 34560 a^4 b^6 c^3 f g^2 h + 3456 a^3 b^8 c^2 f g^2 h$   
 $- 11612160 a^5 b^2 c^6 d^2 g i + 1720320 a^5 b^3 c^5 e f^2 i - 1658880 a^6$   
 $b^2 c^5 e g h^2 + 1596672 a^3 b^6 c^4 d^2 g i - 829440 a^5 b^4 c^4 e g h^2$   
 $- 508032 a^2 b^8 c^3 d^2 g i + 161280 a^4 b^5 c^4 e f^2 i - 25344 a^3 b^7 c$   
 $^3 e f^2 i - 20736 a^4 b^6 c^3 e g h^2 + 768 a^2 b^9 c^2 e f^2 i - 4423680$   
 $a^5 b^2 c^6 e^2 f h + 4147200 a^5 b^3 c^5 d g^2 h - 2580480 a^6 b^2 c^5 d f$   
 $i^2 - 967680 a^5 b^4 c^4 d f i^2 - 414720 a^4 b^5 c^4 d g^2 h - 138240 a^4$   
 $b^4 c^5 e^2 f h + 64512 a^4 b^6 c^3 d f i^2 + 39168 a^3 b^8 c^2 d f i^2 -$   
 $31104 a^3 b^7 c^3 d g^2 h + 13824 a^3 b^6 c^4 e^2 f h + 10368 a^2 b^9 c^2 d$   
 $g^2 h + 15630336 a^5 b^2 c^6 d f^2 h - 14459904 a^4 b^3 c^6 d^2 f h + 9630$   
 $144 a^3 b^5 c^5 d^2 f h - 8764416 a^5 b^3 c^5 d f h^2 - 3870720 a^5 b^2 c^6$   
 $e f^2 g - 3193344 a^3 b^5 c^5 d^2 e i + 2867328 a^4 b^4 c^5 d f^2 h - 2095$   
 $200 a^2 b^7 c^4 d^2 f h - 1414080 a^3 b^6 c^4 d f^2 h - 34836480 a^4 b^2 c^$   
 $7 d^2 e g + 1016064 a^2 b^7 c^4 d^2 e i - 645120 a^4 b^4 c^5 e f^2 g + 3067$   
 $20 a^3 b^7 c^3 d f h^2 + 197820 a^2 b^8 c^3 d f^2 h + 146880 a^4 b^5 c^4 d$   
 $f h^2 + 80640 a^3 b^6 c^4 e f^2 g - 55350 a^2 b^9 c^2 d f h^2 - 2304 a^2 b^$   
 $8 c^3 e f^2 g - 3870720 a^5 b^2 c^6 d f g^2 - 1935360 a^4 b^4 c^5 d f g^2 -$   
 $1658880 a^4 b^3 c^6 d e^2 h + 725760 a^3 b^6 c^4 d f g^2 + 17418240 a^3 b^$   
 $4 c^6 d^2 e g - 124416 a^3 b^5 c^5 d e^2 h - 96768 a^2 b^8 c^3 d f g^2 + 41$   
 $472 a^2 b^7 c^4 d e^2 h - 3919104 a^2 b^6 c^5 d^2 e g - 7741440 a^4 b^2 c^7$   
 $d e^2 f + 2903040 a^3 b^4 c^6 d e^2 f - 387072 a^2 b^6 c^5 d e^2 f + 18432$   
 $0 a^8 b c^4 h^2 i^2 + 25344 a^5 b^7 c h^2 i^2 - 884736 a^6 b^3 c^4 g^3 i -$   
 $589824 a^7 b^3 c^3 g i^3 - 442368 a^5 b^5 c^3 g^3 i - 294912 a^6 b^5 c^2 g$   
 $i^3 + 430080 a^7 b c^5 f^2 i^2 - 1984 a^3 b^9 c f^2 i^2 + 3538944 a^5 b^2 c$   
 $^6 e^3 i - 1648128 a^5 b^3 c^5 f^3 h + 1179648 a^7 b^2 c^4 e i^3 - 898560 a$   
 $^6 b^3 c^4 f h^3 + 589824 a^6 b^4 c^3 e i^3 - 354240 a^5 b^5 c^3 f h^3 - 35$

$$\begin{aligned}
& 4240*a^4*b^5*c^4*f^3*h + 98304*a^5*b^6*c^2*e*i^3 + 43680*a^3*b^7*c^3*f^3*h \\
& - 21600*a^4*b^7*c^2*f*h^3 - 1050*a^2*b^9*c^2*f^3*h + 225*a^2*b^10*c*f^2*h^2 \\
& + 3870720*a^6*b*c^6*d^2*i^2 + 1658880*a^6*b*c^6*e^2*h^2 + 16547328*a^4*b^2 \\
& *c^7*d^3*h - 12306816*a^3*b^4*c^6*d^3*h + 37310976*a^3*b^3*c^7*d^3*f + 3037 \\
& 824*a^2*b^6*c^5*d^3*h - 2654208*a^5*b^3*c^5*e*g^3 + 1949184*a^6*b^2*c^5*d*h \\
& ^3 + 1296000*a^5*b^4*c^4*d*h^3 - 155520*a^4*b^6*c^3*d*h^3 - 40500*a*b^10*c^ \\
& 2*d^2*h^2 - 8100*a^3*b^8*c^2*d*h^3 + 3870720*a^5*b*c^7*e^2*f^2 + 34836480*a \\
& ^4*b*c^8*d^2*e^2 - 108864*a*b^9*c^3*d^2*g^2 - 8068032*a^2*b^5*c^6*d^3*f - 5 \\
& 623296*a^4*b^3*c^6*d*f^3 + 1737792*a^3*b^5*c^5*d*f^3 - 260190*a*b^8*c^4*d^2 \\
& *f^2 - 211680*a^2*b^7*c^4*d*f^3 - 435456*a*b^7*c^5*d^2*e^2 - 245760*a^8*c^5 \\
& *f*h*i^2 + 384*a^3*b^10*f*h*i^2 + 1152*a^2*b^11*d*h*i^2 - 2211840*a^6*c^7*e \\
& ^2*f*h - 1720320*a^7*c^6*d*f*i^2 - 9450*b^11*c^2*d^2*f*h + 6912*b^11*c^2*d^ \\
& 2*e*i + 1612800*a^6*c^7*d*f^2*h - 393216*a^8*b*c^4*g*i^3 - 49152*a^5*b^7*c* \\
& g*i^3 - 20736*b^10*c^3*d^2*e*g - 75188736*a^4*b*c^8*d^3*f - 883200*a^6*b*c^ \\
& 6*f^3*h - 317952*a^7*b*c^5*f*h^3 + 1350*a^3*b^9*c*f*h^3 - 15482880*a^5*c^8* \\
& d*e^2*f - 9792*a*b^11*c*d^2*i^2 - 10616832*a^5*b*c^7*e^3*g - 345060*a*b^8*c \\
& ^4*d^3*h + 4050*a^2*b^10*c*d*h^3 - 4262400*a^5*b*c^7*d*f^3 + 852768*a*b^7*c \\
& ^5*d^3*f + 7350*a*b^9*c^3*d*f^3 + 276480*a^7*b^3*c^3*h^2*i^2 + 140544*a^6*b \\
& ^5*c^2*h^2*i^2 + 884736*a^7*b^2*c^4*g^2*i^2 + 884736*a^6*b^4*c^3*g^2*i^2 + \\
& 221184*a^5*b^6*c^2*g^2*i^2 + 501760*a^6*b^3*c^4*f^2*i^2 + 414720*a^6*b^3*c^ \\
& 4*g^2*h^2 + 207360*a^5*b^5*c^3*g^2*h^2 + 170240*a^5*b^5*c^3*f^2*i^2 + 9216* \\
& a^4*b^7*c^2*f^2*i^2 + 5184*a^4*b^7*c^2*g^2*h^2 + 3538944*a^6*b^2*c^5*e^2*i^ \\
& 2 + 1684224*a^6*b^2*c^5*f^2*h^2 + 1264320*a^5*b^4*c^4*f^2*h^2 + 884736*a^5* \\
& b^4*c^4*e^2*i^2 + 126720*a^4*b^6*c^3*f^2*h^2 - 13950*a^3*b^8*c^2*f^2*h^2 + \\
& 1935360*a^5*b^3*c^5*d^2*i^2 + 967680*a^5*b^3*c^5*f^2*g^2 + 829440*a^5*b^3*c \\
& ^5*e^2*h^2 - 532224*a^4*b^5*c^4*d^2*i^2 + 161280*a^4*b^5*c^4*f^2*g^2 - 9676 \\
& 8*a^3*b^7*c^3*d^2*i^2 + 62784*a^2*b^9*c^2*d^2*i^2 + 20736*a^4*b^5*c^4*e^2*h \\
& ^2 - 20160*a^3*b^7*c^3*f^2*g^2 + 576*a^2*b^9*c^2*f^2*g^2 + 11487744*a^5*b^2 \\
& *c^6*d^2*h^2 + 7962624*a^5*b^2*c^6*e^2*g^2 + 35525376*a^4*b^2*c^7*d^2*f^2 - \\
& 1412640*a^3*b^6*c^4*d^2*h^2 + 461376*a^4*b^4*c^5*d^2*h^2 + 375030*a^2*b^8* \\
& c^3*d^2*h^2 + 8709120*a^4*b^3*c^6*d^2*g^2 - 4354560*a^3*b^5*c^5*d^2*g^2 + 9 \\
& 79776*a^2*b^7*c^4*d^2*g^2 + 645120*a^4*b^3*c^6*e^2*f^2 - 80640*a^3*b^5*c^5* \\
& e^2*f^2 + 2304*a^2*b^7*c^4*e^2*f^2 - 15269184*a^3*b^4*c^6*d^2*f^2 + 2870784 \\
& *a^2*b^6*c^5*d^2*f^2 - 17418240*a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c^6*d \\
& ^2*e^2 - 3456*b^12*c*d^2*g*i + 384*a*b^12*d*f*i^2 + 576*a^4*b^9*h^2*i^2 + 3 \\
& 538944*a^7*c^6*e^2*i^2 + 115200*a^7*c^6*f^2*h^2 + 64*a^2*b^11*f^2*i^2 + 609 \\
& 6384*a^6*c^7*d^2*h^2 + 5184*b^11*c^2*d^2*g^2 + 131072*a^8*b^2*c^3*i^4 + 983 \\
& 04*a^7*b^4*c^2*i^4 + 11025*b^10*c^3*d^2*f^2 + 5644800*a^5*c^8*d^2*f^2 + 142 \\
& 560*a^6*b^4*c^3*h^4 + 103680*a^7*b^2*c^4*h^4 + 32400*a^5*b^6*c^2*h^4 + 2073 \\
& 6*b^9*c^4*d^2*e^2 + 331776*a^5*b^4*c^4*g^4 + 492800*a^5*b^2*c^6*f^4 + 35145 \\
& 6*a^4*b^4*c^5*f^4 - 43120*a^3*b^6*c^4*f^4 + 1225*a^2*b^8*c^3*f^4 - 27433728 \\
& *a^3*b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 + 7077888*a^6*c^7*e^3*i + 786432 \\
& *a^8*c^5*e*i^3 + 28449792*a^5*c^8*d^3*h + 17010*b^10*c^3*d^3*h + 2025*b^12* \\
& c*d^2*h^2 + 580608*a^7*c^6*d*h^3 - 39690*b^9*c^4*d^3*f + 32768*a^6*b^6*c*i^ \\
& 4 + 2025*a^4*b^8*c*h^4 - 734832*a*b^6*c^6*d^4 + 576*b^13*d^2*i^2 + 65536*a^
\end{aligned}$$

$$\begin{aligned}
& 9c^4i^4 + 20736a^8c^5h^4 + 4096a^5b^8i^4 + 49787136a^4c^9d^4 + 1 \\
& 60000a^6c^7f^4 + 5308416a^5c^8e^4 + 35721b^8c^5d^4, z, 1) * x * (83886 \\
& 08a^{11}b^9c^9 - 512a^4b^{15}c^2 + 14336a^5b^{13}c^3 - 172032a^6b^{11}c^4 \\
& + 1146880a^7b^9c^5 - 4587520a^8b^7c^6 + 11010048a^9b^5c^7 - 14680 \\
& 064a^{10}b^3c^8) / (64(a^4b^{12} + 4096a^{10}c^6 - 24a^5b^{10}c + 240a^6 \\
& b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (3244 \\
& 032a^6b^9c^8d^4e - 327680a^8c^7f^4i - 983040a^7c^8e^4f + 1081344a^7b \\
& c^7d^4i + 884736a^7b^9c^7e^4h + 491520a^7b^9c^7f^4g + 294912a^8b^9c^6h \\
& i + 4608a^2b^9c^4d^4e - 87552a^3b^7c^5d^4e + 681984a^4b^5c^6d^4e \\
& - 2433024a^5b^3c^7d^4e - 2304a^2b^{10}c^3d^4g + 43776a^3b^8c^4d^4g + \\
& 1536a^3b^8c^4e^4f - 340992a^4b^6c^5d^4g - 39936a^4b^6c^5e^4f + 12 \\
& 16512a^5b^4c^6d^4g + 184320a^5b^4c^6e^4f - 1622016a^6b^2c^7d^4g + \\
& 49152a^6b^2c^7e^4f + 768a^2b^{11}c^2d^4i - 13056a^3b^9c^3d^4i - 768 \\
& a^3b^9c^3f^4g + 84480a^4b^7c^4d^4i + 4608a^4b^7c^4e^4h + 19968a^4b \\
& b^7c^4f^4g - 178176a^5b^5c^5d^4i + 18432a^5b^5c^5e^4h - 92160a^5b^ \\
& 5c^5f^4g - 270336a^6b^3c^6d^4i - 368640a^6b^3c^6e^4h - 24576a^6b^3 \\
& c^6f^4g + 256a^3b^{10}c^2f^4i - 6144a^4b^8c^3f^4i - 2304a^4b^8c^3g \\
& h + 17408a^5b^6c^4f^4i - 9216a^5b^6c^4g^4h + 69632a^6b^4c^5f^4i + \\
& 184320a^6b^4c^5g^4h - 147456a^7b^2c^6f^4i - 442368a^7b^2c^6g^4h + \\
& 768a^4b^9c^2h^4i + 4608a^5b^7c^3h^4i - 55296a^6b^5c^4h^4i + 24576 \\
& a^7b^3c^5h^4i) / (512(a^4b^{12} + 4096a^{10}c^6 - 24a^5b^{10}c + 240a^6 \\
& b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) - (x * (45 \\
& 1584a^6c^9d^2 + 18b^{12}c^3d^2 - 25600a^7c^8f^2 + 9216a^8c^7h^2 - \\
& 504a^9b^{10}c^4d^2 - 73728a^6b^9c^8e^2 - 8192a^8b^9c^6i^2 + 6228a^2b \\
& ^8c^5d^2 - 42624a^3b^6c^6d^2 + 176256a^4b^4c^7d^2 - 423936a^5b^ \\
& 2c^8d^2 - 4608a^4b^5c^6e^2 + 36864a^5b^3c^7e^2 + 2a^2b^{10}c^3f \\
& ^2 - 84a^3b^8c^4f^2 + 3520a^4b^6c^5f^2 - 26240a^5b^4c^6f^2 + 59 \\
& 904a^6b^2c^7f^2 - 1152a^4b^7c^4g^2 + 9216a^5b^5c^5g^2 - 18432a \\
& ^6b^3c^6g^2 + 468a^4b^8c^3h^2 - 3456a^5b^6c^4h^2 + 5760a^6b^4c \\
& ^5h^2 - 128a^4b^9c^2i^2 + 512a^5b^7c^3i^2 + 1536a^6b^5c^4i^2 \\
& - 4096a^7b^3c^5i^2 + 129024a^7c^8d^4h + 12a^8b^{11}c^3d^4f - 218112a^ \\
& 6b^9c^8d^4f - 49152a^7b^9c^7e^4i - 9216a^7b^9c^7f^4h - 420a^2b^9c^4d^ \\
& f + 4992a^3b^7c^5d^4f - 36480a^4b^5c^6d^4f + 144384a^5b^3c^7d^4f + \\
& 36a^2b^{10}c^3d^4h - 360a^3b^8c^4d^4h + 3456a^4b^6c^5d^4h + 4608a^ \\
& 4b^6c^5e^4g - 11520a^5b^4c^6d^4h - 36864a^5b^4c^6e^4g - 27648a^6b \\
& ^2c^7d^4h + 73728a^6b^2c^7e^4g + 12a^3b^9c^3f^4h - 1536a^4b^7c^4e \\
& e^4i - 2304a^4b^7c^4f^4h + 9216a^5b^5c^5e^4i + 17280a^5b^5c^5f^4h - \\
& 30720a^6b^3c^6f^4h + 768a^4b^8c^3g^4i - 4608a^5b^6c^4g^4i + 24576 \\
& a^7b^2c^6g^4i) / (64(a^4b^{12} + 4096a^{10}c^6 - 24a^5b^{10}c + 240a^6 \\
& b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (x * (1 \\
& 3824a^4c^8e^3 + 512a^7c^5i^3 - 54b^7c^5d^2e + 27b^8c^4d^2g + \\
& 13824a^5c^7e^2i + 4608a^6c^6e^2i^2 - 9b^9c^3d^2i - 1728a^4b^3c \\
& ^5g^3 + 64a^4b^6c^2i^3 + 384a^5b^4c^3i^3 + 768a^6b^2c^4i^3 - 2 \\
& 0160a^4c^8d^4e^4f - 6720a^5c^7d^4f^4i - 2880a^5c^7e^4f^4h - 960a^6c^6 \\
& f^4h^4i + 972a^8b^5c^6d^2e + 24192a^3b^9c^8d^2e - 486a^8b^6c^5d^2g +
\end{aligned}$$

$$\begin{aligned}
& 6240*a^4*b*c^7*e*f^2 - 20736*a^4*b*c^7*e^2*g + 144*a*b^7*c^4*d^2*i + 8064*a^4*b*c^7*d^2*i + 1728*a^5*b*c^6*e*h^2 + 2080*a^5*b*c^6*f^2*i - 2304*a^6*b*c^5*g*i^2 + 576*a^6*b*c^5*h^2*i - 7344*a^2*b^3*c^7*d^2*e + 3672*a^2*b^4*c^6*d^2*g - 6*a^2*b^5*c^5*e*f^2 - 12096*a^3*b^2*c^7*d^2*g + 192*a^3*b^3*c^6*e*f^2 + 10368*a^4*b^2*c^6*e*g^2 - 900*a^2*b^5*c^5*d^2*i + 3*a^2*b^6*c^4*f^2*g + 1584*a^3*b^3*c^6*d^2*i - 96*a^3*b^4*c^5*f^2*g - 3120*a^4*b^2*c^6*f^2*g + 1296*a^4*b^3*c^5*e*h^2 + 6912*a^4*b^2*c^6*e^2*i + 1152*a^4*b^4*c^4*e*i^2 + 4608*a^5*b^2*c^5*e*i^2 - a^2*b^7*c^3*f^2*i + 30*a^3*b^5*c^4*f^2*i + 1104*a^4*b^3*c^5*f^2*i - 648*a^4*b^4*c^4*g*h^2 - 864*a^5*b^2*c^5*g*h^2 + 1728*a^4*b^4*c^4*g^2*i - 576*a^4*b^5*c^3*g*i^2 + 3456*a^5*b^2*c^5*g^2*i - 2304*a^5*b^3*c^4*g*i^2 + 216*a^4*b^5*c^3*h^2*i + 720*a^5*b^3*c^4*h^2*i - 36*a*b^6*c^5*d*e*f + 18*a*b^7*c^4*d*f*g + 15552*a^4*b*c^7*d*e*h + 10080*a^4*b*c^7*d*f*g - 6*a*b^8*c^3*d*f*i + 5184*a^5*b*c^6*d*h*i - 13824*a^5*b*c^6*e*g*i + 1440*a^5*b*c^6*f*g*h + 900*a^2*b^4*c^6*d*e*f - 4896*a^3*b^2*c^7*d*e*f - 108*a^2*b^5*c^5*d*e*h - 450*a^2*b^5*c^5*d*f*g + 2448*a^3*b^3*c^6*d*f*g + 138*a^2*b^6*c^4*d*f*i + 54*a^2*b^6*c^4*d*g*h - 516*a^3*b^4*c^5*d*f*i - 36*a^3*b^4*c^5*e*f*h - 4992*a^4*b^2*c^6*d*f*i - 7776*a^4*b^2*c^6*d*g*h - 6048*a^4*b^2*c^6*e*f*h - 18*a^2*b^7*c^3*d*h*i - 36*a^3*b^5*c^4*d*h*i + 18*a^3*b^5*c^4*f*g*h + 2592*a^4*b^3*c^5*d*h*i - 6912*a^4*b^3*c^5*e*g*i + 3024*a^4*b^3*c^5*f*g*h - 6*a^3*b^6*c^3*f*h*i - 1020*a^4*b^4*c^4*f*h*i - 2496*a^5*b^2*c^5*f*h*i) \\
& / (64*(a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5)) * \text{root}(56371445760*a^11*b^8*c^6*z^4 - 503316480*a^8*b^14*c^3*z^4 + 47185920*a^7*b^16*c^2*z^4 - 171798691840*a^14*b^2*c^9*z^4 + 193273528320*a^13*b^4*c^8*z^4 - 128849018880*a^12*b^6*c^7*z^4 - 16911433728*a^10*b^10*c^5*z^4 + 3523215360*a^9*b^12*c^4*z^4 - 2621440*a^6*b^18*c*z^4 + 68719476736*a^15*c^10*z^4 + 65536*a^5*b^20*z^4 + 196608*a^5*b^13*c*g*i*z^2 - 46080*a^4*b^14*c*f*h*z^2 - 105984*a^3*b^15*c*d*h*z^2 - 73728*a^2*b^16*c*d*f*z^2 + 2548039680*a^9*b^3*c^7*d*h*z^2 + 1509949440*a^9*b^3*c^7*e*g*z^2 - 1401421824*a^8*b^5*c^6*d*h*z^2 - 1321205760*a^9*b^2*c^8*d*f*z^2 - 754974720*a^8*b^5*c^6*e*g*z^2 + 732168192*a^7*b^6*c^6*d*f*z^2 - 603979776*a^10*b^2*c^7*e*i*z^2 - 456130560*a^9*b^4*c^6*f*h*z^2 + 390463488*a^7*b^7*c^5*d*h*z^2 + 301989888*a^10*b^3*c^6*g*i*z^2 - 366280704*a^6*b^8*c^5*d*f*z^2 - 330301440*a^8*b^4*c^7*d*f*z^2 + 254017536*a^8*b^6*c^5*f*h*z^2 - 1887436800*a^10*b*c^8*d*h*z^2 + 188743680*a^10*b^2*c^7*f*h*z^2 + 188743680*a^7*b^7*c^5*e*g*z^2 + 125829120*a^8*b^6*c^5*e*i*z^2 - 62914560*a^8*b^7*c^4*g*i*z^2 - 61931520*a^7*b^8*c^4*f*h*z^2 + 23592960*a^7*b^9*c^3*g*i*z^2 - 47185920*a^7*b^8*c^4*e*i*z^2 - 3538944*a^6*b^11*c^2*g*i*z^2 + 96583680*a^5*b^10*c^4*d*f*z^2 - 51609600*a^6*b^9*c^4*d*h*z^2 + 7077888*a^6*b^10*c^3*e*i*z^2 + 6144000*a^6*b^10*c^3*f*h*z^2 - 393216*a^5*b^12*c^2*e*i*z^2 + 61440*a^5*b^12*c^2*f*h*z^2 - 23592960*a^6*b^9*c^4*e*g*z^2 + 1179648*a^5*b^11*c^3*e*g*z^2 + 829440*a^4*b^13*c^2*d*h*z^2 + 368640*a^5*b^11*c^3*d*h*z^2 - 15175680*a^4*b^12*c^3*d*f*z^2 + 1428480*a^3*b^14*c^2*d*f*z^2 - 1207959552*a^10*b*c^8*e*g*z^2 - 402653184*a^11*b*c^7*g*i*z^2 - 440401920*a^10*b*c^8*f^2*z^2 - 188743680*a^11*b*c^7*h^2*z^2 + 1761607680*a^10*c^9*d*f*z^2 + 524288*a^6*b^12*c*i^2*z^2 + 46080*a^5*b^13*c*h^2*z^2 - 14080*a^3*b^15*c*f^2*z^2 + 693
\end{aligned}$$

$$\begin{aligned}
& 6330240a^8b^3c^8d^2z^2 + 2464874496a^6b^7c^6d^2z^2 - 3963617280a^9b^2c^9d^2z^2 + 805306368a^{11}c^8e^i z^2 - 1509949440a^9b^2c^8e^2 z^2 + 251658240a^{11}c^8f^h z^2 + 1536a^3b^{16}f^h z^2 + 4608a^2b^{17}d^h z^2 - 5400428544a^7b^5c^7d^2z^2 - 94464ab^{17}c^d^2z^2 + 754974720a^8b^4c^7e^2z^2 - 730054656a^5b^9c^5d^2z^2 + 477102080a^9b^3c^7f^2z^2 - 377487360a^9b^4c^6g^2z^2 + 301989888a^{10}b^2c^7g^2z^2 + 188743680a^8b^6c^5g^2z^2 + 141557760a^{10}b^3c^6h^2z^2 - 174325760a^8b^5c^6f^2z^2 - 188743680a^7b^6c^6e^2z^2 + 146165760a^4b^{11}c^4d^2z^2 - 50331648a^{10}b^4c^5i^2z^2 - 33554432a^{11}b^2c^6i^2z^2 + 20971520a^9b^6c^4i^2z^2 - 47185920a^7b^8c^4g^2z^2 - 26542080a^8b^7c^4h^2z^2 - 2752512a^7b^{10}c^2i^2z^2 + 2621440a^8b^8c^3i^2z^2 + 9584640a^7b^9c^3h^2z^2 - 2359296a^9b^5c^5h^2z^2 - 1290240a^6b^{11}c^2h^2z^2 + 5898240a^6b^{10}c^3g^2z^2 - 294912a^5b^{12}c^2g^2z^2 + 11206656a^7b^7c^5f^2z^2 + 8929280a^6b^9c^4f^2z^2 + 23592960a^6b^8c^5e^2z^2 - 2600960a^5b^{11}c^3f^2z^2 + 291840a^4b^{13}c^2f^2z^2 - 19860480a^3b^{13}c^3d^2z^2 - 1179648a^5b^{10}c^4e^2z^2 + 1771776a^2b^{15}c^2d^2z^2 + 1536a^ab^{18}d^f z^2 + 1207959552a^{10}c^9e^2z^2 + 134217728a^{12}c^7i^2z^2 - 32768a^5b^{14}i^2z^2 + 2304a^4b^{15}h^2z^2 + 256a^2b^{17}f^2z^2 + 2304b^{19}d^2z^2 + 169869312a^7b^c^8d^e f z + 99090432a^8b^c^7d^g h z - 3145728a^9b^c^6f^h i z - 27648a^4b^{11}c^f^h i z + 56623104a^8b^c^7d^f i z - 50688a^3b^{12}c^d^h i z - 4608a^3b^{12}c^f^g h z - 9437184a^8b^c^7e^f^h z - 55296a^2b^{13}c^d^f i z - 13824a^2b^{13}c^d^g h z + 9216a^ab^{13}c^2d^e f z - 4608a^ab^{14}c^d^f g z + 219414528a^7b^2c^7d^e h z - 221773824a^6b^3c^7d^e f z - 109707264a^7b^3c^6d^g h z + 110886912a^6b^4c^6d^f g z + 40108032a^8b^2c^6d^h i z + 2359296a^8b^3c^5f^h i z - 491520a^6b^7c^3f^h i z + 184320a^5b^9c^2f^h i z - 88473600a^6b^4c^6d^e h z - 84934656a^7b^2c^7d^f g z + 117964800a^5b^5c^6d^e f z - 45613056a^7b^3c^6d^f i z + 44236800a^6b^5c^5d^g h z - 10321920a^6b^6c^4d^h i z + 7077888a^7b^4c^5d^h i z - 5898240a^7b^4c^5f^g h z + 4718592a^8b^2c^6f^g h z + 2949120a^6b^6c^4f^g h z + 2396160a^5b^8c^3d^h i z - 737280a^5b^8c^3f^g h z + 92160a^4b^{10}c^2f^g h z - 27648a^4b^{10}c^2d^h i z - 58982400a^5b^6c^5d^f g z + 11796480a^7b^3c^6e^f^h z + 8847360a^5b^7c^4d^f i z - 6635520a^5b^7c^4d^g h z - 5898240a^6b^5c^5e^f^h z - 3809280a^4b^9c^3d^f i z + 2359296a^6b^5c^5d^f i z + 1474560a^5b^7c^4e^f^h z + 681984a^3b^{11}c^2d^f i z - 276480a^4b^9c^3d^g h z - 184320a^4b^9c^3e^f^h z + 179712a^3b^{11}c^2d^g h z + 9216a^3b^{11}c^2e^f^h z + 16220160a^4b^8c^4d^f g z + 13271040a^5b^6c^5d^e h z - 2396160a^3b^{10}c^3d^f g z + 552960a^4b^8c^4d^e h z - 359424a^3b^{10}c^3d^e h z + 175104a^2b^{12}c^2d^f g z + 27648a^2b^{12}c^2d^e h z - 32440320a^4b^7c^5d^e f z + 4792320a^3b^9c^4d^e f z - 350208a^2b^{11}c^3d^e f z + 346816512a^7b^c^8d^2g z - 41472a^5b^{10}c^h^2i z + 7077888a^9b^c^6g^h^2z - 11008a^3b^{12}c^f^2i z - 6912a^4b^{11}c^g^h^2z - 19660800a^8b^c^7f^2g z - 768a^2b^{13}c^f^2g z + 214272a^b^{13}c^2d^2g z - 428544a^b^{12}c^3d^2e z - 198180864a^8c^8d^e h z - 660602
\end{aligned}$$

$88a^9c^7d^2h^2i^2z + 1536a^3b^{13}f^2h^2i^2z + 4608a^2b^{14}d^2h^2i^2z - 66816a^b^{14}c^d^2i^2z + 1022754816a^6b^2c^8d^2e^2z - 642318336a^5b^4c^7d^2e^2z - 511377408a^6b^3c^7d^2g^2z + 321159168a^5b^5c^6d^2g^2z + 225312768a^7b^2c^7d^2i^2z + 223395840a^4b^6c^6d^2e^2z - 111697920a^4b^7c^5d^2g^2z + 3538944a^9b^2c^5h^2i^2z - 737280a^7b^6c^3h^2i^2z + 276480a^6b^8c^2h^2i^2z - 10354688a^8b^2c^6f^2i^2z - 43646976a^6b^4c^6d^2i^2z - 8847360a^8b^3c^5g^2h^2z + 4423680a^7b^5c^4g^2h^2z + 2048000a^6b^6c^4f^2i^2z - 1105920a^6b^7c^3g^2h^2z - 849920a^5b^8c^3f^2i^2z + 393216a^7b^4c^5f^2i^2z + 145920a^4b^{10}c^2f^2i^2z + 138240a^5b^9c^2g^2h^2z - 32587776a^5b^6c^5d^2i^2z + 25362432a^7b^3c^6f^2g^2z + 21657600a^4b^8c^4d^2i^2z + 17694720a^8b^2c^6e^2h^2z - 50724864a^7b^2c^7e^2f^2z - 13271040a^6b^5c^5f^2g^2z - 8847360a^7b^4c^5e^2h^2z - 5810688a^3b^{10}c^3d^2i^2z + 3563520a^5b^7c^4f^2g^2z + 2211840a^6b^6c^4e^2h^2z + 845568a^2b^{12}c^2d^2i^2z - 506880a^4b^9c^3f^2g^2z - 276480a^5b^8c^3e^2h^2z + 34560a^3b^{11}c^2f^2g^2z + 13824a^4b^{10}c^2e^2h^2z + 26542080a^6b^4c^6e^2f^2z + 23362560a^3b^9c^4d^2g^2z - 46725120a^3b^8c^5d^2e^2z - 7127040a^5b^6c^5e^2f^2z - 2965248a^2b^{11}c^3d^2g^2z + 1013760a^4b^8c^4e^2f^2z - 69120a^3b^{10}c^3e^2f^2z + 1536a^2b^{12}c^2e^2f^2z + 5930496a^2b^{10}c^4d^2e^2z + 1536a^b^{15}d^2f^2i^2z - 693633024a^7c^9d^2e^2z - 231211008a^8c^8d^2i^2z - 4718592a^{10}c^6h^2i^2z + 2304a^4b^{12}h^2i^2z + 13107200a^9c^7f^2i^2z + 256a^2b^{14}f^2i^2z - 14155776a^9c^7e^2h^2z + 39321600a^8c^8e^2f^2z + 13824b^{14}c^2d^2e^2z - 6912b^{15}c^d^2g^2z + 2304b^{16}d^2i^2z + 737280a^7b^c^5f^2g^2h^2i - 2304a^3b^9c^2f^2g^2h^2i - 6912a^2b^{10}c^d^2g^2h^2i + 11059200a^6b^c^6d^2e^2h^2i + 5160960a^6b^c^6d^2f^2g^2i + 2211840a^6b^c^6e^2f^2g^2h + 4608a^b^{10}c^2d^2e^2f^2i + 15482880a^5b^c^7d^2e^2f^2g - 13824a^b^9c^3d^2e^2f^2g - 2304a^b^{11}c^d^2f^2g^2i + 1843200a^6b^3c^4f^2g^2h^2i + 783360a^5b^5c^3f^2g^2h^2i + 18432a^4b^7c^2f^2g^2h^2i - 5529600a^6b^2c^5d^2g^2h^2i - 3686400a^6b^2c^5e^2f^2h^2i - 2211840a^5b^4c^4d^2g^2h^2i - 1566720a^5b^4c^4e^2f^2h^2i + 317952a^4b^6c^3d^2g^2h^2i - 36864a^4b^6c^3e^2f^2h^2i + 6912a^3b^8c^2d^2g^2h^2i + 4608a^3b^8c^2e^2f^2h^2i + 5160960a^5b^3c^5d^2f^2g^2i + 4423680a^5b^3c^5e^2f^2g^2h + 4423680a^5b^3c^5d^2e^2h^2i - 635904a^4b^5c^4d^2e^2h^2i - 354816a^3b^7c^3d^2f^2g^2i + 322560a^4b^5c^4d^2f^2g^2i + 138240a^4b^5c^4e^2f^2g^2h + 59904a^2b^9c^2d^2f^2g^2i - 13824a^3b^7c^3e^2f^2g^2h - 13824a^3b^7c^3d^2e^2h^2i + 13824a^2b^9c^2d^2e^2h^2i - 16588800a^5b^2c^6d^2e^2g^2h - 10321920a^5b^2c^6d^2e^2f^2i + 1658880a^4b^4c^5d^2e^2g^2h + 709632a^3b^6c^4d^2e^2f^2i - 645120a^4b^4c^5d^2e^2f^2i + 124416a^3b^6c^4d^2e^2g^2h - 119808a^2b^8c^3d^2e^2f^2i - 41472a^2b^8c^3d^2e^2g^2h + 7741440a^4b^3c^6d^2e^2f^2g - 2903040a^3b^5c^5d^2e^2f^2g + 387072a^2b^7c^4d^2e^2f^2g - 3456a^4b^8c^2g^2h^2i - 2304a^4b^8c^2f^2h^2i^2 + 1105920a^7b^c^5e^2h^2i - 384a^2b^{10}c^2f^2g^2i - 10616832a^6b^c^6e^2g^2i - 3538944a^7b^c^5e^2g^2i^2 + 1843200a^7b^c^5d^2h^2i^2 + 1152a^3b^9c^d^2h^2i^2 - 37062144a^5b^c^7d^2f^2h + 2580480a^6b^c^6e^2f^2i + 65664a^b^{10}c^2d^2g^2i + 23224320a^5b^c^7d^2e^2i - 9216a^2b^{10}c^d^2f^2i^2 - 5985792a^6b^c^6d^2f^2h^2 + 206010a^b^9c^3d^2f^2h - 131328a$



$$\begin{aligned}
& *b^9c^3d^2e^i - 6300*a*b^10c^2*d*f^2*h + 16588800*a^5*b*c^7*d*e^2*h + 3 \\
& 456*a*b^10c^2*d*f*g^2 + 435456*a*b^8c^4*d^2*e*g + 13824*a*b^8c^4*d*e^2*f \\
& - 1474560*a^7c^6*e*f*h*i - 10321920*a^6c^7*d*e*f*i + 1350*a*b^11c*d*f*h \\
& ^2 - 552960*a^7*b^2c^4*g*h^2*i - 552960*a^6*b^4c^3*g*h^2*i - 145152*a^5*b \\
& ^6c^2*g*h^2*i - 737280*a^7*b^2c^4*f*h*i^2 - 568320*a^6*b^4c^3*f*h*i^2 - \\
& 136704*a^5*b^6c^2*f*h*i^2 - 1290240*a^6*b^2c^5*f^2*g*i + 1105920*a^6*b^3* \\
& c^4*e*h^2*i - 860160*a^5*b^4c^4*f^2*g*i + 290304*a^5*b^5c^3*e*h^2*i - 806 \\
& 40*a^4*b^6c^3*f^2*g*i + 12672*a^3*b^8c^2*f^2*g*i + 6912*a^4*b^7c^2*e*h^2 \\
& *i + 5308416*a^6*b^2c^5*e*g^2*i - 5308416*a^5*b^3c^5*e^2*g*i - 3538944*a^ \\
& 6*b^3c^4*e*g*i^2 + 2654208*a^5*b^4c^4*e*g^2*i + 1658880*a^6*b^3c^4*d*h*i \\
& ^2 - 1105920*a^5*b^4c^4*f*g^2*h - 884736*a^5*b^5c^3*e*g*i^2 - 552960*a^6* \\
& b^2c^5*f*g^2*h + 262656*a^5*b^5c^3*d*h*i^2 - 55296*a^4*b^7c^2*d*h*i^2 - \\
& 34560*a^4*b^6c^3*f*g^2*h + 3456*a^3*b^8c^2*f*g^2*h - 11612160*a^5*b^2c^6 \\
& *d^2*g*i + 1720320*a^5*b^3c^5*e*f^2*i - 1658880*a^6*b^2c^5*e*g*h^2 + 1596 \\
& 672*a^3*b^6c^4*d^2*g*i - 829440*a^5*b^4c^4*e*g*h^2 - 508032*a^2*b^8c^3*d \\
& ^2*g*i + 161280*a^4*b^5c^4*e*f^2*i - 25344*a^3*b^7c^3*e*f^2*i - 20736*a^4 \\
& *b^6c^3*e*g*h^2 + 768*a^2*b^9c^2*e*f^2*i - 4423680*a^5*b^2c^6*e^2*f*h + \\
& 4147200*a^5*b^3c^5*d*g^2*h - 2580480*a^6*b^2c^5*d*f*i^2 - 967680*a^5*b^4* \\
& c^4*d*f*i^2 - 414720*a^4*b^5c^4*d*g^2*h - 138240*a^4*b^4c^5*e^2*f*h + 645 \\
& 12*a^4*b^6c^3*d*f*i^2 + 39168*a^3*b^8c^2*d*f*i^2 - 31104*a^3*b^7c^3*d*g^ \\
& 2*h + 13824*a^3*b^6c^4*e^2*f*h + 10368*a^2*b^9c^2*d*g^2*h + 15630336*a^5* \\
& b^2c^6*d*f^2*h - 14459904*a^4*b^3c^6*d^2*f*h + 9630144*a^3*b^5c^5*d^2*f* \\
& h - 8764416*a^5*b^3c^5*d*f*h^2 - 3870720*a^5*b^2c^6*e*f^2*g - 3193344*a^3 \\
& *b^5c^5*d^2*e^i + 2867328*a^4*b^4c^5*d*f^2*h - 2095200*a^2*b^7c^4*d^2*f* \\
& h - 1414080*a^3*b^6c^4*d*f^2*h - 34836480*a^4*b^2c^7*d^2*e*g + 1016064*a^ \\
& 2*b^7c^4*d^2*e^i - 645120*a^4*b^4c^5*e*f^2*g + 306720*a^3*b^7c^3*d*f*h^2 \\
& + 197820*a^2*b^8c^3*d*f^2*h + 146880*a^4*b^5c^4*d*f*h^2 + 80640*a^3*b^6* \\
& c^4*e*f^2*g - 55350*a^2*b^9c^2*d*f*h^2 - 2304*a^2*b^8c^3*e*f^2*g - 387072 \\
& 0*a^5*b^2c^6*d*f*g^2 - 1935360*a^4*b^4c^5*d*f*g^2 - 1658880*a^4*b^3c^6*d \\
& *e^2*h + 725760*a^3*b^6c^4*d*f*g^2 + 17418240*a^3*b^4c^6*d^2*e*g - 124416 \\
& *a^3*b^5c^5*d*e^2*h - 96768*a^2*b^8c^3*d*f*g^2 + 41472*a^2*b^7c^4*d*e^2* \\
& h - 3919104*a^2*b^6c^5*d^2*e*g - 7741440*a^4*b^2c^7*d*e^2*f + 2903040*a^3 \\
& *b^4c^6*d*e^2*f - 387072*a^2*b^6c^5*d*e^2*f + 184320*a^8*b*c^4*h^2*i^2 + \\
& 25344*a^5*b^7c*h^2*i^2 - 884736*a^6*b^3c^4*g^3*i - 589824*a^7*b^3c^3*g*i \\
& ^3 - 442368*a^5*b^5c^3*g^3*i - 294912*a^6*b^5c^2*g*i^3 + 430080*a^7*b*c^5 \\
& *f^2*i^2 - 1984*a^3*b^9c*f^2*i^2 + 3538944*a^5*b^2c^6*e^3*i - 1648128*a^5 \\
& *b^3c^5*f^3*h + 1179648*a^7*b^2c^4*e^i^3 - 898560*a^6*b^3c^4*f*h^3 + 589 \\
& 824*a^6*b^4c^3*e^i^3 - 354240*a^5*b^5c^3*f*h^3 - 354240*a^4*b^5c^4*f^3*h \\
& + 98304*a^5*b^6c^2*e^i^3 + 43680*a^3*b^7c^3*f^3*h - 21600*a^4*b^7c^2*f* \\
& h^3 - 1050*a^2*b^9c^2*f^3*h + 225*a^2*b^10c*f^2*h^2 + 3870720*a^6*b*c^6*d \\
& ^2*i^2 + 1658880*a^6*b*c^6*e^2*h^2 + 16547328*a^4*b^2c^7*d^3*h - 12306816* \\
& a^3*b^4c^6*d^3*h + 37310976*a^3*b^3c^7*d^3*f + 3037824*a^2*b^6c^5*d^3*h \\
& - 2654208*a^5*b^3c^5*e*g^3 + 1949184*a^6*b^2c^5*d*h^3 + 1296000*a^5*b^4c \\
& ^4*d*h^3 - 155520*a^4*b^6c^3*d*h^3 - 40500*a*b^10c^2*d^2*h^2 - 8100*a^3*b \\
& ^8c^2*d*h^3 + 3870720*a^5*b*c^7*e^2*f^2 + 34836480*a^4*b*c^8*d^2*e^2 - 108
\end{aligned}$$

$$\begin{aligned}
& 864*a*b^9*c^3*d^2*g^2 - 8068032*a^2*b^5*c^6*d^3*f - 5623296*a^4*b^3*c^6*d*f^3 + 1737792*a^3*b^5*c^5*d*f^3 - 260190*a*b^8*c^4*d^2*f^2 - 211680*a^2*b^7*c^4*d*f^3 - 435456*a*b^7*c^5*d^2*e^2 - 245760*a^8*c^5*f*h*i^2 + 384*a^3*b^10*f*h*i^2 + 1152*a^2*b^11*d*h*i^2 - 2211840*a^6*c^7*e^2*f*h - 1720320*a^7*c^6*d*f*i^2 - 9450*b^11*c^2*d^2*f*h + 6912*b^11*c^2*d^2*e*i + 1612800*a^6*c^7*d*f^2*h - 393216*a^8*b*c^4*g*i^3 - 49152*a^5*b^7*c*g*i^3 - 20736*b^10*c^3*d^2*e*g - 75188736*a^4*b*c^8*d^3*f - 883200*a^6*b*c^6*f^3*h - 317952*a^7*b*c^5*f*h^3 + 1350*a^3*b^9*c*f*h^3 - 15482880*a^5*c^8*d*e^2*f - 9792*a*b^11*c*d^2*i^2 - 10616832*a^5*b*c^7*e^3*g - 345060*a*b^8*c^4*d^3*h + 4050*a^2*b^10*c*d*h^3 - 4262400*a^5*b*c^7*d*f^3 + 852768*a*b^7*c^5*d^3*f + 7350*a*b^9*c^3*d*f^3 + 276480*a^7*b^3*c^3*h^2*i^2 + 140544*a^6*b^5*c^2*h^2*i^2 + 884736*a^7*b^2*c^4*g^2*i^2 + 884736*a^6*b^4*c^3*g^2*i^2 + 221184*a^5*b^6*c^2*g^2*i^2 + 501760*a^6*b^3*c^4*f^2*i^2 + 414720*a^6*b^3*c^4*g^2*h^2 + 207360*a^5*b^5*c^3*g^2*h^2 + 170240*a^5*b^5*c^3*f^2*i^2 + 9216*a^4*b^7*c^2*f^2*i^2 + 5184*a^4*b^7*c^2*g^2*h^2 + 3538944*a^6*b^2*c^5*e^2*i^2 + 1684224*a^6*b^2*c^5*f^2*h^2 + 1264320*a^5*b^4*c^4*f^2*h^2 + 884736*a^5*b^4*c^4*e^2*i^2 + 126720*a^4*b^6*c^3*f^2*h^2 - 13950*a^3*b^8*c^2*f^2*h^2 + 1935360*a^5*b^3*c^5*d^2*i^2 + 967680*a^5*b^3*c^5*f^2*g^2 + 829440*a^5*b^3*c^5*e^2*h^2 - 532224*a^4*b^5*c^4*d^2*i^2 + 161280*a^4*b^5*c^4*f^2*g^2 - 96768*a^3*b^7*c^3*d^2*i^2 + 62784*a^2*b^9*c^2*d^2*i^2 + 20736*a^4*b^5*c^4*e^2*h^2 - 20160*a^3*b^7*c^3*f^2*g^2 + 576*a^2*b^9*c^2*f^2*g^2 + 11487744*a^5*b^2*c^6*d^2*h^2 + 7962624*a^5*b^2*c^6*e^2*g^2 + 35525376*a^4*b^2*c^7*d^2*f^2 - 1412640*a^3*b^6*c^4*d^2*h^2 + 461376*a^4*b^4*c^5*d^2*h^2 + 375030*a^2*b^8*c^3*d^2*h^2 + 8709120*a^4*b^3*c^6*d^2*g^2 - 4354560*a^3*b^5*c^5*d^2*g^2 + 979776*a^2*b^7*c^4*d^2*g^2 + 645120*a^4*b^3*c^6*e^2*f^2 - 80640*a^3*b^5*c^5*e^2*f^2 + 2304*a^2*b^7*c^4*e^2*f^2 - 15269184*a^3*b^4*c^6*d^2*f^2 + 2870784*a^2*b^6*c^5*d^2*f^2 - 17418240*a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c^6*d^2*e^2 - 3456*b^12*c*d^2*g*i + 384*a*b^12*d*f*i^2 + 576*a^4*b^9*h^2*i^2 + 3538944*a^7*c^6*e^2*i^2 + 115200*a^7*c^6*f^2*h^2 + 64*a^2*b^11*f^2*i^2 + 6096384*a^6*c^7*d^2*h^2 + 5184*b^11*c^2*d^2*g^2 + 131072*a^8*b^2*c^3*i^4 + 98304*a^7*b^4*c^2*i^4 + 1025*b^10*c^3*d^2*f^2 + 5644800*a^5*c^8*d^2*f^2 + 142560*a^6*b^4*c^3*h^4 + 103680*a^7*b^2*c^4*h^4 + 32400*a^5*b^6*c^2*h^4 + 20736*b^9*c^4*d^2*e^2 + 331776*a^5*b^4*c^4*g^4 + 492800*a^5*b^2*c^6*f^4 + 351456*a^4*b^4*c^5*f^4 - 43120*a^3*b^6*c^4*f^4 + 1225*a^2*b^8*c^3*f^4 - 27433728*a^3*b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 + 7077888*a^6*c^7*e^3*i + 786432*a^8*c^5*e*i^3 + 28449792*a^5*c^8*d^3*h + 17010*b^10*c^3*d^3*h + 2025*b^12*c*d^2*h^2 + 580608*a^7*c^6*d*h^3 - 39690*b^9*c^4*d^3*f + 32768*a^6*b^6*c*i^4 + 2025*a^4*b^8*c*h^4 - 734832*a*b^6*c^6*d^4 + 576*b^13*d^2*i^2 + 65536*a^9*c^4*i^4 + 20736*a^8*c^5*h^4 + 4096*a^5*b^8*i^4 + 49787136*a^4*c^9*d^4 + 160000*a^6*c^7*f^4 + 5308416*a^5*c^8*e^4 + 35721*b^8*c^5*d^4, z, 1), 1, 1, 4)
\end{aligned}$$

$$3.57 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+jx^5+kx^6+lx^7+mx^8}{(a+bx^2+cx^4)^3} dx$$

Optimal result	675
Rubi [A] (verified)	676
Mathematica [A] (verified)	681
Maple [C] (verified)	682
Fricas [F(-1)]	683
Sympy [F(-1)]	684
Maxima [F]	684
Giac [B] (verification not implemented)	685
Mupad [B] (verification not implemented)	696

### Optimal result

Integrand size = 55, antiderivative size = 1150

$$\int \frac{d+ex+fx^2+gx^3+hx^4+jx^5+kx^6+lx^7+mx^8}{(a+bx^2+cx^4)^3} dx$$

$$= -\frac{bc(ce+aj)-ab^2l-2ac(CG-al)+(2c^3e-c^2(bg+2aj)-b^3l+bc(bj+3al))x^2}{4c^2(b^2-4ac)(a+bx^2+cx^4)^2}$$

$$-\frac{x(abc(cf+ak)-b^2(c^2d+a^2m)+2ac(c^2d-ach+a^2m)+(ab^2ck+2ac^2(cf-ak)-ab^3m-bc(c^2d+a^2m)))}{4ac^2(b^2-4ac)(a+bx^2+cx^4)^2}$$

$$+\frac{\frac{b^3j}{c}+2b(3ce+aj)-16a^2l-\frac{b^4l}{c^2}-b^2(3g-\frac{5al}{c})+2(6c^2e-3bcg+b^2j+2acj-3abl)x^2}{4(b^2-4ac)^2(a+bx^2+cx^4)}$$

$$+\frac{x(4a^2bc^2(2cf+ak)+ab^3c(cf+2ak)-ab^2c(25c^2d+7ach-11a^2m)+4a^2c^2(7c^2d+ach-9a^2m)+b^3c(7c^2d+ach-9a^2m))}{8a^2c^2(b^2-4ac)^2\sqrt{b^2-4ac}}$$

$$+\frac{(ab^2c(cf+3ak)+4a^2c^2(5cf+3ak)+b^3(3c^2d+a^2m)-4abc(6c^2d+3ach+4a^2m)+\frac{ab^3c(cf-3ak)-4a^2m}{\sqrt{b^2-4ac}})}{8\sqrt{2}a^2c^{3/2}(b^2-4ac)^2\sqrt{b^2-4ac}}$$

$$+\frac{(ab^2c(cf+3ak)+4a^2c^2(5cf+3ak)+b^3(3c^2d+a^2m)-4abc(6c^2d+3ach+4a^2m)-\frac{ab^3c(cf-3ak)-4a^2m}{\sqrt{b^2-4ac}})}{8\sqrt{2}a^2c^{3/2}(b^2-4ac)^2\sqrt{b^2-4ac}}$$

$$-\frac{(6c^2e-3bcg+b^2j+2acj-3abl)\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}}$$

```
[Out] 1/4*(-b*c*(a*j+c*e)+a*b^2*l+2*a*c*(-a*l+c*g)-(2*c^3*e-c^2*(2*a*j+b*g)-b^3*l
+b*c*(3*a*l+b*j))*x^2)/c^2/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^2-1/4*x*(a*b*c*(a*k
+c*f)-b^2*(a^2*m+c^2*d)+2*a*c*(a^2*m-a*c*h+c^2*d)+(a*b^2*c*k+2*a*c^2*(-a*k+
c*f)-a*b^3*m-b*c*(-3*a^2*m+a*c*h+c^2*d))*x^2)/a/c^2/(-4*a*c+b^2)/(c*x^4+b*x
^2+a)^2+1/4*(b^3*j/c+2*b*(a*j+3*c*e)-16*a^2*l-b^4*l/c^2-b^2*(3*g-5*a*l/c)+2
```

$$\begin{aligned}
& *(-3*a*b*1+2*a*c*j+b^2*j-3*b*c*g+6*c^2*e)*x^2)/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a) \\
& +1/8*x*(4*a^2*b*c^2*(a*k+2*c*f)+a*b^3*c*(2*a*k+c*f)-a*b^2*c*(-11*a^2*m+7*a*c*h+25*c^2*d) \\
& +4*a^2*c^2*(-9*a^2*m+a*c*h+7*c^2*d)+b^4*(-2*a^2*m+3*c^2*d)+c*(a*b^2*c*(3*a*k+c*f) \\
& +4*a^2*c^2*(3*a*k+5*c*f)+b^3*(a^2*m+3*c^2*d)-4*a*b*c*(4*a^2*m+3*a*c*h+6*c^2*d))*x^2) \\
& /a^2/c^2/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)-(-3*a*b*1+2*a*c*j+b^2*j-3*b*c*g+6*c^2*e) \\
& *arctanh((2*c*x^2+b)/(-4*a*c+b^2)^(1/2))/(-4*a*c+b^2)^(5/2)+1/16*arctan(x*2^(1/2)*c^(1/2)/(b-(-4*a*c+b^2)^(1/2))^(1/2)) \\
& *(a*b^2*c*(3*a*k+c*f)+4*a^2*c^2*(3*a*k+5*c*f)+b^3*(a^2*m+3*c^2*d)-4*a*b*c*(4*a^2*m+3*a*c*h+6*c^2*d) \\
& +(a*b^3*c*(-3*a*k+c*f)-4*a^2*b*c^2*(9*a*k+13*c*f)-6*a*b^2*c*(-3*a^2*m-3*a*c*h+5*c^2*d)+b^4*(-a^2*m+3*c^2*d) \\
& +8*a^2*c^2*(5*a^2*m+3*a*c*h+21*c^2*d))/(-4*a*c+b^2)^(1/2))/a^2/c^(3/2)/(-4*a*c+b^2)^2*2^(1/2) \\
& /b-(-4*a*c+b^2)^(1/2))^(1/2)+1/16*arctan(x*2^(1/2)*c^(1/2)/(b+(-4*a*c+b^2)^(1/2))^(1/2)) \\
& *(a*b^2*c*(3*a*k+c*f)+4*a^2*c^2*(3*a*k+5*c*f)+b^3*(a^2*m+3*c^2*d)-4*a*b*c*(4*a^2*m+3*a*c*h+6*c^2*d) \\
& +(-a*b^3*c*(-3*a*k+c*f)+4*a^2*b*c^2*(9*a*k+13*c*f)+6*a*b^2*c*(-3*a^2*m-3*a*c*h+5*c^2*d)-b^4*(-a^2*m+3*c^2*d) \\
& -8*a^2*c^2*(5*a^2*m+3*a*c*h+21*c^2*d))/(-4*a*c+b^2)^(1/2))/a^2/c^(3/2)/(-4*a*c+b^2)^2*2^(1/2) \\
& /b+(-4*a*c+b^2)^(1/2))^(1/2)
\end{aligned}$$

### Rubi [A] (verified)

Time = 5.06 (sec) , antiderivative size = 1144, normalized size of antiderivative = 0.99, number of steps used = 11, number of rules used = 9,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.164$ , Rules used = {1687, 1692, 1180, 211, 1677, 1674, 652, 632, 212}

$$\begin{aligned}
& \int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^3} dx \\
& = \frac{-\frac{lb^4}{c^2} + \frac{jb^3}{c} - (3g - \frac{5al}{c})b^2 + 2(3ce + aj)b + 2(jb^2 - 3cgb - 3alb + 6c^2e + 2acj)x^2 - 16a^2l}{4(b^2 - 4ac)^2(cx^4 + bx^2 + a)} \\
& + \frac{\left(\left(\frac{ma^2}{c} + 3cd\right)b^3 + a(cf + 3ak)b^2 - 4a(4ma^2 + 3cha + 6c^2d)b + 4a^2c(5cf + 3ak) + \frac{(3c^2d - a^2m)b^4 + ac(cf - 3alb + 6c^2e + 2acj)x^2 - 16a^2l}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}} \\
& + \frac{\left(\left(\frac{ma^2}{c} + 3cd\right)b^3 + a(cf + 3ak)b^2 - 4a(4ma^2 + 3cha + 6c^2d)b + 4a^2c(5cf + 3ak) - \frac{(3c^2d - a^2m)b^4 + ac(cf - 3alb + 6c^2e + 2acj)x^2 - 16a^2l}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}} \\
& - \frac{(jb^2 - 3cgb - 3alb + 6c^2e + 2acj) \operatorname{arctanh}\left(\frac{2cx^2+b}{\sqrt{b^2-4ac}}\right)}{(b^2 - 4ac)^{5/2}} \\
& + \frac{x\left(\left(3cd - \frac{2a^2m}{c}\right)b^4 + a(cf + 2ak)b^3 - a(-11ma^2 + 7cha + 25c^2d)b^2 + 4a^2c(2cf + ak)b + ((ma^2 + 3c^2d)b^4 - alb^2 + c(ce + aj)b + (-lb^3 + c(bj + 3al)b + 2c^3e - c^2(bg + 2aj))x^2 - 2ac(CG - al))\right)}{8a^2c(b^2 - 4ac)(cx^4 + bx^2 + a)^2} \\
& - \frac{x(-((ma^2 + c^2d)b^2) + ac(cf + ak)b + (-amb^3 + ackb^2 - c(-3ma^2 + cha + c^2d)b + 2ac^2(cf - ak))x^2)}{4ac^2(b^2 - 4ac)(cx^4 + bx^2 + a)^2}
\end{aligned}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + j\*x^5 + k\*x^6 + l\*x^7 + m\*x^8)/(a + b\*x^2 + c\*x^4)^3, x]

[Out] 
$$\begin{aligned} & -1/4*(b*c*(c*e + a*j) - a*b^2*l - 2*a*c*(c*g - a*l) + (2*c^3*e - c^2*(b*g + \\ & 2*a*j) - b^3*l + b*c*(b*j + 3*a*l))*x^2)/(c^2*(b^2 - 4*a*c)*(a + b*x^2 + c \\ & *x^4)^2) - (x*(a*b*c*(c*f + a*k) - b^2*(c^2*d + a^2*m) + 2*a*c*(c^2*d - a*c \\ & *h + a^2*m) + (a*b^2*c*k + 2*a*c^2*(c*f - a*k) - a*b^3*m - b*c*(c^2*d + a*c \\ & *h - 3*a^2*m))*x^2))/(4*a*c^2*(b^2 - 4*a*c)*(a + b*x^2 + c*x^4)^2) + ((b^3* \\ & j)/c + 2*b*(3*c*e + a*j) - 16*a^2*l - (b^4*l)/c^2 - b^2*(3*g - (5*a*l)/c) + \\ & 2*(6*c^2*e - 3*b*c*g + b^2*j + 2*a*c*j - 3*a*b*l)*x^2)/(4*(b^2 - 4*a*c)^2* \\ & (a + b*x^2 + c*x^4)) + (x*(4*a^2*b*c*(2*c*f + a*k) + a*b^3*(c*f + 2*a*k) - \\ & a*b^2*(25*c^2*d + 7*a*c*h - 11*a^2*m) + 4*a^2*c*(7*c^2*d + a*c*h - 9*a^2*m) \\ & + b^4*(3*c*d - (2*a^2*m)/c) + (a*b^2*c*(c*f + 3*a*k) + 4*a^2*c^2*(5*c*f + \\ & 3*a*k) + b^3*(3*c^2*d + a^2*m) - 4*a*b*c*(6*c^2*d + 3*a*c*h + 4*a^2*m))*x^2 \\ & ))/(8*a^2*c*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4)) + ((a*b^2*(c*f + 3*a*k) + \\ & 4*a^2*c*(5*c*f + 3*a*k) - 4*a*b*(6*c^2*d + 3*a*c*h + 4*a^2*m) + b^3*(3*c*d \\ & + (a^2*m)/c) + (a*b^3*c*(c*f - 3*a*k) - 4*a^2*b*c^2*(13*c*f + 9*a*k) - 6*a* \\ & b^2*c*(5*c^2*d - 3*a*c*h - 3*a^2*m) + b^4*(3*c^2*d - a^2*m) + 8*a^2*c^2*(21 \\ & *c^2*d + 3*a*c*h + 5*a^2*m))/(c*sqrt[b^2 - 4*a*c])*ArcTan[(sqrt[2]*sqrt[c] \\ & *x)/sqrt[b - sqrt[b^2 - 4*a*c]]]/(8*sqrt[2]*a^2*sqrt[c]*(b^2 - 4*a*c)^2*sqrt \\ & [b - sqrt[b^2 - 4*a*c]]) + ((a*b^2*(c*f + 3*a*k) + 4*a^2*c*(5*c*f + 3*a*k) \\ & ) - 4*a*b*(6*c^2*d + 3*a*c*h + 4*a^2*m) + b^3*(3*c*d + (a^2*m)/c) - (a*b^3* \\ & c*(c*f - 3*a*k) - 4*a^2*b*c^2*(13*c*f + 9*a*k) - 6*a*b^2*c*(5*c^2*d - 3*a*c \\ & *h - 3*a^2*m) + b^4*(3*c^2*d - a^2*m) + 8*a^2*c^2*(21*c^2*d + 3*a*c*h + 5*a \\ & ^2*m))/(c*sqrt[b^2 - 4*a*c])*ArcTan[(sqrt[2]*sqrt[c]*x)/sqrt[b + sqrt[b^2 \\ & - 4*a*c]]]/(8*sqrt[2]*a^2*sqrt[c]*(b^2 - 4*a*c)^2*sqrt[b + sqrt[b^2 - 4*a* \\ & c]]) - ((6*c^2*e - 3*b*c*g + b^2*j + 2*a*c*j - 3*a*b*l)*ArcTanh[(b + 2*c*x^ \\ & 2)/sqrt[b^2 - 4*a*c]])/(b^2 - 4*a*c)^(5/2) \end{aligned}$$

#### Rule 211

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

#### Rule 212

Int[((a\_) + (b\_)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

#### Rule 632

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

#### Rule 652

```
Int[((d_.) + (e_.)*(x_))*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol]
:= Simp[((b*d - 2*a*e + (2*c*d - b*e)*x)/((p + 1)*(b^2 - 4*a*c)))*(a + b*x + c*x^2)^(p + 1), x] - Dist[(2*p + 3)*((2*c*d - b*e)/((p + 1)*(b^2 - 4*a*c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2]
```

#### Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2 - q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2 + c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

#### Rule 1674

```
Int[(Pq_)*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := With[{Q = PolynomialQuotient[Pq, a + b*x + c*x^2, x], f = Coeff[PolynomialRemainder[Pq, a + b*x + c*x^2, x], x, 0], g = Coeff[PolynomialRemainder[Pq, a + b*x + c*x^2, x], x, 1]}, Simp[(b*f - 2*a*g + (2*c*f - b*g)*x)*((a + b*x + c*x^2)^(p + 1)/((p + 1)*(b^2 - 4*a*c))), x] + Dist[1/((p + 1)*(b^2 - 4*a*c)), Int[(a + b*x + c*x^2)^(p + 1)*ExpandToSum[(p + 1)*(b^2 - 4*a*c)*Q - (2*p + 3)*(2*c*f - b*g), x], x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1]
```

#### Rule 1677

```
Int[(Pq_)*(x_)^(m_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] :
> Dist[1/2, Subst[Int[x^((m - 1)/2)*SubstFor[x^2, Pq, x]*(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x^2] && IntegerQ[(m - 1)/2]
```

#### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]
```

#### Rule 1692

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := With[{d = Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b
```

$\wedge^2 - 4*a*c))$ ), x] + Dist[1/(2\*a\*(p + 1)\*(b<sup>2</sup> - 4\*a\*c)), Int[(a + b\*x<sup>2</sup> + c\*x<sup>4</sup>)<sup>(p + 1)</sup>\*ExpandToSum[2\*a\*(p + 1)\*(b<sup>2</sup> - 4\*a\*c)\*PolynomialQuotient[Pq, a + b\*x<sup>2</sup> + c\*x<sup>4</sup>, x] + b<sup>2</sup>\*d\*(2\*p + 3) - 2\*a\*c\*d\*(4\*p + 5) - a\*b\*e + c\*(4\*p + 7)\*(b\*d - 2\*a\*e)\*x<sup>2</sup>, x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x<sup>2</sup>] && Expon[Pq, x<sup>2</sup>] > 1 && NeQ[b<sup>2</sup> - 4\*a\*c, 0] && LtQ[p, -1]

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{x(e + gx^2 + jx^4 + lx^6)}{(a + bx^2 + cx^4)^3} dx + \int \frac{d + fx^2 + hx^4 + kx^6 + mx^8}{(a + bx^2 + cx^4)^3} dx \\
 &= \frac{x(abc(cf + ak) - b^2(c^2d + a^2m) + 2ac(c^2d - ach + a^2m) + (ab^2ck + 2ac^2(cf - ak) - ab^3m - bc^3d + a^3c^2))}{4ac^2(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
 &\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx + jx^2 + lx^3}{(a + bx + cx^2)^3} dx, x, x^2 \right) \\
 &\quad - \frac{\int \frac{abc(cf + ak) + b^2(3c^2d - a^2m) - 2ac(7c^2d + ach - a^2m) + (ab^2ck + 2ac^2(5cf + 3ak) - ab^3m - bc(5c^2d + 5ach + a^2m))x^2 + 4a(4a - \frac{b^2}{c})mx^4}{c^2(a + bx^2 + cx^4)^2} dx}{4a(b^2 - 4ac)} \\
 &= -\frac{bc(ce + aj) - ab^2l - 2ac(cg - al) + (2c^3e - c^2(bg + 2aj) - b^3l + bc(bj + 3al))x^2}{4c^2(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
 &\quad - \frac{x(abc(cf + ak) - b^2(c^2d + a^2m) + 2ac(c^2d - ach + a^2m) + (ab^2ck + 2ac^2(cf - ak) - ab^3m - bc^3d + a^3c^2))}{4ac^2(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
 &\quad + \frac{x(4a^2bc(2cf + ak) + ab^3(cf + 2ak) - ab^2(25c^2d + 7ach - 11a^2m) + 4a^2c(7c^2d + ach - 9a^2m) - bc^3d + a^3c^2)}{8a^2c(b^2 - 4ac)^2} \\
 &\quad + \frac{\int \frac{3b^4d + ab^3f - 4a^2b(4cf + 3ak) + 4a^2(21c^2d + 3ach + 5a^2m) - ab^2(27cd - 3ah - \frac{a^2m}{c}) + (ab^2c(cf + 3ak) + 4a^2c^2(5cf + 3ak) + b^3(3c^2d + a^2m))x^2}{a + bx^2 + cx^4} dx}{8a^2(b^2 - 4ac)^2} \\
 &\quad - \frac{\text{Subst} \left( \int \frac{6ce - 3bg + 2aj - \frac{b^3l}{c^2} + \frac{b(bj + al)}{c} + 2(4a - \frac{b^2}{c})lx}{(a + bx + cx^2)^2} dx, x, x^2 \right)}{4(b^2 - 4ac)}
 \end{aligned}$$

$$\begin{aligned}
&= - \frac{bc(ce + aj) - ab^2l - 2ac(CG - al) + (2c^3e - c^2(bg + 2aj) - b^3l + bc(bj + 3al)) x^2}{4c^2 (b^2 - 4ac) (a + bx^2 + cx^4)^2} \\
&- \frac{x(abc(cf + ak) - b^2(c^2d + a^2m) + 2ac(c^2d - ach + a^2m) + (ab^2ck + 2ac^2(cf - ak) - ab^3m - b)}{4ac^2 (b^2 - 4ac) (a + bx^2 + cx^4)^2} \\
&+ \frac{\frac{b^3j}{c} + 2b(3ce + aj) - 16a^2l - \frac{b^4l}{c^2} - b^2(3g - \frac{5al}{c}) + 2(6c^2e - 3bcg + b^2j + 2acj - 3abl) x^2}{4 (b^2 - 4ac)^2 (a + bx^2 + cx^4)} \\
&+ \frac{x(4a^2bc(2cf + ak) + ab^3(cf + 2ak) - ab^2(25c^2d + 7ach - 11a^2m) + 4a^2c(7c^2d + ach - 9a^2m) -}{8a^2c (b^2 - 4ac)} \\
&+ \frac{(6c^2e - 3bcg + b^2j + 2acj - 3abl) \text{Subst}(\int \frac{1}{a+bx+cx^2} dx, x, x^2)}{2 (b^2 - 4ac)^2} \\
&+ \frac{(ab^2(cf + 3ak) + 4a^2c(5cf + 3ak) - 4ab(6c^2d + 3ach + 4a^2m) + b^3(3cd + \frac{a^2m}{c}) - \frac{ab^3c(cf-3ak)-}{16a^2 (b^2 - 4ac)} \\
&+ \frac{(ab^2(cf + 3ak) + 4a^2c(5cf + 3ak) - 4ab(6c^2d + 3ach + 4a^2m) + b^3(3cd + \frac{a^2m}{c}) + \frac{ab^3c(cf-3ak)-}{16a^2 (b^2 - 4ac)} \\
&= - \frac{bc(ce + aj) - ab^2l - 2ac(CG - al) + (2c^3e - c^2(bg + 2aj) - b^3l + bc(bj + 3al)) x^2}{4c^2 (b^2 - 4ac) (a + bx^2 + cx^4)^2} \\
&- \frac{x(abc(cf + ak) - b^2(c^2d + a^2m) + 2ac(c^2d - ach + a^2m) + (ab^2ck + 2ac^2(cf - ak) - ab^3m - b)}{4ac^2 (b^2 - 4ac) (a + bx^2 + cx^4)^2} \\
&+ \frac{\frac{b^3j}{c} + 2b(3ce + aj) - 16a^2l - \frac{b^4l}{c^2} - b^2(3g - \frac{5al}{c}) + 2(6c^2e - 3bcg + b^2j + 2acj - 3abl) x^2}{4 (b^2 - 4ac)^2 (a + bx^2 + cx^4)} \\
&+ \frac{x(4a^2bc(2cf + ak) + ab^3(cf + 2ak) - ab^2(25c^2d + 7ach - 11a^2m) + 4a^2c(7c^2d + ach - 9a^2m) -}{8a^2c (b^2 - 4ac)} \\
&+ \frac{(ab^2(cf + 3ak) + 4a^2c(5cf + 3ak) - 4ab(6c^2d + 3ach + 4a^2m) + b^3(3cd + \frac{a^2m}{c}) + \frac{ab^3c(cf-3ak)-}{8\sqrt{2}a^2\sqrt{c} (b^2 - 4ac)^2} \\
&+ \frac{(ab^2(cf + 3ak) + 4a^2c(5cf + 3ak) - 4ab(6c^2d + 3ach + 4a^2m) + b^3(3cd + \frac{a^2m}{c}) - \frac{ab^3c(cf-3ak)-}{8\sqrt{2}a^2\sqrt{c} (b^2 - 4ac)^2} \\
&- \frac{(6c^2e - 3bcg + b^2j + 2acj - 3abl) \text{Subst}(\int \frac{1}{b^2-4ac-x^2} dx, x, b + 2cx^2)}{(b^2 - 4ac)^2}
\end{aligned}$$



$$\begin{aligned}
&= -\frac{bc(ce + aj) - ab^2l - 2ac(CG - al) + (2c^3e - c^2(bg + 2aj) - b^3l + bc(bj + 3al)) x^2}{4c^2(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad - \frac{x(abc(cf + ak) - b^2(c^2d + a^2m) + 2ac(c^2d - ach + a^2m) + (ab^2ck + 2ac^2(cf - ak) - ab^3m - 4ac^2(b^2 - 4ac)(a + bx^2 + cx^4)^2)}{4ac^2(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{\frac{b^3j}{c} + 2b(3ce + aj) - 16a^2l - \frac{b^4l}{c^2} - b^2(3g - \frac{5al}{c}) + 2(6c^2e - 3bcg + b^2j + 2acj - 3abl) x^2}{4(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{x(4a^2bc(2cf + ak) + ab^3(cf + 2ak) - ab^2(25c^2d + 7ach - 11a^2m) + 4a^2c(7c^2d + ach - 9a^2m) + 8a^2c(b^2 - 4ac)(a + bx^2 + cx^4)^2)}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2} \\
&\quad + \frac{(ab^2(cf + 3ak) + 4a^2c(5cf + 3ak) - 4ab(6c^2d + 3ach + 4a^2m) + b^3(3cd + \frac{a^2m}{c}) + \frac{ab^3c(cf - 3ak)}{c})}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2} \\
&\quad + \frac{(ab^2(cf + 3ak) + 4a^2c(5cf + 3ak) - 4ab(6c^2d + 3ach + 4a^2m) + b^3(3cd + \frac{a^2m}{c}) - \frac{ab^3c(cf - 3ak)}{c})}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2} \\
&\quad - \frac{(6c^2e - 3bcg + b^2j + 2acj - 3abl) \tanh^{-1}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2 - 4ac)^{5/2}}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 6.85 (sec) , antiderivative size = 1590, normalized size of antiderivative = 1.38

$$\begin{aligned}
&\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^3} dx \\
&= \frac{abc^2e - 2a^2c^2g + a^2bcj - a^2b^2l + 2a^3cl - b^2c^2dx + 2ac^3dx + abc^2fx - 2a^2c^2hx + a^2bckx - a^2b^2mx + 2a^2c^2d}{(a + bx^2 + cx^4)^3} \\
&\quad + \frac{12a^2bc^3e - 6a^2b^2c^2g + 2a^2b^3cj + 4a^3bc^2j - 2a^2b^4l + 10a^3b^2cl - 32a^4c^2l + 3b^4c^2dx - 25ab^2c^3dx + 28a^2c^2d}{(a + bx^2 + cx^4)^3} \\
&\quad + \frac{(3b^4c^2d - 30ab^2c^3d + 168a^2c^4d + 3b^3c^2\sqrt{b^2 - 4acd} - 24abc^3\sqrt{b^2 - 4acd} + ab^3c^2f - 52a^2bc^3f + ab^2c^2\sqrt{b^2 - 4acd})}{(a + bx^2 + cx^4)^3} \\
&\quad + \frac{(-3b^4c^2d + 30ab^2c^3d - 168a^2c^4d + 3b^3c^2\sqrt{b^2 - 4acd} - 24abc^3\sqrt{b^2 - 4acd} - ab^3c^2f + 52a^2bc^3f + ab^2c^2\sqrt{b^2 - 4acd})}{(a + bx^2 + cx^4)^3} \\
&\quad + \frac{(6c^2e - 3bcg + b^2j + 2acj - 3abl) \log(-b + \sqrt{b^2 - 4ac} - 2cx^2)}{2(b^2 - 4ac)^{5/2}} \\
&\quad + \frac{(-6c^2e + 3bcg - b^2j - 2acj + 3abl) \log(b + \sqrt{b^2 - 4ac} + 2cx^2)}{2(b^2 - 4ac)^{5/2}}
\end{aligned}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + j\*x^5 + k\*x^6 + l\*x^7 + m\*x^8)/(a + b\*x^2 + c\*x^4)^3,x]

```
[Out] (a*b*c^2*e - 2*a^2*c^2*g + a^2*b*c*j - a^2*b^2*l + 2*a^3*c*l - b^2*c^2*d*x
+ 2*a*c^3*d*x + a*b*c^2*f*x - 2*a^2*c^2*h*x + a^2*b*c*k*x - a^2*b^2*m*x + 2
*a^3*c*m*x + 2*a*c^3*e*x^2 - a*b*c^2*g*x^2 + a*b^2*c*j*x^2 - 2*a^2*c^2*j*x^
2 - a*b^3*l*x^2 + 3*a^2*b*c*l*x^2 - b*c^3*d*x^3 + 2*a*c^3*f*x^3 - a*b*c^2*h
*x^3 + a*b^2*c*k*x^3 - 2*a^2*c^2*k*x^3 - a*b^3*m*x^3 + 3*a^2*b*c*m*x^3)/(4*
a*c^2*(-b^2 + 4*a*c)*(a + b*x^2 + c*x^4)^2) + (12*a^2*b*c^3*e - 6*a^2*b^2*c
^2*g + 2*a^2*b^3*c*j + 4*a^3*b*c^2*j - 2*a^2*b^4*l + 10*a^3*b^2*c*l - 32*a^
4*c^2*l + 3*b^4*c^2*d*x - 25*a*b^2*c^3*d*x + 28*a^2*c^4*d*x + a*b^3*c^2*f*x
+ 8*a^2*b*c^3*f*x - 7*a^2*b^2*c^2*h*x + 4*a^3*c^3*h*x + 2*a^2*b^3*c*k*x +
4*a^3*b*c^2*k*x - 2*a^2*b^4*m*x + 11*a^3*b^2*c*m*x - 36*a^4*c^2*m*x + 24*a^
2*c^4*e*x^2 - 12*a^2*b*c^3*g*x^2 + 4*a^2*b^2*c^2*j*x^2 + 8*a^3*c^3*j*x^2 -
12*a^3*b*c^2*l*x^2 + 3*b^3*c^3*d*x^3 - 24*a*b*c^4*d*x^3 + a*b^2*c^3*f*x^3 +
20*a^2*c^4*f*x^3 - 12*a^2*b*c^3*h*x^3 + 3*a^2*b^2*c^2*k*x^3 + 12*a^3*c^3*k
*x^3 + a^2*b^3*c*m*x^3 - 16*a^3*b*c^2*m*x^3)/(8*a^2*c^2*(-b^2 + 4*a*c)^2*(a
+ b*x^2 + c*x^4)) + ((3*b^4*c^2*d - 30*a*b^2*c^3*d + 168*a^2*c^4*d + 3*b^3
*c^2*Sqrt[b^2 - 4*a*c]*d - 24*a*b*c^3*Sqrt[b^2 - 4*a*c]*d + a*b^3*c^2*f - 5
2*a^2*b*c^3*f + a*b^2*c^2*Sqrt[b^2 - 4*a*c]*f + 20*a^2*c^3*Sqrt[b^2 - 4*a*c
]*f + 18*a^2*b^2*c^2*h + 24*a^3*c^3*h - 12*a^2*b*c^2*Sqrt[b^2 - 4*a*c]*h -
3*a^2*b^3*c*k - 36*a^3*b*c^2*k + 3*a^2*b^2*c*Sqrt[b^2 - 4*a*c]*k + 12*a^3*c
^2*Sqrt[b^2 - 4*a*c]*k - a^2*b^4*m + 18*a^3*b^2*c*m + 40*a^4*c^2*m + a^2*b^
3*Sqrt[b^2 - 4*a*c]*m - 16*a^3*b*c*Sqrt[b^2 - 4*a*c]*m)*ArcTan[(Sqrt[2]*Sqr
t[c]*x)/Sqrt[b - Sqrt[b^2 - 4*a*c]])/(8*Sqrt[2]*a^2*c^(3/2)*(b^2 - 4*a*c)^
(5/2)*Sqrt[b - Sqrt[b^2 - 4*a*c]]) + ((-3*b^4*c^2*d + 30*a*b^2*c^3*d - 168*
a^2*c^4*d + 3*b^3*c^2*Sqrt[b^2 - 4*a*c]*d - 24*a*b*c^3*Sqrt[b^2 - 4*a*c]*d
- a*b^3*c^2*f + 52*a^2*b*c^3*f + a*b^2*c^2*Sqrt[b^2 - 4*a*c]*f + 20*a^2*c^3
*Sqrt[b^2 - 4*a*c]*f - 18*a^2*b^2*c^2*h - 24*a^3*c^3*h - 12*a^2*b*c^2*Sqrt[
b^2 - 4*a*c]*h + 3*a^2*b^3*c*k + 36*a^3*b*c^2*k + 3*a^2*b^2*c*Sqrt[b^2 - 4*
a*c]*k + 12*a^3*c^2*Sqrt[b^2 - 4*a*c]*k + a^2*b^4*m - 18*a^3*b^2*c*m - 40*a
^4*c^2*m + a^2*b^3*Sqrt[b^2 - 4*a*c]*m - 16*a^3*b*c*Sqrt[b^2 - 4*a*c]*m)*Ar
cTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b + Sqrt[b^2 - 4*a*c]])/(8*Sqrt[2]*a^2*c^(3/
2)*(b^2 - 4*a*c)^(5/2)*Sqrt[b + Sqrt[b^2 - 4*a*c]]) + ((6*c^2*e - 3*b*c*g +
b^2*j + 2*a*c*j - 3*a*b*l)*Log[-b + Sqrt[b^2 - 4*a*c] - 2*c*x^2])/(2*(b^2
- 4*a*c)^(5/2)) + ((-6*c^2*e + 3*b*c*g - b^2*j - 2*a*c*j + 3*a*b*l)*Log[b +
Sqrt[b^2 - 4*a*c] + 2*c*x^2])/(2*(b^2 - 4*a*c)^(5/2))
```

### Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 1.39 (sec) , antiderivative size = 1167, normalized size of antiderivative = 1.01

method	result	size
risch	Expression too large to display	1167
default	Expression too large to display	1987

[In] int((m\*x^8+l\*x^7+k\*x^6+j\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^3,x,method=\_RETURNVERBOSE)

[Out] 
$$\begin{aligned} & (-1/8*(16*a^3*b*c*m-12*a^3*c^2*k-a^2*b^3*m-3*a^2*b^2*c*k+12*a^2*b*c^2*h-20*a^2*c^3*f-a*b^2*c^2*f+24*a*b*c^3*d-3*b^3*c^2*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*x^7-1/2*c*(3*a*b*l-2*a*c*j-b^2*j+3*b*c*g-6*c^2*e)/(16*a^2*c^2-8*a*b^2*c+b^4)*x^6-1/8/a^2*(36*a^4*c^2*m+5*a^3*b^2*c*m-16*a^3*b*c^2*k-4*a^3*c^3*h+a^2*b^4*m-5*a^2*b^3*c*k+19*a^2*b^2*c^2*h-28*a^2*b*c^3*f-28*a^2*c^4*d-2*a*b^3*c^2*f+49*a*b^2*c^3*d-6*b^4*c^2*d)/(16*a^2*c^2-8*a*b^2*c+b^4)/c*x^5-1/4*(16*a^2*c^2*l+a*b^2*c*l-6*a*b*c^2*j+b^4*l-3*b^3*c*j+9*b^2*c^2*g-18*b*c^3*e)/(16*a^2*c^2-8*a*b^2*c+b^4)/c*x^4-1/8/c*(28*a^4*b*c*m+4*a^4*c^2*k+2*a^3*b^3*m-19*a^3*b^2*c*k+16*a^3*b*c^2*h-36*a^3*c^3*f+5*a^2*b^3*c*h-5*a^2*b^2*c^2*f+4*a^2*b*c^3*d-a*b^4*c*f+20*a*b^3*c^2*d-3*b^5*c*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*x^3-1/2/c*(5*a^2*b*c*l+2*a^2*c^2*j+a*b^3*l-5*a*b^2*c*j+5*a*b*c^2*g-10*a*c^3*e+b^3*c*g-2*b^2*c^2*e)/(16*a^2*c^2-8*a*b^2*c+b^4)*x^2-1/8*(20*a^4*c*m+a^3*b^2*m-12*a^3*b*c*k+12*a^3*c^2*h+3*a^2*b^2*c*h-16*a^2*b*c^2*f-44*a^2*c^3*d+a*b^3*c*f+37*a*b^2*c^2*d-5*b^4*c*d)/(16*a^2*c^2-8*a*b^2*c+b^4)/c/a*x-1/4/c*(8*a^3*c*l+a^2*b^2*l-6*a^2*b*c*j+8*a^2*c^2*g+a*b^2*c*g-10*a*b*c^2*e+b^3*c*e)/(16*a^2*c^2-8*a*b^2*c+b^4))/(c*x^4+b*x^2+a)^2+1/16*sum((-16*a^3*b*c*m-12*a^3*c^2*k-a^2*b^3*m-3*a^2*b^2*c*k+12*a^2*b*c^2*h-20*a^2*c^3*f-a*b^2*c^2*f+24*a*b*c^3*d-3*b^3*c^2*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)/c*_R^2-8*(3*a*b*l-2*a*c*j-b^2*j+3*b*c*g-6*c^2*e)/(16*a^2*c^2-8*a*b^2*c+b^4)*_R+1/c*(20*a^4*c*m+a^3*b^2*m-12*a^3*b*c*k+12*a^3*c^2*h+3*a^2*b^2*c*h-16*a^2*b*c^2*f+84*a^2*c^3*d+a*b^3*c*f-27*a*b^2*c^2*d+3*b^4*c*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4))/(2*_R^3*c+_R*b)*ln(x-_R),_R=RootOf(_Z^4*c+_Z^2*b+a)) \end{aligned}$$

## Fricas [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

[In] integrate((m\*x^8+l\*x^7+k\*x^6+j\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^3,x, algorithm="fricas")

[Out] Timed out

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

```
[In] integrate((m*x**8+l*x**7+k*x**6+j*x**5+h*x**4+g*x**3+f*x**2+e*x+d)/(c*x**4+b*x**2+a)**3,x)
```

```
[Out] Timed out
```

**Maxima [F]**

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^3} dx$$

$$= \int \frac{mx^8 + lx^7 + kx^6 + jx^5 + hx^4 + gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^3} dx$$

```
[In] integrate((m*x^8+l*x^7+k*x^6+j*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x, algorithm="maxima")
```

```
[Out] -1/8*((12*a^2*b*c^3*h - 3*(b^3*c^3 - 8*a*b*c^4)*d - (a*b^2*c^3 + 20*a^2*c^4)*f - 3*(a^2*b^2*c^2 + 4*a^3*c^3)*k - (a^2*b^3*c - 16*a^3*b*c^2)*m)*x^7 - 12*a^4*b*c*j - 4*(6*a^2*c^4*e - 3*a^2*b*c^3*g - 3*a^3*b*c^2*l + (a^2*b^2*c^2 + 2*a^3*c^3)*j)*x^6 - ((6*b^4*c^2 - 49*a*b^2*c^3 + 28*a^2*c^4)*d + 2*(a*b^3*c^2 + 14*a^2*b*c^3)*f - (19*a^2*b^2*c^2 - 4*a^3*c^3)*h + (5*a^2*b^3*c + 16*a^3*b*c^2)*k - (a^2*b^4 + 5*a^3*b^2*c + 36*a^4*c^2)*m)*x^5 - 2*(18*a^2*b*c^3*e - 9*a^2*b^2*c^2*g + 3*(a^2*b^3*c + 2*a^3*b*c^2)*j - (a^2*b^4 + a^3*b^2*c + 16*a^4*c^2)*l)*x^4 - ((3*b^5*c - 20*a*b^3*c^2 - 4*a^2*b*c^3)*d + (a*b^4*c + 5*a^2*b^2*c^2 + 36*a^3*c^3)*f - (5*a^2*b^3*c + 16*a^3*b*c^2)*h + (19*a^3*b^2*c - 4*a^4*c^2)*k - 2*(a^3*b^3 + 14*a^4*b*c)*m)*x^3 - 4*(2*(a^2*b^2*c^2 + 5*a^3*c^3)*e - (a^2*b^3*c + 5*a^3*b*c^2)*g + (5*a^3*b^2*c - 2*a^4*c^2)*j - (a^3*b^3 + 5*a^4*b*c)*l)*x^2 + 2*(a^2*b^3*c - 10*a^3*b*c^2)*e + 2*(a^3*b^2*c + 8*a^4*c^2)*g + 2*(a^4*b^2 + 8*a^5*c)*l - (12*a^4*b*c*k + (5*a*b^4*c - 37*a^2*b^2*c^2 + 44*a^3*c^3)*d - (a^2*b^3*c - 16*a^3*b*c^2)*f - 3*(a^3*b^2*c + 4*a^4*c^2)*h - (a^4*b^2 + 20*a^5*c)*m)*x)/(a^4*b^4*c - 8*a^5*b^2*c^2 + 16*a^6*c^3 + (a^2*b^4*c^3 - 8*a^3*b^2*c^4 + 16*a^4*c^5)*x^8 + 2*(a^2*b^5*c^2 - 8*a^3*b^3*c^3 + 16*a^4*b*c^4)*x^6 + (a^2*b^6*c - 6*a^3*b^4*c^2 + 32*a^5*c^4)*x^4 + 2*(a^3*b^5*c - 8*a^4*b^3*c^2 + 16*a^5*b*c^3)*x^2) - 1/8*integrate((12*a^3*b*c*k + (12*a^2*b*c^2*h - 3*(b^3*c^2 - 8*a*b*c^3)*d - (a*b^2*c^2 + 20*a^2*c^3)*f - 3*(a^2*b^2*c + 4*a^3*c^2)*k - (a^2*b^3 - 16*a^3*b*c)*m)*x^2 - 3*(b^4*c - 9*a*b^2*c^2 + 28*a^2*c^3)*d - (a*b^3*c - 16*a^2*b*c^2)*f - 3*(a^2*b^2*c + 4*a^3*c^2)*h - (a^3*b^2 + 20*a^4*c)*m - 8*(6*a^2*c^3*e - 3*a^2*b*c^2*g - 3*a^3*b*c*l + (a^2*b^2*c + 2*a^3*c^2)*j)*x)/(c*x^4 + b*x^2 + a), x)/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)
```

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 22429 vs. 2(1098) = 2196.

Time = 3.50 (sec) , antiderivative size = 22429, normalized size of antiderivative = 19.50

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

```
[In] integrate((m*x^8+l*x^7+k*x^6+j*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x, algorithm="giac")
```

```
[Out] 1/64*(3*(2*b^5*c^4 - 24*a*b^3*c^5 + 64*a^2*b*c^6 - sqrt(2)*sqrt(b^2 - 4*a*c)
)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*b^5*c^2 + 12*sqrt(2)*sqrt(b^2 - 4*a*c)*sq
rt(b*c + sqrt(b^2 - 4*a*c)*c)*a*b^3*c^3 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(
b*c + sqrt(b^2 - 4*a*c)*c)*b^4*c^3 - 32*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c
+ sqrt(b^2 - 4*a*c)*c)*a^2*b*c^4 - 16*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c +
sqrt(b^2 - 4*a*c)*c)*a*b^2*c^4 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(
b^2 - 4*a*c)*c)*b^3*c^4 + 8*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 -
4*a*c)*c)*a*b*c^5 - 2*(b^2 - 4*a*c)*b^3*c^4 + 16*(b^2 - 4*a*c)*a*b*c^5)*(a
^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)^2*d + (2*a*b^4*c^4 + 32*a^2*b^2*c^5
- 160*a^3*c^6 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a
*b^4*c^2 - 16*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2
*b^2*c^3 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a*b^
3*c^3 + 80*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^3*c^
4 + 40*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b*c^4
- sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a*b^2*c^4 - 20*
sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*c^5 - 2*(b^2
- 4*a*c)*a*b^2*c^4 - 40*(b^2 - 4*a*c)*a^2*c^5)*(a^2*b^4*c - 8*a^3*b^2*c^2 +
16*a^4*c^3)^2*f - 12*(2*a^2*b^3*c^4 - 8*a^3*b*c^5 - sqrt(2)*sqrt(b^2 - 4*a
*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b^3*c^2 + 4*sqrt(2)*sqrt(b^2 - 4*a*
c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^3*b*c^3 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*
sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b^2*c^3 - sqrt(2)*sqrt(b^2 - 4*a*c)*sq
rt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b*c^4 - 2*(b^2 - 4*a*c)*a^2*b*c^4)*(a^2*b^
4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)^2*h + 3*(2*a^2*b^4*c^3 - 32*a^4*c^5 - sqr
t(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b^4*c + 2*sqrt(2
)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b^3*c^2 + 16*sqrt(2
)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^4*c^3 + 8*sqrt(2)*sq
rt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^3*b*c^3 - sqrt(2)*sqrt(b^2
- 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b^2*c^3 - 4*sqrt(2)*sqrt(b^2
- 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^3*c^4 - 2*(b^2 - 4*a*c)*a^2*b^2*
c^3 - 8*(b^2 - 4*a*c)*a^3*c^4)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)^2*k
+ (2*a^2*b^5*c^2 - 40*a^3*b^3*c^3 + 128*a^4*b*c^4 - sqrt(2)*sqrt(b^2 - 4*a
*c)*sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b^5 + 20*sqrt(2)*sqrt(b^2 - 4*a*c)*
sqrt(b*c + sqrt(b^2 - 4*a*c)*c)*a^3*b^3*c + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sq
rt(b*c + sqrt(b^2 - 4*a*c)*c)*a^2*b^4*c - 64*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(
```

$$\begin{aligned}
& b*c + \sqrt{b^2 - 4*a*c})*c)*a^4*b*c^2 - 32*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^3*b^2*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^2*b^3*c^2 + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^3*b*c^3 - 2*(b^2 - 4*a*c)*a^2*b^3*c^2 + 32*(b^2 - 4*a*c)*a^3*b*c^3)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)^2*m + 6*(\sqrt{2})*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^2*b^10*c^3 - 21*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^3*b^8*c^4 - 2*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^2*b^9*c^4 - 2*a^2*b^10*c^4 + 184*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^4*b^6*c^5 + 34*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^3*b^7*c^5 + \sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^2*b^8*c^5 + 42*a^3*b^8*c^5 - 832*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^5*b^4*c^6 - 232*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^4*b^5*c^6 - 17*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^3*b^6*c^6 - 368*a^4*b^6*c^6 + 1920*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^6*b^2*c^7 + 736*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^5*b^3*c^7 + 116*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^4*b^4*c^7 + 1664*a^5*b^4*c^7 - 1792*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^7*c^8 - 896*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^6*b*c^8 - 368*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^5*b^2*c^8 - 3840*a^6*b^2*c^8 + 448*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^6*c^9 + 3584*a^7*c^9 + 2*(b^2 - 4*a*c)*a^2*b^8*c^4 - 34*(b^2 - 4*a*c)*a^3*b^6*c^5 + 232*(b^2 - 4*a*c)*a^4*b^4*c^6 - 736*(b^2 - 4*a*c)*a^5*b^2*c^7 + 896*(b^2 - 4*a*c)*a^6*c^8)*d*abs(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3) + 2*(\sqrt{2})*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^3*b^9*c^3 - 28*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^4*b^7*c^4 - 2*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^3*b^8*c^4 - 2*a^3*b^9*c^4 + 240*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^5*b^5*c^5 + 48*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^4*b^6*c^5 + \sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^3*b^7*c^5 + 56*a^4*b^7*c^5 - 832*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^6*b^3*c^6 - 288*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^5*b^4*c^6 - 24*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^4*b^5*c^6 - 480*a^5*b^5*c^6 + 1024*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^7*b*c^7 + 512*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^6*b^2*c^7 + 144*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^5*b^3*c^7 + 1664*a^6*b^3*c^7 - 256*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^6*b*c^8 - 2048*a^7*b*c^8 + 2*(b^2 - 4*a*c)*a^3*b^7*c^4 - 48*(b^2 - 4*a*c)*a^4*b^5*c^5 + 288*(b^2 - 4*a*c)*a^5*b^3*c^6 - 512*(b^2 - 4*a*c)*a^6*b*c^7)*f*abs(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3) + 6*(\sqrt{2})*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^4*b^8*c^3 - 8*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^5*b^6*c^4 - 2*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^4*b^7*c^4 - 2*a^4*b^8*c^4 + 8*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^5*b^5*c^5 + \sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^4*b^6*c^5 + 16*a^5*b^6*c^5 + 128*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^7*b^2*c^6 + 32*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^6*b^3*c^6 - 4*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^5*b^4*c^6 - 256*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^8*c^7 - 128*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^7*b*c^7 - 16*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^6*b^2*c^7 - 256*a^7*b^2*c^7 + 64*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c})*c)*a^7*c^8 + 512*a^8*c^8 + 2*(b^2 - 4*a*c)*a^4*b^6*c^4 - 8*(b^2 - 4*a*c)*a^5*b^4*c^5 - 32
\end{aligned}$$

$$\begin{aligned}
&*(b^2 - 4*a*c)*a^6*b^2*c^6 + 128*(b^2 - 4*a*c)*a^7*c^7)*h*abs(a^2*b^4*c - 8 \\
&*a^3*b^2*c^2 + 16*a^4*c^3) - 24*(sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^ \\
&5*b^7*c^3 - 12*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^6*b^5*c^4 - 2*sqrt \\
&(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^5*b^6*c^4 - 2*a^5*b^7*c^4 + 48*sqrt(2 \\
&)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^7*b^3*c^5 + 16*sqrt(2)*sqrt(b*c + sqrt( \\
&b^2 - 4*a*c))*a^6*b^4*c^5 + sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^5*b \\
&^5*c^5 + 24*a^6*b^5*c^5 - 64*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^8*b* \\
&c^6 - 32*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^7*b^2*c^6 - 8*sqrt(2)*sq \\
&rt(b*c + sqrt(b^2 - 4*a*c))*a^6*b^3*c^6 - 96*a^7*b^3*c^6 + 16*sqrt(2)*sq \\
&rt(b*c + sqrt(b^2 - 4*a*c))*a^7*b*c^7 + 128*a^8*b*c^7 + 2*(b^2 - 4*a*c)*a^ \\
&5*b^5*c^4 - 16*(b^2 - 4*a*c)*a^6*b^3*c^5 + 32*(b^2 - 4*a*c)*a^7*b*c^6)*k*ab \\
&s(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3) + 2*(sqrt(2)*sqrt(b*c + sqrt(b^2 \\
&- 4*a*c))*a^5*b^8*c^2 + 8*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^6*b^6 \\
&*c^3 - 2*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^5*b^7*c^3 - 2*a^5*b^8*c^ \\
&3 - 192*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^7*b^4*c^4 - 24*sqrt(2)*sq \\
&rt(b*c + sqrt(b^2 - 4*a*c))*a^6*b^5*c^4 + sqrt(2)*sqrt(b*c + sqrt(b^2 - 4 \\
&*a*c))*a^5*b^6*c^4 - 16*a^6*b^6*c^4 + 896*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4 \\
&*a*c))*a^8*b^2*c^5 + 288*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^7*b^3* \\
&c^5 + 12*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^6*b^4*c^5 + 384*a^7*b^4* \\
&c^5 - 1280*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^9*c^6 - 640*sqrt(2)*sq \\
&rt(b*c + sqrt(b^2 - 4*a*c))*a^8*b*c^6 - 144*sqrt(2)*sqrt(b*c + sqrt(b^2 - \\
&4*a*c))*a^7*b^2*c^6 - 1792*a^8*b^2*c^6 + 320*sqrt(2)*sqrt(b*c + sqrt(b^2 \\
&- 4*a*c))*a^8*c^7 + 2560*a^9*c^7 + 2*(b^2 - 4*a*c)*a^5*b^6*c^3 + 24*(b^2 \\
&- 4*a*c)*a^6*b^4*c^4 - 288*(b^2 - 4*a*c)*a^7*b^2*c^5 + 640*(b^2 - 4*a*c)*a \\
&^8*c^6)*m*abs(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3) + 3*(2*a^4*b^13*c^6 - \\
&52*a^5*b^11*c^7 + 624*a^6*b^9*c^8 - 4224*a^7*b^7*c^9 + 16384*a^8*b^5*c^10 \\
&- 33792*a^9*b^3*c^11 + 28672*a^10*b*c^12 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b \\
&*c + sqrt(b^2 - 4*a*c))*a^4*b^13*c^4 + 26*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt( \\
&b*c + sqrt(b^2 - 4*a*c))*a^5*b^11*c^5 + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt( \\
&b*c + sqrt(b^2 - 4*a*c))*a^4*b^12*c^5 - 312*sqrt(2)*sqrt(b^2 - 4*a*c)*sq \\
&rt(b*c + sqrt(b^2 - 4*a*c))*a^6*b^9*c^6 - 44*sqrt(2)*sqrt(b^2 - 4*a*c)*sq \\
&rt(b*c + sqrt(b^2 - 4*a*c))*a^5*b^10*c^6 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt( \\
&b*c + sqrt(b^2 - 4*a*c))*a^4*b^11*c^6 + 2112*sqrt(2)*sqrt(b^2 - 4*a*c)*sq \\
&rt(b*c + sqrt(b^2 - 4*a*c))*a^7*b^7*c^7 + 448*sqrt(2)*sqrt(b^2 - 4*a*c)*s \\
&qrt(b*c + sqrt(b^2 - 4*a*c))*a^6*b^8*c^7 + 22*sqrt(2)*sqrt(b^2 - 4*a*c)*s \\
&qrt(b*c + sqrt(b^2 - 4*a*c))*a^5*b^9*c^7 - 8192*sqrt(2)*sqrt(b^2 - 4*a*c) \\
&*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^8*b^5*c^8 - 2432*sqrt(2)*sqrt(b^2 - 4*a* \\
&c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^7*b^6*c^8 - 224*sqrt(2)*sqrt(b^2 - 4*a \\
&*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^6*b^7*c^8 + 16896*sqrt(2)*sqrt(b^2 - \\
&4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^9*b^3*c^9 + 6656*sqrt(2)*sqrt(b^2 \\
&- 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^8*b^4*c^9 + 1216*sqrt(2)*sqrt(b^ \\
&2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^7*b^5*c^9 - 14336*sqrt(2)*sqrt \\
&(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^10*b*c^10 - 7168*sqrt(2)*sq \\
&rt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^9*b^2*c^10 - 3328*sqrt(2) \\
&*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^8*b^3*c^10 + 3584*sqrt
\end{aligned}$$

$$\begin{aligned}
& (2) \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^9 b^c^{11} - 2(b^2 - 4ac) a^4 b^{11} c^6 + 44(b^2 - 4ac) a^5 b^9 c^7 - 448(b^2 - 4ac) a^6 b^7 c^8 + 2432(b^2 - 4ac) a^7 b^5 c^9 - 6656(b^2 - 4ac) a^8 b^3 c^{10} \\
& + 7168(b^2 - 4ac) a^9 b^c^{11} d + (2a^5 b^{12} c^6 - 136a^6 b^{10} c^7 + 1856a^7 b^8 c^8 - 10496a^8 b^6 c^9 + 27136a^9 b^4 c^{10} - 26624a^{10} b^2 c^{11} - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^5 b^{12} c^4 \\
& + 68\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^6 b^{10} c^5 + 2\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^5 b^{11} c^5 - 928\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^7 b^8 c^6 - 128\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^6 b^9 c^6 \\
& - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^5 b^{10} c^6 + 5248\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^8 b^6 c^7 + 1344\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^7 b^7 c^7 + 64\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^6 b^8 c^7 \\
& - 13568\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^9 b^4 c^8 - 5120\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^8 b^5 c^8 - 672\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^7 b^6 c^8 + 13312\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^{10} b^2 c^9 + 6656\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^9 b^3 c^9 \\
& + 2560\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^8 b^4 c^9 - 3328\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^9 b^2 c^{10} - 2(b^2 - 4ac) a^5 b^{10} c^6 + 128(b^2 - 4ac) a^6 b^8 c^7 - 1344(b^2 - 4ac) a^7 b^6 c^8 + 5120(b^2 - 4ac) a^8 b^4 c^9 - 6656(b^2 - 4ac) a^9 b^2 c^{10} \\
& * f + 6(6a^6 b^{11} c^6 - 88a^7 b^9 c^7 + 448a^8 b^7 c^8 - 768a^9 b^5 c^9 - 512a^{10} b^3 c^{10} + 2048a^{11} b^c^{11} - 3\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^6 b^{11} c^4 + 44\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^7 b^9 c^5 + 6\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^6 b^{10} c^5 - 224\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^8 b^7 c^6 - 64\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^7 b^8 c^6 - 3\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^6 b^9 c^6 + 384\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^9 b^5 c^7 + 192\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^8 b^6 c^7 + 32\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^7 b^7 c^7 + 256\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^{10} b^3 c^8 - 96\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^8 b^5 c^8 - 1024\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^{11} b^c^9 - 512\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^{10} b^2 c^9 + 256\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^{10} b^c^{10} - 6(b^2 - 4ac) a^6 b^9 c^6 + 64(b^2 - 4ac) a^7 b^7 c^7 - 192(b^2 - 4ac) a^8 b^5 c^8 + 512(b^2 - 4ac) a^{10} b^c^{10} * h - 3(2a^6 b^{12} c^5 - 8a^7 b^{10} c^6 - 192a^8 b^8 c^7 + 1792a^9 b^6 c^8 - 5632a^{10} b^4 c^9 + 6144a^{11} b^2 c^{10} - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^6 b^{12} c^3 + 4\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c} a^7 b^{10} c^4 + 2\sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc + \sqrt{b^2 - 4ac}c}
\end{aligned}$$



$$\begin{aligned}
& 2 - 4ac)c)a^6b^{11}c^4 + 96\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^8b^8c^5 - \sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^6b^{10}c^5 - 896\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^9b^6c^6 - 192\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^8b^7c^6 + 2816\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^{10}b^4c^7 + 1024\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^9b^5c^7 + 96\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^8b^6c^7 - 3072\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^{11}b^2c^8 - 1536\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^{10}b^3c^8 - 512\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^9b^4c^8 + 768\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^{10}b^2c^9 - 2(b^2 - 4ac)a^6b^{10}c^5 + 192(b^2 - 4ac)a^8b^6c^7 - 1024(b^2 - 4ac)a^9b^4c^8 + 1536(b^2 - 4ac)a^{10}b^2c^9)k - (2a^6b^{13}c^4 - 68a^7b^{11}c^5 + 688a^8b^9c^6 - 2688a^9b^7c^7 + 2048a^{10}b^5c^8 + 11264a^{11}b^3c^9 - 20480a^{12}b^c^{10} - \sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^6b^{13}c^2 + 34\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^7b^{11}c^3 + 2\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^6b^{12}c^3 - 344\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^8b^9c^4 - 60\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^7b^{10}c^4 - \sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^6b^{11}c^4 + 1344\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^9b^7c^5 + 448\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^8b^8c^5 + 30\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^7b^9c^5 - 1024\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^{10}b^5c^6 - 896\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^9b^6c^6 - 224\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^8b^7c^6 - 5632\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^{11}b^3c^7 - 1536\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^{10}b^4c^7 + 448\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^9b^5c^7 + 10240\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^{12}b^c^8 + 5120\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^{11}b^2c^8 + 768\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^{10}b^3c^8 - 2560\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c)a^{11}b^c^9 - 2(b^2 - 4ac)a^6b^{11}c^4 + 60(b^2 - 4ac)a^7b^9c^5 - 448(b^2 - 4ac)a^8b^7c^6 + 896(b^2 - 4ac)a^9b^5c^7 + 1536(b^2 - 4ac)a^{10}b^3c^8 - 5120(b^2 - 4ac)a^{11}b^c^9)m) \\
& \arctan(2\sqrt{1/2}x/\sqrt{(a^2b^5c - 8a^3b^3c^2 + 16a^4b^c^3 + \sqrt{(a^2b^5c - 8a^3b^3c^2 + 16a^4b^c^3)^2 - 4(a^3b^4c - 8a^4b^2c^2 + 16a^5c^3)(a^2b^4c^2 - 8a^3b^2c^3 + 16a^4c^4))})/(a^2b^4c^2 - 8a^3b^2c^3 + 16a^4c^4)))/((a^5b^{10}c^3 - 20a^6b^8c^4 - 2a^5b^9c^4 + 160a^7b^6c^5 + 32a^6b^7c^5 + a^5b^8c^5 - 640a^8b^4c^6 - 192a^7b^5c^6 - 16a^6b^6c^6 + 1280a^9b^2c^7 + 512a^8b^3c^7 + 96a^7b^4c^7 - 1024a^{10}c^8 - 512a^9b^c^8 - 256a^8b^2c^8 + 256a^9c^9) \cdot \text{abs}(a^2b^4c - 8a^3b^2c^2 + 16a^4c^3) \cdot \text{abs}(c)) - 1/64(3(2b^5c^4 -
\end{aligned}$$

$$\begin{aligned}
& 24*a*b^3*c^5 + 64*a^2*b*c^6 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b^5*c^2 + 12*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^3*c^3 + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b^4*c^3 - 32*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b*c^4 - 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^2*c^4 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*b^3*c^4 + 8*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b*c^5 - 2*(b^2 - 4*a*c)*b^3*c^4 + 16*(b^2 - 4*a*c)*a*b*c^5)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)^2*d + (2*a*b^4*c^4 + 32*a^2*b^2*c^5 - 160*a^3*c^6 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^4*c^2 - 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^2*c^3 + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^3*c^3 + 80*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*c^4 + 40*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b*c^4 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a*b^2*c^4 - 20*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*c^5 - 2*(b^2 - 4*a*c)*a*b^2*c^4 - 40*(b^2 - 4*a*c)*a^2*c^5)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)^2*f - 12*(2*a^2*b^3*c^4 - 8*a^3*b*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^2 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^3 + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^2*c^3 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b*c^4 - 2*(b^2 - 4*a*c)*a^2*b*c^4)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)^2*h + 3*(2*a^2*b^4*c^3 - 32*a^4*c^5 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^2 + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*c^3 + 8*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^3 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^2*c^3 - 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*c^4 - 2*(b^2 - 4*a*c)*a^2*b^2*c^3 - 8*(b^2 - 4*a*c)*a^3*c^4)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)^2*k + (2*a^2*b^5*c^2 - 40*a^3*b^3*c^3 + 128*a^4*b*c^4 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^5 + 20*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^3*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^4*c - 64*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b*c^2 - 32*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^2*c^2 - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^3*c^2 + 16*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b*c^3 - 2*(b^2 - 4*a*c)*a^2*b^3*c^2 + 32*(b^2 - 4*a*c)*a^3*b*c^3)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)^2*m - 6*(\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^10*c^3 - 21*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^8*c^4 - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^9*c^4 + 2*a^2*b^10*c^4 + 184*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b^6*c^5 + 34*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^3*b^7*c^5 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^2*b^8*c^5 - 42*a^3*b^8*c^5 - 832*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*b^4*c^6 - 232*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^4*b^
\end{aligned}$$

$$\begin{aligned}
& 5c^6 - 17\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^3 b^6 c^6 + 368a^4 b^6 c^6 + 1920\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^6 b^2 c^7 + 736\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^5 b^3 c^7 + 116\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^4 b^4 c^7 - 1664a^5 b^4 c^7 - 1792\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^7 c^8 - 896\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^6 b c^8 - 368\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^5 b^2 c^8 + 3840 a^6 b^2 c^8 + 448\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^6 c^9 - 3584a^7 c^9 - 2(b^2 - 4ac) a^2 b^8 c^4 + 34(b^2 - 4ac) a^3 b^6 c^5 - 232(b^2 - 4ac) a^4 b^4 c^6 + 736(b^2 - 4ac) a^5 b^2 c^7 - 896(b^2 - 4ac) a^6 c^8) d \operatorname{abs}(a^2 b^4 c - 8a^3 b^2 c^2 + 16a^4 c^3) - 2(\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^3 b^9 c^3 - 28\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^4 b^7 c^4 - 2\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^3 b^8 c^4 + 2a^3 b^9 c^4 + 240\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^5 b^5 c^5 + 48\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^4 b^6 c^5 + \sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^3 b^7 c^5 - 56a^4 b^7 c^5 - 832\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^6 b^3 c^6 - 288\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^5 b^4 c^6 - 24\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^4 b^5 c^6 + 480a^5 b^5 c^6 + 1024\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^7 b c^7 + 512\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^6 b^2 c^7 + 144\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^5 b^3 c^7 - 1664a^6 b^3 c^7 - 256\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^6 b c^8 + 2048a^7 b c^8 - 2(b^2 - 4ac) a^3 b^7 c^4 + 48(b^2 - 4ac) a^4 b^5 c^5 - 288(b^2 - 4ac) a^5 b^3 c^6 + 512(b^2 - 4ac) a^6 b c^7) f \operatorname{abs}(a^2 b^4 c - 8a^3 b^2 c^2 + 16a^4 c^3) - 6(\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^4 b^8 c^3 - 8\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^5 b^6 c^4 - 2\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^4 b^7 c^4 + 2a^4 b^8 c^4 + 8\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^5 b^5 c^5 + \sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^4 b^6 c^5 - 16a^5 b^6 c^5 + 128\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^7 b^2 c^6 + 32\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^6 b^3 c^6 - 4\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^5 b^4 c^6 - 256\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^8 c^7 - 128\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^7 b c^7 - 16\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^6 b^2 c^7 + 256a^7 b^2 c^7 + 64\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^7 c^8 - 512a^8 c^8 - 2(b^2 - 4ac) a^4 b^6 c^4 + 8(b^2 - 4ac) a^5 b^4 c^5 + 32(b^2 - 4ac) a^6 b^2 c^6 - 128(b^2 - 4ac) a^7 c^7) h \operatorname{abs}(a^2 b^4 c - 8a^3 b^2 c^2 + 16a^4 c^3) + 24(\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^5 b^7 c^3 - 12\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^6 b^5 c^4 - 2\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^5 b^6 c^4 + 2a^5 b^7 c^4 + 48\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^7 b^3 c^5 + 16\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^6 b^4 c^5 + \sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^5 b^5 c^5 - 24a^6 b^5 c^5 - 64\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^8 b c^6 - 32\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^7 b^2 c^6 - 8\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^6 b^3 c^6 + 96a^7 b^3 c^6 + 16\sqrt{2}\sqrt{bc - \sqrt{b^2 - 4ac}}c) a^7 b c^7 - 128a^8 b c^7 - 2(b^2 - 4ac) a^5 b^5 c^4 + 16(b^2 - 4ac) a^6 b^3 c^5 - 32(b^2 - 4ac) a^7 b c^6) k \operatorname{abs}(a^2 b^4 c - 8a^3 b
\end{aligned}$$

$$\begin{aligned}
& ^2*c^2 + 16*a^4*c^3) - 2*(\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^5*b^8*c \\
& ^2 + 8*\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^6*b^6*c^3 - 2*\text{sqrt}(2)*\text{sqrt} \\
& (b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^5*b^7*c^3 + 2*a^5*b^8*c^3 - 192*\text{sqrt}(2)*\text{sqrt} \\
& (b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^4*c^4 - 24*\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4 \\
& *a*c))*c)*a^6*b^5*c^4 + \text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^5*b^6*c^4 \\
& + 16*a^6*b^6*c^4 + 896*\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^8*b^2*c^5 \\
& + 288*\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^3*c^5 + 12*\text{sqrt}(2)*\text{sqrt} \\
& (b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^6*b^4*c^5 - 384*a^7*b^4*c^5 - 1280*\text{sqrt}(2)*\text{sq} \\
& \text{rt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^9*c^6 - 640*\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4 \\
& *a*c))*c)*a^8*b*c^6 - 144*\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^2*c^ \\
& 6 + 1792*a^8*b^2*c^6 + 320*\text{sqrt}(2)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^8*c^7 \\
& - 2560*a^9*c^7 - 2*(b^2 - 4*a*c)*a^5*b^6*c^3 - 24*(b^2 - 4*a*c)*a^6*b^4*c^4 \\
& + 288*(b^2 - 4*a*c)*a^7*b^2*c^5 - 640*(b^2 - 4*a*c)*a^8*c^6)*m*\text{abs}(a^2*b^4 \\
& *c - 8*a^3*b^2*c^2 + 16*a^4*c^3) + 3*(2*a^4*b^13*c^6 - 52*a^5*b^11*c^7 + 62 \\
& 4*a^6*b^9*c^8 - 4224*a^7*b^7*c^9 + 16384*a^8*b^5*c^10 - 33792*a^9*b^3*c^11 \\
& + 28672*a^10*b*c^12 - \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c \\
& ))*c)*a^4*b^13*c^4 + 26*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a* \\
& c))*c)*a^5*b^11*c^5 + 2*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a* \\
& c))*c)*a^4*b^12*c^5 - 312*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4* \\
& a*c))*c)*a^6*b^9*c^6 - 44*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4* \\
& a*c))*c)*a^5*b^10*c^6 - \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a* \\
& c))*c)*a^4*b^11*c^6 + 2112*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4 \\
& *a*c))*c)*a^7*b^7*c^7 + 448*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - \\
& 4*a*c))*c)*a^6*b^8*c^7 + 22*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - \\
& 4*a*c))*c)*a^5*b^9*c^7 - 8192*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 \\
& - 4*a*c))*c)*a^8*b^5*c^8 - 2432*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^ \\
& 2 - 4*a*c))*c)*a^7*b^6*c^8 - 224*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b \\
& ^2 - 4*a*c))*c)*a^6*b^7*c^8 + 16896*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqr} \\
& \text{t}(b^2 - 4*a*c))*c)*a^9*b^3*c^9 + 6656*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{s} \\
& \text{qrt}(b^2 - 4*a*c))*c)*a^8*b^4*c^9 + 1216*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \\
& \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^5*c^9 - 14336*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt}(b* \\
& c - \text{sqrt}(b^2 - 4*a*c))*c)*a^10*b*c^10 - 7168*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sqrt} \\
& (b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^9*b^2*c^10 - 3328*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c))*\text{sq} \\
& \text{rt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^8*b^3*c^10 + 3584*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c) \\
& *\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^9*b*c^11 - 2*(b^2 - 4*a*c)*a^4*b^11*c^6 \\
& + 44*(b^2 - 4*a*c)*a^5*b^9*c^7 - 448*(b^2 - 4*a*c)*a^6*b^7*c^8 + 2432*(b^2 \\
& - 4*a*c)*a^7*b^5*c^9 - 6656*(b^2 - 4*a*c)*a^8*b^3*c^10 + 7168*(b^2 - 4*a*c) \\
& *a^9*b*c^11)*d + (2*a^5*b^12*c^6 - 136*a^6*b^10*c^7 + 1856*a^7*b^8*c^8 - 10 \\
& 496*a^8*b^6*c^9 + 27136*a^9*b^4*c^10 - 26624*a^10*b^2*c^11 - \text{sqrt}(2)*\text{sqrt}(b \\
& ^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^5*b^12*c^4 + 68*\text{sqrt}(2)*\text{sqrt} \\
& (b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^6*b^10*c^5 + 2*\text{sqrt}(2)*\text{sqrt} \\
& (b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^5*b^11*c^5 - 928*\text{sqrt}(2)*\text{sq} \\
& \text{rt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^8*c^6 - 128*\text{sqrt}(2)*\text{sq} \\
& \text{rt}(b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^6*b^9*c^6 - \text{sqrt}(2)*\text{sqrt} \\
& (b^2 - 4*a*c))*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c))*c)*a^5*b^10*c^6 + 5248*\text{sqrt}(2)*\text{sq}
\end{aligned}$$



$$\begin{aligned}
& *c) *c) *a^{10} *b^2 *c^9 - 2 * (b^2 - 4 *a *c) *a^6 *b^{10} *c^5 + 192 * (b^2 - 4 *a *c) *a^8 * \\
& b^6 *c^7 - 1024 * (b^2 - 4 *a *c) *a^9 *b^4 *c^8 + 1536 * (b^2 - 4 *a *c) *a^{10} *b^2 *c^9) \\
& *k - (2 *a^6 *b^{13} *c^4 - 68 *a^7 *b^{11} *c^5 + 688 *a^8 *b^9 *c^6 - 2688 *a^9 *b^7 *c^7 \\
& + 2048 *a^{10} *b^5 *c^8 + 11264 *a^{11} *b^3 *c^9 - 20480 *a^{12} *b *c^{10} - \sqrt{2} * \sqrt{ \\
& t(b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^6 *b^{13} *c^2 + 34 * \sqrt{2} * \sqrt{ \\
& rt(b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^7 *b^{11} *c^3 + 2 * \sqrt{2} * \sqrt{ \\
& rt(b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^6 *b^{12} *c^3 - 344 * \sqrt{2} * \\
& \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^8 *b^9 *c^4 - 60 * \sqrt{2} * \\
& \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^7 *b^{10} *c^4 - \sqrt{2} * \sqrt{ \\
& rt(b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^6 *b^{11} *c^4 + 1344 * \sqrt{2} \\
& * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^9 *b^7 *c^5 + 448 * \sqrt{2} \\
& ) * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^8 *b^8 *c^5 + 30 * \sqrt{2} \\
& ) * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^7 *b^9 *c^5 - 1024 * \sqrt{2} \\
& * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^{10} *b^5 *c^6 - 896 * \sqrt{ \\
& rt(2) * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^9 *b^6 *c^6 - 224 * \sqrt{ \\
& rt(2) * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^8 *b^7 *c^6 - 5632 \\
& * \sqrt{2} * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^{11} *b^3 *c^7 - 1 \\
& 536 * \sqrt{2} * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^{10} *b^4 *c^7 \\
& + 448 * \sqrt{2} * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^9 *b^5 *c^7 \\
& + 10240 * \sqrt{2} * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^{12} *b *c \\
& ^8 + 5120 * \sqrt{2} * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^{11} *b^2 \\
& ^2 *c^8 + 768 * \sqrt{2} * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^{10} * \\
& b^3 *c^8 - 2560 * \sqrt{2} * \sqrt{b^2 - 4 *a *c) * \sqrt{b *c - \sqrt{b^2 - 4 *a *c) *c) *a^{11} \\
& *b *c^9 - 2 * (b^2 - 4 *a *c) *a^6 *b^{11} *c^4 + 60 * (b^2 - 4 *a *c) *a^7 *b^9 *c^5 - 44 \\
& 8 * (b^2 - 4 *a *c) *a^8 *b^7 *c^6 + 896 * (b^2 - 4 *a *c) *a^9 *b^5 *c^7 + 1536 * (b^2 - 4 \\
& *a *c) *a^{10} *b^3 *c^8 - 5120 * (b^2 - 4 *a *c) *a^{11} *b *c^9) *m) * \arctan(2 * \sqrt{1/2} * x \\
& / \sqrt{(a^2 *b^5 *c - 8 *a^3 *b^3 *c^2 + 16 *a^4 *b *c^3 - \sqrt{(a^2 *b^5 *c - 8 *a^3 *b \\
& ^3 *c^2 + 16 *a^4 *b *c^3)^2 - 4 * (a^3 *b^4 *c - 8 *a^4 *b^2 *c^2 + 16 *a^5 *c^3) * (a^2 * \\
& b^4 *c^2 - 8 *a^3 *b^2 *c^3 + 16 *a^4 *c^4)) / (a^2 *b^4 *c^2 - 8 *a^3 *b^2 *c^3 + 16 *a \\
& ^4 *c^4)) / ((a^5 *b^{10} *c^3 - 20 *a^6 *b^8 *c^4 - 2 *a^5 *b^9 *c^4 + 160 *a^7 *b^6 *c^5 \\
& + 32 *a^6 *b^7 *c^5 + a^5 *b^8 *c^5 - 640 *a^8 *b^4 *c^6 - 192 *a^7 *b^5 *c^6 - 16 *a^ \\
& 6 *b^6 *c^6 + 1280 *a^9 *b^2 *c^7 + 512 *a^8 *b^3 *c^7 + 96 *a^7 *b^4 *c^7 - 1024 *a^{10} \\
& *c^8 - 512 *a^9 *b *c^8 - 256 *a^8 *b^2 *c^8 + 256 *a^9 *c^9) * \text{abs}(a^2 *b^4 *c - 8 *a^3 \\
& *b^2 *c^2 + 16 *a^4 *c^3) * \text{abs}(c) + 1/8 * (3 *b^3 *c^3 *d *x^7 - 24 *a *b *c^4 *d *x^7 + \\
& a *b^2 *c^3 *f *x^7 + 20 *a^2 *c^4 *f *x^7 - 12 *a^2 *b *c^3 *h *x^7 + 3 *a^2 *b^2 *c^2 *k *x \\
& ^7 + 12 *a^3 *c^3 *k *x^7 + a^2 *b^3 *c *m *x^7 - 16 *a^3 *b *c^2 *m *x^7 + 24 *a^2 *c^4 *e \\
& *x^6 - 12 *a^2 *b *c^3 *g *x^6 + 4 *a^2 *b^2 *c^2 *j *x^6 + 8 *a^3 *c^3 *j *x^6 - 12 *a^3 * \\
& b *c^2 *l *x^6 + 6 *b^4 *c^2 *d *x^5 - 49 *a *b^2 *c^3 *d *x^5 + 28 *a^2 *c^4 *d *x^5 + 2 *a \\
& *b^3 *c^2 *f *x^5 + 28 *a^2 *b *c^3 *f *x^5 - 19 *a^2 *b^2 *c^2 *h *x^5 + 4 *a^3 *c^3 *h *x^ \\
& 5 + 5 *a^2 *b^3 *c *k *x^5 + 16 *a^3 *b *c^2 *k *x^5 - a^2 *b^4 *m *x^5 - 5 *a^3 *b^2 *c *m * \\
& x^5 - 36 *a^4 *c^2 *m *x^5 + 36 *a^2 *b *c^3 *e *x^4 - 18 *a^2 *b^2 *c^2 *g *x^4 + 6 *a^2 * \\
& b^3 *c *j *x^4 + 12 *a^3 *b *c^2 *j *x^4 - 2 *a^2 *b^4 *l *x^4 - 2 *a^3 *b^2 *c *l *x^4 - 32 \\
& *a^4 *c^2 *l *x^4 + 3 *b^5 *c *d *x^3 - 20 *a *b^3 *c^2 *d *x^3 - 4 *a^2 *b *c^3 *d *x^3 + a \\
& *b^4 *c *f *x^3 + 5 *a^2 *b^2 *c^2 *f *x^3 + 36 *a^3 *c^3 *f *x^3 - 5 *a^2 *b^3 *c *h *x^3 - \\
& 16 *a^3 *b *c^2 *h *x^3 + 19 *a^3 *b^2 *c *k *x^3 - 4 *a^4 *c^2 *k *x^3 - 2 *a^3 *b^3 *m *x^
\end{aligned}$$



```

2 - 4*a*c)))*j*abs(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3) - 3*(a*b^4*c - 4*
a^2*b^2*c^2 - 2*a*b^3*c^2 + a*b^2*c^3 - (a*b^3*c - 4*a^2*b*c^2 - 2*a*b^2*c^
2 + a*b*c^3))*sqrt(b^2 - 4*a*c))*1*abs(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^
3) - 6*(a^2*b^7*c^4 - 12*a^3*b^5*c^5 - 2*a^2*b^6*c^5 + 48*a^4*b^3*c^6 + 16*
a^3*b^4*c^6 + a^2*b^5*c^6 - 64*a^5*b*c^7 - 32*a^4*b^2*c^7 - 8*a^3*b^3*c^7 +
16*a^4*b*c^8 - (a^2*b^6*c^4 - 8*a^3*b^4*c^5 - 2*a^2*b^5*c^5 + 16*a^4*b^2*c
^6 + 8*a^3*b^3*c^6 + a^2*b^4*c^6 - 4*a^3*b^2*c^7))*sqrt(b^2 - 4*a*c))*e + 3*
(a^2*b^8*c^3 - 12*a^3*b^6*c^4 - 2*a^2*b^7*c^4 + 48*a^4*b^4*c^5 + 16*a^3*b^5
*c^5 + a^2*b^6*c^5 - 64*a^5*b^2*c^6 - 32*a^4*b^3*c^6 - 8*a^3*b^4*c^6 + 16*a
^4*b^2*c^7 + (a^2*b^7*c^3 - 8*a^3*b^5*c^4 - 2*a^2*b^6*c^4 + 16*a^4*b^3*c^5
+ 8*a^3*b^4*c^5 + a^2*b^5*c^5 - 4*a^3*b^3*c^6))*sqrt(b^2 - 4*a*c))*g - (a^2*
b^9*c^2 - 10*a^3*b^7*c^3 - 2*a^2*b^8*c^3 + 24*a^4*b^5*c^4 + 12*a^3*b^6*c^4
+ a^2*b^7*c^4 + 32*a^5*b^3*c^5 - 6*a^3*b^5*c^5 - 128*a^6*b*c^6 - 64*a^5*b^2
*c^6 + 32*a^5*b*c^7 + (a^2*b^8*c^2 - 6*a^3*b^6*c^3 - 2*a^2*b^7*c^3 + 4*a^3*
b^5*c^4 + a^2*b^6*c^4 + 32*a^5*b^2*c^5 + 16*a^4*b^3*c^5 - 2*a^3*b^4*c^5 - 8
*a^4*b^2*c^6))*sqrt(b^2 - 4*a*c))*j + 3*(a^3*b^8*c^2 - 12*a^4*b^6*c^3 - 2*a^
3*b^7*c^3 + 48*a^5*b^4*c^4 + 16*a^4*b^5*c^4 + a^3*b^6*c^4 - 64*a^6*b^2*c^5
- 32*a^5*b^3*c^5 - 8*a^4*b^4*c^5 + 16*a^5*b^2*c^6 - (a^3*b^7*c^2 - 8*a^4*b^
5*c^3 - 2*a^3*b^6*c^3 + 16*a^5*b^3*c^4 + 8*a^4*b^4*c^4 + a^3*b^5*c^4 - 4*a^
4*b^3*c^5))*sqrt(b^2 - 4*a*c))*1)*log(x^2 + 1/2*(a^2*b^5*c - 8*a^3*b^3*c^2 +
16*a^4*b*c^3 - sqrt((a^2*b^5*c - 8*a^3*b^3*c^2 + 16*a^4*b*c^3)^2 - 4*(a^3*
b^4*c - 8*a^4*b^2*c^2 + 16*a^5*c^3)*(a^2*b^4*c^2 - 8*a^3*b^2*c^3 + 16*a^4*c
^4)))/(a^2*b^4*c^2 - 8*a^3*b^2*c^3 + 16*a^4*c^4))/((a*b^6 - 12*a^2*b^4*c -
2*a*b^5*c + 48*a^3*b^2*c^2 + 16*a^2*b^3*c^2 + a*b^4*c^2 - 64*a^4*c^3 - 32*a
^3*b*c^3 - 8*a^2*b^2*c^3 + 16*a^3*c^4)*c^2*abs(a^2*b^4*c - 8*a^3*b^2*c^2 +
16*a^4*c^3))

```

## Mupad [B] (verification not implemented)

Time = 32.04 (sec) , antiderivative size = 114377, normalized size of antiderivative = 99.46

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + jx^5 + kx^6 + lx^7 + mx^8}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

```
[In] int((d + e*x + f*x^2 + g*x^3 + h*x^4 + j*x^5 + k*x^6 + l*x^7 + m*x^8)/(a +
b*x^2 + c*x^4)^3,x)
```

```
[Out] symsum(log(root(56371445760*a^11*b^8*c^9*z^4 - 503316480*a^8*b^14*c^6*z^4 +
47185920*a^7*b^16*c^5*z^4 - 2621440*a^6*b^18*c^4*z^4 + 65536*a^5*b^20*c^3*
z^4 - 171798691840*a^14*b^2*c^12*z^4 + 193273528320*a^13*b^4*c^11*z^4 - 128
849018880*a^12*b^6*c^10*z^4 - 16911433728*a^10*b^10*c^8*z^4 + 3523215360*a^
9*b^12*c^7*z^4 + 68719476736*a^15*c^13*z^4 + 1536*a^5*b^16*c*k*m*z^2 + 1536
*a*b^18*c^3*d*f*z^2 - 2571632640*a^9*b^5*c^8*d*m*z^2 + 2548039680*a^9*b^3*c
^10*d*h*z^2 + 1509949440*a^10*b^3*c^9*e*l*z^2 + 1509949440*a^9*b^3*c^10*e*g
*z^2 - 1401421824*a^8*b^5*c^9*d*h*z^2 - 1321205760*a^9*b^2*c^11*d*f*z^2 - 2

```



$793406464a^{11}b^7c^{10}d^7m^2z^2 + 890634240a^8b^7c^7d^7m^2z^2 - 754974720a^{10}b^4c^8g^1m^2z^2 - 754974720a^9b^5c^8e^1m^2z^2 + 719585280a^8b^6c^8d^7k^2z^2 - 707788800a^9b^4c^9d^7k^2z^2 - 754974720a^8b^5c^9e^7g^2z^2 + 603979776a^{11}b^2c^9g^1m^2z^2 - 581959680a^{10}b^4c^8f^7m^2z^2 + 732168192a^7b^6c^9d^7f^2z^2 + 534773760a^{11}b^3c^8h^7m^2z^2 - 456130560a^{11}b^4c^7k^7m^2z^2 - 603979776a^{10}b^2c^{10}e^7j^2z^2 + 534773760a^{10}b^3c^9f^7k^2z^2 + 384040960a^9b^6c^7f^7m^2z^2 + 377487360a^9b^6c^7g^1m^2z^2 - 456130560a^9b^4c^9f^7h^2z^2 + 301989888a^{11}b^3c^8j^7m^2z^2 - 415236096a^{10}b^2c^{10}d^7k^2z^2 + 254017536a^{10}b^6c^6k^7m^2z^2 - 330301440a^{10}b^4c^8h^7k^2z^2 + 390463488a^7b^7c^8d^7h^2z^2 + 188743680a^{12}b^2c^8k^7m^2z^2 + 301989888a^{10}b^3c^9g^7j^2z^2 - 297861120a^7b^8c^7d^7k^2z^2 - 366280704a^6b^8c^8d^7f^2z^2 + 188743680a^{11}b^2c^9h^7k^2z^2 - 330301440a^8b^4c^8d^7f^2z^2 + 254017536a^8b^6c^8f^7h^2z^2 - 188743680a^{10}b^6c^{11}d^7h^2z^2 + 188743680a^8b^7c^7e^7m^2z^2 + 153354240a^9b^6c^7h^7k^2z^2 - 185303040a^7b^9c^6d^7m^2z^2 - 117964800a^{10}b^5c^7h^7m^2z^2 - 61931520a^9b^8c^5k^7m^2z^2 + 121634816a^{11}b^2c^9f^7m^2z^2 - 115671040a^8b^8c^6f^7m^2z^2 - 62914560a^9b^7c^6j^7m^2z^2 + 188743680a^{10}b^2c^{10}f^7h^2z^2 - 94371840a^8b^8c^6g^7m^2z^2 + 6144000a^8b^10c^4k^7m^2z^2 - 117964800a^9b^5c^8f^7k^2z^2 + 61440a^7b^12c^3k^7m^2z^2 - 46080a^6b^14c^2k^7m^2z^2 + 23592960a^8b^9c^5j^7m^2z^2 + 188743680a^7b^7c^8e^7g^2z^2 - 37355520a^9b^7c^6h^7m^2z^2 + 125829120a^8b^6c^8e^7j^2z^2 + 23101440a^8b^9c^5h^7m^2z^2 - 3538944a^7b^11c^4j^7m^2z^2 + 196608a^6b^13c^3j^7m^2z^2 - 4349952a^7b^11c^4h^7m^2z^2 + 337920a^6b^13c^3h^7m^2z^2 - 7680a^5b^15c^2h^7m^2z^2 - 62914560a^8b^7c^7g^7j^2z^2 - 26542080a^8b^8c^6h^7k^2z^2 + 17940480a^7b^10c^5f^7m^2z^2 + 11796480a^7b^10c^5g^7m^2z^2 - 37355520a^8b^7c^7f^7k^2z^2 - 1347584a^6b^12c^4f^7m^2z^2 + 68272128a^6b^10c^6d^7k^2z^2 - 589824a^6b^12c^4g^7m^2z^2 + 552960a^6b^12c^4h^7k^2z^2 - 147456a^7b^10c^5h^7k^2z^2 - 46080a^5b^14c^3h^7k^2z^2 + 35840a^5b^14c^3f^7m^2z^2 + 23592960a^7b^9c^6g^7j^2z^2 - 23592960a^7b^9c^6e^7m^2z^2 + 23371776a^6b^11c^5d^7m^2z^2 + 23101440a^7b^9c^6f^7k^2z^2 - 47185920a^7b^8c^7e^7j^2z^2 - 61931520a^7b^8c^7f^7h^2z^2 - 4349952a^6b^11c^5f^7k^2z^2 - 3538944a^6b^11c^5g^7j^2z^2 - 1677312a^5b^13c^4d^7m^2z^2 + 1179648a^6b^11c^5e^7m^2z^2 + 337920a^5b^13c^4f^7k^2z^2 + 196608a^5b^13c^4g^7j^2z^2 + 53760a^4b^15c^3d^7m^2z^2 - 7680a^4b^15c^3f^7k^2z^2 + 96583680a^5b^10c^7d^7f^2z^2 - 9179136a^5b^12c^5d^7k^2z^2 + 7077888a^6b^10c^6e^7j^2z^2 - 51609600a^6b^9c^7d^7h^2z^2 + 691200a^4b^14c^4d^7k^2z^2 - 393216a^5b^12c^5e^7j^2z^2 - 23040a^3b^16c^3d^7k^2z^2 + 6144000a^6b^10c^6f^7h^2z^2 + 61440a^5b^12c^5f^7h^2z^2 - 46080a^4b^14c^4f^7h^2z^2 + 1536a^3b^16c^3f^7h^2z^2 - 23592960a^6b^9c^7e^7g^2z^2 + 1179648a^5b^11c^6e^7g^2z^2 + 829440a^4b^13c^5d^7h^2z^2 + 368640a^5b^11c^6d^7h^2z^2 - 105984a^3b^15c^4d^7h^2z^2 + 4608a^2b^17c^3d^7h^2z^2 - 15175680a^4b^12c^6d^7f^2z^2 + 1428480a^3b^14c^5d^7f^2z^2 - 73728a^2b^16c^4d^7f^2z^2 + 4108320768a^{10}b^3c^9d^7m^2z^2 - 1207959552a^{11}b^7c^{10}e^7m^2z^2 - 1207959552a^{10}b^7c^{11}e^7g^2z^2 - 578813952a^{12}b^7c^9h^7m^2z^2 - 578813952a^{11}b^7c^{10}f^7k^2z^2 - 402653184a^{12}b^7c^9j^7m^2z^2 - 402653184a^{11}b^7c^{10}g^7j^2z^2 - 440401920a^{10}b^7c^{11}f^7m^2z^2$

$^2z^2 - 188743680a^{12}b^3c^9k^2z^2 - 188743680a^{11}b^3c^{10}h^2z^2 + 176$   
 $1607680a^{10}c^{12}d^2f^2z^2 - 14080a^6b^{15}c^m^2z^2 - 94464a^8b^{17}c^4d^2$   
 $z^2 + 6936330240a^8b^3c^{11}d^2z^2 + 2464874496a^6b^7c^9d^2z^2 - 3$   
 $963617280a^9b^3c^{12}d^2z^2 + 1056964608a^{11}c^{11}d^2k^2z^2 + 805306368a^{11}$   
 $c^{11}e^2j^2z^2 + 419430400a^{12}c^{10}f^2m^2z^2 + 251658240a^{13}c^9k^2m^2z^2 -$   
 $1509949440a^9b^2c^{11}e^2z^2 + 251658240a^{11}c^{11}f^2h^2z^2 + 150994944a^{12}$   
 $c^{10}h^2k^2z^2 - 5400428544a^7b^5c^{10}d^2z^2 + 754974720a^8b^4c^{10}$   
 $e^2z^2 - 730054656a^5b^9c^8d^2z^2 + 477102080a^{12}b^3c^7m^2z^2 -$   
 $377487360a^{11}b^4c^7l^2z^2 + 477102080a^9b^3c^{10}f^2z^2 + 3019898$   
 $88a^{12}b^2c^8l^2z^2 - 377487360a^9b^4c^9g^2z^2 + 301989888a^{10}b^2$   
 $c^{10}g^2z^2 - 174325760a^{11}b^5c^6m^2z^2 + 188743680a^{10}b^6c^6l^2$   
 $z^2 + 141557760a^{11}b^3c^8k^2z^2 + 188743680a^8b^6c^8g^2z^2 + 14$   
 $1557760a^{10}b^3c^9h^2z^2 - 174325760a^8b^5c^9f^2z^2 - 188743680a^7$   
 $b^6c^9e^2z^2 - 47185920a^9b^8c^5l^2z^2 + 11206656a^{10}b^7c^5m^2$   
 $z^2 + 8929280a^9b^9c^4m^2z^2 - 2600960a^8b^{11}c^3m^2z^2 + 291840$   
 $a^7b^{13}c^2m^2z^2 - 50331648a^{10}b^4c^8j^2z^2 + 146165760a^4b^{11}c^7$   
 $d^2z^2 - 26542080a^9b^7c^6k^2z^2 + 5898240a^8b^{10}c^4l^2z^2 -$   
 $294912a^7b^{12}c^3l^2z^2 - 33554432a^{11}b^2c^9j^2z^2 + 9584640a^8b^9$   
 $c^5k^2z^2 + 20971520a^9b^6c^7j^2z^2 - 2359296a^{10}b^5c^7k^2z^2 -$   
 $1290240a^7b^{11}c^4k^2z^2 + 46080a^6b^{13}c^3k^2z^2 + 2304a^5b^{15}$   
 $c^2k^2z^2 - 2752512a^7b^{10}c^5j^2z^2 + 2621440a^8b^8c^6j^2z^2 +$   
 $524288a^6b^{12}c^4j^2z^2 - 32768a^5b^{14}c^3j^2z^2 - 47185920a^7$   
 $b^8c^7g^2z^2 - 26542080a^8b^7c^7h^2z^2 + 9584640a^7b^9c^6h^2z^2 -$   
 $2359296a^9b^5c^8h^2z^2 - 1290240a^6b^{11}c^5h^2z^2 + 46080a^5b^{13}$   
 $c^4h^2z^2 + 2304a^4b^{15}c^3h^2z^2 + 5898240a^6b^{10}c^6g^2z^2 -$   
 $294912a^5b^{12}c^5g^2z^2 + 11206656a^7b^7c^8f^2z^2 + 8929280a^6$   
 $b^9c^7f^2z^2 + 23592960a^6b^8c^8e^2z^2 - 2600960a^5b^{11}c^6f^2z^2$   
 $+ 291840a^4b^{13}c^5f^2z^2 - 14080a^3b^{15}c^4f^2z^2 + 256a^2b^{17}c^3f^2z^2$   
 $- 19860480a^3b^{13}c^6d^2z^2 - 1179648a^5b^{10}c^7e^2z^2 + 1771776a^2b^{15}$   
 $c^5d^2z^2 - 440401920a^{13}b^3c^8m^2z^2 + 1207959552a^{10}c^{12}e^2z^2$   
 $+ 134217728a^{12}c^{10}j^2z^2 + 256a^5b^{17}m^2z^2 + 2304b^{19}c^3d^2z^2 -$   
 $23592960a^{10}b^3c^8f^2k^2z^2 + 99090432a^9b^3c^9d^2h^2z^2 + 9437184a^{10}$   
 $b^3c^8e^2k^2m^2z^2 + 23592960a^{10}b^3c^8g^2h^2m^2z^2 + 141557760a^8b^3c^{10}$   
 $d^2e^2k^2z^2 + 47185920a^9b^3c^9d^2j^2k^2z^2 - 23592960a^9b^3c^9f^2g^2k^2z^2$   
 $+ 169869312a^7b^3c^{11}d^2e^2f^2z^2 + 99090432a^8b^3c^{10}d^2g^2h^2z^2 - 314572$   
 $8a^9b^3c^9f^2h^2j^2z^2 + 56623104a^8b^3c^{10}d^2f^2j^2z^2 + 1536a^8b^{15}c^3d^2f^2j^2z^2$   
 $- 9437184a^8b^3c^{10}e^2f^2h^2z^2 - 4608a^8b^{14}c^4d^2f^2g^2z^2 + 9216a^8b^{13}c^5d^2$   
 $e^2f^2z^2 + 412876800a^8b^2c^9d^2e^2m^2z^2 - 206438400a^9b^3c^7d^2l^2m^2z^2 + 58$   
 $98240a^{10}b^4c^5k^2l^2m^2z^2 - 206438400a^8b^3c^8d^2g^2m^2z^2 - 4718592a^{11}b^2$   
 $c^6k^2l^2m^2z^2 - 2949120a^9b^6c^4k^2l^2m^2z^2 + 737280a^8b^8c^3k^2l^2m^2z^2 -$   
 $92160a^7b^{10}c^2k^2l^2m^2z^2 + 103219200a^8b^5c^6d^2l^2m^2z^2 - 29491200a^{10}$   
 $b^3c^6h^2l^2m^2z^2 - 206438400a^7b^4c^8d^2e^2m^2z^2 - 2359296a^{10}b^3c^6j^2k^2$   
 $m^2z^2 + 491520a^8b^7c^4j^2k^2m^2z^2 - 184320a^7b^9c^3j^2k^2m^2z^2 + 27648a^6b^{11}$   
 $c^2j^2k^2m^2z^2 + 14745600a^9b^5c^5h^2l^2m^2z^2 - 3686400a^8b^7c^4h^2l^2m^2z^2$   
 $+ 460800a^7b^9c^3h^2l^2m^2z^2 - 23040a^6b^{11}c^2h^2l^2m^2z^2 + 88473600a^8$

$$\begin{aligned}
& *b^4c^7dk*1z + 82575360a^9b^2c^8d*j*m*z + 11796480a^{10}b^2c^7h*j \\
& *m*z + 5898240a^9b^4c^6g*k*m*z - 4718592a^{10}b^2c^7g*k*m*z - 7077888 \\
& 0a^9b^2c^8d*k*1z - 2949120a^8b^6c^5g*k*m*z - 2457600a^8b^6c^5h \\
& *j*m*z + 921600a^7b^8c^4h*j*m*z + 737280a^7b^8c^4g*k*m*z - 138240a \\
& ^6b^{10}c^3h*j*m*z - 92160a^6b^{10}c^3g*k*m*z + 7680a^5b^{12}c^2h*j*m \\
& z + 4608a^5b^{12}c^2g*k*m*z + 29491200a^9b^3c^7f*k*1z - 176947200a^ \\
& 7b^3c^9d*e*k*z - 109707264a^8b^3c^8d*h*1z - 25804800a^7b^7c^5d* \\
& 1*m*z + 103219200a^7b^5c^7d*g*m*z + 219414528a^7b^2c^{10}d*e*h*z - 14 \\
& 745600a^8b^5c^6f*k*1z - 29491200a^9b^3c^7g*h*m*z - 11796480a^9b^ \\
& 3c^7e*k*m*z - 44236800a^7b^6c^6d*k*1z + 58982400a^9b^2c^8e*h*m*z \\
& + 5898240a^8b^5c^6e*k*m*z + 3686400a^7b^7c^5f*k*1z + 3225600a^6 \\
& b^9c^4d*1*m*z - 1474560a^7b^7c^5e*k*m*z - 460800a^6b^9c^4f*k*1z \\
& + 184320a^6b^9c^4e*k*m*z - 161280a^5b^{11}c^3d*1*m*z + 23040a^5b^{11} \\
& *c^3f*k*1z - 9216a^5b^{11}c^3e*k*m*z + 14745600a^8b^5c^6g*h*m*z + 1 \\
& 10886912a^7b^4c^8d*f*1z - 3686400a^7b^7c^5g*h*m*z - 221773824a^6 \\
& b^3c^{10}d*e*f*z + 460800a^6b^9c^4g*h*m*z - 17203200a^7b^6c^6d*j*m \\
& z - 23040a^5b^{11}c^3g*h*m*z - 29491200a^8b^4c^7e*h*m*z - 11796480a^ \\
& 9b^2c^8f*j*k*z + 11059200a^6b^8c^5d*k*1z + 6451200a^6b^8c^5d*j* \\
& m*z + 88473600a^7b^4c^8d*g*k*z + 2457600a^7b^6c^6f*j*k*z - 35389440 \\
& *a^8b^3c^8d*j*k*z - 1382400a^5b^{10}c^4d*k*1z - 84934656a^8b^2c^9 \\
& d*f*1z - 967680a^5b^{10}c^4d*j*m*z - 921600a^6b^8c^5f*j*k*z + 138240 \\
& *a^5b^{10}c^4f*j*k*z + 69120a^4b^{12}c^3d*k*1z + 53760a^4b^{12}c^3d*j \\
& *m*z - 7680a^4b^{12}c^3f*j*k*z + 44236800a^7b^5c^7d*h*1z + 7372800a \\
& ^7b^6c^6e*h*m*z - 5898240a^8b^4c^7f*h*1z + 4718592a^9b^2c^8f*h* \\
& 1z - 70778880a^8b^2c^9d*g*k*z + 2949120a^7b^6c^6f*h*1z - 921600a \\
& ^6b^8c^5e*h*m*z - 737280a^6b^8c^5f*h*1z + 92160a^5b^{10}c^4f*h*1 \\
& z + 46080a^5b^{10}c^4e*h*m*z - 4608a^4b^{12}c^3f*h*1z + 29491200a^8b \\
& ^3c^8f*g*k*z - 109707264a^7b^3c^9d*g*h*z - 25804800a^6b^7c^6d*g*m \\
& *z - 58982400a^8b^2c^9e*f*k*z - 58982400a^6b^6c^7d*f*1z + 7372800 \\
& a^6b^7c^6d*j*k*z + 88473600a^6b^5c^8d*e*k*z - 2764800a^5b^9c^5d* \\
& j*k*z + 51609600a^6b^6c^7d*e*m*z + 414720a^4b^{11}c^4d*j*k*z - 23040 \\
& a^3b^{13}c^3d*j*k*z - 14745600a^7b^5c^7f*g*k*z - 44236800a^6b^6c^7 \\
& d*g*k*z - 6635520a^6b^7c^6d*h*1z + 40108032a^8b^2c^9d*h*j*z + 3686 \\
& 400a^6b^7c^6f*g*k*z + 3225600a^5b^9c^5d*g*m*z + 2359296a^8b^3c^8 \\
& *f*h*j*z - 491520a^6b^7c^6f*h*j*z - 460800a^5b^9c^5f*g*k*z - 276480 \\
& *a^5b^9c^5d*h*1z + 184320a^5b^9c^5f*h*j*z + 179712a^4b^{11}c^4d*h \\
& *1z - 161280a^4b^{11}c^4d*g*m*z - 27648a^4b^{11}c^4f*h*j*z + 23040a^4 \\
& *b^{11}c^4f*g*k*z - 13824a^3b^{13}c^3d*h*1z + 1536a^3b^{13}c^3f*h*j*z \\
& + 29491200a^7b^4c^8e*f*k*z + 110886912a^6b^4c^9d*f*g*z + 16220160a \\
& ^5b^8c^6d*f*1z - 45613056a^7b^3c^9d*f*j*z + 11059200a^5b^8c^6d* \\
& g*k*z - 10321920a^6b^6c^7d*h*j*z - 7372800a^6b^6c^7e*f*k*z + 707788 \\
& 8a^7b^4c^8d*h*j*z - 6451200a^5b^8c^6d*e*m*z - 88473600a^6b^4c^9 \\
& d*e*h*z + 2396160a^5b^8c^6d*h*j*z - 2396160a^4b^{10}c^5d*f*1z - 1382 \\
& 400a^4b^{10}c^5d*g*k*z - 84934656a^7b^2c^{10}d*f*g*z + 921600a^5b^8c \\
& ^6e*f*k*z + 117964800a^5b^5c^9d*e*f*z + 322560a^4b^{10}c^5d*e*m*z +
\end{aligned}$$

$175104a^3b^{12}c^4d^*f^*l^*z + 69120a^3b^{12}c^4d^*g^*k^*z - 50688a^3b^{12}c^4d^*h^*j^*z - 46080a^4b^{10}c^5e^*f^*k^*z - 27648a^4b^{10}c^5d^*h^*j^*z + 4608a^2b^{14}c^3d^*h^*j^*z - 4608a^2b^{14}c^3d^*f^*l^*z + 44236800a^6b^5c^8d^*g^*h^*z - 5898240a^7b^4c^8f^*g^*h^*z - 22118400a^5b^7c^7d^*e^*k^*z + 4718592a^8b^2c^9f^*g^*h^*z + 2949120a^6b^6c^7f^*g^*h^*z - 737280a^5b^8c^6f^*g^*h^*z + 92160a^4b^{10}c^5f^*g^*h^*z - 4608a^3b^{12}c^4f^*g^*h^*z + 8847360a^5b^7c^7d^*f^*j^*z - 58982400a^5b^6c^8d^*f^*g^*z - 3809280a^4b^9c^6d^*f^*j^*z + 2764800a^4b^9c^6d^*e^*k^*z + 2359296a^6b^5c^8d^*f^*j^*z + 681984a^3b^{11}c^5d^*f^*j^*z - 138240a^3b^{11}c^5d^*e^*k^*z - 55296a^2b^{13}c^4d^*f^*j^*z + 11796480a^7b^3c^9e^*f^*h^*z - 6635520a^5b^7c^7d^*g^*h^*z - 5898240a^6b^5c^8e^*f^*h^*z + 1474560a^5b^7c^7e^*f^*h^*z - 276480a^4b^9c^6d^*g^*h^*z - 184320a^4b^9c^6e^*f^*h^*z + 179712a^3b^{11}c^5d^*g^*h^*z - 13824a^2b^{13}c^4d^*g^*h^*z + 9216a^3b^{11}c^5e^*f^*h^*z + 16220160a^4b^8c^7d^*f^*g^*z + 13271040a^5b^6c^8d^*e^*h^*z - 2396160a^3b^{10}c^6d^*f^*g^*z + 552960a^4b^8c^7d^*e^*h^*z - 359424a^3b^{10}c^6d^*e^*h^*z + 175104a^2b^{12}c^5d^*f^*g^*z + 27648a^2b^{12}c^5d^*e^*h^*z - 32440320a^4b^7c^8d^*e^*f^*z + 4792320a^3b^9c^7d^*e^*f^*z - 350208a^2b^{11}c^6d^*e^*f^*z + 165150720a^{10}b^c^8d^*l^*m^*z + 4608a^6b^{12}c^*k^*l^*m^*z + 23592960a^{11}b^c^7h^*l^*m^*z + 3145728a^{11}b^c^7j^*k^*m^*z - 1536a^5b^{13}c^*j^*k^*m^*z + 165150720a^9b^c^9d^*g^*m^*z + 346816512a^7b^c^{11}d^2g^*z + 19660800a^{12}b^c^6l^*m^2z - 34560a^7b^{11}c^*l^*m^2z - 7077888a^{11}b^c^7k^2l^*z + 11008a^6b^{12}c^*j^*m^2z + 19660800a^{11}b^c^7g^*m^2z + 7077888a^{10}b^c^8h^2l^*z + 768a^5b^{13}c^*g^*m^2z - 19660800a^9b^c^9f^2l^*z - 7077888a^{10}b^c^8g^*k^2z - 6912a^*b^{15}c^3d^2*l^*z + 7077888a^9b^c^9g^*h^2z - 19660800a^8b^c^{10}f^2g^*z - 66816a^*b^{14}c^4d^2j^*z + 214272a^*b^{13}c^5d^2g^*z - 428544a^*b^{12}c^6d^2e^*z - 330301440a^9c^{10}d^*e^*m^*z - 110100480a^{10}c^9d^*j^*m^*z - 15728640a^{11}c^8h^*j^*m^*z - 47185920a^{10}c^9e^*h^*m^*z - 198180864a^8c^{11}d^*e^*h^*z + 15728640a^{10}c^9f^*j^*k^*z - 66060288a^9c^{10}d^*h^*j^*z + 47185920a^9c^{10}e^*f^*k^*z + 1022754816a^6b^2c^{11}d^2e^*z - 642318336a^5b^4c^{10}d^2e^*z - 511377408a^7b^3c^9d^2l^*z - 511377408a^6b^3c^{10}d^2g^*z + 321159168a^6b^5c^8d^2l^*z + 321159168a^5b^5c^9d^2g^*z + 225312768a^7b^2c^{10}d^2j^*z - 25362432a^{11}b^3c^5l^*m^2z + 13271040a^{10}b^5c^4l^*m^2z - 3563520a^9b^7c^3l^*m^2z + 506880a^8b^9c^2l^*m^2z + 10354688a^{11}b^2c^6j^*m^2z + 8847360a^{10}b^3c^6k^2l^*z - 4423680a^9b^5c^5k^2l^*z - 204800a^9b^6c^4j^*m^2z + 1105920a^8b^7c^4k^2l^*z + 849920a^8b^8c^3j^*m^2z - 393216a^{10}b^4c^5j^*m^2z - 145920a^7b^{10}c^2j^*m^2z - 138240a^7b^9c^3k^2l^*z + 6912a^6b^{11}c^2k^2l^*z - 111697920a^5b^7c^7d^2l^*z + 223395840a^4b^6c^9d^2e^*z - 25362432a^{10}b^3c^6g^*m^2z - 3538944a^{10}b^2c^7j^*k^2z + 737280a^8b^6c^5j^*k^2z + 50724864a^{10}b^2c^7e^*m^2z - 276480a^7b^8c^4j^*k^2z + 41472a^6b^{10}c^3j^*k^2z - 2304a^5b^{12}c^2j^*k^2z + 13271040a^9b^5c^5g^*m^2z - 8847360a^9b^3c^7h^2l^*z + 4423680a^8b^5c^6h^2l^*z - 3563520a^8b^7c^4g^*m^2z - 1105920a^7b^7c^5h^2l^*z + 506880a^7b^9c^3g^*m^2z + 138240a^6b^9c^4h^2l^*z - 34560a^6b^{11}c^2g^*m^2z - 6912a^5b^{11}c^3h^2l^*z - 26542080a^9b^4c^6e^*m^2z + 25362432a^8b^3c^8f^2l^*z - 13271040a^7b^5c^7f^$

$^2*1*z + 8847360*a^9*b^3*c^7*g*k^2*z + 7127040*a^8*b^6*c^5*e*m^2*z - 442368$   
 $0*a^8*b^5*c^6*g*k^2*z + 3563520*a^6*b^7*c^6*f^2*1*z + 3538944*a^9*b^2*c^8*h$   
 $^2*j*z + 1105920*a^7*b^7*c^5*g*k^2*z - 1013760*a^7*b^8*c^4*e*m^2*z - 737280$   
 $*a^7*b^6*c^6*h^2*j*z - 506880*a^5*b^9*c^5*f^2*1*z + 276480*a^6*b^8*c^5*h^2*$   
 $j*z - 138240*a^6*b^9*c^4*g*k^2*z + 69120*a^6*b^10*c^3*e*m^2*z - 41472*a^5*b$   
 $^10*c^4*h^2*j*z + 34560*a^4*b^11*c^4*f^2*1*z + 6912*a^5*b^11*c^3*g*k^2*z +$   
 $2304*a^4*b^12*c^3*h^2*j*z - 1536*a^5*b^12*c^2*e*m^2*z - 768*a^3*b^13*c^3*f^$   
 $2*1*z - 111697920*a^4*b^7*c^8*d^2*g*z + 23362560*a^4*b^9*c^6*d^2*1*z - 1769$   
 $4720*a^9*b^2*c^8*e*k^2*z - 10354688*a^8*b^2*c^9*f^2*j*z - 43646976*a^6*b^4*$   
 $c^9*d^2*j*z + 8847360*a^8*b^4*c^7*e*k^2*z - 2965248*a^3*b^11*c^5*d^2*1*z -$   
 $2211840*a^7*b^6*c^6*e*k^2*z + 2048000*a^6*b^6*c^7*f^2*j*z - 849920*a^5*b^8*$   
 $c^6*f^2*j*z + 393216*a^7*b^4*c^8*f^2*j*z + 276480*a^6*b^8*c^5*e*k^2*z + 214$   
 $272*a^2*b^13*c^4*d^2*1*z + 145920*a^4*b^10*c^5*f^2*j*z - 13824*a^5*b^10*c^4$   
 $*e*k^2*z - 11008*a^3*b^12*c^4*f^2*j*z + 256*a^2*b^14*c^3*f^2*j*z - 32587776$   
 $*a^5*b^6*c^8*d^2*j*z - 8847360*a^8*b^3*c^8*g*h^2*z + 21657600*a^4*b^8*c^7*d$   
 $^2*j*z + 4423680*a^7*b^5*c^7*g*h^2*z - 1105920*a^6*b^7*c^6*g*h^2*z + 138240$   
 $*a^5*b^9*c^5*g*h^2*z - 6912*a^4*b^11*c^4*g*h^2*z + 25362432*a^7*b^3*c^9*f^2$   
 $*g*z - 5810688*a^3*b^10*c^6*d^2*j*z + 17694720*a^8*b^2*c^9*e*h^2*z + 845568$   
 $*a^2*b^12*c^5*d^2*j*z - 50724864*a^7*b^2*c^10*e*f^2*z - 13271040*a^6*b^5*c^$   
 $8*f^2*g*z - 8847360*a^7*b^4*c^8*e*h^2*z + 3563520*a^5*b^7*c^7*f^2*g*z + 221$   
 $1840*a^6*b^6*c^7*e*h^2*z - 506880*a^4*b^9*c^6*f^2*g*z - 276480*a^5*b^8*c^6*$   
 $e*h^2*z + 34560*a^3*b^11*c^5*f^2*g*z + 13824*a^4*b^10*c^5*e*h^2*z - 768*a^2$   
 $*b^13*c^4*f^2*g*z + 26542080*a^6*b^4*c^9*e*f^2*z + 23362560*a^3*b^9*c^7*d^2$   
 $*g*z - 46725120*a^3*b^8*c^8*d^2*e*z - 7127040*a^5*b^6*c^8*e*f^2*z - 2965248$   
 $*a^2*b^11*c^6*d^2*g*z + 1013760*a^4*b^8*c^7*e*f^2*z - 69120*a^3*b^10*c^6*e*$   
 $f^2*z + 1536*a^2*b^12*c^5*e*f^2*z + 5930496*a^2*b^10*c^7*d^2*e*z + 34681651$   
 $2*a^8*b*c^10*d^2*1*z - 693633024*a^7*c^12*d^2*e*z - 231211008*a^8*c^11*d^2*$   
 $j*z + 768*a^6*b^13*1*m^2*z - 13107200*a^12*c^7*j*m^2*z - 256*a^5*b^14*j*m^2$   
 $*z + 4718592*a^11*c^8*j*k^2*z - 39321600*a^11*c^8*e*m^2*z - 4718592*a^10*c^$   
 $9*h^2*j*z + 14155776*a^10*c^9*e*k^2*z + 13107200*a^9*c^10*f^2*j*z + 2304*b^$   
 $16*c^3*d^2*j*z - 14155776*a^9*c^10*e*h^2*z + 39321600*a^8*c^11*e*f^2*z - 69$   
 $12*b^15*c^4*d^2*g*z + 13824*b^14*c^5*d^2*e*z + 737280*a^10*b*c^5*j*k*1*m -$   
 $2304*a^6*b^9*c*j*k*1*m + 2211840*a^9*b*c^6*e*k*1*m + 1228800*a^9*b*c^6*f*j*$   
 $1*m + 737280*a^9*b*c^6*g*j*k*m + 442368*a^9*b*c^6*h*j*k*1 + 36*a^3*b^12*c*f$   
 $*h*k*m + 3096576*a^8*b*c^7*d*j*k*1 - 12745728*a^8*b*c^7*d*h*k*m + 3686400*a$   
 $^8*b*c^7*e*f*1*m + 3391488*a^8*b*c^7*e*h*j*m + 2211840*a^8*b*c^7*e*g*k*m +$   
 $1327104*a^8*b*c^7*e*h*k*1 + 1228800*a^8*b*c^7*f*g*j*m + 737280*a^8*b*c^7*f*$   
 $h*j*1 + 442368*a^8*b*c^7*g*h*j*k + 108*a^2*b^13*c*d*h*k*m + 16367616*a^7*b*$   
 $c^8*d*e*j*m + 9289728*a^7*b*c^8*d*e*k*1 + 5160960*a^7*b*c^8*d*f*j*1 + 33914$   
 $88*a^7*b*c^8*e*f*j*k + 3096576*a^7*b*c^8*d*g*j*k - 19307520*a^7*b*c^8*d*f*h$   
 $*m + 3686400*a^7*b*c^8*e*f*g*m + 2211840*a^7*b*c^8*e*f*h*1 + 1327104*a^7*b*$   
 $c^8*e*g*h*k + 737280*a^7*b*c^8*f*g*h*j - 180*a*b^13*c^2*d*f*h*m - 540*a*b^1$   
 $2*c^3*d*f*h*k + 15482880*a^6*b*c^9*d*e*f*1 + 11059200*a^6*b*c^9*d*e*h*j + 9$   
 $289728*a^6*b*c^9*d*e*g*k + 5160960*a^6*b*c^9*d*f*g*j - 2304*a*b^11*c^4*d*f*$   
 $g*j + 2211840*a^6*b*c^9*e*f*g*h + 4608*a*b^10*c^5*d*e*f*j + 15482880*a^5*b*$

$c^{10}d^*e^*f^*g - 13824a^*b^9c^6d^*e^*f^*g + 36a^*b^{14}c^*d^*f^*k^*m + 1843200a^9b^3c^4j^*k^*l^*m + 783360a^8b^5c^3j^*k^*l^*m + 18432a^7b^7c^2j^*k^*l^*m - 2211840a^8b^4c^4g^*k^*l^*m - 1695744a^9b^2c^5h^*j^*l^*m - 1400832a^8b^4c^4h^*j^*l^*m - 1105920a^9b^2c^5g^*k^*l^*m - 253440a^7b^6c^3h^*j^*l^*m - 69120a^7b^6c^3g^*k^*l^*m + 11520a^6b^8c^2h^*j^*l^*m + 6912a^6b^8c^2g^*k^*l^*m + 4423680a^8b^3c^5e^*k^*l^*m + 2506752a^8b^3c^5f^*j^*l^*m + 1843200a^8b^3c^5g^*j^*k^*m + 1327104a^8b^3c^5h^*j^*k^*l + 838656a^7b^5c^4f^*j^*l^*m + 783360a^7b^5c^4g^*j^*k^*m + 691200a^7b^5c^4h^*j^*k^*l + 138240a^7b^5c^4e^*k^*l^*m + 69120a^6b^7c^3h^*j^*k^*l - 53760a^6b^7c^3f^*j^*l^*m + 18432a^6b^7c^3g^*j^*k^*m - 13824a^6b^7c^3e^*k^*l^*m - 2304a^5b^9c^2g^*j^*k^*m + 2543616a^8b^3c^5g^*h^*l^*m + 829440a^7b^5c^4g^*h^*l^*m - 34560a^6b^7c^3g^*h^*l^*m - 8183808a^8b^2c^6d^*j^*l^*m - 3686400a^8b^2c^6e^*j^*k^*m - 2285568a^7b^4c^5d^*j^*l^*m - 1695744a^8b^2c^6f^*j^*k^*l - 1566720a^7b^4c^5e^*j^*k^*m - 1400832a^7b^4c^5f^*j^*k^*l + 741888a^6b^6c^4d^*j^*l^*m - 253440a^6b^6c^4f^*j^*k^*l - 80640a^5b^8c^3d^*j^*l^*m - 36864a^6b^6c^4e^*j^*k^*m + 11520a^5b^8c^3f^*j^*k^*l + 4608a^5b^8c^3e^*j^*k^*m + 6700032a^8b^2c^6f^*h^*k^*m + 5103360a^7b^4c^5f^*h^*k^*m - 5087232a^8b^2c^6e^*h^*l^*m - 2838528a^7b^4c^5f^*g^*l^*m - 1843200a^8b^2c^6f^*g^*l^*m - 1695744a^8b^2c^6g^*h^*j^*m - 1658880a^7b^4c^5g^*h^*k^*l - 1658880a^7b^4c^5e^*h^*l^*m - 1400832a^7b^4c^5g^*h^*j^*m - 663552a^8b^2c^6g^*h^*k^*l + 483840a^6b^6c^4f^*h^*k^*m - 253440a^6b^6c^4g^*h^*j^*m - 207360a^6b^6c^4g^*h^*k^*l + 161280a^6b^6c^4f^*g^*l^*m + 69120a^6b^6c^4e^*h^*l^*m - 50040a^5b^8c^3f^*h^*k^*m + 11520a^5b^8c^3g^*h^*j^*m + 180a^4b^10c^2f^*h^*k^*m + 4202496a^7b^3c^6d^*j^*k^*l + 635904a^6b^5c^5d^*j^*k^*l - 276480a^5b^7c^4d^*j^*k^*l + 34560a^4b^9c^3d^*j^*k^*l - 16671744a^7b^3c^6d^*h^*k^*m + 12275712a^7b^3c^6d^*g^*l^*m + 5677056a^7b^3c^6e^*f^*l^*m + 4423680a^7b^3c^6e^*g^*k^*m + 3317760a^7b^3c^6e^*h^*k^*l + 2801664a^7b^3c^6e^*h^*j^*m - 2709504a^6b^5c^5d^*g^*l^*m + 2543616a^7b^3c^6f^*g^*k^*l + 2506752a^7b^3c^6f^*g^*j^*m + 1843200a^7b^3c^6f^*h^*j^*l + 1327104a^7b^3c^6g^*h^*j^*k + 838656a^6b^5c^5f^*g^*j^*m + 829440a^6b^5c^5f^*g^*k^*l + 783360a^6b^5c^5f^*h^*j^*l + 691200a^6b^5c^5g^*h^*j^*k + 665280a^5b^7c^4d^*h^*k^*m + 506880a^6b^5c^5e^*h^*j^*m + 414720a^6b^5c^5e^*h^*k^*l - 322560a^6b^5c^5e^*f^*l^*m + 241920a^5b^7c^4d^*g^*l^*m + 138240a^6b^5c^5e^*g^*k^*m - 108540a^4b^9c^3d^*h^*k^*m + 69120a^5b^7c^4g^*h^*j^*k - 53760a^5b^7c^4f^*g^*j^*m - 51840a^6b^5c^5d^*h^*k^*m - 34560a^5b^7c^4f^*g^*k^*l - 23040a^5b^7c^4e^*h^*j^*m + 18432a^5b^7c^4f^*h^*j^*l - 13824a^5b^7c^4e^*g^*k^*m - 2304a^4b^9c^3f^*h^*j^*l + 1296a^3b^11c^2d^*h^*k^*m + 31924224a^7b^2c^7d^*f^*k^*m - 24551424a^7b^2c^7d^*e^*l^*m + 10616832a^7b^2c^7e^*g^*j^*l - 8183808a^7b^2c^7d^*g^*j^*m - 5529600a^7b^2c^7d^*h^*j^*l + 5419008a^6b^4c^6d^*e^*l^*m + 5308416a^6b^4c^6e^*g^*j^*l - 5087232a^7b^2c^7e^*f^*k^*l - 5013504a^7b^2c^7e^*f^*j^*m + 4868352a^6b^4c^6d^*f^*k^*m - 4644864a^7b^2c^7d^*g^*k^*l - 3981312a^6b^4c^6d^*g^*k^*l - 2654208a^7b^2c^7e^*h^*j^*k - 2367360a^5b^6c^5d^*f^*k^*m - 2285568a^6b^4c^6d^*g^*j^*m - 2211840a^6b^4c^6d^*h^*j^*l - 1695744a^7b^2c^7f^*g^*j^*k - 1677312a^6b^4c^6e^*f^*j^*m - 1658880a^6b^4c^6e^*f^*k^*l - 1400832a^6b^4c^6f^*g^*j^*k - 1382400a^6b^4c^6e^*h^*j^*k + 10368$

$00a^5b^6c^5d^5g^5k^5 + 741888a^5b^6c^5d^5g^5j^5m - 483840a^5b^6c^5d^5e^5l^5m + 317952a^5b^6c^5d^5h^5j^5l + 268920a^4b^8c^4d^5f^5k^5m - 253440a^5b^6c^5f^5g^5j^5k - 138240a^5b^6c^5e^5h^5j^5k + 107520a^5b^6c^5e^5f^5j^5m - 103680a^4b^8c^4d^5g^5k^5l - 80640a^4b^8c^4d^5g^5j^5m + 69120a^5b^6c^5e^5f^5k^5l + 11520a^4b^8c^4f^5g^5j^5k + 6912a^4b^8c^4d^5h^5j^5l - 6912a^3b^10c^3d^5h^5j^5l + 6120a^3b^10c^3d^5f^5k^5m - 1368a^2b^12c^2d^5f^5k^5m - 5087232a^7b^2c^7e^5g^5h^5m - 2211840a^6b^4c^6f^5g^5h^5l - 1658880a^6b^4c^6e^5g^5h^5m - 1105920a^7b^2c^7f^5g^5h^5l - 69120a^5b^6c^5f^5g^5h^5l + 69120a^5b^6c^5e^5g^5h^5m + 6912a^4b^8c^4f^5g^5h^5l + 7962624a^6b^3c^7d^5e^5k^5l - 22164480a^6b^3c^7d^5f^5h^5m + 5160960a^6b^3c^7d^5f^5j^5l + 4571136a^6b^3c^7d^5e^5j^5m + 4202496a^6b^3c^7d^5g^5j^5k + 2801664a^6b^3c^7e^5f^5j^5k - 2073600a^5b^5c^6d^5e^5k^5l - 1483776a^5b^5c^6d^5e^5j^5m + 635904a^5b^5c^6d^5g^5j^5k + 506880a^5b^5c^6e^5f^5j^5k - 354816a^4b^7c^5d^5f^5j^5l + 322560a^5b^5c^6d^5f^5j^5l - 276480a^4b^7c^5d^5g^5j^5k + 207360a^4b^7c^5d^5e^5k^5l + 161280a^4b^7c^5d^5e^5j^5m + 59904a^3b^9c^4d^5f^5j^5l + 34560a^3b^9c^4d^5g^5j^5k - 23040a^4b^7c^5e^5f^5j^5k - 2304a^2b^11c^3d^5f^5j^5l + 8294400a^6b^3c^7d^5g^5h^5l + 5677056a^6b^3c^7e^5f^5g^5m + 4423680a^6b^3c^7e^5f^5h^5l + 3317760a^6b^3c^7e^5g^5h^5k + 2805120a^5b^5c^6d^5f^5h^5m + 1843200a^6b^3c^7f^5g^5h^5j - 829440a^5b^5c^6d^5g^5h^5l + 783360a^5b^5c^6f^5g^5h^5j + 437184a^4b^7c^5d^5f^5h^5m + 414720a^5b^5c^6e^5g^5h^5k - 322560a^5b^5c^6e^5f^5g^5m - 146268a^3b^9c^4d^5f^5h^5m + 138240a^5b^5c^6e^5f^5h^5l - 62208a^4b^7c^5d^5g^5h^5l + 20736a^3b^9c^4d^5g^5h^5l + 18432a^4b^7c^5f^5g^5h^5j - 13824a^4b^7c^5e^5f^5h^5l + 9360a^2b^11c^3d^5f^5h^5m - 2304a^3b^9c^4f^5g^5h^5j - 8404992a^6b^2c^8d^5e^5j^5k - 24551424a^6b^2c^8d^5e^5g^5m + 21150720a^6b^2c^8d^5f^5h^5k - 1271808a^5b^4c^7d^5e^5j^5k + 552960a^4b^6c^6d^5e^5j^5k - 69120a^3b^8c^5d^5e^5j^5k - 16588800a^6b^2c^8d^5e^5h^5l - 7741440a^6b^2c^8d^5f^5g^5l + 6946560a^5b^4c^7d^5f^5h^5k - 5529600a^6b^2c^8d^5g^5h^5j + 5419008a^5b^4c^7d^5e^5g^5m - 5087232a^6b^2c^8e^5f^5g^5k - 3870720a^5b^4c^7d^5f^5g^5l - 3686400a^6b^2c^8e^5f^5h^5j - 2211840a^5b^4c^7d^5g^5h^5j - 1755648a^4b^6c^6d^5f^5h^5k - 1658880a^5b^4c^7e^5f^5g^5k + 1658880a^5b^4c^7d^5e^5h^5l - 1566720a^5b^4c^7e^5f^5h^5j + 1451520a^4b^6c^6d^5f^5g^5l - 483840a^4b^6c^6d^5e^5g^5m + 317952a^4b^6c^6d^5g^5h^5j - 193536a^3b^8c^5d^5f^5g^5l + 124416a^4b^6c^6d^5e^5h^5l + 114696a^3b^8c^5d^5f^5h^5k + 69120a^4b^6c^6e^5f^5g^5k - 41472a^3b^8c^5d^5e^5h^5l - 36864a^4b^6c^6e^5f^5h^5j + 14580a^2b^10c^4d^5f^5h^5k + 6912a^3b^8c^5d^5g^5h^5j - 6912a^2b^10c^4d^5g^5h^5j + 6912a^2b^10c^4d^5f^5g^5l + 4608a^3b^8c^5e^5f^5h^5j + 7962624a^5b^3c^8d^5e^5g^5k + 7741440a^5b^3c^8d^5e^5f^5l + 5160960a^5b^3c^8d^5f^5g^5j + 4423680a^5b^3c^8d^5e^5h^5j - 2903040a^4b^5c^7d^5e^5f^5l - 2073600a^4b^5c^7d^5e^5g^5k - 635904a^4b^5c^7d^5e^5h^5j + 387072a^3b^7c^6d^5e^5f^5l - 354816a^3b^7c^6d^5f^5g^5j + 322560a^4b^5c^7d^5f^5g^5j + 207360a^3b^7c^6d^5e^5g^5k + 59904a^2b^9c^5d^5f^5g^5j - 13824a^3b^7c^6d^5e^5h^5j + 13824a^2b^9c^5d^5e^5h^5j - 13824a^2b^9c^5d^5e^5f^5l + 4423680a^5b^3c^8e^5f^5g^5h + 138240a^4b^5c^7e^5f^5g^5h - 13824a^3b^7c^6e^5f^5g^5h - 10321920a^5b^2c^9d^5e^5f^5j + 709632a^3b^6c^7d^5e^5f^5j - 645120a^4b^4c^8d^5e^5f^5j - 119808a^2b^8c^6d^5e^5f^5j - 1658$

$8800a^5b^2c^9d*eg*h + 1658880a^4b^4c^8d*eg*h + 124416a^3b^6c^7$   
 $*d*eg*h - 41472a^2b^8c^6d*eg*h + 7741440a^4b^3c^9d*ef*g - 290304$   
 $0a^3b^5c^8d*ef*g + 387072a^2b^7c^7d*ef*g + 3456a^7b^8c*k^1^2m$   
 $+ 12672a^7b^8c*j^1m^2 + 384a^5b^10c*j^2k*m - 1635840a^10b*c^5h*$   
 $k*m^2 - 1009152a^9b*c^6h^2k*m + 3690a^6b^9c*h*k*m^2 + 1152a^6b^9c$   
 $*g^1m^2 - 540a^5b^10c*h*k^2m + 54a^4b^11c*h^2k*m + 565248a^9b*c^$   
 $6h*j^2m - 39771648a^7b*c^8d^2k*m - 2496000a^8b*c^7f^2k*m - 154368$   
 $0a^9b*c^6f*k^2m + 1980a^5b^10c*f*k*m^2 - 384a^5b^10c*g*j*m^2 - 18$   
 $0a^4b^11c*f*k^2m + 6a^2b^13c*f^2k*m - 10298880a^9b*c^6d*k*m^2 +$   
 $2580480a^9b*c^6e*j*m^2 + 5310a^4b^11c*d*k*m^2 - 1674a*b^13c^2d^2k*$   
 $*m - 540a^3b^12c*d*k^2m - 10616832a^7b*c^8e^2*j^1 - 3538944a^8b*c^$   
 $7e*j^2^1 + 2727936a^8b*c^7d*j^2m - 2496000a^9b*c^6f*h*m^2 - 1543680$   
 $a^8b*c^7f*h^2m + 565248a^8b*c^7f*j^2k - 270a^4b^11c*f*h*m^2 - 59$   
 $512320a^6b*c^9d^2f*m + 5087232a^7b*c^8e^2h*m + 1105920a^8b*c^7e*$   
 $j*k^2 - 3456a*b^12c^3d^2*j^1 - 1635840a^7b*c^8f^2h*k - 1009152a^8b$   
 $*c^7f*h*k^2 + 10260a*b^12c^3d^2h*m - 684a^3b^12c*d*h*m^2 - 24675840$   
 $a^6b*c^9d^2h*k - 15552000a^8b*c^7d*f*m^2 + 24551424a^6b*c^9d*e^2*$   
 $m - 3939840a^7b*c^8d*h^2k + 1105920a^7b*c^8e*h^2*j - 25074a*b^11c^$   
 $4d^2f*m + 10530a*b^11c^4d^2h*k + 10368a*b^11c^4d^2*g^1 + 420a*b^1$   
 $2c^3d*f^2m - 378a^2b^13c*d*f*m^2 - 10616832a^6b*c^9e^2*g*j + 50872$   
 $32a^6b*c^9e^2f*k - 3538944a^7b*c^8e*g*j^2 + 1843200a^7b*c^8d*h*j^$   
 $2 - 7994880a^6b*c^9d*f^2k - 4990464a^7b*c^8d*f*k^2 + 2580480a^6b*c$   
 $^9e*f^2*j + 65664a*b^10c^5d^2*g*j - 27972a*b^10c^5d^2f*k - 20736a*$   
 $b^10c^5d^2e^1 + 1260a*b^11c^4d*f^2k + 54a*b^13c^2d*f*k^2 + 232243$   
 $20a^5b*c^10d^2e*j - 37062144a^5b*c^10d^2f*h + 384a*b^12c^3d*f*j^$   
 $2 - 131328a*b^9c^6d^2e*j - 5985792a^6b*c^9d*f*h^2 + 206010a*b^9c^6$   
 $d^2f*h - 6300a*b^10c^5d*f^2h + 1350a*b^11c^4d*f*h^2 + 16588800a^5$   
 $*b*c^10d*e^2h + 3456a*b^10c^5d*f*g^2 + 435456a*b^8c^7d^2e*g + 1382$   
 $4a*b^8c^7d*e^2f - 1474560a^9c^7e*j*k*m + 460800a^9c^7f*h*k*m + 32$   
 $25600a^8c^8d*f*k*m - 2457600a^8c^8e*f*j*m - 884736a^8c^8e*h*j*k -$   
 $6193152a^7c^9d*e*j*k + 1935360a^7c^9d*f*h*k - 1474560a^7c^9e*f*h*j$   
 $- 10321920a^6c^10d*ef*j - 1105920a^9b^4c^3k^1^2m - 552960a^10b^$   
 $2c^4k^1^2m - 34560a^8b^6c^2k^1^2m - 1290240a^10b^2c^4j^1m^2 -$   
 $860160a^9b^4c^3j^1m^2 - 80640a^8b^6c^2j^1m^2 - 737280a^9b^2c^5$   
 $*j^2k*m - 568320a^8b^4c^4j^2k*m - 136704a^7b^6c^3j^2k*m - 2304a*$   
 $^6b^8c^2j^2k*m + 1271808a^9b^3c^4h^1^2m - 552960a^9b^2c^5j*k^2$   
 $*1 - 552960a^8b^4c^4j*k^2^1 + 414720a^8b^5c^3h^1^2m - 145152a^7b$   
 $^6c^3j*k^2^1 - 17280a^7b^7c^2h^1^2m - 3456a^6b^8c^2j*k^2^1 - 364$   
 $0320a^9b^3c^4h*k*m^2 - 2626560a^8b^3c^5h^2k*m + 2211840a^9b^2c^$   
 $5h*k^2m + 2056320a^8b^4c^4h*k^2m + 1935360a^9b^3c^4g^1m^2 - 114$   
 $3360a^8b^5c^3h*k*m^2 - 1097280a^7b^5c^4h^2k*m + 364608a^7b^6c^3$   
 $*h*k^2m + 322560a^8b^5c^3g^1m^2 - 56160a^6b^7c^3h^2k*m - 40320a*$   
 $^7b^7c^2g^1m^2 + 27936a^7b^7c^2h*k*m^2 - 3780a^6b^8c^2h*k^2m +$   
 $2970a^5b^9c^2h^2k*m - 1419264a^8b^4c^4f^1^2m - 1105920a^7b^4c$   
 $^5g^2k*m - 921600a^9b^2c^5f^1^2m - 829440a^8b^4c^4h*k^1^2 + 7495$



$68a^8b^3c^5h^2j^2m - 552960a^8b^2c^6g^2k^2m - 331776a^9b^2c^5h^2k^2 + 317952a^7b^5c^4h^2j^2m - 103680a^7b^6c^3h^2k^2 + 80640a^7b^6c^3f^2m + 38400a^6b^7c^3h^2j^2m - 34560a^6b^6c^4g^2k^2m + 3456a^5b^8c^3g^2k^2m - 1920a^5b^9c^2h^2j^2m - 5142528a^7b^3c^6f^2k^2m + 5068800a^9b^2c^5f^2k^2m - 3870720a^9b^2c^5e^2m - 3755520a^8b^3c^5f^2k^2m + 3000960a^8b^4c^4f^2k^2m - 1290240a^9b^2c^5g^2j^2m - 1085760a^7b^5c^4f^2k^2m - 959040a^6b^5c^5f^2k^2m - 860160a^8b^4c^4g^2j^2m + 829440a^8b^3c^5g^2k^2m - 645120a^8b^4c^4e^2m - 552960a^8b^2c^6h^2j^2m - 552960a^7b^4c^5h^2j^2m + 414720a^7b^5c^4g^2k^2m - 145152a^6b^6c^4h^2j^2m + 103200a^5b^7c^4f^2k^2m - 80640a^7b^6c^3g^2j^2m + 80640a^7b^6c^3e^2m + 41280a^7b^6c^3f^2k^2m - 37188a^6b^8c^2f^2k^2m + 13536a^6b^7c^3f^2k^2m + 12672a^6b^8c^2g^2j^2m + 10368a^6b^7c^3g^2k^2m + 5490a^5b^9c^2f^2k^2m - 3456a^5b^8c^3h^2j^2m - 2304a^6b^8c^2e^2m + 810a^4b^9c^3f^2k^2m - 270a^3b^11c^2f^2k^2m + 6137856a^8b^3c^5d^2m - 4423680a^7b^2c^7e^2k^2m - 2654208a^8b^3c^5g^2j^2m - 2654208a^7b^3c^6g^2j^2m + 1769472a^8b^2c^6g^2j^2m + 1769472a^7b^4c^5g^2j^2m - 1354752a^7b^5c^4d^2m - 1327104a^7b^5c^4g^2j^2m - 1327104a^6b^5c^5g^2j^2m + 1271808a^8b^3c^5f^2k^2m - 1040384a^8b^2c^6f^2j^2m - 697344a^7b^4c^5f^2j^2m - 516096a^8b^2c^6h^2j^2k - 451584a^7b^4c^5h^2j^2k + 442368a^6b^6c^4g^2j^2m + 414720a^7b^5c^4f^2k^2m - 138240a^6b^6c^4h^2j^2k - 138240a^6b^4c^6e^2k^2m - 121856a^6b^6c^4f^2j^2m + 120960a^6b^7c^3d^2m - 17280a^6b^7c^3f^2k^2m + 13824a^5b^6c^5e^2k^2m - 11520a^5b^8c^3h^2j^2k + 8960a^5b^8c^3f^2j^2m + 10851840a^8b^2c^6d^2k^2m - 10464768a^6b^3c^7d^2k^2m - 10275840a^8b^3c^5d^2k^2m + 7121088a^5b^5c^6d^2k^2m + 3127680a^7b^4c^5d^2k^2m + 1720320a^8b^3c^5e^2j^2m - 1658880a^8b^2c^6e^2k^2m - 1290240a^7b^2c^7f^2j^2m + 1271808a^7b^3c^6g^2h^2m - 1222560a^4b^7c^5d^2k^2m + 999360a^7b^5c^4d^2k^2m - 860160a^6b^4c^6f^2j^2m - 829440a^7b^4c^5e^2k^2m - 705024a^6b^6c^4d^2k^2m - 552960a^8b^2c^6g^2j^2k^2 - 552960a^7b^4c^5g^2j^2k^2 + 414720a^6b^5c^5g^2h^2m + 319392a^6b^7c^3d^2k^2m + 161280a^7b^5c^4e^2j^2m - 145152a^6b^6c^4g^2j^2k^2 - 85734a^5b^9c^2d^2k^2m - 80640a^5b^6c^5f^2j^2m - 25344a^6b^7c^3e^2j^2m + 23490a^3b^9c^4d^2k^2m - 20736a^6b^6c^4e^2k^2m - 17280a^5b^7c^4g^2h^2m + 14148a^5b^8c^3d^2k^2m + 13716a^2b^11c^3d^2k^2m + 12690a^4b^10c^2d^2k^2m + 12672a^4b^8c^4f^2j^2m - 3456a^5b^8c^3g^2j^2k^2 + 768a^5b^9c^2e^2j^2m - 384a^3b^10c^3f^2j^2m + 5308416a^8b^2c^6e^2j^2m - 5308416a^6b^3c^7e^2j^2m - 5142528a^8b^3c^5f^2h^2m + 5068800a^7b^2c^7f^2h^2m - 3755520a^7b^3c^6f^2h^2m - 3538944a^7b^3c^6e^2j^2m + 3000960a^6b^4c^6f^2h^2m + 2654208a^7b^4c^5e^2j^2m - 2322432a^8b^2c^6d^2k^2m + 2125824a^7b^3c^6d^2j^2m - 1990656a^7b^4c^5d^2k^2m - 1085760a^6b^5c^5f^2h^2m - 959040a^7b^5c^4f^2h^2m - 884736a^6b^5c^5e^2j^2m + 829440a^7b^3c^6g^2h^2m + 749568a^7b^3c^6f^2j^2k + 518400a^6b^6c^4d^2k^2m + 414720a^6b^5c^5g^2h^2m + 317952a^6b^5c^5f^2j^2k + 133632a^6b^5c^5d^2j^2m + 103200a^6b^7c^3f^2h^2m - 96768a^5b^7c^4$

$$\begin{aligned}
& *d*j^2*m - 51840*a^5*b^8*c^3*d*k^1^2 + 41280*a^5*b^6*c^5*f^2*h*m + 38400*a^5*b^7*c^4*f*j^2*k - 37188*a^4*b^8*c^4*f^2*h*m + 13536*a^5*b^7*c^4*f*h^2*m + \\
& 13440*a^4*b^9*c^3*d*j^2*m + 10368*a^5*b^7*c^4*g*h^2*1 + 5490*a^4*b^9*c^3*f*h^2*m + 1980*a^3*b^10*c^3*f^2*h*m - 1920*a^4*b^9*c^3*f*j^2*k + 810*a^5*b^9*c^2*f*h*m^2 - 180*a^3*b^11*c^2*f*h^2*m - 30*a^2*b^12*c^2*f^2*h*m + 3006720*a^6*b^2*c^8*d^2*h*m - 11612160*a^6*b^2*c^8*d^2*j*1 + 1658880*a^6*b^3*c^7*e^2*h*m + 1596672*a^4*b^6*c^6*d^2*j*1 - 1419264*a^6*b^4*c^6*f*g^2*m - 1105920*a^7*b^4*c^5*f*h*1^2 + 1105920*a^7*b^3*c^6*e*j*k^2 - 921600*a^7*b^2*c^7*f*g^2*m - 829440*a^6*b^4*c^6*g^2*h*k - 552960*a^8*b^2*c^6*f*h*1^2 - 508032*a^3*b^8*c^5*d^2*j*1 - 331776*a^7*b^2*c^7*g^2*h*k + 290304*a^6*b^5*c^5*e*j*k^2 - 103680*a^5*b^6*c^5*g^2*h*k + 80640*a^5*b^6*c^5*f*g^2*m - 69120*a^5*b^5*c^6*e^2*h*m + 65664*a^2*b^10*c^4*d^2*j*1 - 34560*a^6*b^6*c^4*f*h*1^2 + 6912*a^5*b^7*c^4*e*j*k^2 + 3456*a^5*b^8*c^3*f*h*1^2 + 11930112*a^8*b^2*c^6*d*h*m^2 + 8432640*a^7*b^2*c^7*d*h^2*m + 4450176*a^7*b^4*c^5*d*h*m^2 + 4337280*a^6*b^4*c^6*d*h^2*m - 3870720*a^8*b^2*c^6*e*g*m^2 - 3640320*a^6*b^3*c^7*f^2*h*k - 2885760*a^5*b^4*c^7*d^2*h*m - 2844288*a^4*b^6*c^6*d^2*h*m - 2626560*a^7*b^3*c^6*f*h*k^2 + 2211840*a^7*b^2*c^7*f*h^2*k + 2056320*a^6*b^4*c^6*f*h^2*k + 1935360*a^6*b^3*c^7*f^2*g*1 - 1916928*a^7*b^2*c^7*d*j^2*k - 1687680*a^6*b^6*c^4*d*h*m^2 - 1658880*a^7*b^2*c^7*e*h^2*1 - 1143360*a^5*b^5*c^6*f^2*h*k - 1097280*a^6*b^5*c^5*f*h*k^2 + 1019412*a^3*b^8*c^5*d^2*h*m - 1007424*a^5*b^6*c^5*d*h^2*m - 912384*a^6*b^4*c^6*d*j^2*k - 829440*a^6*b^4*c^6*e*h^2*1 - 645120*a^7*b^4*c^5*e*g*m^2 - 552960*a^7*b^2*c^7*g*h^2*j - 552960*a^6*b^4*c^6*g*h^2*j + 364608*a^5*b^6*c^5*f*h^2*k + 322560*a^5*b^5*c^6*f^2*g*1 + 197460*a^5*b^8*c^3*d*h*m^2 - 145152*a^5*b^6*c^5*g*h^2*j - 143802*a^2*b^10*c^4*d^2*h*m + 80640*a^6*b^6*c^4*e*g*m^2 - 56160*a^5*b^7*c^4*f*h*k^2 + 51948*a^4*b^8*c^4*d*h^2*m - 40320*a^4*b^7*c^5*f^2*g*1 + 34560*a^4*b^8*c^4*d*j^2*k + 27936*a^4*b^7*c^5*f^2*h*k - 20736*a^5*b^6*c^5*e*h^2*1 - 13824*a^5*b^6*c^5*d*j^2*k + 10800*a^3*b^10*c^3*d*h^2*m - 5760*a^3*b^10*c^3*d*j^2*k - 3780*a^4*b^8*c^4*f*h^2*k + 3690*a^3*b^9*c^4*f^2*h*k - 3456*a^4*b^8*c^4*g*h^2*j + 2970*a^4*b^9*c^3*f*h*k^2 - 2304*a^5*b^8*c^3*e*g*m^2 + 1152*a^3*b^9*c^4*f^2*g*1 - 540*a^3*b^10*c^3*f*h^2*k - 540*a^2*b^12*c^2*d*h^2*m - 90*a^4*b^10*c^2*d*h*m^2 - 90*a^2*b^11*c^3*f^2*h*k + 54*a^3*b^11*c^2*f*h*k^2 + 15925248*a^6*b^2*c^8*e^2*g*1 - 7962624*a^7*b^3*c^6*e*g*1^2 - 7962624*a^6*b^3*c^7*e*g^2*1 + 23385600*a^6*b^2*c^8*d*f^2*m + 6137856*a^6*b^3*c^7*d*g^2*m - 5677056*a^6*b^2*c^8*e^2*f*m + 4147200*a^7*b^3*c^6*d*h*1^2 - 3317760*a^6*b^2*c^8*e^2*h*k - 1354752*a^5*b^5*c^6*d*g^2*m + 1271808*a^6*b^3*c^7*f*g^2*k - 737280*a^7*b^2*c^7*f*h*j^2 + 17418240*a^5*b^3*c^8*d^2*g*1 - 568320*a^6*b^4*c^6*f*h*j^2 - 414720*a^6*b^5*c^5*d*h*1^2 + 414720*a^5*b^5*c^6*f*g^2*k - 414720*a^5*b^4*c^7*e^2*h*k + 322560*a^5*b^4*c^7*e^2*f*m - 136704*a^5*b^6*c^5*f*h*j^2 + 120960*a^4*b^7*c^5*d*g^2*m - 31104*a^5*b^7*c^4*d*h*1^2 - 17280*a^4*b^7*c^5*f*g^2*k + 10368*a^4*b^9*c^3*d*h*1^2 - 2304*a^4*b^8*c^4*f*h*j^2 + 384*a^3*b^10*c^3*f*h*j^2 + 50042880*a^5*b^2*c^9*d^2*f*k - 13271040*a^5*b^3*c^8*d^2*h*k - 13149696*a^7*b^3*c^6*d*f*m^2 + 10906560*a^4*b^5*c^7*d^2*f*m - 8709120*a^4*b^5*c^7*d^2*g*1 - 7418880*a^5*b^3*c^8*d^2*f*m + 7133184*a^7*b^2*c^7*d*h*k^2 - 6428160*a^6*b^3*c^7*d*h^2*k + 5593536*a^4*b^5*c^7*d^2*h*k - 3870720*a^6
\end{aligned}$$

$$\begin{aligned}
& *b^2*c^8*e*f^2*m + 3369600*a^6*b^4*c^6*d*h*k^2 + 3148992*a^6*b^5*c^5*d*f*m^2 \\
& - 2985696*a^3*b^7*c^6*d^2*f*m + 1959552*a^3*b^7*c^6*d^2*g*1 - 1658880*a^7 \\
& *b^2*c^7*e*g*k^2 - 1505280*a^4*b^6*c^6*d*f^2*m - 1290240*a^6*b^2*c^8*f^2*g* \\
& j - 34836480*a^5*b^2*c^9*d^2*e*1 + 1105920*a^6*b^3*c^7*e*h^2*j - 860160*a^5 \\
& *b^4*c^7*f^2*g*j - 829440*a^6*b^4*c^6*e*g*k^2 - 692064*a^3*b^7*c^6*d^2*h*k \\
& - 689472*a^5*b^5*c^6*d*h^2*k - 645120*a^5*b^4*c^7*e*f^2*1 - 388800*a^5*b^6* \\
& c^5*d*h*k^2 + 378954*a^2*b^9*c^5*d^2*f*m + 362880*a^5*b^4*c^7*d*f^2*m + 296 \\
& 964*a^3*b^8*c^5*d*f^2*m + 290304*a^5*b^5*c^6*e*h^2*j + 277344*a^4*b^7*c^5*d \\
& *h^2*k - 217728*a^2*b^9*c^5*d^2*g*1 - 80640*a^4*b^6*c^6*f^2*g*j + 80640*a^4 \\
& *b^6*c^6*e*f^2*1 - 77070*a^4*b^9*c^3*d*f*m^2 - 30240*a^5*b^7*c^4*d*f*m^2 - \\
& 28350*a^3*b^9*c^4*d*h^2*k - 26406*a^2*b^9*c^5*d^2*h*k - 21060*a^4*b^8*c^4*d \\
& *h*k^2 - 20736*a^5*b^6*c^5*e*g*k^2 - 19278*a^2*b^10*c^4*d*f^2*m + 12672*a^3 \\
& *b^8*c^5*f^2*g*j + 10044*a^3*b^10*c^3*d*h*k^2 + 8820*a^3*b^11*c^2*d*f*m^2 + \\
& 6912*a^4*b^7*c^5*e*h^2*j - 2304*a^3*b^8*c^5*e*f^2*1 - 1620*a^2*b^11*c^3*d* \\
& h^2*k - 384*a^2*b^10*c^4*f^2*g*j + 162*a^2*b^12*c^2*d*h*k^2 - 5419008*a^5*b \\
& ^3*c^8*d*e^2*m + 5308416*a^6*b^2*c^8*e*g^2*j - 5308416*a^5*b^3*c^8*e^2*g*j \\
& - 3870720*a^7*b^2*c^7*d*f*1^2 - 3538944*a^6*b^3*c^7*e*g*j^2 + 2654208*a^5*b \\
& ^4*c^7*e*g^2*j - 2322432*a^6*b^2*c^8*d*g^2*k - 1990656*a^5*b^4*c^7*d*g^2*k \\
& - 1935360*a^6*b^4*c^6*d*f*1^2 + 1658880*a^6*b^3*c^7*d*h*j^2 + 1658880*a^5*b \\
& ^3*c^8*e^2*f*k - 884736*a^5*b^5*c^6*e*g*j^2 + 725760*a^5*b^6*c^5*d*f*1^2 + \\
& 17418240*a^4*b^4*c^8*d^2*e*1 + 518400*a^4*b^6*c^6*d*g^2*k + 483840*a^4*b^5* \\
& c^7*d*e^2*m + 262656*a^5*b^5*c^6*d*h*j^2 - 96768*a^4*b^8*c^4*d*f*1^2 - 6912 \\
& 0*a^4*b^5*c^7*e^2*f*k - 55296*a^4*b^7*c^5*d*h*j^2 - 51840*a^3*b^8*c^5*d*g^2 \\
& *k + 3456*a^3*b^10*c^3*d*f*1^2 + 1152*a^3*b^9*c^4*d*h*j^2 + 1152*a^2*b^11*c \\
& ^3*d*h*j^2 - 15431040*a^4*b^4*c^8*d^2*f*k - 13248000*a^5*b^3*c^8*d*f^2*k - \\
& 11612160*a^5*b^2*c^9*d^2*g*j - 10063872*a^6*b^3*c^7*d*f*k^2 - 3919104*a^3*b \\
& ^6*c^7*d^2*e*1 + 2554560*a^4*b^5*c^7*d*f^2*k + 1720320*a^5*b^3*c^8*e*f^2*j \\
& + 1596672*a^3*b^6*c^7*d^2*g*j + 1518912*a^3*b^6*c^7*d^2*f*k - 1105920*a^5*b \\
& ^4*c^7*f*g^2*h + 838080*a^5*b^5*c^6*d*f*k^2 - 552960*a^6*b^2*c^8*f*g^2*h - \\
& 508032*a^2*b^8*c^6*d^2*g*j + 435456*a^2*b^8*c^6*d^2*e*1 + 161280*a^4*b^5*c^ \\
& 7*e*f^2*j + 116640*a^4*b^7*c^5*d*f*k^2 + 106812*a^2*b^8*c^6*d^2*f*k - 98208 \\
& *a^3*b^7*c^6*d*f^2*k - 34560*a^4*b^6*c^6*f*g^2*h - 27270*a^3*b^9*c^4*d*f*k^ \\
& 2 - 26334*a^2*b^9*c^5*d*f^2*k - 25344*a^3*b^7*c^6*e*f^2*j + 3456*a^3*b^8*c^ \\
& 5*f*g^2*h + 768*a^2*b^9*c^5*e*f^2*j - 702*a^2*b^11*c^3*d*f*k^2 - 7962624*a^ \\
& 5*b^2*c^9*d*e^2*k - 2580480*a^6*b^2*c^8*d*f*j^2 + 2073600*a^4*b^4*c^8*d*e^2 \\
& *k - 1658880*a^6*b^2*c^8*e*g*h^2 - 967680*a^5*b^4*c^7*d*f*j^2 - 829440*a^5* \\
& b^4*c^7*e*g*h^2 - 207360*a^3*b^6*c^7*d*e^2*k + 64512*a^4*b^6*c^6*d*f*j^2 + \\
& 39168*a^3*b^8*c^5*d*f*j^2 - 20736*a^4*b^6*c^6*e*g*h^2 - 9216*a^2*b^10*c^4*d \\
& *f*j^2 - 4423680*a^5*b^2*c^9*e^2*f*h + 4147200*a^5*b^3*c^8*d*g^2*h - 319334 \\
& 4*a^3*b^5*c^8*d^2*e*j + 1016064*a^2*b^7*c^7*d^2*e*j - 414720*a^4*b^5*c^7*d* \\
& g^2*h - 138240*a^4*b^4*c^8*e^2*f*h - 31104*a^3*b^7*c^6*d*g^2*h + 13824*a^3* \\
& b^6*c^7*e^2*f*h + 10368*a^2*b^9*c^5*d*g^2*h + 15630336*a^5*b^2*c^9*d*f^2*h \\
& - 14459904*a^4*b^3*c^9*d^2*f*h + 9630144*a^3*b^5*c^8*d^2*f*h - 8764416*a^5* \\
& b^3*c^8*d*f*h^2 - 3870720*a^5*b^2*c^9*e*f^2*g + 2867328*a^4*b^4*c^8*d*f^2*h \\
& - 2095200*a^2*b^7*c^7*d^2*f*h - 1414080*a^3*b^6*c^7*d*f^2*h - 34836480*a^4
\end{aligned}$$

$$\begin{aligned}
& *b^2*c^{10}*d^2*e*g - 645120*a^4*b^4*c^8*e*f^2*g + 306720*a^3*b^7*c^6*d*f*h^2 \\
& + 197820*a^2*b^8*c^6*d*f^2*h + 146880*a^4*b^5*c^7*d*f*h^2 + 80640*a^3*b^6* \\
& c^7*e*f^2*g - 55350*a^2*b^9*c^5*d*f*h^2 - 2304*a^2*b^8*c^6*e*f^2*g - 387072 \\
& 0*a^5*b^2*c^9*d*f*g^2 - 1935360*a^4*b^4*c^8*d*f*g^2 - 1658880*a^4*b^3*c^9*d \\
& *e^2*h + 725760*a^3*b^6*c^7*d*f*g^2 + 17418240*a^3*b^4*c^9*d^2*e*g - 124416 \\
& *a^3*b^5*c^8*d*e^2*h - 96768*a^2*b^8*c^6*d*f*g^2 + 41472*a^2*b^7*c^7*d*e^2* \\
& h - 3919104*a^2*b^6*c^8*d^2*e*g - 7741440*a^4*b^2*c^{10}*d*e^2*f + 2903040*a^ \\
& 3*b^4*c^9*d*e^2*f - 387072*a^2*b^6*c^8*d*e^2*f - 20160*a^8*b^7*c^1^2*m^2 - \\
& 1648128*a^{10}*b^3*c^3*k*m^3 - 898560*a^9*b^3*c^4*k^3*m - 354240*a^9*b^5*c^2* \\
& k*m^3 - 354240*a^8*b^5*c^3*k^3*m - 21600*a^7*b^7*c^2*k^3*m - 13950*a^7*b^8* \\
& c*k^2*m^2 + 430080*a^{10}*b*c^5*j^2*m^2 - 1984*a^6*b^9*c*j^2*m^2 - 884736*a^9 \\
& *b^3*c^4*j^1^3 - 589824*a^8*b^3*c^5*j^3*1 - 442368*a^8*b^5*c^3*j^1^3 - 2949 \\
& 12*a^7*b^5*c^4*j^3*1 - 49152*a^6*b^7*c^3*j^3*1 + 1359360*a^{10}*b^2*c^4*h*m^3 \\
& + 1173120*a^9*b^4*c^3*h*m^3 + 743040*a^7*b^4*c^5*h^3*m + 622080*a^8*b^2*c^ \\
& 6*h^3*m + 184320*a^9*b*c^6*j^2*k^2 + 107136*a^6*b^6*c^4*h^3*m - 32640*a^8*b \\
& ^6*c^2*h*m^3 + 540*a^5*b^8*c^3*h^3*m - 270*a^4*b^{10}*c^2*h^3*m - 180*a^5*b^1 \\
& 0*c*h^2*m^2 - 2293760*a^9*b^3*c^4*f*m^3 - 2293760*a^6*b^3*c^7*f^3*m + 13271 \\
& 04*a^8*b^4*c^4*g*1^3 + 1327104*a^6*b^4*c^6*g^3*1 - 622080*a^8*b^3*c^5*h*k^3 \\
& - 622080*a^7*b^3*c^6*h^3*k - 326592*a^7*b^5*c^4*h*k^3 - 326592*a^6*b^5*c^5 \\
& *h^3*k - 199360*a^8*b^5*c^3*f*m^3 - 199360*a^5*b^5*c^6*f^3*m + 61920*a^7*b^ \\
& 7*c^2*f*m^3 + 61920*a^4*b^7*c^5*f^3*m - 38880*a^6*b^7*c^3*h*k^3 - 38880*a^5 \\
& *b^7*c^4*h^3*k - 3682*a^3*b^9*c^4*f^3*m - 810*a^5*b^9*c^2*h*k^3 - 810*a^4*b \\
& ^9*c^3*h^3*k - 70*a^3*b^{12}*c*f^2*m^2 + 70*a^2*b^{11}*c^3*f^3*m + 3870720*a^8* \\
& b*c^7*e^2*m^2 + 184320*a^8*b*c^7*h^2*j^2 - 14152320*a^4*b^4*c^8*d^3*m + 106 \\
& 44480*a^5*b^2*c^9*d^3*m + 5483520*a^9*b^2*c^5*d*m^3 + 4269888*a^3*b^6*c^7*d \\
& ^3*m - 2654208*a^8*b^3*c^5*e^1^3 + 1359360*a^6*b^2*c^8*f^3*k + 1330560*a^8* \\
& b^4*c^4*d*m^3 + 1173120*a^5*b^4*c^7*f^3*k - 884736*a^6*b^3*c^7*g^3*j - 8265 \\
& 60*a^7*b^6*c^3*d*m^3 + 743040*a^7*b^4*c^5*f*k^3 + 622080*a^8*b^2*c^6*f*k^3 \\
& - 607068*a^2*b^8*c^6*d^3*m - 589824*a^7*b^3*c^6*g*j^3 - 442368*a^5*b^5*c^6* \\
& g^3*j - 294912*a^6*b^5*c^5*g*j^3 + 145188*a^6*b^8*c^2*d*m^3 + 107136*a^6*b^ \\
& 6*c^4*f*k^3 - 49152*a^5*b^7*c^4*g*j^3 - 32640*a^4*b^6*c^6*f^3*k - 5796*a^3* \\
& b^8*c^5*f^3*k + 540*a^5*b^8*c^3*f*k^3 - 270*a^4*b^{10}*c^2*f*k^3 + 210*a^2*b^ \\
& 10*c^4*f^3*k + 19077120*a^4*b^3*c^9*d^3*k + 1658880*a^7*b*c^8*e^2*k^2 + 430 \\
& 080*a^7*b*c^8*f^2*j^2 + 3538944*a^5*b^2*c^9*e^3*j - 2488320*a^7*b^3*c^6*d*k \\
& ^3 - 2379456*a^3*b^5*c^8*d^3*k + 1179648*a^7*b^2*c^7*e*j^3 + 589824*a^6*b^4 \\
& *c^6*e*j^3 + 98304*a^5*b^6*c^5*e*j^3 - 95904*a^2*b^7*c^7*d^3*k - 57024*a^6* \\
& b^5*c^5*d*k^3 + 49248*a^5*b^7*c^4*d*k^3 - 4050*a^4*b^9*c^3*d*k^3 - 810*a^3* \\
& b^{11}*c^2*d*k^3 - 486*a*b^{12}*c^3*d^2*k^2 + 3870720*a^6*b*c^9*d^2*j^2 - 16481 \\
& 28*a^5*b^3*c^8*f^3*h - 898560*a^6*b^3*c^7*f*h^3 - 354240*a^5*b^5*c^6*f*h^3 \\
& - 354240*a^4*b^5*c^7*f^3*h + 43680*a^3*b^7*c^6*f^3*h - 21600*a^4*b^7*c^5*f* \\
& h^3 - 9792*a*b^{11}*c^4*d^2*j^2 + 1350*a^3*b^9*c^4*f*h^3 - 1050*a^2*b^9*c^5*f \\
& ^3*h + 1658880*a^6*b*c^9*e^2*h^2 + 16547328*a^4*b^2*c^{10}*d^3*h - 12306816*a \\
& ^3*b^4*c^9*d^3*h + 37310976*a^3*b^3*c^{10}*d^3*f + 3037824*a^2*b^6*c^8*d^3*h \\
& - 2654208*a^5*b^3*c^8*e*g^3 + 1949184*a^6*b^2*c^8*d*h^3 + 1296000*a^5*b^4*c \\
& ^7*d*h^3 - 155520*a^4*b^6*c^6*d*h^3 - 40500*a*b^{10}*c^5*d^2*h^2 - 8100*a^3*b
\end{aligned}$$

$$\begin{aligned}
& 8c^5d^3h^3 + 4050a^2b^{10}c^4d^3h^3 + 3870720a^5b^3c^{10}e^2f^2 + 34836 \\
& 480a^4b^3c^{11}d^2e^2 - 108864a^3b^9c^6d^2g^2 - 8068032a^2b^5c^9d^3 \\
& *f - 5623296a^4b^3c^9d^3f^3 + 1737792a^3b^5c^8d^3f^3 - 260190a^3b^8c \\
& ^7d^2f^2 - 211680a^2b^7c^7d^3f^3 - 435456a^3b^7c^8d^2e^2 - 245760a \\
& ^{10}c^6j^2k^m - 384a^6b^{10}j^1l^m^2 + 138240a^{10}c^6h^k^2m - 90a^5b \\
& ^{11}h^k^m^2 + 384000a^{10}c^6f^k^m^2 - 2211840a^8c^8e^2k^m - 409600a^ \\
& 9c^7f^j^2m - 147456a^9c^7h^j^2k - 30a^4b^{12}f^k^m^2 + 967680a^9c \\
& ^7d^k^2m + 384000a^8c^8f^2h^m - 90a^3b^{13}d^k^m^2 + 20321280a^7c^ \\
& 9d^2h^m - 883200a^{11}b^3c^4k^m^3 - 317952a^{10}b^3c^5k^3m + 43680a^8b \\
& ^7c^k^m^3 + 1350a^6b^9c^k^3m - 270b^{14}c^2d^2h^m + 6a^3b^{13}f^h^m \\
& ^2 + 4838400a^9c^7d^h^m^2 + 2903040a^8c^8d^h^2m - 1032192a^8c^8d^ \\
& j^2k + 138240a^8c^8f^h^2k - 3686400a^7c^9e^2f^m - 1327104a^7c^9e \\
& ^2h^k - 393216a^9b^3c^6j^3l - 245760a^8c^8f^h^j^2 - 810b^{13}c^3d^ \\
& 2h^k + 630b^{13}c^3d^2f^m + 18a^2b^{14}d^h^m^2 + 2688000a^7c^9d^3f^2m \\
& + 580608a^8c^8d^h^k^2 - 5796a^7b^8c^h^m^3 - 3456b^{12}c^4d^2g^j + \\
& 1890b^{12}c^4d^2f^k + 6773760a^6c^{10}d^2f^k - 1344000a^{10}b^3c^5f^m^ \\
& 3 - 1344000a^7b^3c^8f^3m - 207360a^9b^3c^6h^k^3 - 207360a^8b^3c^7h^ \\
& ^3k - 3682a^6b^9c^f^m^3 - 9289728a^6c^{10}d^e^2k - 1720320a^7c^9d^3f^ \\
& j^2 - 50803200a^5b^3c^{10}d^3k + 6912b^{11}c^5d^2e^j - 10616832a^6b^3c^ \\
& 9e^3l - 2211840a^6c^{10}e^2f^h - 393216a^8b^3c^7g^j^3 + 43416a^3b^{10} \\
& c^5d^3m - 9576a^5b^{10}c^d^m^3 - 9450b^{11}c^5d^2f^h - 504a^3b^{14}c^d^ \\
& 2m^2 + 1612800a^6c^{10}d^3f^2h - 1036800a^8b^3c^7d^k^3 + 45198a^3b^9c^ \\
& 6d^3k - 20736b^{10}c^6d^2e^g - 75188736a^4b^3c^{11}d^3f - 883200a^6b \\
& ^3c^9f^3h - 317952a^7b^3c^8f^h^3 - 15482880a^5c^{11}d^e^2f - 10616832a \\
& ^5b^3c^{10}e^3g - 345060a^3b^8c^7d^3h - 4262400a^5b^3c^{10}d^3f^3 + 8527 \\
& 68a^3b^7c^8d^3f + 7350a^3b^9c^6d^3f^3 + 967680a^{10}b^3c^3l^2m^2 + 1 \\
& 61280a^9b^5c^2l^2m^2 + 1684224a^{10}b^2c^4k^2m^2 + 1264320a^9b^4c^ \\
& ^3k^2m^2 + 126720a^8b^6c^2k^2m^2 + 501760a^9b^3c^4j^2m^2 + 414 \\
& 720a^9b^3c^4k^2l^2 + 207360a^8b^5c^3k^2l^2 + 170240a^8b^5c^3j \\
& ^2m^2 + 9216a^7b^7c^2j^2m^2 + 5184a^7b^7c^2k^2l^2 + 884736a^9b \\
& ^2c^5j^2l^2 + 884736a^8b^4c^4j^2l^2 + 221184a^7b^6c^3j^2l^2 + \\
& 1419840a^8b^4c^4h^2m^2 + 1387008a^9b^2c^5h^2m^2 + 276480a^8b^3c^ \\
& ^5j^2k^2 + 140544a^7b^5c^4j^2k^2 + 84960a^7b^6c^3h^2m^2 + 2534 \\
& 4a^6b^7c^3j^2k^2 - 8010a^6b^8c^2h^2m^2 + 576a^5b^9c^2j^2k^2 \\
& + 967680a^8b^3c^5g^2m^2 + 414720a^8b^3c^5h^2l^2 + 207360a^7b^5c^ \\
& ^4h^2l^2 + 161280a^7b^5c^4g^2m^2 - 20160a^6b^7c^3g^2m^2 + 5184 \\
& a^6b^7c^3h^2l^2 + 576a^5b^9c^2g^2m^2 + 3808000a^8b^2c^6f^2m^ \\
& 2 + 1990656a^7b^4c^5g^2l^2 + 1643712a^7b^4c^5f^2m^2 + 803520a^7b \\
& ^4c^5h^2k^2 + 725760a^8b^2c^6h^2k^2 + 207360a^6b^6c^4h^2k^2 - \\
& 125440a^6b^6c^4f^2m^2 - 13790a^5b^8c^3f^2m^2 + 10530a^5b^8c^3 \\
& ^h^2k^2 + 1785a^4b^{10}c^2f^2m^2 + 81a^4b^{10}c^2h^2k^2 + 18427392a \\
& ^7b^2c^7d^2m^2 + 967680a^7b^3c^6f^2l^2 + 645120a^7b^3c^6e^2m^ \\
& 2 + 414720a^7b^3c^6g^2k^2 + 276480a^7b^3c^6h^2j^2 + 207360a^6b^ \\
& ^5c^5g^2k^2 + 161280a^6b^5c^5f^2l^2 + 140544a^6b^5c^5h^2j^2 - 8 \\
& 0640a^6b^5c^5e^2m^2 + 25344a^5b^7c^4h^2j^2 - 20160a^5b^7c^4f^
\end{aligned}$$

$$\begin{aligned}
& 2*1^2 + 5184*a^5*b^7*c^4*g^2*k^2 + 2304*a^5*b^7*c^4*e^2*m^2 + 576*a^4*b^9*c^3*h^2*j^2 + 576*a^4*b^9*c^3*f^2*1^2 + 7962624*a^7*b^2*c^7*e^2*1^2 - 414892 \\
& 8*a^6*b^4*c^6*d^2*m^2 + 1419840*a^6*b^4*c^6*f^2*k^2 + 1387008*a^7*b^2*c^7*f^2*k^2 - 1183392*a^5*b^6*c^5*d^2*m^2 + 884736*a^7*b^2*c^7*g^2*j^2 + 884736* \\
& a^6*b^4*c^6*g^2*j^2 + 645750*a^4*b^8*c^4*d^2*m^2 + 221184*a^5*b^6*c^5*g^2*j^2 - 115920*a^3*b^10*c^3*d^2*m^2 + 84960*a^5*b^6*c^5*f^2*k^2 + 10836*a^2*b^12*c^2*d^2*m^2 - 8010*a^4*b^8*c^4*f^2*k^2 - 180*a^3*b^10*c^3*f^2*k^2 + 9*a^2*b^12*c^2*f^2*k^2 + 8709120*a^6*b^3*c^7*d^2*1^2 - 4354560*a^5*b^5*c^6*d^2*1^2 + 979776*a^4*b^7*c^5*d^2*1^2 + 829440*a^6*b^3*c^7*e^2*k^2 + 17480448*a^6*b^2*c^8*d^2*k^2 + 501760*a^6*b^3*c^7*f^2*j^2 + 170240*a^5*b^5*c^6*f^2*j^2 - 108864*a^3*b^9*c^4*d^2*1^2 + 20736*a^5*b^5*c^6*e^2*k^2 + 9216*a^4*b^7*c^5*f^2*j^2 + 5184*a^2*b^11*c^3*d^2*1^2 - 1984*a^3*b^9*c^4*f^2*j^2 + 64*a^2*b^11*c^3*f^2*j^2 + 3538944*a^6*b^2*c^8*e^2*j^2 - 3302208*a^5*b^4*c^7*d^2*k^2 + 884736*a^5*b^4*c^7*e^2*j^2 + 414720*a^6*b^3*c^7*g^2*h^2 + 207360*a^5*b^5*c^6*g^2*h^2 - 103680*a^4*b^6*c^6*d^2*k^2 + 101250*a^3*b^8*c^5*d^2*k^2 - 5751*a^2*b^10*c^4*d^2*k^2 + 5184*a^4*b^7*c^5*g^2*h^2 + 1935360*a^5*b^3*c^8*d^2*j^2 + 1684224*a^6*b^2*c^8*f^2*h^2 + 1264320*a^5*b^4*c^7*f^2*h^2 - 532224*a^4*b^5*c^7*d^2*j^2 + 126720*a^4*b^6*c^6*f^2*h^2 - 96768*a^3*b^7*c^6*d^2*j^2 + 62784*a^2*b^9*c^5*d^2*j^2 - 13950*a^3*b^8*c^5*f^2*h^2 + 225*a^2*b^10*c^4*f^2*h^2 + 967680*a^5*b^3*c^8*f^2*g^2 + 829440*a^5*b^3*c^8*e^2*h^2 + 161280*a^4*b^5*c^7*f^2*g^2 + 20736*a^4*b^5*c^7*e^2*h^2 - 20160*a^3*b^7*c^6*f^2*g^2 + 576*a^2*b^9*c^5*f^2*g^2 + 11487744*a^5*b^2*c^9*d^2*h^2 + 7962624*a^5*b^2*c^9*e^2*g^2 + 35525376*a^4*b^2*c^10*d^2*f^2 - 1412640*a^3*b^6*c^7*d^2*h^2 + 461376*a^4*b^4*c^8*d^2*h^2 + 375030*a^2*b^8*c^6*d^2*h^2 + 8709120*a^4*b^3*c^9*d^2*g^2 - 4354560*a^3*b^5*c^8*d^2*g^2 + 979776*a^2*b^7*c^7*d^2*g^2 + 645120*a^4*b^3*c^9*e^2*f^2 - 80640*a^3*b^5*c^8*e^2*f^2 + 2304*a^2*b^7*c^7*e^2*f^2 - 15269184*a^3*b^4*c^9*d^2*f^2 + 2870784*a^2*b^6*c^8*d^2*f^2 - 17418240*a^3*b^3*c^10*d^2*e^2 + 3919104*a^2*b^5*c^9*d^2*e^2 + 54*b^15*c*d^2*k*m + 6*a*b^15*d*f*m^2 + 115200*a^11*c^5*k^2*m^2 + 576*a^7*b^9*1^2*m^2 + 225*a^6*b^10*k^2*m^2 + 64*a^5*b^11*j^2*m^2 + 345600*a^10*c^6*h^2*m^2 + 9*a^4*b^12*h^2*m^2 + 320000*a^9*c^7*f^2*m^2 + 41472*a^9*c^7*h^2*k^2 + 16934400*a^8*c^8*d^2*m^2 + 345600*a^8*c^8*f^2*k^2 + 81*b^14*c^2*d^2*k^2 + 3538944*a^7*c^9*e^2*j^2 + 2032128*a^7*c^9*d^2*k^2 + 492800*a^11*b^2*c^3*m^4 + 351456*a^10*b^4*c^2*m^4 + 576*b^13*c^3*d^2*j^2 + 331776*a^9*b^4*c^3*1^4 + 115200*a^7*c^9*f^2*h^2 + 142560*a^8*b^4*c^4*k^4 + 103680*a^9*b^2*c^5*k^4 + 32400*a^7*b^6*c^3*k^4 + 2025*b^12*c^4*d^2*h^2 + 2025*a^6*b^8*c^2*k^4 + 6096384*a^6*c^10*d^2*h^2 + 131072*a^8*b^2*c^6*j^4 + 98304*a^7*b^4*c^5*j^4 + 32768*a^6*b^6*c^4*j^4 + 5184*b^11*c^5*d^2*g^2 + 4096*a^5*b^8*c^3*j^4 + 11025*b^10*c^6*d^2*f^2 + 5644800*a^5*c^11*d^2*f^2 + 142560*a^6*b^4*c^6*h^4 + 103680*a^7*b^2*c^7*h^4 + 32400*a^5*b^6*c^5*h^4 + 20736*b^9*c^7*d^2*e^2 + 2025*a^4*b^8*c^4*h^4 + 331776*a^5*b^4*c^7*g^4 + 492800*a^5*b^2*c^9*f^4 + 351456*a^4*b^4*c^8*f^4 - 43120*a^3*b^6*c^7*f^4 + 1225*a^2*b^8*c^6*f^4 - 27433728*a^3*b^2*c^11*d^4 + 6446304*a^2*b^4*c^10*d^4 - 1050*a^7*b^9*k*m^3 + 384000*a^11*c^5*h*m^3 + 138240*a^9*c^7*h^3*m + 210*a^6*b^10*h*m^3 + 47416320*a^6*c^10*d^3*m - 1134*b^12*c^4*d^3*m + 70*a^5*b^11*f*m^3 + 2688000*a^10*c^6*d*m^3 + 384000*a^7*c^
\end{aligned}$$

$$\begin{aligned}
& 9*f^3*k + 138240*a^9*c^7*f*k^3 - 3402*b^11*c^5*d^3*k + 210*a^4*b^12*d*m^3 + \\
& 7077888*a^6*c^10*e^3*j + 786432*a^8*c^8*e*j^3 - 43120*a^9*b^6*c*m^4 + 2844 \\
& 9792*a^5*c^11*d^3*h + 17010*b^10*c^6*d^3*h + 580608*a^7*c^9*d*h^3 - 39690*b \\
& ^9*c^7*d^3*f - 734832*a*b^6*c^9*d^4 + 9*b^16*d^2*m^2 + 160000*a^12*c^4*m^4 \\
& + 1225*a^8*b^8*m^4 + 20736*a^10*c^6*k^4 + 65536*a^9*c^7*j^4 + 20736*a^8*c^8 \\
& *h^4 + 49787136*a^4*c^12*d^4 + 160000*a^6*c^10*f^4 + 5308416*a^5*c^11*e^4 + \\
& 35721*b^8*c^8*d^4 + a^2*b^14*f^2*m^2, z, k1)*(root(56371445760*a^11*b^8*c^ \\
& 9*z^4 - 503316480*a^8*b^14*c^6*z^4 + 47185920*a^7*b^16*c^5*z^4 - 2621440*a^ \\
& 6*b^18*c^4*z^4 + 65536*a^5*b^20*c^3*z^4 - 171798691840*a^14*b^2*c^12*z^4 + \\
& 193273528320*a^13*b^4*c^11*z^4 - 128849018880*a^12*b^6*c^10*z^4 - 169114337 \\
& 28*a^10*b^10*c^8*z^4 + 3523215360*a^9*b^12*c^7*z^4 + 68719476736*a^15*c^13* \\
& z^4 + 1536*a^5*b^16*c*k*m*z^2 + 1536*a*b^18*c^3*d*f*z^2 - 2571632640*a^9*b^ \\
& 5*c^8*d*m*z^2 + 2548039680*a^9*b^3*c^10*d*h*z^2 + 1509949440*a^10*b^3*c^9*e \\
& *l*z^2 + 1509949440*a^9*b^3*c^10*e*g*z^2 - 1401421824*a^8*b^5*c^9*d*h*z^2 - \\
& 1321205760*a^9*b^2*c^11*d*f*z^2 - 2793406464*a^11*b*c^10*d*m*z^2 + 8906342 \\
& 40*a^8*b^7*c^7*d*m*z^2 - 754974720*a^10*b^4*c^8*g*l*z^2 - 754974720*a^9*b^5 \\
& *c^8*e*l*z^2 + 719585280*a^8*b^6*c^8*d*k*z^2 - 707788800*a^9*b^4*c^9*d*k*z^ \\
& 2 - 754974720*a^8*b^5*c^9*e*g*z^2 + 603979776*a^11*b^2*c^9*g*l*z^2 - 581959 \\
& 680*a^10*b^4*c^8*f*m*z^2 + 732168192*a^7*b^6*c^9*d*f*z^2 + 534773760*a^11*b \\
& ^3*c^8*h*m*z^2 - 456130560*a^11*b^4*c^7*k*m*z^2 - 603979776*a^10*b^2*c^10*e \\
& *j*z^2 + 534773760*a^10*b^3*c^9*f*k*z^2 + 384040960*a^9*b^6*c^7*f*m*z^2 + 3 \\
& 77487360*a^9*b^6*c^7*g*l*z^2 - 456130560*a^9*b^4*c^9*f*h*z^2 + 301989888*a^ \\
& 11*b^3*c^8*j*l*z^2 - 415236096*a^10*b^2*c^10*d*k*z^2 + 254017536*a^10*b^6*c \\
& ^6*k*m*z^2 - 330301440*a^10*b^4*c^8*h*k*z^2 + 390463488*a^7*b^7*c^8*d*h*z^2 \\
& + 188743680*a^12*b^2*c^8*k*m*z^2 + 301989888*a^10*b^3*c^9*g*j*z^2 - 297861 \\
& 120*a^7*b^8*c^7*d*k*z^2 - 366280704*a^6*b^8*c^8*d*f*z^2 + 188743680*a^11*b^ \\
& 2*c^9*h*k*z^2 - 330301440*a^8*b^4*c^10*d*f*z^2 + 254017536*a^8*b^6*c^8*f*h* \\
& z^2 - 1887436800*a^10*b*c^11*d*h*z^2 + 188743680*a^8*b^7*c^7*e*l*z^2 + 1533 \\
& 54240*a^9*b^6*c^7*h*k*z^2 - 185303040*a^7*b^9*c^6*d*m*z^2 - 117964800*a^10* \\
& b^5*c^7*h*m*z^2 - 61931520*a^9*b^8*c^5*k*m*z^2 + 121634816*a^11*b^2*c^9*f*m \\
& *z^2 - 115671040*a^8*b^8*c^6*f*m*z^2 - 62914560*a^9*b^7*c^6*j*l*z^2 + 18874 \\
& 3680*a^10*b^2*c^10*f*h*z^2 - 94371840*a^8*b^8*c^6*g*l*z^2 + 6144000*a^8*b^1 \\
& 0*c^4*k*m*z^2 - 117964800*a^9*b^5*c^8*f*k*z^2 + 61440*a^7*b^12*c^3*k*m*z^2 \\
& - 46080*a^6*b^14*c^2*k*m*z^2 + 23592960*a^8*b^9*c^5*j*l*z^2 + 188743680*a^7 \\
& *b^7*c^8*e*g*z^2 - 37355520*a^9*b^7*c^6*h*m*z^2 + 125829120*a^8*b^6*c^8*e*j \\
& *z^2 + 23101440*a^8*b^9*c^5*h*m*z^2 - 3538944*a^7*b^11*c^4*j*l*z^2 + 196608 \\
& *a^6*b^13*c^3*j*l*z^2 - 4349952*a^7*b^11*c^4*h*m*z^2 + 337920*a^6*b^13*c^3* \\
& h*m*z^2 - 7680*a^5*b^15*c^2*h*m*z^2 - 62914560*a^8*b^7*c^7*g*j*z^2 - 265420 \\
& 80*a^8*b^8*c^6*h*k*z^2 + 17940480*a^7*b^10*c^5*f*m*z^2 + 11796480*a^7*b^10* \\
& c^5*g*l*z^2 - 37355520*a^8*b^7*c^7*f*k*z^2 - 1347584*a^6*b^12*c^4*f*m*z^2 + \\
& 68272128*a^6*b^10*c^6*d*k*z^2 - 589824*a^6*b^12*c^4*g*l*z^2 + 552960*a^6*b \\
& ^12*c^4*h*k*z^2 - 147456*a^7*b^10*c^5*h*k*z^2 - 46080*a^5*b^14*c^3*h*k*z^2 \\
& + 35840*a^5*b^14*c^3*f*m*z^2 + 23592960*a^7*b^9*c^6*g*j*z^2 - 23592960*a^7* \\
& b^9*c^6*e*l*z^2 + 23371776*a^6*b^11*c^5*d*m*z^2 + 23101440*a^7*b^9*c^6*f*k* \\
& z^2 - 47185920*a^7*b^8*c^7*e*j*z^2 - 61931520*a^7*b^8*c^7*f*h*z^2 - 4349952
\end{aligned}$$

$a^6 b^{11} c^5 f k z^2 - 3538944 a^6 b^{11} c^5 g j z^2 - 1677312 a^5 b^{13} c^4$   
 $d m z^2 + 1179648 a^6 b^{11} c^5 e l z^2 + 337920 a^5 b^{13} c^4 f k z^2 + 196$   
 $608 a^5 b^{13} c^4 g j z^2 + 53760 a^4 b^{15} c^3 d m z^2 - 7680 a^4 b^{15} c^3 f$   
 $k z^2 + 96583680 a^5 b^{10} c^7 d f z^2 - 9179136 a^5 b^{12} c^5 d k z^2 + 707$   
 $7888 a^6 b^{10} c^6 e j z^2 - 51609600 a^6 b^9 c^7 d h z^2 + 691200 a^4 b^{14} c^4$   
 $d k z^2 - 393216 a^5 b^{12} c^5 e j z^2 - 23040 a^3 b^{16} c^3 d k z^2 + 61$   
 $44000 a^6 b^{10} c^6 f h z^2 + 61440 a^5 b^{12} c^5 f h z^2 - 46080 a^4 b^{14} c^4$   
 $f h z^2 + 1536 a^3 b^{16} c^3 f h z^2 - 23592960 a^6 b^9 c^7 e g z^2 + 1179$   
 $648 a^5 b^{11} c^6 e g z^2 + 829440 a^4 b^{13} c^5 d h z^2 + 368640 a^5 b^{11} c^6$   
 $d h z^2 - 105984 a^3 b^{15} c^4 d h z^2 + 4608 a^2 b^{17} c^3 d h z^2 - 15175$   
 $680 a^4 b^{12} c^6 d f z^2 + 1428480 a^3 b^{14} c^5 d f z^2 - 73728 a^2 b^{16} c^4$   
 $d f z^2 + 4108320768 a^{10} b^3 c^9 d m z^2 - 1207959552 a^{11} b c^{10} e l z^2$   
 $- 1207959552 a^{10} b c^{11} e g z^2 - 578813952 a^{12} b c^9 h m z^2 - 5788139$   
 $52 a^{11} b c^{10} f k z^2 - 402653184 a^{12} b c^9 j l z^2 - 402653184 a^{11} b c^{10}$   
 $g j z^2 - 440401920 a^{10} b c^{11} f^2 z^2 - 188743680 a^{12} b c^9 k^2 z^2 -$   
 $188743680 a^{11} b c^{10} h^2 z^2 + 1761607680 a^{10} c^{12} d f z^2 - 14080 a^6 b$   
 $^{15} c^m^2 z^2 - 94464 a^6 b^{17} c^4 d^2 z^2 + 6936330240 a^8 b^3 c^{11} d^2 z^2$   
 $+ 2464874496 a^6 b^7 c^9 d^2 z^2 - 3963617280 a^9 b c^{12} d^2 z^2 + 10569646$   
 $08 a^{11} c^{11} d k z^2 + 805306368 a^{11} c^{11} e j z^2 + 419430400 a^{12} c^{10} f m$   
 $z^2 + 251658240 a^{13} c^9 k m z^2 - 1509949440 a^9 b^2 c^{11} e^2 z^2 + 2516$   
 $58240 a^{11} c^{11} f h z^2 + 150994944 a^{12} c^{10} h k z^2 - 5400428544 a^7 b^5 c^{10}$   
 $d^2 z^2 + 754974720 a^8 b^4 c^{10} e^2 z^2 - 730054656 a^5 b^9 c^8 d^2 z^2$   
 $+ 477102080 a^{12} b^3 c^7 m^2 z^2 - 377487360 a^{11} b^4 c^7 l^2 z^2 + 4771$   
 $02080 a^9 b^3 c^{10} f^2 z^2 + 301989888 a^{12} b^2 c^8 l^2 z^2 - 377487360 a^9$   
 $b^4 c^9 g^2 z^2 + 301989888 a^{10} b^2 c^{10} g^2 z^2 - 174325760 a^{11} b^5 c^6$   
 $m^2 z^2 + 188743680 a^{10} b^6 c^6 l^2 z^2 + 141557760 a^{11} b^3 c^8 k^2 z^2$   
 $+ 188743680 a^8 b^6 c^8 g^2 z^2 + 141557760 a^{10} b^3 c^9 h^2 z^2 - 17432576$   
 $0 a^8 b^5 c^9 f^2 z^2 - 188743680 a^7 b^6 c^9 e^2 z^2 - 47185920 a^9 b^8 c^5$   
 $l^2 z^2 + 11206656 a^{10} b^7 c^5 m^2 z^2 + 8929280 a^9 b^9 c^4 m^2 z^2 - 2$   
 $600960 a^8 b^{11} c^3 m^2 z^2 + 291840 a^7 b^{13} c^2 m^2 z^2 - 50331648 a^{10} b$   
 $^4 c^8 j^2 z^2 + 146165760 a^4 b^{11} c^7 d^2 z^2 - 26542080 a^9 b^7 c^6 k^2 z^2$   
 $+ 5898240 a^8 b^{10} c^4 l^2 z^2 - 294912 a^7 b^{12} c^3 l^2 z^2 - 33554432$   
 $a^{11} b^2 c^9 j^2 z^2 + 9584640 a^8 b^9 c^5 k^2 z^2 + 20971520 a^9 b^6 c^7 j^2$   
 $z^2 - 2359296 a^{10} b^5 c^7 k^2 z^2 - 1290240 a^7 b^{11} c^4 k^2 z^2 + 460$   
 $80 a^6 b^{13} c^3 k^2 z^2 + 2304 a^5 b^{15} c^2 k^2 z^2 - 2752512 a^7 b^{10} c^5 j^2$   
 $z^2 + 2621440 a^8 b^8 c^6 j^2 z^2 + 524288 a^6 b^{12} c^4 j^2 z^2 - 32768$   
 $a^5 b^{14} c^3 j^2 z^2 - 47185920 a^7 b^8 c^7 g^2 z^2 - 26542080 a^8 b^7 c^7$   
 $h^2 z^2 + 9584640 a^7 b^9 c^6 h^2 z^2 - 2359296 a^9 b^5 c^8 h^2 z^2 - 1290$   
 $240 a^6 b^{11} c^5 h^2 z^2 + 46080 a^5 b^{13} c^4 h^2 z^2 + 2304 a^4 b^{15} c^3 h^2$   
 $z^2 + 5898240 a^6 b^{10} c^6 g^2 z^2 - 294912 a^5 b^{12} c^5 g^2 z^2 + 11206$   
 $656 a^7 b^7 c^8 f^2 z^2 + 8929280 a^6 b^9 c^7 f^2 z^2 + 23592960 a^6 b^8 c^8$   
 $e^2 z^2 - 2600960 a^5 b^{11} c^6 f^2 z^2 + 291840 a^4 b^{13} c^5 f^2 z^2 - 14$   
 $080 a^3 b^{15} c^4 f^2 z^2 + 256 a^2 b^{17} c^3 f^2 z^2 - 19860480 a^3 b^{13} c^6$   
 $d^2 z^2 - 1179648 a^5 b^{10} c^7 e^2 z^2 + 1771776 a^2 b^{15} c^5 d^2 z^2 - 44$   
 $0401920 a^{13} b c^8 m^2 z^2 + 1207959552 a^{10} c^{12} e^2 z^2 + 134217728 a^{12}$



$c^{10}j^2z^2 + 256a^5b^{17}m^2z^2 + 2304b^{19}c^3d^2z^2 - 23592960a^{10}$   
 $*b^8c^8f^*k^*l^*z + 99090432a^9b^8c^9d^*h^*l^*z + 9437184a^{10}b^8c^8e^*k^*m^*z +$   
 $23592960a^{10}b^8c^8g^*h^*m^*z + 141557760a^8b^8c^{10}d^*e^*k^*z + 47185920a^9b^8$   
 $*c^9d^*j^*k^*z - 23592960a^9b^8c^9f^*g^*k^*z + 169869312a^7b^8c^{11}d^*e^*f^*z +$   
 $99090432a^8b^8c^{10}d^*g^*h^*z - 3145728a^9b^8c^9f^*h^*j^*z + 56623104a^8b^8c^{10}$   
 $d^*f^*j^*z + 1536a^*b^{15}c^3d^*f^*j^*z - 9437184a^8b^8c^{10}e^*f^*h^*z - 4608a^*$   
 $b^{14}c^4d^*f^*g^*z + 9216a^*b^{13}c^5d^*e^*f^*z + 412876800a^8b^2c^9d^*e^*m^*z$   
 $- 206438400a^9b^3c^7d^*l^*m^*z + 5898240a^{10}b^4c^5k^*l^*m^*z - 206438400*$   
 $a^8b^3c^8d^*g^*m^*z - 4718592a^{11}b^2c^6k^*l^*m^*z - 2949120a^9b^6c^4k^*$   
 $l^*m^*z + 737280a^8b^8c^3k^*l^*m^*z - 92160a^7b^{10}c^2k^*l^*m^*z + 103219200$   
 $*a^8b^5c^6d^*l^*m^*z - 29491200a^{10}b^3c^6h^*l^*m^*z - 206438400a^7b^4c^8$   
 $d^*e^*m^*z - 2359296a^{10}b^3c^6j^*k^*m^*z + 491520a^8b^7c^4j^*k^*m^*z - 184$   
 $320a^7b^9c^3j^*k^*m^*z + 27648a^6b^{11}c^2j^*k^*m^*z + 14745600a^9b^5c^5$   
 $*h^*l^*m^*z - 3686400a^8b^7c^4h^*l^*m^*z + 460800a^7b^9c^3h^*l^*m^*z - 23040$   
 $*a^6b^{11}c^2h^*l^*m^*z + 88473600a^8b^4c^7d^*k^*l^*z + 82575360a^9b^2c^8$   
 $*d^*j^*m^*z + 11796480a^{10}b^2c^7h^*j^*m^*z + 5898240a^9b^4c^6g^*k^*m^*z - 47$   
 $18592a^{10}b^2c^7g^*k^*m^*z - 70778880a^9b^2c^8d^*k^*l^*z - 2949120a^8b^6$   
 $*c^5g^*k^*m^*z - 2457600a^8b^6c^5h^*j^*m^*z + 921600a^7b^8c^4h^*j^*m^*z + 7$   
 $37280a^7b^8c^4g^*k^*m^*z - 138240a^6b^{10}c^3h^*j^*m^*z - 92160a^6b^{10}c^3$   
 $*g^*k^*m^*z + 7680a^5b^{12}c^2h^*j^*m^*z + 4608a^5b^{12}c^2g^*k^*m^*z + 2949120$   
 $0a^9b^3c^7f^*k^*l^*z - 176947200a^7b^3c^9d^*e^*k^*z - 109707264a^8b^3c^8$   
 $d^*h^*l^*z - 25804800a^7b^7c^5d^*l^*m^*z + 103219200a^7b^5c^7d^*g^*m^*z +$   
 $219414528a^7b^2c^{10}d^*e^*h^*z - 14745600a^8b^5c^6f^*k^*l^*z - 29491200a^9$   
 $b^3c^7g^*h^*m^*z - 11796480a^9b^3c^7e^*k^*m^*z - 44236800a^7b^6c^6d^*$   
 $k^*l^*z + 58982400a^9b^2c^8e^*h^*m^*z + 5898240a^8b^5c^6e^*k^*m^*z + 368640$   
 $0a^7b^7c^5f^*k^*l^*z + 3225600a^6b^9c^4d^*l^*m^*z - 1474560a^7b^7c^5e^*$   
 $*k^*m^*z - 460800a^6b^9c^4f^*k^*l^*z + 184320a^6b^9c^4e^*k^*m^*z - 161280a^$   
 $5b^{11}c^3d^*l^*m^*z + 23040a^5b^{11}c^3f^*k^*l^*z - 9216a^5b^{11}c^3e^*k^*m^*$   
 $z + 14745600a^8b^5c^6g^*h^*m^*z + 110886912a^7b^4c^8d^*f^*l^*z - 3686400*$   
 $a^7b^7c^5g^*h^*m^*z - 221773824a^6b^3c^{10}d^*e^*f^*z + 460800a^6b^9c^4g^*$   
 $*h^*m^*z - 17203200a^7b^6c^6d^*j^*m^*z - 23040a^5b^{11}c^3g^*h^*m^*z - 294912$   
 $00a^8b^4c^7e^*h^*m^*z - 11796480a^9b^2c^8f^*j^*k^*z + 11059200a^6b^8c^5$   
 $d^*k^*l^*z + 6451200a^6b^8c^5d^*j^*m^*z + 88473600a^7b^4c^8d^*g^*k^*z + 24$   
 $57600a^7b^6c^6f^*j^*k^*z - 35389440a^8b^3c^8d^*j^*k^*z - 1382400a^5b^{10}$   
 $*c^4d^*k^*l^*z - 84934656a^8b^2c^9d^*f^*l^*z - 967680a^5b^{10}c^4d^*j^*m^*z -$   
 $921600a^6b^8c^5f^*j^*k^*z + 138240a^5b^{10}c^4f^*j^*k^*z + 69120a^4b^{12}c^3$   
 $d^*k^*l^*z + 53760a^4b^{12}c^3d^*j^*m^*z - 7680a^4b^{12}c^3f^*j^*k^*z + 4423$   
 $6800a^7b^5c^7d^*h^*l^*z + 7372800a^7b^6c^6e^*h^*m^*z - 5898240a^8b^4c^7$   
 $f^*h^*l^*z + 4718592a^9b^2c^8f^*h^*l^*z - 70778880a^8b^2c^9d^*g^*k^*z + 29$   
 $49120a^7b^6c^6f^*h^*l^*z - 921600a^6b^8c^5e^*h^*m^*z - 737280a^6b^8c^5$   
 $*f^*h^*l^*z + 92160a^5b^{10}c^4f^*h^*l^*z + 46080a^5b^{10}c^4e^*h^*m^*z - 4608a^$   
 $4b^{12}c^3f^*h^*l^*z + 29491200a^8b^3c^8f^*g^*k^*z - 109707264a^7b^3c^9$   
 $d^*g^*h^*z - 25804800a^6b^7c^6d^*g^*m^*z - 58982400a^8b^2c^9e^*f^*k^*z - 589$   
 $82400a^6b^6c^7d^*f^*l^*z + 7372800a^6b^7c^6d^*j^*k^*z + 88473600a^6b^5c^8$   
 $d^*e^*k^*z - 2764800a^5b^9c^5d^*j^*k^*z + 51609600a^6b^6c^7d^*e^*m^*z +$

$414720a^4b^{11}c^4d^*jk^*z - 23040a^3b^{13}c^3d^*jk^*z - 14745600a^7b^5$   
 $*c^7f^*g^*k^*z - 44236800a^6b^6c^7d^*g^*k^*z - 6635520a^6b^7c^6d^*h^*l^*z +$   
 $40108032a^8b^2c^9d^*h^*j^*z + 3686400a^6b^7c^6f^*g^*k^*z + 3225600a^5b$   
 $^9c^5d^*g^*m^*z + 2359296a^8b^3c^8f^*h^*j^*z - 491520a^6b^7c^6f^*h^*j^*z -$   
 $460800a^5b^9c^5f^*g^*k^*z - 276480a^5b^9c^5d^*h^*l^*z + 184320a^5b^9c$   
 $^5f^*h^*j^*z + 179712a^4b^{11}c^4d^*h^*l^*z - 161280a^4b^{11}c^4d^*g^*m^*z - 27$   
 $648a^4b^{11}c^4f^*h^*j^*z + 23040a^4b^{11}c^4f^*g^*k^*z - 13824a^3b^{13}c^3$   
 $d^*h^*l^*z + 1536a^3b^{13}c^3f^*h^*j^*z + 29491200a^7b^4c^8e^*f^*k^*z + 110886$   
 $912a^6b^4c^9d^*f^*g^*z + 16220160a^5b^8c^6d^*f^*l^*z - 45613056a^7b^3c$   
 $^9d^*f^*j^*z + 11059200a^5b^8c^6d^*g^*k^*z - 10321920a^6b^6c^7d^*h^*j^*z -$   
 $7372800a^6b^6c^7e^*f^*k^*z + 7077888a^7b^4c^8d^*h^*j^*z - 6451200a^5b^8$   
 $*c^6d^*e^*m^*z - 88473600a^6b^4c^9d^*e^*h^*z + 2396160a^5b^8c^6d^*h^*j^*z -$   
 $2396160a^4b^{10}c^5d^*f^*l^*z - 1382400a^4b^{10}c^5d^*g^*k^*z - 84934656a^7$   
 $*b^2c^{10}d^*f^*g^*z + 921600a^5b^8c^6e^*f^*k^*z + 117964800a^5b^5c^9d^*e^*$   
 $f^*z + 322560a^4b^{10}c^5d^*e^*m^*z + 175104a^3b^{12}c^4d^*f^*l^*z + 69120a^3$   
 $*b^{12}c^4d^*g^*k^*z - 50688a^3b^{12}c^4d^*h^*j^*z - 46080a^4b^{10}c^5e^*f^*k^*z$   
 $- 27648a^4b^{10}c^5d^*h^*j^*z + 4608a^2b^{14}c^3d^*h^*j^*z - 4608a^2b^{14}c$   
 $^3d^*f^*l^*z + 44236800a^6b^5c^8d^*g^*h^*z - 5898240a^7b^4c^8f^*g^*h^*z - 2$   
 $2118400a^5b^7c^7d^*e^*k^*z + 4718592a^8b^2c^9f^*g^*h^*z + 2949120a^6b^6$   
 $*c^7f^*g^*h^*z - 737280a^5b^8c^6f^*g^*h^*z + 92160a^4b^{10}c^5f^*g^*h^*z - 46$   
 $08a^3b^{12}c^4f^*g^*h^*z + 8847360a^5b^7c^7d^*f^*j^*z - 5898240a^5b^6c^8$   
 $d^*f^*g^*z - 3809280a^4b^9c^6d^*f^*j^*z + 2764800a^4b^9c^6d^*e^*k^*z + 235$   
 $9296a^6b^5c^8d^*f^*j^*z + 681984a^3b^{11}c^5d^*f^*j^*z - 138240a^3b^{11}c^5$   
 $d^*e^*k^*z - 55296a^2b^{13}c^4d^*f^*j^*z + 11796480a^7b^3c^9e^*f^*h^*z - 663$   
 $5520a^5b^7c^7d^*g^*h^*z - 5898240a^6b^5c^8e^*f^*h^*z + 1474560a^5b^7c^7$   
 $e^*f^*h^*z - 276480a^4b^9c^6d^*g^*h^*z - 184320a^4b^9c^6e^*f^*h^*z + 17971$   
 $2a^3b^{11}c^5d^*g^*h^*z - 13824a^2b^{13}c^4d^*g^*h^*z + 9216a^3b^{11}c^5e^*f$   
 $*h^*z + 16220160a^4b^8c^7d^*f^*g^*z + 13271040a^5b^6c^8d^*e^*h^*z - 239616$   
 $0a^3b^{10}c^6d^*f^*g^*z + 552960a^4b^8c^7d^*e^*h^*z - 359424a^3b^{10}c^6d$   
 $*e^*h^*z + 175104a^2b^{12}c^5d^*f^*g^*z + 27648a^2b^{12}c^5d^*e^*h^*z - 3244032$   
 $0a^4b^7c^8d^*e^*f^*z + 4792320a^3b^9c^7d^*e^*f^*z - 350208a^2b^{11}c^6d$   
 $*e^*f^*z + 165150720a^{10}b^*c^8d^*l^*m^*z + 4608a^6b^{12}c^*k^*l^*m^*z + 23592960*$   
 $a^{11}b^*c^7h^*l^*m^*z + 3145728a^{11}b^*c^7j^*k^*m^*z - 1536a^5b^{13}c^*j^*k^*m^*z +$   
 $165150720a^9b^*c^9d^*g^*m^*z + 346816512a^7b^*c^{11}d^2g^*z + 19660800a^{12}$   
 $*b^*c^6l^*m^2z - 34560a^7b^{11}c^*l^*m^2z - 7077888a^{11}b^*c^7k^2l^*z + 11$   
 $008a^6b^{12}c^*j^*m^2z + 19660800a^{11}b^*c^7g^*m^2z + 7077888a^{10}b^*c^8h$   
 $^2l^*z + 768a^5b^{13}c^*g^*m^2z - 19660800a^9b^*c^9f^2l^*z - 7077888a^{10}$   
 $*b^*c^8g^*k^2z - 6912a^*b^{15}c^3d^2l^*z + 7077888a^9b^*c^9g^*h^2z - 1966$   
 $0800a^8b^*c^{10}f^2g^*z - 66816a^*b^{14}c^4d^2j^*z + 214272a^*b^{13}c^5d^2*$   
 $g^*z - 428544a^*b^{12}c^6d^2e^*z - 330301440a^9c^{10}d^*e^*m^*z - 110100480a^$   
 $10c^9d^*j^*m^*z - 15728640a^{11}c^8h^*j^*m^*z - 47185920a^{10}c^9e^*h^*m^*z - 19$   
 $8180864a^8c^{11}d^*e^*h^*z + 15728640a^{10}c^9f^*j^*k^*z - 66060288a^9c^{10}d^*$   
 $h^*j^*z + 47185920a^9c^{10}e^*f^*k^*z + 1022754816a^6b^2c^{11}d^2e^*z - 64231$   
 $8336a^5b^4c^{10}d^2e^*z - 511377408a^7b^3c^9d^2l^*z - 511377408a^6b$   
 $^3c^{10}d^2g^*z + 321159168a^6b^5c^8d^2l^*z + 321159168a^5b^5c^9d^2$

$*g*z + 225312768*a^7*b^2*c^{10}*d^2*j*z - 25362432*a^{11}*b^3*c^5*l*m^2*z + 132$   
 $71040*a^{10}*b^5*c^4*l*m^2*z - 3563520*a^9*b^7*c^3*l*m^2*z + 506880*a^8*b^9*c$   
 $^2*l*m^2*z + 10354688*a^{11}*b^2*c^6*j*m^2*z + 8847360*a^{10}*b^3*c^6*k^2*l*z -$   
 $4423680*a^9*b^5*c^5*k^2*l*z - 2048000*a^9*b^6*c^4*j*m^2*z + 1105920*a^8*b^$   
 $7*c^4*k^2*l*z + 849920*a^8*b^8*c^3*j*m^2*z - 393216*a^{10}*b^4*c^5*j*m^2*z -$   
 $145920*a^7*b^{10}*c^2*j*m^2*z - 138240*a^7*b^9*c^3*k^2*l*z + 6912*a^6*b^{11}*c^$   
 $2*k^2*l*z - 111697920*a^5*b^7*c^7*d^2*l*z + 223395840*a^4*b^6*c^9*d^2*e*z -$   
 $25362432*a^{10}*b^3*c^6*g*m^2*z - 3538944*a^{10}*b^2*c^7*j*k^2*z + 737280*a^8*$   
 $b^6*c^5*j*k^2*z + 50724864*a^{10}*b^2*c^7*e*m^2*z - 276480*a^7*b^8*c^4*j*k^2*$   
 $z + 41472*a^6*b^{10}*c^3*j*k^2*z - 2304*a^5*b^{12}*c^2*j*k^2*z + 13271040*a^9*b$   
 $^5*c^5*g*m^2*z - 8847360*a^9*b^3*c^7*h^2*l*z + 4423680*a^8*b^5*c^6*h^2*l*z$   
 $- 3563520*a^8*b^7*c^4*g*m^2*z - 1105920*a^7*b^7*c^5*h^2*l*z + 506880*a^7*b^$   
 $9*c^3*g*m^2*z + 138240*a^6*b^9*c^4*h^2*l*z - 34560*a^6*b^{11}*c^2*g*m^2*z - 6$   
 $912*a^5*b^{11}*c^3*h^2*l*z - 26542080*a^9*b^4*c^6*e*m^2*z + 25362432*a^8*b^3*$   
 $c^8*f^2*l*z - 13271040*a^7*b^5*c^7*f^2*l*z + 8847360*a^9*b^3*c^7*g*k^2*z +$   
 $7127040*a^8*b^6*c^5*e*m^2*z - 4423680*a^8*b^5*c^6*g*k^2*z + 3563520*a^6*b^7$   
 $*c^6*f^2*l*z + 3538944*a^9*b^2*c^8*h^2*j*z + 1105920*a^7*b^7*c^5*g*k^2*z -$   
 $1013760*a^7*b^8*c^4*e*m^2*z - 737280*a^7*b^6*c^6*h^2*j*z - 506880*a^5*b^9*c$   
 $^5*f^2*l*z + 276480*a^6*b^8*c^5*h^2*j*z - 138240*a^6*b^9*c^4*g*k^2*z + 6912$   
 $0*a^6*b^{10}*c^3*e*m^2*z - 41472*a^5*b^{10}*c^4*h^2*j*z + 34560*a^4*b^{11}*c^4*f^$   
 $2*l*z + 6912*a^5*b^{11}*c^3*g*k^2*z + 2304*a^4*b^{12}*c^3*h^2*j*z - 1536*a^5*b^$   
 $12*c^2*e*m^2*z - 768*a^3*b^{13}*c^3*f^2*l*z - 111697920*a^4*b^7*c^8*d^2*g*z +$   
 $23362560*a^4*b^9*c^6*d^2*l*z - 17694720*a^9*b^2*c^8*e*k^2*z - 10354688*a^8$   
 $*b^2*c^9*f^2*j*z - 43646976*a^6*b^4*c^9*d^2*j*z + 8847360*a^8*b^4*c^7*e*k^2$   
 $*z - 2965248*a^3*b^{11}*c^5*d^2*l*z - 2211840*a^7*b^6*c^6*e*k^2*z + 2048000*a$   
 $^6*b^6*c^7*f^2*j*z - 849920*a^5*b^8*c^6*f^2*j*z + 393216*a^7*b^4*c^8*f^2*j*$   
 $z + 276480*a^6*b^8*c^5*e*k^2*z + 214272*a^2*b^{13}*c^4*d^2*l*z + 145920*a^4*b$   
 $^10*c^5*f^2*j*z - 13824*a^5*b^{10}*c^4*e*k^2*z - 11008*a^3*b^{12}*c^4*f^2*j*z +$   
 $256*a^2*b^{14}*c^3*f^2*j*z - 32587776*a^5*b^6*c^8*d^2*j*z - 8847360*a^8*b^3*$   
 $c^8*g*h^2*z + 21657600*a^4*b^8*c^7*d^2*j*z + 4423680*a^7*b^5*c^7*g*h^2*z -$   
 $1105920*a^6*b^7*c^6*g*h^2*z + 138240*a^5*b^9*c^5*g*h^2*z - 6912*a^4*b^{11}*c^$   
 $4*g*h^2*z + 25362432*a^7*b^3*c^9*f^2*g*z - 5810688*a^3*b^{10}*c^6*d^2*j*z + 1$   
 $7694720*a^8*b^2*c^9*e*h^2*z + 845568*a^2*b^{12}*c^5*d^2*j*z - 50724864*a^7*b^$   
 $2*c^{10}*e*f^2*z - 13271040*a^6*b^5*c^8*f^2*g*z - 8847360*a^7*b^4*c^8*e*h^2*z$   
 $+ 3563520*a^5*b^7*c^7*f^2*g*z + 2211840*a^6*b^6*c^7*e*h^2*z - 506880*a^4*b$   
 $^9*c^6*f^2*g*z - 276480*a^5*b^8*c^6*e*h^2*z + 34560*a^3*b^{11}*c^5*f^2*g*z +$   
 $13824*a^4*b^{10}*c^5*e*h^2*z - 768*a^2*b^{13}*c^4*f^2*g*z + 26542080*a^6*b^4*c^$   
 $9*e*f^2*z + 23362560*a^3*b^9*c^7*d^2*g*z - 46725120*a^3*b^8*c^8*d^2*e*z - 7$   
 $127040*a^5*b^6*c^8*e*f^2*z - 2965248*a^2*b^{11}*c^6*d^2*g*z + 1013760*a^4*b^8$   
 $*c^7*e*f^2*z - 69120*a^3*b^{10}*c^6*e*f^2*z + 1536*a^2*b^{12}*c^5*e*f^2*z + 593$   
 $0496*a^2*b^{10}*c^7*d^2*e*z + 346816512*a^8*b*c^{10}*d^2*l*z - 693633024*a^7*c^$   
 $12*d^2*e*z - 231211008*a^8*c^{11}*d^2*j*z + 768*a^6*b^{13}*l*m^2*z - 13107200*a$   
 $^12*c^7*j*m^2*z - 256*a^5*b^{14}*j*m^2*z + 4718592*a^{11}*c^8*j*k^2*z - 3932160$   
 $0*a^{11}*c^8*e*m^2*z - 4718592*a^{10}*c^9*h^2*j*z + 14155776*a^{10}*c^9*e*k^2*z +$   
 $13107200*a^9*c^{10}*f^2*j*z + 2304*b^{16}*c^3*d^2*j*z - 14155776*a^9*c^{10}*e*h^$

$2*z + 39321600*a^8*c^{11}*e*f^2*z - 6912*b^{15}*c^4*d^2*g*z + 13824*b^{14}*c^5*d^2*e*z + 737280*a^{10}*b*c^5*j*k*l*m - 2304*a^6*b^9*c*j*k*l*m + 221840*a^9*b*c^6*e*k*l*m + 1228800*a^9*b*c^6*f*j*l*m + 737280*a^9*b*c^6*g*j*k*m + 442368*a^9*b*c^6*h*j*k*l + 36*a^3*b^{12}*c*f*h*k*m + 3096576*a^8*b*c^7*d*j*k*l - 12745728*a^8*b*c^7*d*h*k*m + 3686400*a^8*b*c^7*e*f*l*m + 3391488*a^8*b*c^7*e*h*j*m + 221840*a^8*b*c^7*e*g*k*m + 1327104*a^8*b*c^7*e*h*k*l + 1228800*a^8*b*c^7*f*g*j*m + 737280*a^8*b*c^7*f*h*j*l + 442368*a^8*b*c^7*g*h*j*k + 108*a^2*b^{13}*c*d*h*k*m + 16367616*a^7*b*c^8*d*e*j*m + 9289728*a^7*b*c^8*d*e*k*l + 5160960*a^7*b*c^8*d*f*j*l + 3391488*a^7*b*c^8*e*f*j*k + 3096576*a^7*b*c^8*d*g*j*k - 19307520*a^7*b*c^8*d*f*h*m + 3686400*a^7*b*c^8*e*f*g*m + 221840*a^7*b*c^8*e*f*h*l + 1327104*a^7*b*c^8*e*g*h*k + 737280*a^7*b*c^8*f*g*h*j - 180*a*b^{13}*c^2*d*f*h*m - 540*a*b^{12}*c^3*d*f*h*k + 15482880*a^6*b*c^9*d*e*f*l + 11059200*a^6*b*c^9*d*e*h*j + 9289728*a^6*b*c^9*d*e*g*k + 5160960*a^6*b*c^9*d*f*g*j - 2304*a*b^{11}*c^4*d*f*g*j + 221840*a^6*b*c^9*e*f*g*h + 4608*a*b^{10}*c^5*d*e*f*j + 15482880*a^5*b*c^{10}*d*e*f*g - 13824*a*b^9*c^6*d*e*f*g + 36*a*b^{14}*c*d*f*k*m + 1843200*a^9*b^3*c^4*j*k*l*m + 783360*a^8*b^5*c^3*j*k*l*m + 18432*a^7*b^7*c^2*j*k*l*m - 221840*a^8*b^4*c^4*g*k*l*m - 1695744*a^9*b^2*c^5*h*j*l*m - 1400832*a^8*b^4*c^4*h*j*l*m - 1105920*a^9*b^2*c^5*g*k*l*m - 253440*a^7*b^6*c^3*h*j*l*m - 69120*a^7*b^6*c^3*g*k*l*m + 11520*a^6*b^8*c^2*h*j*l*m + 6912*a^6*b^8*c^2*g*k*l*m + 4423680*a^8*b^3*c^5*e*k*l*m + 2506752*a^8*b^3*c^5*f*j*l*m + 1843200*a^8*b^3*c^5*g*j*k*m + 1327104*a^8*b^3*c^5*h*j*k*l + 838656*a^7*b^5*c^4*f*j*l*m + 783360*a^7*b^5*c^4*g*j*k*m + 691200*a^7*b^5*c^4*h*j*k*l + 138240*a^7*b^5*c^4*e*k*l*m + 69120*a^6*b^7*c^3*h*j*k*l - 53760*a^6*b^7*c^3*f*j*l*m + 18432*a^6*b^7*c^3*g*j*k*m - 13824*a^6*b^7*c^3*e*k*l*m - 2304*a^5*b^9*c^2*g*j*k*m + 2543616*a^8*b^3*c^5*g*h*l*m + 829440*a^7*b^5*c^4*g*h*l*m - 34560*a^6*b^7*c^3*g*h*l*m - 8183808*a^8*b^2*c^6*d*j*l*m - 3686400*a^8*b^2*c^6*e*j*k*m - 2285568*a^7*b^4*c^5*d*j*l*m - 1695744*a^8*b^2*c^6*f*j*k*l - 1566720*a^7*b^4*c^5*e*j*k*m - 1400832*a^7*b^4*c^5*f*j*k*l + 741888*a^6*b^6*c^4*d*j*l*m - 253440*a^6*b^6*c^4*f*j*k*l - 80640*a^5*b^8*c^3*d*j*l*m - 36864*a^6*b^6*c^4*e*j*k*m + 11520*a^5*b^8*c^3*f*j*k*l + 4608*a^5*b^8*c^3*e*j*k*m + 6700032*a^8*b^2*c^6*f*h*k*m + 5103360*a^7*b^4*c^5*f*h*k*m - 5087232*a^8*b^2*c^6*e*h*l*m - 2838528*a^7*b^4*c^5*f*g*l*m - 1843200*a^8*b^2*c^6*f*g*l*m - 1695744*a^8*b^2*c^6*g*h*j*m - 1658880*a^7*b^4*c^5*g*h*k*l - 1658880*a^7*b^4*c^5*e*h*l*m - 1400832*a^7*b^4*c^5*g*h*j*m - 663552*a^8*b^2*c^6*g*h*k*l + 483840*a^6*b^6*c^4*f*h*k*m - 253440*a^6*b^6*c^4*g*h*j*m - 207360*a^6*b^6*c^4*g*h*k*l + 161280*a^6*b^6*c^4*f*g*l*m + 69120*a^6*b^6*c^4*e*h*l*m - 50040*a^5*b^8*c^3*f*h*k*m + 11520*a^5*b^8*c^3*g*h*j*m + 180*a^4*b^{10}*c^2*f*h*k*m + 4202496*a^7*b^3*c^6*d*j*k*l + 635904*a^6*b^5*c^5*d*j*k*l - 276480*a^5*b^7*c^4*d*j*k*l + 34560*a^4*b^9*c^3*d*j*k*l - 16671744*a^7*b^3*c^6*d*h*k*m + 12275712*a^7*b^3*c^6*d*g*l*m + 5677056*a^7*b^3*c^6*e*f*l*m + 4423680*a^7*b^3*c^6*e*g*k*m + 3317760*a^7*b^3*c^6*e*h*k*l + 2801664*a^7*b^3*c^6*e*h*j*m - 2709504*a^6*b^5*c^5*d*g*l*m + 2543616*a^7*b^3*c^6*f*g*k*l + 2506752*a^7*b^3*c^6*f*g*j*m + 1843200*a^7*b^3*c^6*f*h*j*l + 1327104*a^7*b^3*c^6*g*h*j*k + 838656*a^6*b^5*c^5*f*g*j*m + 829440*a^6*b^5*c^5*f*g*k*l + 783360*a^6*b^5*c^5*f*h*j*l + 691200*a^6*b^5*c^5*g*h*j*k + 665280$

$a^5b^7c^4d^h*k*m + 506880a^6b^5c^5e*h*j*m + 414720a^6b^5c^5e*h*k*1 - 322560a^6b^5c^5e*f*1*m + 241920a^5b^7c^4d*g*1*m + 138240a^6b^5c^5e*g*k*m - 108540a^4b^9c^3d^h*k*m + 69120a^5b^7c^4g^h*j*k - 53760a^5b^7c^4f*g*j*m - 51840a^6b^5c^5d^h*k*m - 34560a^5b^7c^4f*g*k*1 - 23040a^5b^7c^4e*h*j*m + 18432a^5b^7c^4f^h*j*1 - 13824a^5b^7c^4e*g*k*m - 2304a^4b^9c^3f^h*j*1 + 1296a^3b^11c^2d^h*k*m + 31924224a^7b^2c^7d*f*k*m - 24551424a^7b^2c^7d*e*1*m + 10616832a^7b^2c^7e*g*j*1 - 8183808a^7b^2c^7d*g*j*m - 5529600a^7b^2c^7d^h*j*1 + 5419008a^6b^4c^6d*e*1*m + 5308416a^6b^4c^6e*g*j*1 - 5087232a^7b^2c^7e*f*k*1 - 5013504a^7b^2c^7e*f*j*m + 4868352a^6b^4c^6d*f*k*m - 4644864a^7b^2c^7d*g*k*1 - 3981312a^6b^4c^6d*g*k*1 - 2654208a^7b^2c^7e^h*j*k - 2367360a^5b^6c^5d*f*k*m - 2285568a^6b^4c^6d*g*j*m - 2211840a^6b^4c^6d^h*j*1 - 1695744a^7b^2c^7f*g*j*k - 1677312a^6b^4c^6e*f*j*m - 1658880a^6b^4c^6e*f*k*1 - 1400832a^6b^4c^6f*g*j*k - 1382400a^6b^4c^6e^h*j*k + 1036800a^5b^6c^5d*g*k*1 + 741888a^5b^6c^5d*g*j*m - 483840a^5b^6c^5d*e*1*m + 317952a^5b^6c^5d^h*j*1 + 268920a^4b^8c^4d*f*k*m - 253440a^5b^6c^5f*g*j*k - 138240a^5b^6c^5e^h*j*k + 107520a^5b^6c^5e*f*j*m - 103680a^4b^8c^4d*g*k*1 - 80640a^4b^8c^4d*g*j*m + 69120a^5b^6c^5e*f*k*1 + 11520a^4b^8c^4f*g*j*k + 6912a^4b^8c^4d^h*j*1 - 6912a^3b^10c^3d^h*j*1 + 6120a^3b^10c^3d*f*k*m - 1368a^2b^12c^2d*f*k*m - 5087232a^7b^2c^7e*g^h*m - 2211840a^6b^4c^6f*g^h*1 - 1658880a^6b^4c^6e*g^h*m - 1105920a^7b^2c^7f^g^h*1 - 69120a^5b^6c^5f*g^h*1 + 69120a^5b^6c^5e*g^h*m + 6912a^4b^8c^4f^g^h*1 + 7962624a^6b^3c^7d^e*k*1 - 22164480a^6b^3c^7d^f^h*m + 5160960a^6b^3c^7d^f*j*1 + 4571136a^6b^3c^7d^e*j*m + 4202496a^6b^3c^7d*g*j*k + 2801664a^6b^3c^7e*f*j*k - 2073600a^5b^5c^6d^e*k*1 - 1483776a^5b^5c^6d^e*j*m + 635904a^5b^5c^6d*g*j*k + 506880a^5b^5c^6e*f*j*k - 354816a^4b^7c^5d^f*j*1 + 322560a^5b^5c^6d^f*j*1 - 276480a^4b^7c^5d*g*j*k + 207360a^4b^7c^5d^e*k*1 + 161280a^4b^7c^5d^e*j*m + 59904a^3b^9c^4d^f*j*1 + 34560a^3b^9c^4d*g*j*k - 23040a^4b^7c^5e*f*j*k - 2304a^2b^11c^3d^f*j*1 + 8294400a^6b^3c^7d^g^h*1 + 5677056a^6b^3c^7e^f^g^m + 4423680a^6b^3c^7e^f^h*1 + 3317760a^6b^3c^7e^g^h*k + 2805120a^5b^5c^6d^f^h*m + 1843200a^6b^3c^7f^g^h*j - 829440a^5b^5c^6d^g^h*1 + 783360a^5b^5c^6f^g^h*j + 437184a^4b^7c^5d^f^h*m + 414720a^5b^5c^6e^g^h*k - 322560a^5b^5c^6e^f^g^m - 146268a^3b^9c^4d^f^h*m + 138240a^5b^5c^6e^f^h*1 - 62208a^4b^7c^5d^g^h*1 + 20736a^3b^9c^4d^g^h*1 + 18432a^4b^7c^5f^g^h*j - 13824a^4b^7c^5e^f^h*1 + 9360a^2b^11c^3d^f^h*m - 2304a^3b^9c^4f^g^h*j - 8404992a^6b^2c^8d^e*j*k - 24551424a^6b^2c^8d^e^g^m + 21150720a^6b^2c^8d^f^h*k - 1271808a^5b^4c^7d^e^j*k + 552960a^4b^6c^6d^e^j*k - 69120a^3b^8c^5d^e^j*k - 1658880a^6b^2c^8d^e^h*1 - 7741440a^6b^2c^8d^f^g*1 + 6946560a^5b^4c^7d^f^h*k - 5529600a^6b^2c^8d^g^h*j + 5419008a^5b^4c^7d^e^g^m - 5087232a^6b^2c^8e^f^g^k - 3870720a^5b^4c^7d^f^g*1 - 3686400a^6b^2c^8e^f^h*j - 2211840a^5b^4c^7d^g^h*j - 1755648a^4b^6c^6d^f^h*k - 1658880a^5b^4c^7e^f^g^k + 1658880a^5b^4c^$

$7*d*e*h*1 - 1566720*a^5*b^4*c^7*e*f*h*j + 1451520*a^4*b^6*c^6*d*f*g*1 - 483$   
 $840*a^4*b^6*c^6*d*e*g*m + 317952*a^4*b^6*c^6*d*g*h*j - 193536*a^3*b^8*c^5*d$   
 $*f*g*1 + 124416*a^4*b^6*c^6*d*e*h*1 + 114696*a^3*b^8*c^5*d*f*h*k + 69120*a^$   
 $4*b^6*c^6*e*f*g*k - 41472*a^3*b^8*c^5*d*e*h*1 - 36864*a^4*b^6*c^6*e*f*h*j +$   
 $14580*a^2*b^10*c^4*d*f*h*k + 6912*a^3*b^8*c^5*d*g*h*j - 6912*a^2*b^10*c^4*$   
 $d*g*h*j + 6912*a^2*b^10*c^4*d*f*g*1 + 4608*a^3*b^8*c^5*e*f*h*j + 7962624*a^$   
 $5*b^3*c^8*d*e*g*k + 7741440*a^5*b^3*c^8*d*e*f*1 + 5160960*a^5*b^3*c^8*d*f*g$   
 $*j + 4423680*a^5*b^3*c^8*d*e*h*j - 2903040*a^4*b^5*c^7*d*e*f*1 - 2073600*a^$   
 $4*b^5*c^7*d*e*g*k - 635904*a^4*b^5*c^7*d*e*h*j + 387072*a^3*b^7*c^6*d*e*f*1$   
 $- 354816*a^3*b^7*c^6*d*f*g*j + 322560*a^4*b^5*c^7*d*f*g*j + 207360*a^3*b^7$   
 $*c^6*d*e*g*k + 59904*a^2*b^9*c^5*d*f*g*j - 13824*a^3*b^7*c^6*d*e*h*j + 1382$   
 $4*a^2*b^9*c^5*d*e*h*j - 13824*a^2*b^9*c^5*d*e*f*1 + 4423680*a^5*b^3*c^8*e*f$   
 $*g*h + 138240*a^4*b^5*c^7*e*f*g*h - 13824*a^3*b^7*c^6*e*f*g*h - 10321920*a^$   
 $5*b^2*c^9*d*e*f*j + 709632*a^3*b^6*c^7*d*e*f*j - 645120*a^4*b^4*c^8*d*e*f*j$   
 $- 119808*a^2*b^8*c^6*d*e*f*j - 16588800*a^5*b^2*c^9*d*e*g*h + 1658880*a^4*$   
 $b^4*c^8*d*e*g*h + 124416*a^3*b^6*c^7*d*e*g*h - 41472*a^2*b^8*c^6*d*e*g*h +$   
 $7741440*a^4*b^3*c^9*d*e*f*g - 2903040*a^3*b^5*c^8*d*e*f*g + 387072*a^2*b^7*$   
 $c^7*d*e*f*g + 3456*a^7*b^8*c*k*1^2*m + 12672*a^7*b^8*c*j*1*m^2 + 384*a^5*b^$   
 $10*c*j^2*k*m - 1635840*a^10*b*c^5*h*k*m^2 - 1009152*a^9*b*c^6*h^2*k*m + 369$   
 $0*a^6*b^9*c*h*k*m^2 + 1152*a^6*b^9*c*g*1*m^2 - 540*a^5*b^10*c*h*k^2*m + 54*$   
 $a^4*b^11*c*h^2*k*m + 565248*a^9*b*c^6*h*j^2*m - 39771648*a^7*b*c^8*d^2*k*m$   
 $- 2496000*a^8*b*c^7*f^2*k*m - 1543680*a^9*b*c^6*f*k^2*m + 1980*a^5*b^10*c*f$   
 $*k*m^2 - 384*a^5*b^10*c*g*j*m^2 - 180*a^4*b^11*c*f*k^2*m + 6*a^2*b^13*c*f^2$   
 $*k*m - 10298880*a^9*b*c^6*d*k*m^2 + 2580480*a^9*b*c^6*e*j*m^2 + 5310*a^4*b^$   
 $11*c*d*k*m^2 - 1674*a*b^13*c^2*d^2*k*m - 540*a^3*b^12*c*d*k^2*m - 10616832*$   
 $a^7*b*c^8*e^2*j*1 - 3538944*a^8*b*c^7*e*j^2*1 + 2727936*a^8*b*c^7*d*j^2*m -$   
 $2496000*a^9*b*c^6*f*h*m^2 - 1543680*a^8*b*c^7*f*h^2*m + 565248*a^8*b*c^7*f$   
 $*j^2*k - 270*a^4*b^11*c*f*h*m^2 - 59512320*a^6*b*c^9*d^2*f*m + 5087232*a^7*$   
 $b*c^8*e^2*h*m + 1105920*a^8*b*c^7*e*j*k^2 - 3456*a*b^12*c^3*d^2*j*1 - 16358$   
 $40*a^7*b*c^8*f^2*h*k - 1009152*a^8*b*c^7*f*h*k^2 + 10260*a*b^12*c^3*d^2*h*m$   
 $- 684*a^3*b^12*c*d*h*m^2 - 24675840*a^6*b*c^9*d^2*h*k - 15552000*a^8*b*c^7$   
 $*d*f*m^2 + 24551424*a^6*b*c^9*d*e^2*m - 3939840*a^7*b*c^8*d*h^2*k + 1105920$   
 $*a^7*b*c^8*e*h^2*j - 25074*a*b^11*c^4*d^2*f*m + 10530*a*b^11*c^4*d^2*h*k +$   
 $10368*a*b^11*c^4*d^2*g*1 + 420*a*b^12*c^3*d*f^2*m - 378*a^2*b^13*c*d*f*m^2$   
 $- 10616832*a^6*b*c^9*e^2*g*j + 5087232*a^6*b*c^9*e^2*f*k - 3538944*a^7*b*c^$   
 $8*e*g*j^2 + 1843200*a^7*b*c^8*d*h*j^2 - 7994880*a^6*b*c^9*d*f^2*k - 4990464$   
 $*a^7*b*c^8*d*f*k^2 + 2580480*a^6*b*c^9*e*f^2*j + 65664*a*b^10*c^5*d^2*g*j -$   
 $27972*a*b^10*c^5*d^2*f*k - 20736*a*b^10*c^5*d^2*e*1 + 1260*a*b^11*c^4*d*f^$   
 $2*k + 54*a*b^13*c^2*d*f*k^2 + 23224320*a^5*b*c^10*d^2*e*j - 37062144*a^5*b*$   
 $c^10*d^2*f*h + 384*a*b^12*c^3*d*f*j^2 - 131328*a*b^9*c^6*d^2*e*j - 5985792*$   
 $a^6*b*c^9*d*f*h^2 + 206010*a*b^9*c^6*d^2*f*h - 6300*a*b^10*c^5*d*f^2*h + 13$   
 $50*a*b^11*c^4*d*f*h^2 + 16588800*a^5*b*c^10*d*e^2*h + 3456*a*b^10*c^5*d*f*g$   
 $^2 + 435456*a*b^8*c^7*d^2*e*g + 13824*a*b^8*c^7*d*e^2*f - 1474560*a^9*c^7*e$   
 $*j*k*m + 460800*a^9*c^7*f*h*k*m + 3225600*a^8*c^8*d*f*k*m - 2457600*a^8*c^8$   
 $*e*f*j*m - 884736*a^8*c^8*e*h*j*k - 6193152*a^7*c^9*d*e*j*k + 1935360*a^7*c$

$$\begin{aligned}
& ^9d*f*h*k - 1474560*a^7*c^9*e*f*h*j - 10321920*a^6*c^10*d*e*f*j - 1105920* \\
& a^9*b^4*c^3*k*1^2*m - 552960*a^10*b^2*c^4*k*1^2*m - 34560*a^8*b^6*c^2*k*1^2 \\
& *m - 1290240*a^10*b^2*c^4*j*1*m^2 - 860160*a^9*b^4*c^3*j*1*m^2 - 80640*a^8* \\
& b^6*c^2*j*1*m^2 - 737280*a^9*b^2*c^5*j^2*k*m - 568320*a^8*b^4*c^4*j^2*k*m - \\
& 136704*a^7*b^6*c^3*j^2*k*m - 2304*a^6*b^8*c^2*j^2*k*m + 1271808*a^9*b^3*c^ \\
& 4*h*1^2*m - 552960*a^9*b^2*c^5*j*k^2*1 - 552960*a^8*b^4*c^4*j*k^2*1 + 41472 \\
& 0*a^8*b^5*c^3*h*1^2*m - 145152*a^7*b^6*c^3*j*k^2*1 - 17280*a^7*b^7*c^2*h*1^ \\
& 2*m - 3456*a^6*b^8*c^2*j*k^2*1 - 3640320*a^9*b^3*c^4*h*k*m^2 - 2626560*a^8* \\
& b^3*c^5*h^2*k*m + 2211840*a^9*b^2*c^5*h*k^2*m + 2056320*a^8*b^4*c^4*h*k^2*m \\
& + 1935360*a^9*b^3*c^4*g*1*m^2 - 1143360*a^8*b^5*c^3*h*k*m^2 - 1097280*a^7* \\
& b^5*c^4*h^2*k*m + 364608*a^7*b^6*c^3*h*k^2*m + 322560*a^8*b^5*c^3*g*1*m^2 - \\
& 56160*a^6*b^7*c^3*h^2*k*m - 40320*a^7*b^7*c^2*g*1*m^2 + 27936*a^7*b^7*c^2* \\
& h*k*m^2 - 3780*a^6*b^8*c^2*h*k^2*m + 2970*a^5*b^9*c^2*h^2*k*m - 1419264*a^8 \\
& *b^4*c^4*f*1^2*m - 1105920*a^7*b^4*c^5*g^2*k*m - 921600*a^9*b^2*c^5*f*1^2*m \\
& - 829440*a^8*b^4*c^4*h*k*1^2 + 749568*a^8*b^3*c^5*h*j^2*m - 552960*a^8*b^2 \\
& *c^6*g^2*k*m - 331776*a^9*b^2*c^5*h*k*1^2 + 317952*a^7*b^5*c^4*h*j^2*m - 10 \\
& 3680*a^7*b^6*c^3*h*k*1^2 + 80640*a^7*b^6*c^3*f*1^2*m + 38400*a^6*b^7*c^3*h* \\
& j^2*m - 34560*a^6*b^6*c^4*g^2*k*m + 3456*a^5*b^8*c^3*g^2*k*m - 1920*a^5*b^9 \\
& *c^2*h*j^2*m - 5142528*a^7*b^3*c^6*f^2*k*m + 5068800*a^9*b^2*c^5*f*k*m^2 - \\
& 3870720*a^9*b^2*c^5*e*1*m^2 - 3755520*a^8*b^3*c^5*f*k^2*m + 3000960*a^8*b^4 \\
& *c^4*f*k*m^2 - 1290240*a^9*b^2*c^5*g*j*m^2 - 1085760*a^7*b^5*c^4*f*k^2*m - \\
& 959040*a^6*b^5*c^5*f^2*k*m - 860160*a^8*b^4*c^4*g*j*m^2 + 829440*a^8*b^3*c^ \\
& 5*g*k^2*1 - 645120*a^8*b^4*c^4*e*1*m^2 - 552960*a^8*b^2*c^6*h^2*j*1 - 55296 \\
& 0*a^7*b^4*c^5*h^2*j*1 + 414720*a^7*b^5*c^4*g*k^2*1 - 145152*a^6*b^6*c^4*h^2 \\
& *j*1 + 103200*a^5*b^7*c^4*f^2*k*m - 80640*a^7*b^6*c^3*g*j*m^2 + 80640*a^7*b \\
& ^6*c^3*e*1*m^2 + 41280*a^7*b^6*c^3*f*k*m^2 - 37188*a^6*b^8*c^2*f*k*m^2 + 13 \\
& 536*a^6*b^7*c^3*f*k^2*m + 12672*a^6*b^8*c^2*g*j*m^2 + 10368*a^6*b^7*c^3*g*k \\
& ^2*1 + 5490*a^5*b^9*c^2*f*k^2*m - 3456*a^5*b^8*c^3*h^2*j*1 - 2304*a^6*b^8*c \\
& ^2*e*1*m^2 + 810*a^4*b^9*c^3*f^2*k*m - 270*a^3*b^11*c^2*f^2*k*m + 6137856*a \\
& ^8*b^3*c^5*d*1^2*m - 4423680*a^7*b^2*c^7*e^2*k*m - 2654208*a^8*b^3*c^5*g*j* \\
& 1^2 - 2654208*a^7*b^3*c^6*g^2*j*1 + 1769472*a^8*b^2*c^6*g*j^2*1 + 1769472*a \\
& ^7*b^4*c^5*g*j^2*1 - 1354752*a^7*b^5*c^4*d*1^2*m - 1327104*a^7*b^5*c^4*g*j* \\
& 1^2 - 1327104*a^6*b^5*c^5*g^2*j*1 + 1271808*a^8*b^3*c^5*f*k*1^2 - 1040384*a \\
& ^8*b^2*c^6*f*j^2*m - 697344*a^7*b^4*c^5*f*j^2*m - 516096*a^8*b^2*c^6*h*j^2* \\
& k - 451584*a^7*b^4*c^5*h*j^2*k + 442368*a^6*b^6*c^4*g*j^2*1 + 414720*a^7*b^ \\
& 5*c^4*f*k*1^2 - 138240*a^6*b^6*c^4*h*j^2*k - 138240*a^6*b^4*c^6*e^2*k*m - 1 \\
& 21856*a^6*b^6*c^4*f*j^2*m + 120960*a^6*b^7*c^3*d*1^2*m - 17280*a^6*b^7*c^3* \\
& f*k*1^2 + 13824*a^5*b^6*c^5*e^2*k*m - 11520*a^5*b^8*c^3*h*j^2*k + 8960*a^5* \\
& b^8*c^3*f*j^2*m + 10851840*a^8*b^2*c^6*d*k^2*m - 10464768*a^6*b^3*c^7*d^2*k \\
& *m - 10275840*a^8*b^3*c^5*d*k*m^2 + 7121088*a^5*b^5*c^6*d^2*k*m + 3127680*a \\
& ^7*b^4*c^5*d*k^2*m + 1720320*a^8*b^3*c^5*e*j*m^2 - 1658880*a^8*b^2*c^6*e*k^ \\
& 2*1 - 1290240*a^7*b^2*c^7*f^2*j*1 + 1271808*a^7*b^3*c^6*g^2*h*m - 1222560*a \\
& ^4*b^7*c^5*d^2*k*m + 999360*a^7*b^5*c^4*d*k*m^2 - 860160*a^6*b^4*c^6*f^2*j* \\
& 1 - 829440*a^7*b^4*c^5*e*k^2*1 - 705024*a^6*b^6*c^4*d*k^2*m - 552960*a^8*b^ \\
& 2*c^6*g*j*k^2 - 552960*a^7*b^4*c^5*g*j*k^2 + 414720*a^6*b^5*c^5*g^2*h*m + 3
\end{aligned}$$

$19392a^6b^7c^3dk^2m^2 + 161280a^7b^5c^4e^2jm^2 - 145152a^6b^6c^4$   
 $g^2jk^2 - 85734a^5b^9c^2dk^2m^2 - 80640a^5b^6c^5f^2j^2m - 25344a^6$   
 $b^7c^3e^2jm^2 + 23490a^3b^9c^4d^2k^2m - 20736a^6b^6c^4e^2k^2m -$   
 $17280a^5b^7c^4g^2hm + 14148a^5b^8c^3dk^2m + 13716a^2b^11c^3$   
 $d^2k^2m + 12690a^4b^10c^2dk^2m + 12672a^4b^8c^4f^2j^2m - 3456a^5$   
 $b^8c^3g^2jk^2 + 768a^5b^9c^2e^2jm^2 - 384a^3b^10c^3f^2j^2m + 53$   
 $08416a^8b^2c^6e^2j^2m - 5308416a^6b^3c^7e^2j^2m - 5142528a^8b^3c^5$   
 $f^2hm^2 + 5068800a^7b^2c^7f^2hm - 375520a^7b^3c^6f^2hm - 35$   
 $38944a^7b^3c^6e^2j^2m + 3000960a^6b^4c^6f^2hm + 2654208a^7b^4c^5$   
 $e^2j^2m - 2322432a^8b^2c^6dk^2m + 2125824a^7b^3c^6dj^2m - 19$   
 $90656a^7b^4c^5dk^2m - 1085760a^6b^5c^5f^2hm - 959040a^7b^5c^4$   
 $f^2hm - 884736a^6b^5c^5e^2j^2m + 829440a^7b^3c^6g^2hm + 74956$   
 $8a^7b^3c^6f^2j^2k + 518400a^6b^6c^4dk^2m + 414720a^6b^5c^5g^2hm$   
 $+ 317952a^6b^5c^5f^2j^2k + 133632a^6b^5c^5dk^2m + 103200a^6$   
 $b^7c^3f^2hm - 96768a^5b^7c^4dk^2m - 51840a^5b^8c^3dk^2m +$   
 $41280a^5b^6c^5f^2hm + 38400a^5b^7c^4f^2j^2k - 37188a^4b^8c^4f^2$   
 $hm + 13536a^5b^7c^4f^2hm + 13440a^4b^9c^3dj^2m + 10368a^5b^7$   
 $c^4g^2hm + 5490a^4b^9c^3f^2hm + 1980a^3b^10c^3f^2hm - 19$   
 $20a^4b^9c^3f^2j^2k + 810a^5b^9c^2f^2hm - 180a^3b^11c^2f^2hm -$   
 $30a^2b^12c^2f^2hm + 30067200a^6b^2c^8d^2hm - 11612160a^6b^2$   
 $c^8d^2j^2m + 1658880a^6b^3c^7e^2hm + 1596672a^4b^6c^6d^2j^2m -$   
 $1419264a^6b^4c^6f^2g^2m - 1105920a^7b^4c^5f^2hm + 1105920a^7b^3$   
 $c^6e^2jk^2 - 921600a^7b^2c^7f^2g^2m - 829440a^6b^4c^6g^2hm - 5$   
 $52960a^8b^2c^6f^2hm - 508032a^3b^8c^5d^2j^2m - 331776a^7b^2c^7$   
 $g^2hm + 290304a^6b^5c^5e^2jk^2 - 103680a^5b^6c^5g^2hm + 80640a^5$   
 $b^6c^5f^2g^2m - 69120a^5b^5c^6e^2hm + 65664a^2b^10c^4d^2j^2m -$   
 $34560a^6b^6c^4f^2hm + 6912a^5b^7c^4e^2jk^2 + 3456a^5b^8c^3$   
 $f^2hm + 11930112a^8b^2c^6d^2hm + 8432640a^7b^2c^7d^2hm + 445$   
 $0176a^7b^4c^5d^2hm + 4337280a^6b^4c^6d^2hm - 3870720a^8b^2c^6$   
 $e^2gm - 3640320a^6b^3c^7f^2hm - 2885760a^5b^4c^7d^2hm - 284$   
 $4288a^4b^6c^6d^2hm - 2626560a^7b^3c^6f^2hm + 2211840a^7b^2c^7$   
 $f^2hm + 2056320a^6b^4c^6f^2hm + 1935360a^6b^3c^7f^2g^2m - 191$   
 $6928a^7b^2c^7dj^2k - 1687680a^6b^6c^4d^2hm - 1658880a^7b^2c^7$   
 $e^2hm - 1143360a^5b^5c^6f^2hm - 1097280a^6b^5c^5f^2hm + 101$   
 $9412a^3b^8c^5d^2hm - 1007424a^5b^6c^5d^2hm - 912384a^6b^4c^6$   
 $d^2j^2k - 829440a^6b^4c^6e^2hm - 645120a^7b^4c^5e^2gm - 552960$   
 $a^7b^2c^7g^2hm - 552960a^6b^4c^6g^2hm + 364608a^5b^6c^5f^2hm$   
 $+ 322560a^5b^5c^6f^2g^2m + 197460a^5b^8c^3d^2hm - 145152a^5b^6$   
 $c^5g^2hm - 143802a^2b^10c^4d^2hm + 80640a^6b^6c^4e^2gm -$   
 $56160a^5b^7c^4f^2hm + 51948a^4b^8c^4d^2hm - 40320a^4b^7c^5f^2$   
 $g^2m + 34560a^4b^8c^4dj^2k + 27936a^4b^7c^5f^2hm - 20736a^5b^6$   
 $c^5e^2hm - 13824a^5b^6c^5dk^2m + 10800a^3b^10c^3d^2hm -$   
 $5760a^3b^10c^3dj^2k - 3780a^4b^8c^4f^2hm + 3690a^3b^9c^4f^2$   
 $hm - 3456a^4b^8c^4g^2hm + 2970a^4b^9c^3f^2hm - 2304a^5b^8c^3$   
 $e^2gm + 1152a^3b^9c^4f^2g^2m - 540a^3b^10c^3f^2hm - 540a^2$



$$\begin{aligned}
& *b^{12}c^2d^2h^{2m} - 90a^4b^{10}c^2d^2h^m - 90a^2b^{11}c^3f^2h^k + 54a^3b^{11}c^2f^2h^k + 15925248a^6b^2c^8e^2g^1 - 7962624a^7b^3c^6e \\
& *g^1 - 7962624a^6b^3c^7e^2g^1 + 23385600a^6b^2c^8d^2f^2m + 61378 \\
& 56a^6b^3c^7d^2g^2m - 5677056a^6b^2c^8e^2f^2m + 4147200a^7b^3c^6d^2h^1 - 3317760a^6b^2c^8e^2h^k - 1354752a^5b^5c^6d^2g^2m + 12718 \\
& 08a^6b^3c^7f^2g^2k - 737280a^7b^2c^7f^2h^j + 17418240a^5b^3c^8d^2g^1 - 568320a^6b^4c^6f^2h^j - 414720a^6b^5c^5d^2h^1 + 414720a^5b^5c^6f^2g^2k - 414720a^5b^4c^7e^2h^k + 322560a^5b^4c^7e^2f^2m - 136704a^5b^6c^5f^2h^j + 120960a^4b^7c^5d^2g^2m - 31104a^5b^7c^4d^2h^1 - 17280a^4b^7c^5f^2g^2k + 10368a^4b^9c^3d^2h^1 - 230 \\
& 4a^4b^8c^4f^2h^j + 384a^3b^{10}c^3f^2h^j + 50042880a^5b^2c^9d^2f^2k - 13271040a^5b^3c^8d^2h^k - 13149696a^7b^3c^6d^2f^2m + 109065 \\
& 60a^4b^5c^7d^2f^2m - 8709120a^4b^5c^7d^2g^1 - 7418880a^5b^3c^8d^2f^2m + 7133184a^7b^2c^7d^2h^k - 6428160a^6b^3c^7d^2h^2k + 55935 \\
& 36a^4b^5c^7d^2h^k - 3870720a^6b^2c^8e^2f^2m + 3369600a^6b^4c^6d^2h^k + 3148992a^6b^5c^5d^2f^2m - 2985696a^3b^7c^6d^2f^2m + 19595 \\
& 52a^3b^7c^6d^2g^1 - 1658880a^7b^2c^7e^2g^2k - 1505280a^4b^6c^6d^2f^2m - 1290240a^6b^2c^8f^2g^2j - 34836480a^5b^2c^9d^2e^1 + 1105 \\
& 920a^6b^3c^7e^2h^2j - 860160a^5b^4c^7f^2g^2j - 829440a^6b^4c^6e^2g^2k - 692064a^3b^7c^6d^2h^k - 689472a^5b^5c^6d^2h^2k - 645120a^5b^4c^7e^2f^2m - 388800a^5b^6c^5d^2h^k + 378954a^2b^9c^5d^2f^2m + 362880a^5b^4c^7d^2f^2m + 296964a^3b^8c^5d^2f^2m + 290304a^5b^5c^6e^2h^2j + 277344a^4b^7c^5d^2h^2k - 217728a^2b^9c^5d^2g^1 - 8 \\
& 0640a^4b^6c^6f^2g^2j + 80640a^4b^6c^6e^2f^2m - 77070a^4b^9c^3d^2f^2m - 30240a^5b^7c^4d^2f^2m - 28350a^3b^9c^4d^2h^2k - 26406a^2b^9c^5d^2h^k - 21060a^4b^8c^4d^2h^k - 20736a^5b^6c^5e^2g^2k - 19 \\
& 278a^2b^{10}c^4d^2f^2m + 12672a^3b^8c^5f^2g^2j + 10044a^3b^{10}c^3d^2h^k + 8820a^3b^{11}c^2d^2f^2m + 6912a^4b^7c^5e^2h^2j - 2304a^3b^8c^5e^2f^2m - 1620a^2b^{11}c^3d^2h^2k - 384a^2b^{10}c^4f^2g^2j + 162a^2b^{12}c^2d^2h^k - 5419008a^5b^3c^8d^2e^2m + 5308416a^6b^2c^8e^2g^2j - 5308416a^5b^3c^8e^2g^2j - 3870720a^7b^2c^7d^2f^1 - 3538944a^6b^3c^7e^2g^2j + 2654208a^5b^4c^7e^2g^2j - 2322432a^6b^2c^8d^2g^2k - 1990656a^5b^4c^7d^2g^2k - 1935360a^6b^4c^6d^2f^1 + 1658880a^6b^3c^7d^2h^j + 1658880a^5b^3c^8e^2f^2k - 884736a^5b^5c^6e^2g^2j + 725760a^5b^6c^5d^2f^1 + 17418240a^4b^4c^8d^2e^1 + 518400a^4b^6c^6d^2g^2k + 483840a^4b^5c^7d^2e^2m + 262656a^5b^5c^6d^2h^j - 96768a^4b^8c^4d^2f^1 - 69120a^4b^5c^7e^2f^2k - 55296a^4b^7c^5d^2h^j - 51840a^3b^8c^5d^2g^2k + 3456a^3b^{10}c^3d^2f^1 + 1152a^3b^9c^4d^2h^j + 1152a^2b^{11}c^3d^2h^j - 15431040a^4b^4c^8d^2f^2k - 13248000a^5b^3c^8d^2f^2k - 11612160a^5b^2c^9d^2g^2j - 10063872a^6b^3c^7d^2f^2k - 3919104a^3b^6c^7d^2e^1 + 2554560a^4b^5c^7d^2f^2k + 1720320a^5b^3c^8e^2f^2j + 1596672a^3b^6c^7d^2g^2j + 1518912a^3b^6c^7d^2f^2k - 1105920a^5b^4c^7f^2g^2h + 838080a^5b^5c^6d^2f^2k - 552960a^6b^2c^8f^2g^2h - 508032a^2b^8c^6d^2g^2j + 435456a^2b^8c^6d^2e^1 + 161280a^4b^5c^7e^2f^2j + 116640a^4b^7c^5d^2f^2k
\end{aligned}$$

$$\begin{aligned}
& + 106812a^2b^8c^6d^2f^*k - 98208a^3b^7c^6d^*f^2k - 34560a^4b^6c^6f^*g^2h - 27270a^3b^9c^4d^*f^*k^2 - 26334a^2b^9c^5d^*f^2k - 25344a^3b^7c^6e^*f^2j + 3456a^3b^8c^5f^*g^2h + 768a^2b^9c^5e^*f^2j - 702a^2b^11c^3d^*f^*k^2 - 7962624a^5b^2c^9d^*e^2k - 2580480a^6b^2c^8d^*f^*j^2 + 2073600a^4b^4c^8d^*e^2k - 1658880a^6b^2c^8e^*g^*h^2 - 967680a^5b^4c^7d^*f^*j^2 - 829440a^5b^4c^7e^*g^*h^2 - 207360a^3b^6c^7d^*e^2k + 64512a^4b^6c^6d^*f^*j^2 + 39168a^3b^8c^5d^*f^*j^2 - 20736a^4b^6c^6e^*g^*h^2 - 9216a^2b^10c^4d^*f^*j^2 - 4423680a^5b^2c^9e^2f^*h + 4147200a^5b^3c^8d^*g^2h - 3193344a^3b^5c^8d^2e^*j + 1016064a^2b^7c^7d^2e^*j - 414720a^4b^5c^7d^*g^2h - 138240a^4b^4c^8e^2f^*h - 31104a^3b^7c^6d^*g^2h + 13824a^3b^6c^7e^2f^*h + 10368a^2b^9c^5d^*g^2h + 15630336a^5b^2c^9d^*f^2h - 14459904a^4b^3c^9d^2f^*h + 9630144a^3b^5c^8d^2f^*h - 8764416a^5b^3c^8d^*f^*h^2 - 3870720a^5b^2c^9e^2f^2g + 2867328a^4b^4c^8d^*f^2h - 2095200a^2b^7c^7d^2f^*h - 1414080a^3b^6c^7d^*f^2h - 34836480a^4b^2c^10d^2e^*g - 645120a^4b^4c^8e^*f^2g + 306720a^3b^7c^6d^*f^*h^2 + 197820a^2b^8c^6d^*f^2h + 146880a^4b^5c^7d^*f^*h^2 + 80640a^3b^6c^7e^*f^2g - 55350a^2b^9c^5d^*f^*h^2 - 2304a^2b^8c^6e^*f^2g - 3870720a^5b^2c^9d^*f^*g^2 - 1935360a^4b^4c^8d^*f^*g^2 - 1658880a^4b^3c^9d^*e^2h + 725760a^3b^6c^7d^*f^*g^2 + 17418240a^3b^4c^9d^2e^*g - 124416a^3b^5c^8d^*e^2h - 96768a^2b^8c^6d^*f^*g^2 + 41472a^2b^7c^7d^*e^2h - 3919104a^2b^6c^8d^2e^*g - 7741440a^4b^2c^10d^*e^2f + 2903040a^3b^4c^9d^*e^2f - 387072a^2b^6c^8d^*e^2f - 20160a^8b^7c^1^2m^2 - 1648128a^10b^3c^3k^*m^3 - 898560a^9b^3c^4k^3m - 354240a^9b^5c^2k^*m^3 - 354240a^8b^5c^3k^3m - 21600a^7b^7c^2k^3m - 13950a^7b^8c^*k^2m^2 + 430080a^10b^*c^5j^2m^2 - 1984a^6b^9c^*j^2m^2 - 884736a^9b^3c^4j^*l^3 - 589824a^8b^3c^5j^3*l - 442368a^8b^5c^3j^*l^3 - 294912a^7b^5c^4j^3*l - 49152a^6b^7c^3j^3*l + 1359360a^10b^2c^4h^*m^3 + 1173120a^9b^4c^3h^*m^3 + 743040a^7b^4c^5h^3m + 622080a^8b^2c^6h^3m + 184320a^9b^*c^6j^2k^2 + 107136a^6b^6c^4h^3m - 32640a^8b^6c^2h^*m^3 + 540a^5b^8c^3h^3m - 270a^4b^10c^2h^3m - 180a^5b^10c^*h^2m^2 - 2293760a^9b^3c^4f^*m^3 - 2293760a^6b^3c^7f^3m + 1327104a^8b^4c^4g^*l^3 + 1327104a^6b^4c^6g^3l - 622080a^8b^3c^5h^*k^3 - 622080a^7b^3c^6h^3k - 326592a^7b^5c^4h^*k^3 - 326592a^6b^5c^5h^3k - 199360a^8b^5c^3f^*m^3 - 199360a^5b^5c^6f^3m + 61920a^7b^7c^2f^*m^3 + 61920a^4b^7c^5f^3m - 38880a^6b^7c^3h^*k^3 - 38880a^5b^7c^4h^3k - 3682a^3b^9c^4f^3m - 810a^5b^9c^2h^*k^3 - 810a^4b^9c^3h^3k - 70a^3b^12c^*f^2m^2 + 70a^2b^11c^3f^3m + 3870720a^8b^*c^7e^2m^2 + 184320a^8b^*c^7h^2j^2 - 14152320a^4b^4c^8d^3m + 10644480a^5b^2c^9d^3m + 5483520a^9b^2c^5d^*m^3 + 4269888a^3b^6c^7d^3m - 2654208a^8b^3c^5e^*l^3 + 1359360a^6b^2c^8f^3k + 1330560a^8b^4c^4d^*m^3 + 1173120a^5b^4c^7f^3k - 884736a^6b^3c^7g^3j - 826560a^7b^6c^3d^*m^3 + 743040a^7b^4c^5f^*k^3 + 622080a^8b^2c^6f^*k^3 - 607068a^2b^8c^6d^3m - 589824a^7b^3c^6g^*j^3 - 442368a^5b^5c^6g^3j - 294912a^6b^5c^5g^*j^3 + 145188a^6b^8c^2d^*m^3 + 107136a^6b^6c^4f^*k^3 - 49152a^5b^7c^4g^*j^3 -
\end{aligned}$$

$$\begin{aligned}
& 32640a^4b^6c^6f^3k - 5796a^3b^8c^5f^3k + 540a^5b^8c^3fk^3 - \\
& 270a^4b^{10}c^2fk^3 + 210a^2b^{10}c^4f^3k + 19077120a^4b^3c^9d^3 \\
& *k + 1658880a^7b^3c^8e^2k^2 + 430080a^7b^3c^8f^2j^2 + 3538944a^5b^2 \\
& *c^9e^3j - 2488320a^7b^3c^6dk^3 - 2379456a^3b^5c^8d^3k + 117964 \\
& 8a^7b^2c^7ej^3 + 589824a^6b^4c^6ej^3 + 98304a^5b^6c^5ej^3 - \\
& 95904a^2b^7c^7d^3k - 57024a^6b^5c^5dk^3 + 49248a^5b^7c^4dk^3 \\
& - 4050a^4b^9c^3dk^3 - 810a^3b^{11}c^2dk^3 - 486a^6b^{12}c^3d^2k^2 \\
& + 3870720a^6b^3c^9d^2j^2 - 1648128a^5b^3c^8f^3h - 898560a^6b^3c \\
& ^7fh^3 - 354240a^5b^5c^6fh^3 - 354240a^4b^5c^7f^3h + 43680a^3b \\
& ^7c^6f^3h - 21600a^4b^7c^5fh^3 - 9792a^6b^{11}c^4d^2j^2 + 1350a^ \\
& 3b^9c^4fh^3 - 1050a^2b^9c^5f^3h + 1658880a^6b^3c^9e^2h^2 + 1654 \\
& 7328a^4b^2c^{10}d^3h - 12306816a^3b^4c^9d^3h + 37310976a^3b^3c^1 \\
& 0d^3f + 3037824a^2b^6c^8d^3h - 2654208a^5b^3c^8e^3g^3 + 1949184a \\
& ^6b^2c^8dh^3 + 1296000a^5b^4c^7d^3h - 155520a^4b^6c^6d^3h - 4 \\
& 0500a^6b^{10}c^5d^2h^2 - 8100a^3b^8c^5d^3h + 4050a^2b^{10}c^4d^3h \\
& + 3870720a^5b^3c^{10}e^2f^2 + 34836480a^4b^3c^{11}d^2e^2 - 108864a^6b^9c \\
& ^6d^2g^2 - 8068032a^2b^5c^9d^3f - 5623296a^4b^3c^9d^3f^3 + 173779 \\
& 2a^3b^5c^8d^3f^3 - 260190a^6b^8c^7d^2f^2 - 211680a^2b^7c^7d^3f^3 - \\
& 435456a^6b^7c^8d^2e^2 - 245760a^{10}c^6j^2km - 384a^6b^{10}j^2lm^2 \\
& + 138240a^{10}c^6hk^2m - 90a^5b^{11}h^2km^2 + 384000a^{10}c^6fk^2m - \\
& 2211840a^8c^8e^2k^2m - 409600a^9c^7f^2j^2m - 147456a^9c^7h^2j^2k \\
& - 30a^4b^{12}fk^2m + 967680a^9c^7d^2k^2m + 384000a^8c^8f^2hm - 9 \\
& 0a^3b^{13}dk^2m + 20321280a^7c^9d^2hm - 883200a^{11}b^3c^4k^2m^3 - 3 \\
& 17952a^{10}b^3c^5k^3m + 43680a^8b^7c^3k^2m^3 + 1350a^6b^9c^3k^3m - 270 \\
& *b^{14}c^2d^2hm + 6a^3b^{13}fh^2m^2 + 4838400a^9c^7d^3hm^2 + 2903040* \\
& a^8c^8d^3hm - 1032192a^8c^8d^3j^2k + 138240a^8c^8fh^2k - 368640 \\
& 0a^7c^9e^2fm - 1327104a^7c^9e^2hk - 393216a^9b^3c^6j^3l - 2457 \\
& 60a^8c^8fh^2j^2 - 810b^{13}c^3d^2hk + 630b^{13}c^3d^2fm + 18a^2b \\
& ^{14}d^3hm^2 + 2688000a^7c^9d^3fm + 580608a^8c^8d^3hk^2 - 5796a^7b \\
& ^8c^8hm^3 - 3456b^{12}c^4d^2g^2j + 1890b^{12}c^4d^2fk + 6773760a^6c^ \\
& 10d^2fk - 1344000a^{10}b^3c^5fm^3 - 1344000a^7b^3c^8f^3m - 207360a^ \\
& 9b^3c^6hk^3 - 207360a^8b^3c^7h^3k - 3682a^6b^9c^3fm^3 - 9289728a^6 \\
& *c^{10}de^2k - 1720320a^7c^9d^3fm^2 - 50803200a^5b^3c^{10}d^3k + 6912* \\
& b^{11}c^5d^2ej - 10616832a^6b^3c^9e^3l - 2211840a^6c^{10}e^2fh - 39 \\
& 3216a^8b^3c^7g^2j^3 + 43416a^6b^{10}c^5d^3m - 9576a^5b^{10}c^3d^3m^3 - 945 \\
& 0b^{11}c^5d^2fh - 504a^6b^{14}c^3d^2m^2 + 1612800a^6c^{10}d^3f^2h - 1036 \\
& 800a^8b^3c^7dk^3 + 45198a^6b^9c^6d^3k - 20736b^{10}c^6d^2eg - 7518 \\
& 8736a^4b^3c^{11}d^3f - 883200a^6b^3c^9f^3h - 317952a^7b^3c^8fh^3 - 1 \\
& 5482880a^5c^{11}de^2f - 10616832a^5b^3c^{10}e^3g - 345060a^6b^8c^7d^3 \\
& *h - 4262400a^5b^3c^{10}d^3f^3 + 852768a^6b^7c^8d^3f + 7350a^6b^9c^6d^3f \\
& ^3 + 967680a^{10}b^3c^3l^2m^2 + 161280a^9b^5c^2l^2m^2 + 1684224a^1 \\
& 0b^2c^4k^2m^2 + 1264320a^9b^4c^3k^2m^2 + 126720a^8b^6c^2k^2m^ \\
& 2 + 501760a^9b^3c^4j^2m^2 + 414720a^9b^3c^4k^2l^2 + 207360a^8b^ \\
& 5c^3k^2l^2 + 170240a^8b^5c^3j^2m^2 + 9216a^7b^7c^2j^2m^2 + 518 \\
& 4a^7b^7c^2k^2l^2 + 884736a^9b^2c^5j^2l^2 + 884736a^8b^4c^4j^2
\end{aligned}$$

$$\begin{aligned}
& *1^2 + 221184*a^7*b^6*c^3*j^2*1^2 + 1419840*a^8*b^4*c^4*h^2*m^2 + 1387008*a \\
& ^9*b^2*c^5*h^2*m^2 + 276480*a^8*b^3*c^5*j^2*k^2 + 140544*a^7*b^5*c^4*j^2*k^ \\
& 2 + 84960*a^7*b^6*c^3*h^2*m^2 + 25344*a^6*b^7*c^3*j^2*k^2 - 8010*a^6*b^8*c^ \\
& 2*h^2*m^2 + 576*a^5*b^9*c^2*j^2*k^2 + 967680*a^8*b^3*c^5*g^2*m^2 + 414720*a \\
& ^8*b^3*c^5*h^2*1^2 + 207360*a^7*b^5*c^4*h^2*1^2 + 161280*a^7*b^5*c^4*g^2*m^ \\
& 2 - 20160*a^6*b^7*c^3*g^2*m^2 + 5184*a^6*b^7*c^3*h^2*1^2 + 576*a^5*b^9*c^2* \\
& g^2*m^2 + 3808000*a^8*b^2*c^6*f^2*m^2 + 1990656*a^7*b^4*c^5*g^2*1^2 + 16437 \\
& 12*a^7*b^4*c^5*f^2*m^2 + 803520*a^7*b^4*c^5*h^2*k^2 + 725760*a^8*b^2*c^6*h^ \\
& 2*k^2 + 207360*a^6*b^6*c^4*h^2*k^2 - 125440*a^6*b^6*c^4*f^2*m^2 - 13790*a^5 \\
& *b^8*c^3*f^2*m^2 + 10530*a^5*b^8*c^3*h^2*k^2 + 1785*a^4*b^10*c^2*f^2*m^2 + \\
& 81*a^4*b^10*c^2*h^2*k^2 + 18427392*a^7*b^2*c^7*d^2*m^2 + 967680*a^7*b^3*c^6 \\
& *f^2*1^2 + 645120*a^7*b^3*c^6*e^2*m^2 + 414720*a^7*b^3*c^6*g^2*k^2 + 276480 \\
& *a^7*b^3*c^6*h^2*j^2 + 207360*a^6*b^5*c^5*g^2*k^2 + 161280*a^6*b^5*c^5*f^2* \\
& 1^2 + 140544*a^6*b^5*c^5*h^2*j^2 - 80640*a^6*b^5*c^5*e^2*m^2 + 25344*a^5*b^ \\
& 7*c^4*h^2*j^2 - 20160*a^5*b^7*c^4*f^2*1^2 + 5184*a^5*b^7*c^4*g^2*k^2 + 2304 \\
& *a^5*b^7*c^4*e^2*m^2 + 576*a^4*b^9*c^3*h^2*j^2 + 576*a^4*b^9*c^3*f^2*1^2 + \\
& 7962624*a^7*b^2*c^7*e^2*1^2 - 4148928*a^6*b^4*c^6*d^2*m^2 + 1419840*a^6*b^4 \\
& *c^6*f^2*k^2 + 1387008*a^7*b^2*c^7*f^2*k^2 - 1183392*a^5*b^6*c^5*d^2*m^2 + \\
& 884736*a^7*b^2*c^7*g^2*j^2 + 884736*a^6*b^4*c^6*g^2*j^2 + 645750*a^4*b^8*c^ \\
& 4*d^2*m^2 + 221184*a^5*b^6*c^5*g^2*j^2 - 115920*a^3*b^10*c^3*d^2*m^2 + 8496 \\
& 0*a^5*b^6*c^5*f^2*k^2 + 10836*a^2*b^12*c^2*d^2*m^2 - 8010*a^4*b^8*c^4*f^2*k \\
& ^2 - 180*a^3*b^10*c^3*f^2*k^2 + 9*a^2*b^12*c^2*f^2*k^2 + 8709120*a^6*b^3*c^ \\
& 7*d^2*1^2 - 4354560*a^5*b^5*c^6*d^2*1^2 + 979776*a^4*b^7*c^5*d^2*1^2 + 8294 \\
& 40*a^6*b^3*c^7*e^2*k^2 + 17480448*a^6*b^2*c^8*d^2*k^2 + 501760*a^6*b^3*c^7* \\
& f^2*j^2 + 170240*a^5*b^5*c^6*f^2*j^2 - 108864*a^3*b^9*c^4*d^2*1^2 + 20736*a \\
& ^5*b^5*c^6*e^2*k^2 + 9216*a^4*b^7*c^5*f^2*j^2 + 5184*a^2*b^11*c^3*d^2*1^2 - \\
& 1984*a^3*b^9*c^4*f^2*j^2 + 64*a^2*b^11*c^3*f^2*j^2 + 3538944*a^6*b^2*c^8*e \\
& ^2*j^2 - 3302208*a^5*b^4*c^7*d^2*k^2 + 884736*a^5*b^4*c^7*e^2*j^2 + 414720* \\
& a^6*b^3*c^7*g^2*h^2 + 207360*a^5*b^5*c^6*g^2*h^2 - 103680*a^4*b^6*c^6*d^2*k \\
& ^2 + 101250*a^3*b^8*c^5*d^2*k^2 - 5751*a^2*b^10*c^4*d^2*k^2 + 5184*a^4*b^7* \\
& c^5*g^2*h^2 + 1935360*a^5*b^3*c^8*d^2*j^2 + 1684224*a^6*b^2*c^8*f^2*h^2 + 1 \\
& 264320*a^5*b^4*c^7*f^2*h^2 - 532224*a^4*b^5*c^7*d^2*j^2 + 126720*a^4*b^6*c^ \\
& 6*f^2*h^2 - 96768*a^3*b^7*c^6*d^2*j^2 + 62784*a^2*b^9*c^5*d^2*j^2 - 13950*a \\
& ^3*b^8*c^5*f^2*h^2 + 225*a^2*b^10*c^4*f^2*h^2 + 967680*a^5*b^3*c^8*f^2*g^2 \\
& + 829440*a^5*b^3*c^8*e^2*h^2 + 161280*a^4*b^5*c^7*f^2*g^2 + 20736*a^4*b^5*c \\
& ^7*e^2*h^2 - 20160*a^3*b^7*c^6*f^2*g^2 + 576*a^2*b^9*c^5*f^2*g^2 + 11487744 \\
& *a^5*b^2*c^9*d^2*h^2 + 7962624*a^5*b^2*c^9*e^2*g^2 + 35525376*a^4*b^2*c^10* \\
& d^2*f^2 - 1412640*a^3*b^6*c^7*d^2*h^2 + 461376*a^4*b^4*c^8*d^2*h^2 + 375030 \\
& *a^2*b^8*c^6*d^2*h^2 + 8709120*a^4*b^3*c^9*d^2*g^2 - 4354560*a^3*b^5*c^8*d^ \\
& 2*g^2 + 979776*a^2*b^7*c^7*d^2*g^2 + 645120*a^4*b^3*c^9*e^2*f^2 - 80640*a^3 \\
& *b^5*c^8*e^2*f^2 + 2304*a^2*b^7*c^7*e^2*f^2 - 15269184*a^3*b^4*c^9*d^2*f^2 \\
& + 2870784*a^2*b^6*c^8*d^2*f^2 - 17418240*a^3*b^3*c^10*d^2*e^2 + 3919104*a^2 \\
& *b^5*c^9*d^2*e^2 + 54*b^15*c*d^2*k*m + 6*a*b^15*d*f*m^2 + 115200*a^11*c^5*k \\
& ^2*m^2 + 576*a^7*b^9*1^2*m^2 + 225*a^6*b^10*k^2*m^2 + 64*a^5*b^11*j^2*m^2 + \\
& 345600*a^10*c^6*h^2*m^2 + 9*a^4*b^12*h^2*m^2 + 320000*a^9*c^7*f^2*m^2 + 41
\end{aligned}$$

$$\begin{aligned}
& 472*a^9*c^7*h^2*k^2 + 16934400*a^8*c^8*d^2*m^2 + 345600*a^8*c^8*f^2*k^2 + 8 \\
& 1*b^14*c^2*d^2*k^2 + 3538944*a^7*c^9*e^2*j^2 + 2032128*a^7*c^9*d^2*k^2 + 49 \\
& 2800*a^11*b^2*c^3*m^4 + 351456*a^10*b^4*c^2*m^4 + 576*b^13*c^3*d^2*j^2 + 33 \\
& 1776*a^9*b^4*c^3*1^4 + 115200*a^7*c^9*f^2*h^2 + 142560*a^8*b^4*c^4*k^4 + 10 \\
& 3680*a^9*b^2*c^5*k^4 + 32400*a^7*b^6*c^3*k^4 + 2025*b^12*c^4*d^2*h^2 + 2025 \\
& *a^6*b^8*c^2*k^4 + 6096384*a^6*c^10*d^2*h^2 + 131072*a^8*b^2*c^6*j^4 + 9830 \\
& 4*a^7*b^4*c^5*j^4 + 32768*a^6*b^6*c^4*j^4 + 5184*b^11*c^5*d^2*g^2 + 4096*a^ \\
& 5*b^8*c^3*j^4 + 11025*b^10*c^6*d^2*f^2 + 5644800*a^5*c^11*d^2*f^2 + 142560* \\
& a^6*b^4*c^6*h^4 + 103680*a^7*b^2*c^7*h^4 + 32400*a^5*b^6*c^5*h^4 + 20736*b^ \\
& 9*c^7*d^2*e^2 + 2025*a^4*b^8*c^4*h^4 + 331776*a^5*b^4*c^7*g^4 + 492800*a^5* \\
& b^2*c^9*f^4 + 351456*a^4*b^4*c^8*f^4 - 43120*a^3*b^6*c^7*f^4 + 1225*a^2*b^8 \\
& *c^6*f^4 - 27433728*a^3*b^2*c^11*d^4 + 6446304*a^2*b^4*c^10*d^4 - 1050*a^7* \\
& b^9*k*m^3 + 384000*a^11*c^5*h*m^3 + 138240*a^9*c^7*h^3*m + 210*a^6*b^10*h*m \\
& ^3 + 47416320*a^6*c^10*d^3*m - 1134*b^12*c^4*d^3*m + 70*a^5*b^11*f*m^3 + 26 \\
& 88000*a^10*c^6*d*m^3 + 384000*a^7*c^9*f^3*k + 138240*a^9*c^7*f*k^3 - 3402*b \\
& ^11*c^5*d^3*k + 210*a^4*b^12*d*m^3 + 7077888*a^6*c^10*e^3*j + 786432*a^8*c^ \\
& 8*e*j^3 - 43120*a^9*b^6*c*m^4 + 28449792*a^5*c^11*d^3*h + 17010*b^10*c^6*d^ \\
& 3*h + 580608*a^7*c^9*d*h^3 - 39690*b^9*c^7*d^3*f - 734832*a*b^6*c^9*d^4 + 9 \\
& *b^16*d^2*m^2 + 160000*a^12*c^4*m^4 + 1225*a^8*b^8*m^4 + 20736*a^10*c^6*k^4 \\
& + 65536*a^9*c^7*j^4 + 20736*a^8*c^8*h^4 + 49787136*a^4*c^12*d^4 + 160000*a \\
& ^6*c^10*f^4 + 5308416*a^5*c^11*e^4 + 35721*b^8*c^8*d^4 + a^2*b^14*f^2*m^2, \\
& z, k1)*((768*a^2*b^14*c^3*d - 3145728*a^10*c^9*h - 5242880*a^11*c^8*m - 220 \\
& 20096*a^9*c^10*d - 22272*a^3*b^12*c^4*d + 282624*a^4*b^10*c^5*d - 2027520*a \\
& ^5*b^8*c^6*d + 8847360*a^6*b^6*c^7*d - 23396352*a^7*b^4*c^8*d + 34603008*a^ \\
& 8*b^2*c^9*d + 256*a^3*b^13*c^3*f - 9216*a^4*b^11*c^4*f + 122880*a^5*b^9*c^5 \\
& *f - 819200*a^6*b^7*c^6*f + 2949120*a^7*b^5*c^7*f - 5505024*a^8*b^3*c^8*f + \\
& 768*a^4*b^12*c^3*h - 12288*a^5*b^10*c^4*h + 61440*a^6*b^8*c^5*h - 983040*a \\
& ^8*b^4*c^7*h + 3145728*a^9*b^2*c^8*h - 3072*a^5*b^11*c^3*k + 61440*a^6*b^9* \\
& c^4*k - 491520*a^7*b^7*c^5*k + 1966080*a^8*b^5*c^6*k - 3932160*a^9*b^3*c^7* \\
& k + 256*a^5*b^12*c^2*m - 61440*a^7*b^8*c^4*m + 655360*a^8*b^6*c^5*m - 29491 \\
& 20*a^9*b^4*c^6*m + 6291456*a^10*b^2*c^7*m + 4194304*a^9*b*c^9*f + 3145728*a \\
& ^10*b*c^8*k)/(512*(4096*a^10*c^7 + a^4*b^12*c - 24*a^5*b^10*c^2 + 240*a^6*b \\
& ^8*c^3 - 1280*a^7*b^6*c^4 + 3840*a^8*b^4*c^5 - 6144*a^9*b^2*c^6)) + (x*(157 \\
& 2864*a^9*c^10*e + 524288*a^10*c^9*j - 1536*a^4*b^10*c^5*e + 30720*a^5*b^8*c \\
& ^6*e - 245760*a^6*b^6*c^7*e + 983040*a^7*b^4*c^8*e - 1966080*a^8*b^2*c^9*e \\
& + 768*a^4*b^11*c^4*g - 15360*a^5*b^9*c^5*g + 122880*a^6*b^7*c^6*g - 491520* \\
& a^7*b^5*c^7*g + 983040*a^8*b^3*c^8*g - 256*a^4*b^12*c^3*j + 4608*a^5*b^10*c \\
& ^4*j - 30720*a^6*b^8*c^5*j + 81920*a^7*b^6*c^6*j - 393216*a^9*b^2*c^8*j + 7 \\
& 68*a^5*b^11*c^3*1 - 15360*a^6*b^9*c^4*1 + 122880*a^7*b^7*c^5*1 - 491520*a^8 \\
& *b^5*c^6*1 + 983040*a^9*b^3*c^7*1 - 786432*a^9*b*c^9*g - 786432*a^10*b*c^8* \\
& 1))/(64*(4096*a^10*c^7 + a^4*b^12*c - 24*a^5*b^10*c^2 + 240*a^6*b^8*c^3 - 1 \\
& 280*a^7*b^6*c^4 + 3840*a^8*b^4*c^5 - 6144*a^9*b^2*c^6)) + (root(56371445760 \\
& *a^11*b^8*c^9*z^4 - 503316480*a^8*b^14*c^6*z^4 + 47185920*a^7*b^16*c^5*z^4 \\
& - 2621440*a^6*b^18*c^4*z^4 + 65536*a^5*b^20*c^3*z^4 - 171798691840*a^14*b^2 \\
& *c^12*z^4 + 193273528320*a^13*b^4*c^11*z^4 - 128849018880*a^12*b^6*c^10*z^4
\end{aligned}$$

$$\begin{aligned}
& - 16911433728a^{10}b^{10}c^8z^4 + 3523215360a^9b^{12}c^7z^4 + 6871947673 \\
& 6a^{15}c^{13}z^4 + 1536a^5b^{16}c^k m z^2 + 1536a^b^{18}c^3 d f z^2 - 25716 \\
& 32640a^9b^5c^8 d m z^2 + 2548039680a^9b^3c^{10} d h z^2 + 1509949440a^ \\
& 10b^3c^9 e l z^2 + 1509949440a^9b^3c^{10} e g z^2 - 1401421824a^8b^5c \\
& ^9 d h z^2 - 1321205760a^9b^2c^{11} d f z^2 - 2793406464a^{11} b c^{10} d m z \\
& ^2 + 890634240a^8b^7c^7 d m z^2 - 754974720a^{10}b^4c^8 g l z^2 - 75497 \\
& 4720a^9b^5c^8 e l z^2 + 719585280a^8b^6c^8 d k z^2 - 707788800a^9b^ \\
& 4c^9 d k z^2 - 754974720a^8b^5c^9 e g z^2 + 603979776a^{11} b^2 c^9 g l \\
& z^2 - 581959680a^{10}b^4c^8 f m z^2 + 732168192a^7b^6c^9 d f z^2 + 5347 \\
& 73760a^{11} b^3 c^8 h m z^2 - 456130560a^{11} b^4 c^7 k m z^2 - 603979776a^1 \\
& 0b^2 c^{10} e j z^2 + 534773760a^{10}b^3 c^9 f k z^2 + 384040960a^9b^6 c^7 \\
& f m z^2 + 377487360a^9b^6 c^7 g l z^2 - 456130560a^9b^4 c^9 f h z^2 + \\
& 301989888a^{11} b^3 c^8 j l z^2 - 415236096a^{10}b^2 c^{10} d k z^2 + 25401753 \\
& 6a^{10}b^6 c^6 k m z^2 - 330301440a^{10}b^4 c^8 h k z^2 + 390463488a^7b^7 \\
& c^8 d h z^2 + 188743680a^{12} b^2 c^8 k m z^2 + 301989888a^{10}b^3 c^9 g j \\
& z^2 - 297861120a^7b^8 c^7 d k z^2 - 366280704a^6b^8 c^8 d f z^2 + 18874 \\
& 3680a^{11} b^2 c^9 h k z^2 - 330301440a^8b^4 c^{10} d f z^2 + 254017536a^8 \\
& b^6 c^8 f h z^2 - 1887436800a^{10}b c^{11} d h z^2 + 188743680a^8b^7 c^7 e \\
& l z^2 + 153354240a^9b^6 c^7 h k z^2 - 185303040a^7b^9 c^6 d m z^2 - 117 \\
& 964800a^{10}b^5 c^7 h m z^2 - 61931520a^9b^8 c^5 k m z^2 + 121634816a^{11} \\
& b^2 c^9 f m z^2 - 115671040a^8b^8 c^6 f m z^2 - 62914560a^9b^7 c^6 j l \\
& z^2 + 188743680a^{10}b^2 c^{10} f h z^2 - 94371840a^8b^8 c^6 g l z^2 + 614 \\
& 4000a^8b^{10} c^4 k m z^2 - 117964800a^9b^5 c^8 f k z^2 + 61440a^7b^{12} \\
& c^3 k m z^2 - 46080a^6b^{14} c^2 k m z^2 + 23592960a^8b^9 c^5 j l z^2 + 1 \\
& 88743680a^7b^7 c^8 e g z^2 - 37355520a^9b^7 c^6 h m z^2 + 125829120a^8 \\
& b^6 c^8 e j z^2 + 23101440a^8b^9 c^5 h m z^2 - 3538944a^7b^{11} c^4 j l \\
& z^2 + 196608a^6b^{13} c^3 j l z^2 - 4349952a^7b^{11} c^4 h m z^2 + 337920a \\
& ^6b^{13} c^3 h m z^2 - 7680a^5b^{15} c^2 h m z^2 - 62914560a^8b^7 c^7 g j \\
& z^2 - 26542080a^8b^8 c^6 h k z^2 + 17940480a^7b^{10} c^5 f m z^2 + 117964 \\
& 80a^7b^{10} c^5 g l z^2 - 37355520a^8b^7 c^7 f k z^2 - 1347584a^6b^{12} c \\
& ^4 f m z^2 + 68272128a^6b^{10} c^6 d k z^2 - 589824a^6b^{12} c^4 g l z^2 + \\
& 552960a^6b^{12} c^4 h k z^2 - 147456a^7b^{10} c^5 h k z^2 - 46080a^5b^{14} \\
& c^3 h k z^2 + 35840a^5b^{14} c^3 f m z^2 + 23592960a^7b^9 c^6 g j z^2 - 2 \\
& 3592960a^7b^9 c^6 e l z^2 + 23371776a^6b^{11} c^5 d m z^2 + 23101440a^7 \\
& b^9 c^6 f k z^2 - 47185920a^7b^8 c^7 e j z^2 - 61931520a^7b^8 c^7 f h z \\
& ^2 - 4349952a^6b^{11} c^5 f k z^2 - 3538944a^6b^{11} c^5 g j z^2 - 1677312 \\
& a^5b^{13} c^4 d m z^2 + 1179648a^6b^{11} c^5 e l z^2 + 337920a^5b^{13} c^4 f \\
& k z^2 + 196608a^5b^{13} c^4 g j z^2 + 53760a^4b^{15} c^3 d m z^2 - 7680a^ \\
& 4b^{15} c^3 f k z^2 + 96583680a^5b^{10} c^7 d f z^2 - 9179136a^5b^{12} c^5 d \\
& k z^2 + 7077888a^6b^{10} c^6 e j z^2 - 51609600a^6b^9 c^7 d h z^2 + 6912 \\
& 00a^4b^{14} c^4 d k z^2 - 393216a^5b^{12} c^5 e j z^2 - 23040a^3b^{16} c^3 \\
& d k z^2 + 6144000a^6b^{10} c^6 f h z^2 + 61440a^5b^{12} c^5 f h z^2 - 46080 \\
& a^4b^{14} c^4 f h z^2 + 1536a^3b^{16} c^3 f h z^2 - 23592960a^6b^9 c^7 e \\
& g z^2 + 1179648a^5b^{11} c^6 e g z^2 + 829440a^4b^{13} c^5 d h z^2 + 368640 \\
& a^5b^{11} c^6 d h z^2 - 105984a^3b^{15} c^4 d h z^2 + 4608a^2b^{17} c^3 d h
\end{aligned}$$

$$\begin{aligned}
& *z^2 - 15175680*a^4*b^{12}*c^6*d*f*z^2 + 1428480*a^3*b^{14}*c^5*d*f*z^2 - 73728 \\
& *a^2*b^{16}*c^4*d*f*z^2 + 4108320768*a^{10}*b^3*c^9*d*m*z^2 - 1207959552*a^{11}*b \\
& *c^{10}*e*1*z^2 - 1207959552*a^{10}*b*c^{11}*e*g*z^2 - 578813952*a^{12}*b*c^9*h*m*z \\
& ^2 - 578813952*a^{11}*b*c^{10}*f*k*z^2 - 402653184*a^{12}*b*c^9*j*1*z^2 - 4026531 \\
& 84*a^{11}*b*c^{10}*g*j*z^2 - 440401920*a^{10}*b*c^{11}*f^2*z^2 - 188743680*a^{12}*b*c \\
& ^9*k^2*z^2 - 188743680*a^{11}*b*c^{10}*h^2*z^2 + 1761607680*a^{10}*c^{12}*d*f*z^2 - \\
& 14080*a^6*b^{15}*c*m^2*z^2 - 94464*a*b^{17}*c^4*d^2*z^2 + 6936330240*a^8*b^3*c \\
& ^{11}*d^2*z^2 + 2464874496*a^6*b^7*c^9*d^2*z^2 - 3963617280*a^9*b*c^{12}*d^2*z^ \\
& 2 + 1056964608*a^{11}*c^{11}*d*k*z^2 + 805306368*a^{11}*c^{11}*e*j*z^2 + 419430400* \\
& a^{12}*c^{10}*f*m*z^2 + 251658240*a^{13}*c^9*k*m*z^2 - 1509949440*a^9*b^2*c^{11}*e^ \\
& 2*z^2 + 251658240*a^{11}*c^{11}*f*h*z^2 + 150994944*a^{12}*c^{10}*h*k*z^2 - 5400428 \\
& 544*a^7*b^5*c^{10}*d^2*z^2 + 754974720*a^8*b^4*c^{10}*e^2*z^2 - 730054656*a^5*b \\
& ^9*c^8*d^2*z^2 + 477102080*a^{12}*b^3*c^7*m^2*z^2 - 377487360*a^{11}*b^4*c^7*1^ \\
& 2*z^2 + 477102080*a^9*b^3*c^{10}*f^2*z^2 + 301989888*a^{12}*b^2*c^8*1^2*z^2 - 3 \\
& 77487360*a^9*b^4*c^9*g^2*z^2 + 301989888*a^{10}*b^2*c^{10}*g^2*z^2 - 174325760* \\
& a^{11}*b^5*c^6*m^2*z^2 + 188743680*a^{10}*b^6*c^6*1^2*z^2 + 141557760*a^{11}*b^3*c \\
& ^8*k^2*z^2 + 188743680*a^8*b^6*c^8*g^2*z^2 + 141557760*a^{10}*b^3*c^9*h^2*z^ \\
& 2 - 174325760*a^8*b^5*c^9*f^2*z^2 - 188743680*a^7*b^6*c^9*e^2*z^2 - 4718592 \\
& 0*a^9*b^8*c^5*1^2*z^2 + 11206656*a^{10}*b^7*c^5*m^2*z^2 + 8929280*a^9*b^9*c^4 \\
& *m^2*z^2 - 2600960*a^8*b^{11}*c^3*m^2*z^2 + 291840*a^7*b^{13}*c^2*m^2*z^2 - 503 \\
& 31648*a^{10}*b^4*c^8*j^2*z^2 + 146165760*a^4*b^{11}*c^7*d^2*z^2 - 26542080*a^9*b \\
& ^7*c^6*k^2*z^2 + 5898240*a^8*b^{10}*c^4*1^2*z^2 - 294912*a^7*b^{12}*c^3*1^2*z^ \\
& 2 - 33554432*a^{11}*b^2*c^9*j^2*z^2 + 9584640*a^8*b^9*c^5*k^2*z^2 + 20971520* \\
& a^9*b^6*c^7*j^2*z^2 - 2359296*a^{10}*b^5*c^7*k^2*z^2 - 1290240*a^7*b^{11}*c^4*k \\
& ^2*z^2 + 46080*a^6*b^{13}*c^3*k^2*z^2 + 2304*a^5*b^{15}*c^2*k^2*z^2 - 2752512*a \\
& ^7*b^{10}*c^5*j^2*z^2 + 2621440*a^8*b^8*c^6*j^2*z^2 + 524288*a^6*b^{12}*c^4*j^2 \\
& *z^2 - 32768*a^5*b^{14}*c^3*j^2*z^2 - 47185920*a^7*b^8*c^7*g^2*z^2 - 26542080 \\
& *a^8*b^7*c^7*h^2*z^2 + 9584640*a^7*b^9*c^6*h^2*z^2 - 2359296*a^9*b^5*c^8*h^ \\
& 2*z^2 - 1290240*a^6*b^{11}*c^5*h^2*z^2 + 46080*a^5*b^{13}*c^4*h^2*z^2 + 2304*a^ \\
& 4*b^{15}*c^3*h^2*z^2 + 5898240*a^6*b^{10}*c^6*g^2*z^2 - 294912*a^5*b^{12}*c^5*g^2 \\
& *z^2 + 11206656*a^7*b^7*c^8*f^2*z^2 + 8929280*a^6*b^9*c^7*f^2*z^2 + 2359296 \\
& 0*a^6*b^8*c^8*e^2*z^2 - 2600960*a^5*b^{11}*c^6*f^2*z^2 + 291840*a^4*b^{13}*c^5* \\
& f^2*z^2 - 14080*a^3*b^{15}*c^4*f^2*z^2 + 256*a^2*b^{17}*c^3*f^2*z^2 - 19860480* \\
& a^3*b^{13}*c^6*d^2*z^2 - 1179648*a^5*b^{10}*c^7*e^2*z^2 + 1771776*a^2*b^{15}*c^5* \\
& d^2*z^2 - 440401920*a^{13}*b*c^8*m^2*z^2 + 1207959552*a^{10}*c^{12}*e^2*z^2 + 134 \\
& 217728*a^{12}*c^{10}*j^2*z^2 + 256*a^5*b^{17}*m^2*z^2 + 2304*b^{19}*c^3*d^2*z^2 - 2 \\
& 3592960*a^{10}*b*c^8*f*k*1*z + 99090432*a^9*b*c^9*d*h*1*z + 9437184*a^{10}*b*c^ \\
& 8*e*k*m*z + 23592960*a^{10}*b*c^8*g*h*m*z + 141557760*a^8*b*c^{10}*d*e*k*z + 47 \\
& 185920*a^9*b*c^9*d*j*k*z - 23592960*a^9*b*c^9*f*g*k*z + 169869312*a^7*b*c^1 \\
& 1*d*e*f*z + 99090432*a^8*b*c^{10}*d*g*h*z - 3145728*a^9*b*c^9*f*h*j*z + 56623 \\
& 104*a^8*b*c^{10}*d*f*j*z + 1536*a*b^{15}*c^3*d*f*j*z - 9437184*a^8*b*c^{10}*e*f*h \\
& *z - 4608*a*b^{14}*c^4*d*f*g*z + 9216*a*b^{13}*c^5*d*e*f*z + 412876800*a^8*b^2* \\
& c^9*d*e*m*z - 206438400*a^9*b^3*c^7*d*1*m*z + 5898240*a^{10}*b^4*c^5*k*1*m*z \\
& - 206438400*a^8*b^3*c^8*d*g*m*z - 4718592*a^{11}*b^2*c^6*k*1*m*z - 2949120*a^ \\
& 9*b^6*c^4*k*1*m*z + 737280*a^8*b^8*c^3*k*1*m*z - 92160*a^7*b^{10}*c^2*k*1*m*z
\end{aligned}$$

+ 103219200\*a^8\*b^5\*c^6\*d\*1\*m\*z - 29491200\*a^10\*b^3\*c^6\*h\*1\*m\*z - 20643840\*  
 0\*a^7\*b^4\*c^8\*d\*e\*m\*z - 2359296\*a^10\*b^3\*c^6\*j\*k\*m\*z + 491520\*a^8\*b^7\*c^4\*j  
 \*k\*m\*z - 184320\*a^7\*b^9\*c^3\*j\*k\*m\*z + 27648\*a^6\*b^11\*c^2\*j\*k\*m\*z + 14745600  
 \*a^9\*b^5\*c^5\*h\*1\*m\*z - 3686400\*a^8\*b^7\*c^4\*h\*1\*m\*z + 460800\*a^7\*b^9\*c^3\*h\*1  
 \*m\*z - 23040\*a^6\*b^11\*c^2\*h\*1\*m\*z + 88473600\*a^8\*b^4\*c^7\*d\*k\*1\*z + 82575360  
 \*a^9\*b^2\*c^8\*d\*j\*m\*z + 11796480\*a^10\*b^2\*c^7\*h\*j\*m\*z + 5898240\*a^9\*b^4\*c^6\*  
 g\*k\*m\*z - 4718592\*a^10\*b^2\*c^7\*g\*k\*m\*z - 70778880\*a^9\*b^2\*c^8\*d\*k\*1\*z - 294  
 9120\*a^8\*b^6\*c^5\*g\*k\*m\*z - 2457600\*a^8\*b^6\*c^5\*h\*j\*m\*z + 921600\*a^7\*b^8\*c^4  
 \*h\*j\*m\*z + 737280\*a^7\*b^8\*c^4\*g\*k\*m\*z - 138240\*a^6\*b^10\*c^3\*h\*j\*m\*z - 92160  
 \*a^6\*b^10\*c^3\*g\*k\*m\*z + 7680\*a^5\*b^12\*c^2\*h\*j\*m\*z + 4608\*a^5\*b^12\*c^2\*g\*k\*m  
 \*z + 29491200\*a^9\*b^3\*c^7\*f\*k\*1\*z - 176947200\*a^7\*b^3\*c^9\*d\*e\*k\*z - 1097072  
 64\*a^8\*b^3\*c^8\*d\*h\*1\*z - 25804800\*a^7\*b^7\*c^5\*d\*1\*m\*z + 103219200\*a^7\*b^5\*c  
 ^7\*d\*g\*m\*z + 219414528\*a^7\*b^2\*c^10\*d\*e\*h\*z - 14745600\*a^8\*b^5\*c^6\*f\*k\*1\*z  
 - 29491200\*a^9\*b^3\*c^7\*g\*h\*m\*z - 11796480\*a^9\*b^3\*c^7\*e\*k\*m\*z - 44236800\*a^  
 7\*b^6\*c^6\*d\*k\*1\*z + 58982400\*a^9\*b^2\*c^8\*e\*h\*m\*z + 5898240\*a^8\*b^5\*c^6\*e\*k\*  
 m\*z + 3686400\*a^7\*b^7\*c^5\*f\*k\*1\*z + 3225600\*a^6\*b^9\*c^4\*d\*1\*m\*z - 1474560\*a  
 ^7\*b^7\*c^5\*e\*k\*m\*z - 460800\*a^6\*b^9\*c^4\*f\*k\*1\*z + 184320\*a^6\*b^9\*c^4\*e\*k\*m\*  
 z - 161280\*a^5\*b^11\*c^3\*d\*1\*m\*z + 23040\*a^5\*b^11\*c^3\*f\*k\*1\*z - 9216\*a^5\*b^1  
 1\*c^3\*e\*k\*m\*z + 14745600\*a^8\*b^5\*c^6\*g\*h\*m\*z + 110886912\*a^7\*b^4\*c^8\*d\*f\*1\*  
 z - 3686400\*a^7\*b^7\*c^5\*g\*h\*m\*z - 221773824\*a^6\*b^3\*c^10\*d\*e\*f\*z + 460800\*a  
 ^6\*b^9\*c^4\*g\*h\*m\*z - 17203200\*a^7\*b^6\*c^6\*d\*j\*m\*z - 23040\*a^5\*b^11\*c^3\*g\*h\*  
 m\*z - 29491200\*a^8\*b^4\*c^7\*e\*h\*m\*z - 11796480\*a^9\*b^2\*c^8\*f\*j\*k\*z + 1105920  
 0\*a^6\*b^8\*c^5\*d\*k\*1\*z + 6451200\*a^6\*b^8\*c^5\*d\*j\*m\*z + 88473600\*a^7\*b^4\*c^8\*  
 d\*g\*k\*z + 2457600\*a^7\*b^6\*c^6\*f\*j\*k\*z - 35389440\*a^8\*b^3\*c^8\*d\*j\*k\*z - 1382  
 400\*a^5\*b^10\*c^4\*d\*k\*1\*z - 84934656\*a^8\*b^2\*c^9\*d\*f\*1\*z - 967680\*a^5\*b^10\*c  
 ^4\*d\*j\*m\*z - 921600\*a^6\*b^8\*c^5\*f\*j\*k\*z + 138240\*a^5\*b^10\*c^4\*f\*j\*k\*z + 691  
 20\*a^4\*b^12\*c^3\*d\*k\*1\*z + 53760\*a^4\*b^12\*c^3\*d\*j\*m\*z - 7680\*a^4\*b^12\*c^3\*f\*  
 j\*k\*z + 44236800\*a^7\*b^5\*c^7\*d\*h\*1\*z + 7372800\*a^7\*b^6\*c^6\*e\*h\*m\*z - 589824  
 0\*a^8\*b^4\*c^7\*f\*h\*1\*z + 4718592\*a^9\*b^2\*c^8\*f\*h\*1\*z - 70778880\*a^8\*b^2\*c^9\*  
 d\*g\*k\*z + 2949120\*a^7\*b^6\*c^6\*f\*h\*1\*z - 921600\*a^6\*b^8\*c^5\*e\*h\*m\*z - 737280  
 \*a^6\*b^8\*c^5\*f\*h\*1\*z + 92160\*a^5\*b^10\*c^4\*f\*h\*1\*z + 46080\*a^5\*b^10\*c^4\*e\*h\*  
 m\*z - 4608\*a^4\*b^12\*c^3\*f\*h\*1\*z + 29491200\*a^8\*b^3\*c^8\*f\*g\*k\*z - 109707264\*  
 a^7\*b^3\*c^9\*d\*g\*h\*z - 25804800\*a^6\*b^7\*c^6\*d\*g\*m\*z - 58982400\*a^8\*b^2\*c^9\*e  
 \*f\*k\*z - 58982400\*a^6\*b^6\*c^7\*d\*f\*1\*z + 7372800\*a^6\*b^7\*c^6\*d\*j\*k\*z + 88473  
 600\*a^6\*b^5\*c^8\*d\*e\*k\*z - 2764800\*a^5\*b^9\*c^5\*d\*j\*k\*z + 51609600\*a^6\*b^6\*c^  
 7\*d\*e\*m\*z + 414720\*a^4\*b^11\*c^4\*d\*j\*k\*z - 23040\*a^3\*b^13\*c^3\*d\*j\*k\*z - 1474  
 5600\*a^7\*b^5\*c^7\*f\*g\*k\*z - 44236800\*a^6\*b^6\*c^7\*d\*g\*k\*z - 6635520\*a^6\*b^7\*c  
 ^6\*d\*h\*1\*z + 40108032\*a^8\*b^2\*c^9\*d\*h\*j\*z + 3686400\*a^6\*b^7\*c^6\*f\*g\*k\*z + 3  
 225600\*a^5\*b^9\*c^5\*d\*g\*m\*z + 2359296\*a^8\*b^3\*c^8\*f\*h\*j\*z - 491520\*a^6\*b^7\*c  
 ^6\*f\*h\*j\*z - 460800\*a^5\*b^9\*c^5\*f\*g\*k\*z - 276480\*a^5\*b^9\*c^5\*d\*h\*1\*z + 1843  
 20\*a^5\*b^9\*c^5\*f\*h\*j\*z + 179712\*a^4\*b^11\*c^4\*d\*h\*1\*z - 161280\*a^4\*b^11\*c^4\*  
 d\*g\*m\*z - 27648\*a^4\*b^11\*c^4\*f\*h\*j\*z + 23040\*a^4\*b^11\*c^4\*f\*g\*k\*z - 13824\*a  
 ^3\*b^13\*c^3\*d\*h\*1\*z + 1536\*a^3\*b^13\*c^3\*f\*h\*j\*z + 29491200\*a^7\*b^4\*c^8\*e\*f\*  
 k\*z + 110886912\*a^6\*b^4\*c^9\*d\*f\*g\*z + 16220160\*a^5\*b^8\*c^6\*d\*f\*1\*z - 456130  
 56\*a^7\*b^3\*c^9\*d\*f\*j\*z + 11059200\*a^5\*b^8\*c^6\*d\*g\*k\*z - 10321920\*a^6\*b^6\*c^



$$\begin{aligned}
& 7*d*h*j*z - 7372800*a^6*b^6*c^7*e*f*k*z + 7077888*a^7*b^4*c^8*d*h*j*z - 645 \\
& 1200*a^5*b^8*c^6*d*e*m*z - 88473600*a^6*b^4*c^9*d*e*h*z + 2396160*a^5*b^8*c \\
& ^6*d*h*j*z - 2396160*a^4*b^10*c^5*d*f*l*z - 1382400*a^4*b^10*c^5*d*g*k*z - \\
& 84934656*a^7*b^2*c^10*d*f*g*z + 921600*a^5*b^8*c^6*e*f*k*z + 117964800*a^5* \\
& b^5*c^9*d*e*f*z + 322560*a^4*b^10*c^5*d*e*m*z + 175104*a^3*b^12*c^4*d*f*l*z \\
& + 69120*a^3*b^12*c^4*d*g*k*z - 50688*a^3*b^12*c^4*d*h*j*z - 46080*a^4*b^10 \\
& *c^5*e*f*k*z - 27648*a^4*b^10*c^5*d*h*j*z + 4608*a^2*b^14*c^3*d*h*j*z - 460 \\
& 8*a^2*b^14*c^3*d*f*l*z + 44236800*a^6*b^5*c^8*d*g*h*z - 5898240*a^7*b^4*c^8 \\
& *f*g*h*z - 2218400*a^5*b^7*c^7*d*e*k*z + 4718592*a^8*b^2*c^9*f*g*h*z + 294 \\
& 9120*a^6*b^6*c^7*f*g*h*z - 737280*a^5*b^8*c^6*f*g*h*z + 92160*a^4*b^10*c^5* \\
& f*g*h*z - 4608*a^3*b^12*c^4*f*g*h*z + 8847360*a^5*b^7*c^7*d*f*j*z - 5898240 \\
& 0*a^5*b^6*c^8*d*f*g*z - 3809280*a^4*b^9*c^6*d*f*j*z + 2764800*a^4*b^9*c^6*d \\
& *e*k*z + 2359296*a^6*b^5*c^8*d*f*j*z + 681984*a^3*b^11*c^5*d*f*j*z - 138240 \\
& *a^3*b^11*c^5*d*e*k*z - 55296*a^2*b^13*c^4*d*f*j*z + 11796480*a^7*b^3*c^9*e \\
& *f*h*z - 6635520*a^5*b^7*c^7*d*g*h*z - 5898240*a^6*b^5*c^8*e*f*h*z + 147456 \\
& 0*a^5*b^7*c^7*e*f*h*z - 276480*a^4*b^9*c^6*d*g*h*z - 184320*a^4*b^9*c^6*e*f \\
& *h*z + 179712*a^3*b^11*c^5*d*g*h*z - 13824*a^2*b^13*c^4*d*g*h*z + 9216*a^3* \\
& b^11*c^5*e*f*h*z + 16220160*a^4*b^8*c^7*d*f*g*z + 13271040*a^5*b^6*c^8*d*e* \\
& h*z - 2396160*a^3*b^10*c^6*d*f*g*z + 552960*a^4*b^8*c^7*d*e*h*z - 359424*a^ \\
& 3*b^10*c^6*d*e*h*z + 175104*a^2*b^12*c^5*d*f*g*z + 27648*a^2*b^12*c^5*d*e*h \\
& *z - 32440320*a^4*b^7*c^8*d*e*f*z + 4792320*a^3*b^9*c^7*d*e*f*z - 350208*a^ \\
& 2*b^11*c^6*d*e*f*z + 165150720*a^10*b*c^8*d*l*m*z + 4608*a^6*b^12*c*k*l*m*z \\
& + 23592960*a^11*b*c^7*h*l*m*z + 3145728*a^11*b*c^7*j*k*m*z - 1536*a^5*b^13 \\
& *c*j*k*m*z + 165150720*a^9*b*c^9*d*g*m*z + 346816512*a^7*b*c^11*d^2*g*z + 1 \\
& 9660800*a^12*b*c^6*l*m^2*z - 34560*a^7*b^11*c*l*m^2*z - 7077888*a^11*b*c^7* \\
& k^2*l*z + 11008*a^6*b^12*c*j*m^2*z + 19660800*a^11*b*c^7*g*m^2*z + 7077888* \\
& a^10*b*c^8*h^2*l*z + 768*a^5*b^13*c*g*m^2*z - 19660800*a^9*b*c^9*f^2*l*z - \\
& 7077888*a^10*b*c^8*g*k^2*z - 6912*a*b^15*c^3*d^2*l*z + 7077888*a^9*b*c^9*g* \\
& h^2*z - 19660800*a^8*b*c^10*f^2*g*z - 66816*a*b^14*c^4*d^2*j*z + 214272*a*b \\
& ^13*c^5*d^2*g*z - 428544*a*b^12*c^6*d^2*e*z - 330301440*a^9*c^10*d*e*m*z - \\
& 110100480*a^10*c^9*d*j*m*z - 15728640*a^11*c^8*h*j*m*z - 47185920*a^10*c^9* \\
& e*h*m*z - 198180864*a^8*c^11*d*e*h*z + 15728640*a^10*c^9*f*j*k*z - 66060288 \\
& *a^9*c^10*d*h*j*z + 47185920*a^9*c^10*e*f*k*z + 1022754816*a^6*b^2*c^11*d^2 \\
& *e*z - 642318336*a^5*b^4*c^10*d^2*e*z - 511377408*a^7*b^3*c^9*d^2*l*z - 511 \\
& 377408*a^6*b^3*c^10*d^2*g*z + 321159168*a^6*b^5*c^8*d^2*l*z + 321159168*a^5 \\
& *b^5*c^9*d^2*g*z + 225312768*a^7*b^2*c^10*d^2*j*z - 25362432*a^11*b^3*c^5*l \\
& *m^2*z + 13271040*a^10*b^5*c^4*l*m^2*z - 3563520*a^9*b^7*c^3*l*m^2*z + 5068 \\
& 80*a^8*b^9*c^2*l*m^2*z + 10354688*a^11*b^2*c^6*j*m^2*z + 8847360*a^10*b^3*c \\
& ^6*k^2*l*z - 4423680*a^9*b^5*c^5*k^2*l*z - 2048000*a^9*b^6*c^4*j*m^2*z + 11 \\
& 05920*a^8*b^7*c^4*k^2*l*z + 849920*a^8*b^8*c^3*j*m^2*z - 393216*a^10*b^4*c^ \\
& 5*j*m^2*z - 145920*a^7*b^10*c^2*j*m^2*z - 138240*a^7*b^9*c^3*k^2*l*z + 6912 \\
& *a^6*b^11*c^2*k^2*l*z - 111697920*a^5*b^7*c^7*d^2*l*z + 223395840*a^4*b^6*c \\
& ^9*d^2*e*z - 25362432*a^10*b^3*c^6*g*m^2*z - 3538944*a^10*b^2*c^7*j*k^2*z + \\
& 737280*a^8*b^6*c^5*j*k^2*z + 50724864*a^10*b^2*c^7*e*m^2*z - 276480*a^7*b^ \\
& 8*c^4*j*k^2*z + 41472*a^6*b^10*c^3*j*k^2*z - 2304*a^5*b^12*c^2*j*k^2*z + 13
\end{aligned}$$

$$\begin{aligned}
& 271040a^9b^5c^5g^m^2z - 8847360a^9b^3c^7h^2l^2z + 4423680a^8b^5c^6h^2l^2z - 3563520a^8b^7c^4g^m^2z - 1105920a^7b^7c^5h^2l^2z + 506880a^7b^9c^3g^m^2z + 138240a^6b^9c^4h^2l^2z - 34560a^6b^11c^2g^m^2z - 6912a^5b^11c^3h^2l^2z - 26542080a^9b^4c^6e^m^2z + 25362432a^8b^3c^8f^2l^2z - 13271040a^7b^5c^7f^2l^2z + 8847360a^9b^3c^7g^k^2z + 7127040a^8b^6c^5e^m^2z - 4423680a^8b^5c^6g^k^2z + 3563520a^6b^7c^6f^2l^2z + 3538944a^9b^2c^8h^2j^2z + 1105920a^7b^7c^5g^k^2z - 1013760a^7b^8c^4e^m^2z - 737280a^7b^6c^6h^2j^2z - 506880a^5b^9c^5f^2l^2z + 276480a^6b^8c^5h^2j^2z - 138240a^6b^9c^4g^k^2z + 69120a^6b^10c^3e^m^2z - 41472a^5b^10c^4h^2j^2z + 34560a^4b^11c^4f^2l^2z + 6912a^5b^11c^3g^k^2z + 2304a^4b^12c^3h^2j^2z - 1536a^5b^12c^2e^m^2z - 768a^3b^13c^3f^2l^2z - 111697920a^4b^7c^8d^2g^*z + 23362560a^4b^9c^6d^2l^2z - 17694720a^9b^2c^8e^k^2z - 10354688a^8b^2c^9f^2j^2z - 43646976a^6b^4c^9d^2j^2z + 8847360a^8b^4c^7e^k^2z - 2965248a^3b^11c^5d^2l^2z - 2211840a^7b^6c^6e^k^2z + 2048000a^6b^6c^7f^2j^2z - 849920a^5b^8c^6f^2j^2z + 393216a^7b^4c^8f^2j^2z + 276480a^6b^8c^5e^k^2z + 214272a^2b^13c^4d^2l^2z + 145920a^4b^10c^5f^2j^2z - 13824a^5b^10c^4e^k^2z - 11008a^3b^12c^4f^2j^2z + 256a^2b^14c^3f^2j^2z - 32587776a^5b^6c^8d^2j^2z - 8847360a^8b^3c^8g^h^2z + 21657600a^4b^8c^7d^2j^2z + 4423680a^7b^5c^7g^h^2z - 1105920a^6b^7c^6g^h^2z + 138240a^5b^9c^5g^h^2z - 6912a^4b^11c^4g^h^2z + 25362432a^7b^3c^9f^2g^*z - 5810688a^3b^10c^6d^2j^2z + 17694720a^8b^2c^9e^h^2z + 845568a^2b^12c^5d^2j^2z - 50724864a^7b^2c^10e^f^2z - 13271040a^6b^5c^8f^2g^*z - 8847360a^7b^4c^8e^h^2z + 3563520a^5b^7c^7f^2g^*z + 2211840a^6b^6c^7e^h^2z - 506880a^4b^9c^6f^2g^*z - 276480a^5b^8c^6e^h^2z + 34560a^3b^11c^5f^2g^*z + 13824a^4b^10c^5e^h^2z - 768a^2b^13c^4f^2g^*z + 26542080a^6b^4c^9e^f^2z + 23362560a^3b^9c^7d^2g^*z - 46725120a^3b^8c^8d^2e^*z - 7127040a^5b^6c^8e^f^2z - 2965248a^2b^11c^6d^2g^*z + 1013760a^4b^8c^7e^f^2z - 69120a^3b^10c^6e^f^2z + 1536a^2b^12c^5e^f^2z + 5930496a^2b^10c^7d^2e^*z + 346816512a^8b^c^10d^2l^2z - 693633024a^7c^12d^2e^*z - 231211008a^8c^11d^2j^2z + 768a^6b^13l^2m^2z - 13107200a^12c^7j^2m^2z - 256a^5b^14j^2m^2z + 4718592a^11c^8j^2k^2z - 39321600a^11c^8e^m^2z - 4718592a^10c^9h^2j^2z + 14155776a^10c^9e^k^2z + 13107200a^9c^10f^2j^2z + 2304b^16c^3d^2j^2z - 14155776a^9c^10e^h^2z + 39321600a^8c^11e^f^2z - 6912b^15c^4d^2g^*z + 13824b^14c^5d^2e^*z + 737280a^10b^c^5j^2k^2l^2m - 2304a^6b^9c^j^2k^2l^2m + 2211840a^9b^c^6e^k^2l^2m + 1228800a^9b^c^6f^2j^2l^2m + 737280a^9b^c^6g^2j^2k^2m + 442368a^9b^c^6h^2j^2k^2l^2m + 36a^3b^12c^2f^2h^2k^2m + 3096576a^8b^c^7d^2j^2k^2l^2m - 12745728a^8b^c^7d^2h^2k^2m + 3686400a^8b^c^7e^2f^2l^2m + 3391488a^8b^c^7e^2h^2j^2m + 2211840a^8b^c^7e^2g^2k^2m + 1327104a^8b^c^7e^2h^2k^2l^2m + 1228800a^8b^c^7f^2g^2j^2m + 737280a^8b^c^7f^2h^2j^2l^2m + 442368a^8b^c^7g^2h^2j^2k^2m + 108a^2b^13c^2d^2h^2k^2m + 16367616a^7b^c^8d^2e^2j^2m + 9289728a^7b^c^8d^2e^2k^2l^2m + 5160960a^7b^c^8d^2f^2j^2l^2m + 3391488a^7b^c^8e^2f^2j^2k^2m + 3096576a^7b^c^8d^2g^2j^2k^2m - 19307520a^7b^c^8d^2f^2h^2m + 3686400a^7b^c^8e^2f^2*
\end{aligned}$$

$g^m + 2211840a^7b^8c^8efgh^*h^*l + 1327104a^7b^8c^8efgh^*h^*k + 737280a^7b^8c^8efgh^*h^*j - 180a^8b^{13}c^2d^2f^2h^*m - 540a^8b^{12}c^3d^2f^2h^*k + 15482880a^6b^8c^9d^2ef^2l + 11059200a^6b^8c^9d^2ef^2h^*j + 9289728a^6b^8c^9d^2ef^2g^*k + 5160960a^6b^8c^9d^2ef^2g^*j - 2304a^8b^{11}c^4d^2f^2g^*j + 2211840a^6b^8c^9ef^2g^*h + 4608a^8b^{10}c^5d^2ef^2j + 15482880a^5b^8c^{10}d^2ef^2g - 13824a^8b^9c^6d^2ef^2g + 36a^8b^{14}c^2d^2f^2k^*m + 1843200a^9b^3c^4j^*k^*l^*m + 783360a^8b^5c^3j^*k^*l^*m + 18432a^7b^7c^2j^*k^*l^*m - 2211840a^8b^4c^4g^*k^*l^*m - 1695744a^9b^2c^5h^*j^*l^*m - 1400832a^8b^4c^4h^*j^*l^*m - 1105920a^9b^2c^5g^*k^*l^*m - 253440a^7b^6c^3h^*j^*l^*m - 69120a^7b^6c^3g^*k^*l^*m + 11520a^6b^8c^2h^*j^*l^*m + 6912a^6b^8c^2g^*k^*l^*m + 4423680a^8b^3c^5e^*k^*l^*m + 2506752a^8b^3c^5f^*j^*l^*m + 1843200a^8b^3c^5g^*j^*k^*m + 1327104a^8b^3c^5h^*j^*k^*l + 838656a^7b^5c^4f^*j^*l^*m + 783360a^7b^5c^4g^*j^*k^*m + 691200a^7b^5c^4h^*j^*k^*l + 138240a^7b^5c^4e^*k^*l^*m + 69120a^6b^7c^3h^*j^*k^*l - 53760a^6b^7c^3f^*j^*l^*m + 18432a^6b^7c^3g^*j^*k^*m - 13824a^6b^7c^3e^*k^*l^*m - 2304a^5b^9c^2g^*j^*k^*m + 2543616a^8b^3c^5g^*h^*l^*m + 829440a^7b^5c^4g^*h^*l^*m - 34560a^6b^7c^3g^*h^*l^*m - 8183808a^8b^2c^6d^2j^*l^*m - 3686400a^8b^2c^6e^*j^*k^*m - 2285568a^7b^4c^5d^2j^*l^*m - 1695744a^8b^2c^6f^*j^*k^*l - 1566720a^7b^4c^5e^*j^*k^*m - 1400832a^7b^4c^5f^*j^*k^*l + 741888a^6b^6c^4d^2j^*l^*m - 253440a^6b^6c^4f^*j^*k^*l - 80640a^5b^8c^3d^2j^*l^*m - 36864a^6b^6c^4e^*j^*k^*m + 11520a^5b^8c^3f^*j^*k^*l + 4608a^5b^8c^3e^*j^*k^*m + 6700032a^8b^2c^6f^*h^*k^*m + 5103360a^7b^4c^5f^*h^*k^*m - 5087232a^8b^2c^6e^*h^*l^*m - 2838528a^7b^4c^5f^*g^*l^*m - 1843200a^8b^2c^6f^*g^*l^*m - 1695744a^8b^2c^6g^*h^*j^*m - 1658880a^7b^4c^5g^*h^*k^*l - 1658880a^7b^4c^5e^*h^*l^*m - 1400832a^7b^4c^5g^*h^*j^*m - 663552a^8b^2c^6g^*h^*k^*l + 483840a^6b^6c^4f^*h^*k^*m - 253440a^6b^6c^4g^*h^*j^*m - 207360a^6b^6c^4g^*h^*k^*l + 161280a^6b^6c^4f^*g^*l^*m + 69120a^6b^6c^4e^*h^*l^*m - 50040a^5b^8c^3f^*h^*k^*m + 11520a^5b^8c^3g^*h^*j^*m + 180a^4b^{10}c^2f^2h^*k^*m + 4202496a^7b^3c^6d^2j^*k^*l + 635904a^6b^5c^5d^2j^*k^*l - 276480a^5b^7c^4d^2j^*k^*l + 34560a^4b^9c^3d^2j^*k^*l - 16671744a^7b^3c^6d^2h^*k^*m + 12275712a^7b^3c^6d^2g^*l^*m + 5677056a^7b^3c^6e^*f^*l^*m + 4423680a^7b^3c^6e^*g^*k^*m + 3317760a^7b^3c^6e^*h^*k^*l + 2801664a^7b^3c^6e^*h^*j^*m - 2709504a^6b^5c^5d^2g^*l^*m + 2543616a^7b^3c^6f^*g^*k^*l + 2506752a^7b^3c^6f^*g^*j^*m + 1843200a^7b^3c^6f^*h^*j^*l + 1327104a^7b^3c^6g^*h^*j^*k + 838656a^6b^5c^5f^*g^*j^*m + 829440a^6b^5c^5f^*g^*k^*l + 783360a^6b^5c^5f^*h^*j^*l + 691200a^6b^5c^5g^*h^*j^*k + 665280a^5b^7c^4d^2h^*k^*m + 506880a^6b^5c^5e^*h^*j^*m + 414720a^6b^5c^5e^*h^*k^*l - 322560a^6b^5c^5e^*f^*l^*m + 241920a^5b^7c^4d^2g^*l^*m + 138240a^6b^5c^5e^*g^*k^*m - 108540a^4b^9c^3d^2h^*k^*m + 69120a^5b^7c^4g^*h^*j^*k - 53760a^5b^7c^4f^*g^*j^*m - 51840a^6b^5c^5d^2h^*k^*m - 34560a^5b^7c^4f^*g^*k^*l - 23040a^5b^7c^4e^*h^*j^*m + 18432a^5b^7c^4f^*h^*j^*l - 13824a^5b^7c^4e^*g^*k^*m - 2304a^4b^9c^3f^*h^*j^*l + 1296a^3b^{11}c^2d^2h^*k^*m + 31924224a^7b^2c^7d^2f^2k^*m - 24551424a^7b^2c^7d^2e^*l^*m + 10616832a^7b^2c^7e^*g^*j^*l - 8183808a^7b^2c^7d^2g^*j^*m - 5529600a^7b^2c^7d^2h^*j^*l + 5419008a^6b^4c^6d^2e^*l^*m + 5308416a^6b^4c^6e^*g^*j^*l - 5087232a^7b^2c^7e^*f^*k^*l - 5013504a^7b^2c^7e^*f^*j^*m + 4868352a^6b^4c^$

$^6*d*f*k*m - 4644864*a^7*b^2*c^7*d*g*k*k*1 - 3981312*a^6*b^4*c^6*d*g*k*k*1 - 26$   
 $54208*a^7*b^2*c^7*e*h*j*k - 2367360*a^5*b^6*c^5*d*f*k*m - 2285568*a^6*b^4*c$   
 $^6*d*g*j*m - 2211840*a^6*b^4*c^6*d*h*j*1 - 1695744*a^7*b^2*c^7*f*g*j*k - 16$   
 $77312*a^6*b^4*c^6*e*f*j*m - 1658880*a^6*b^4*c^6*e*f*k*1 - 1400832*a^6*b^4*c$   
 $^6*f*g*j*k - 1382400*a^6*b^4*c^6*e*h*j*k + 1036800*a^5*b^6*c^5*d*g*k*1 + 74$   
 $1888*a^5*b^6*c^5*d*g*j*m - 483840*a^5*b^6*c^5*d*e*1*m + 317952*a^5*b^6*c^5*$   
 $d*h*j*1 + 268920*a^4*b^8*c^4*d*f*k*m - 253440*a^5*b^6*c^5*f*g*j*k - 138240*$   
 $a^5*b^6*c^5*e*h*j*k + 107520*a^5*b^6*c^5*e*f*j*m - 103680*a^4*b^8*c^4*d*g*k$   
 $*1 - 80640*a^4*b^8*c^4*d*g*j*m + 69120*a^5*b^6*c^5*e*f*k*1 + 11520*a^4*b^8*$   
 $c^4*f*g*j*k + 6912*a^4*b^8*c^4*d*h*j*1 - 6912*a^3*b^10*c^3*d*h*j*1 + 6120*a$   
 $^3*b^10*c^3*d*f*k*m - 1368*a^2*b^12*c^2*d*f*k*m - 5087232*a^7*b^2*c^7*e*g*h$   
 $*m - 2211840*a^6*b^4*c^6*f*g*h*1 - 1658880*a^6*b^4*c^6*e*g*h*m - 1105920*a^$   
 $7*b^2*c^7*f*g*h*1 - 69120*a^5*b^6*c^5*f*g*h*1 + 69120*a^5*b^6*c^5*e*g*h*m +$   
 $6912*a^4*b^8*c^4*f*g*h*1 + 7962624*a^6*b^3*c^7*d*e*k*1 - 22164480*a^6*b^3*$   
 $c^7*d*f*h*m + 5160960*a^6*b^3*c^7*d*f*j*1 + 4571136*a^6*b^3*c^7*d*e*j*m + 4$   
 $202496*a^6*b^3*c^7*d*g*j*k + 2801664*a^6*b^3*c^7*e*f*j*k - 2073600*a^5*b^5*$   
 $c^6*d*e*k*1 - 1483776*a^5*b^5*c^6*d*e*j*m + 635904*a^5*b^5*c^6*d*g*j*k + 50$   
 $6880*a^5*b^5*c^6*e*f*j*k - 354816*a^4*b^7*c^5*d*f*j*1 + 322560*a^5*b^5*c^6*$   
 $d*f*j*1 - 276480*a^4*b^7*c^5*d*g*j*k + 207360*a^4*b^7*c^5*d*e*k*1 + 161280*$   
 $a^4*b^7*c^5*d*e*j*m + 59904*a^3*b^9*c^4*d*f*j*1 + 34560*a^3*b^9*c^4*d*g*j*k$   
 $- 23040*a^4*b^7*c^5*e*f*j*k - 2304*a^2*b^11*c^3*d*f*j*1 + 8294400*a^6*b^3*$   
 $c^7*d*g*h*1 + 5677056*a^6*b^3*c^7*e*f*g*m + 4423680*a^6*b^3*c^7*e*f*h*1 + 3$   
 $317760*a^6*b^3*c^7*e*g*h*k + 2805120*a^5*b^5*c^6*d*f*h*m + 1843200*a^6*b^3*$   
 $c^7*f*g*h*j - 829440*a^5*b^5*c^6*d*g*h*1 + 783360*a^5*b^5*c^6*f*g*h*j + 437$   
 $184*a^4*b^7*c^5*d*f*h*m + 414720*a^5*b^5*c^6*e*g*h*k - 322560*a^5*b^5*c^6*$   
 $e*f*g*m - 146268*a^3*b^9*c^4*d*f*h*m + 138240*a^5*b^5*c^6*e*f*h*1 - 62208*a^$   
 $4*b^7*c^5*d*g*h*1 + 20736*a^3*b^9*c^4*d*g*h*1 + 18432*a^4*b^7*c^5*f*g*h*j -$   
 $13824*a^4*b^7*c^5*e*f*h*1 + 9360*a^2*b^11*c^3*d*f*h*m - 2304*a^3*b^9*c^4*f$   
 $*g*h*j - 8404992*a^6*b^2*c^8*d*e*j*k - 24551424*a^6*b^2*c^8*d*e*g*m + 21150$   
 $720*a^6*b^2*c^8*d*f*h*k - 1271808*a^5*b^4*c^7*d*e*j*k + 552960*a^4*b^6*c^6*$   
 $d*e*j*k - 69120*a^3*b^8*c^5*d*e*j*k - 1658880*a^6*b^2*c^8*d*e*h*1 - 774144$   
 $0*a^6*b^2*c^8*d*f*g*1 + 6946560*a^5*b^4*c^7*d*f*h*k - 5529600*a^6*b^2*c^8*d$   
 $*g*h*j + 5419008*a^5*b^4*c^7*d*e*g*m - 5087232*a^6*b^2*c^8*e*f*g*k - 387072$   
 $0*a^5*b^4*c^7*d*f*g*1 - 3686400*a^6*b^2*c^8*e*f*h*j - 2211840*a^5*b^4*c^7*d$   
 $*g*h*j - 1755648*a^4*b^6*c^6*d*f*h*k - 1658880*a^5*b^4*c^7*e*f*g*k + 165888$   
 $0*a^5*b^4*c^7*d*e*h*1 - 1566720*a^5*b^4*c^7*e*f*h*j + 1451520*a^4*b^6*c^6*d$   
 $*f*g*1 - 483840*a^4*b^6*c^6*d*e*g*m + 317952*a^4*b^6*c^6*d*g*h*j - 193536*a$   
 $^3*b^8*c^5*d*f*g*1 + 124416*a^4*b^6*c^6*d*e*h*1 + 114696*a^3*b^8*c^5*d*f*h*$   
 $k + 69120*a^4*b^6*c^6*e*f*g*k - 41472*a^3*b^8*c^5*d*e*h*1 - 36864*a^4*b^6*c$   
 $^6*e*f*h*j + 14580*a^2*b^10*c^4*d*f*h*k + 6912*a^3*b^8*c^5*d*g*h*j - 6912*a$   
 $^2*b^10*c^4*d*g*h*j + 6912*a^2*b^10*c^4*d*f*g*1 + 4608*a^3*b^8*c^5*e*f*h*j$   
 $+ 7962624*a^5*b^3*c^8*d*e*g*k + 7741440*a^5*b^3*c^8*d*e*f*1 + 5160960*a^5*b$   
 $^3*c^8*d*f*g*j + 4423680*a^5*b^3*c^8*d*e*h*j - 2903040*a^4*b^5*c^7*d*e*f*1$   
 $- 2073600*a^4*b^5*c^7*d*e*g*k - 635904*a^4*b^5*c^7*d*e*h*j + 387072*a^3*b^7$   
 $*c^6*d*e*f*1 - 354816*a^3*b^7*c^6*d*f*g*j + 322560*a^4*b^5*c^7*d*f*g*j + 20$

$7360a^3b^7c^6d^6e^6g^6k + 59904a^2b^9c^5d^6f^6g^6j - 13824a^3b^7c^6d^6e^6h^6j + 13824a^2b^9c^5d^6e^6h^6j - 13824a^2b^9c^5d^6e^6f^6l + 4423680a^5b^3c^8e^6f^6g^6h + 138240a^4b^5c^7e^6f^6g^6h - 13824a^3b^7c^6e^6f^6g^6h - 10321920a^5b^2c^9d^6e^6f^6j + 709632a^3b^6c^7d^6e^6f^6j - 645120a^4b^4c^8d^6e^6f^6j - 119808a^2b^8c^6d^6e^6f^6j - 16588800a^5b^2c^9d^6e^6g^6h + 1658880a^4b^4c^8d^6e^6g^6h + 124416a^3b^6c^7d^6e^6g^6h - 41472a^2b^8c^6d^6e^6g^6h + 7741440a^4b^3c^9d^6e^6f^6g - 2903040a^3b^5c^8d^6e^6f^6g + 387072a^2b^7c^7d^6e^6f^6g + 3456a^7b^8c^6k^6l^2m + 12672a^7b^8c^6j^6l^2m^2 + 384a^5b^10c^6j^2k^6m - 1635840a^10b^6c^5h^6k^6m^2 - 1009152a^9b^6c^6h^2k^6m + 3690a^6b^9c^6h^6k^6m^2 + 1152a^6b^9c^6g^6l^6m^2 - 540a^5b^10c^6h^6k^6m + 54a^4b^11c^6h^2k^6m + 565248a^9b^6c^6h^6j^2m - 39771648a^7b^6c^8d^2k^6m - 2496000a^8b^6c^7f^2k^6m - 1543680a^9b^6c^6f^6k^2m + 1980a^5b^10c^6f^6k^6m^2 - 384a^5b^10c^6g^6j^6m^2 - 180a^4b^11c^6f^6k^2m + 6a^2b^13c^6f^2k^6m - 10298880a^9b^6c^6d^6k^6m^2 + 2580480a^9b^6c^6e^6j^6m^2 + 5310a^4b^11c^6d^6k^6m^2 - 1674a^6b^13c^2d^2k^6m - 540a^3b^12c^6d^6k^2m - 10616832a^7b^6c^8e^2j^6l - 3538944a^8b^6c^7e^6j^2l + 2727936a^8b^6c^7d^6j^2m - 2496000a^9b^6c^6f^6h^6m^2 - 1543680a^8b^6c^7f^6h^2m + 565248a^8b^6c^7f^6j^2k - 270a^4b^11c^6f^6h^6m^2 - 59512320a^6b^6c^9d^2f^6m + 5087232a^7b^6c^8e^2h^6m + 1105920a^8b^6c^7e^6j^6k^2 - 3456a^6b^12c^3d^2j^6l - 1635840a^7b^6c^8f^2h^6k - 1009152a^8b^6c^7f^6h^6k^2 + 10260a^6b^12c^3d^2h^6m - 684a^3b^12c^6d^6h^6m^2 - 24675840a^6b^6c^9d^2h^6k - 15552000a^8b^6c^7d^6f^6m^2 + 24551424a^6b^6c^9d^6e^2m - 3939840a^7b^6c^8d^6h^2k + 1105920a^7b^6c^8e^6h^2j - 25074a^6b^11c^4d^2f^6m + 10530a^6b^11c^4d^2h^6k + 10368a^6b^11c^4d^2g^6l + 420a^6b^12c^3d^6f^2m - 378a^2b^13c^6d^6f^6m^2 - 10616832a^6b^6c^9e^2g^6j + 5087232a^6b^6c^9e^2f^6k - 3538944a^7b^6c^8e^6g^6j^2 + 1843200a^7b^6c^8d^6h^6j^2 - 7994880a^6b^6c^9d^6f^2k - 4990464a^7b^6c^8d^6f^6k^2 + 2580480a^6b^6c^9e^6f^2j + 65664a^6b^10c^5d^2g^6j - 27972a^6b^10c^5d^2f^6k - 20736a^6b^10c^5d^2e^6l + 1260a^6b^11c^4d^6f^2k + 54a^6b^13c^2d^6f^6k^2 + 23224320a^5b^6c^10d^2e^6j - 37062144a^5b^6c^10d^2f^6h + 384a^6b^12c^3d^6f^6j^2 - 131328a^6b^9c^6d^2e^6j - 5985792a^6b^6c^9d^6f^6h^2 + 206010a^6b^9c^6d^2f^6h - 6300a^6b^10c^5d^6f^2h + 1350a^6b^11c^4d^6f^6h^2 + 16588800a^5b^6c^10d^6e^2h + 3456a^6b^10c^5d^6f^6g^2 + 435456a^6b^8c^7d^2e^6g + 13824a^6b^8c^7d^6e^2f - 1474560a^9c^7e^6j^6k^6m + 460800a^9c^7f^6h^6k^6m + 3225600a^8c^8d^6f^6k^6m - 2457600a^8c^8e^6f^6j^6m - 884736a^8c^8e^6h^6j^6k - 6193152a^7c^9d^6e^6j^6k + 1935360a^7c^9d^6f^6h^6k - 1474560a^7c^9e^6f^6h^6j - 10321920a^6c^10d^6e^6f^6j - 1105920a^9b^4c^3k^6l^2m - 552960a^10b^2c^4k^6l^2m - 34560a^8b^6c^2k^6l^2m - 1290240a^10b^2c^4j^6l^2m - 860160a^9b^4c^3j^6l^2m - 80640a^8b^6c^2j^6l^2m - 737280a^9b^2c^5j^2k^6m - 568320a^8b^4c^4j^2k^6m - 136704a^7b^6c^3j^2k^6m - 2304a^6b^8c^2j^2k^6m + 1271808a^9b^3c^4h^6l^2m - 552960a^9b^2c^5j^6k^2l - 552960a^8b^4c^4j^6k^2l + 414720a^8b^5c^3h^6l^2m - 145152a^7b^6c^3j^6k^2l - 17280a^7b^7c^2h^6l^2m - 3456a^6b^8c^2j^6k^2l - 3640320a^9b^3c^4h^6k^6m^2 - 2626560a^8b^3c^5h^2k^6m + 2211840a^9b^2c^5h^6k^2m + 2056320a^8b^4c^4h^6k^2m + 1935360a^9b^3c^4g^6l^2m - 1143360a^8b^5c^3h^6k^6m^2 -$

$1097280a^7b^5c^4h^2k^m + 364608a^7b^6c^3hk^2m + 322560a^8b^5c^3g^1m^2 - 56160a^6b^7c^3h^2k^m - 40320a^7b^7c^2g^1m^2 + 27936a^7b^7c^2hk^m^2 - 3780a^6b^8c^2hk^2m + 2970a^5b^9c^2h^2k^m - 1419264a^8b^4c^4f^1^2m - 1105920a^7b^4c^5g^2k^m - 921600a^9b^2c^5f^1^2m - 829440a^8b^4c^4hk^1^2 + 749568a^8b^3c^5h^2j^2m - 552960a^8b^2c^6g^2k^m - 331776a^9b^2c^5hk^1^2 + 317952a^7b^5c^4h^2j^2m - 103680a^7b^6c^3hk^1^2 + 80640a^7b^6c^3f^1^2m + 38400a^6b^7c^3h^2j^2m - 34560a^6b^6c^4g^2k^m + 3456a^5b^8c^3g^2k^m - 1920a^5b^9c^2h^2j^2m - 5142528a^7b^3c^6f^2k^m + 5068800a^9b^2c^5f^1k^m^2 - 3870720a^9b^2c^5e^1m^2 - 3755520a^8b^3c^5f^1k^2m + 3000960a^8b^4c^4f^1k^m^2 - 1290240a^9b^2c^5g^2j^2m - 1085760a^7b^5c^4f^1k^2m - 959040a^6b^5c^5f^2k^m - 860160a^8b^4c^4g^2j^2m + 829440a^8b^3c^5g^2k^1 - 645120a^8b^4c^4e^1m^2 - 552960a^8b^2c^6h^2j^1 - 552960a^7b^4c^5h^2j^1 + 414720a^7b^5c^4g^2k^1 - 145152a^6b^6c^4h^2j^1 + 103200a^5b^7c^4f^2k^m - 80640a^7b^6c^3g^2j^2m + 80640a^7b^6c^3e^1m^2 + 41280a^7b^6c^3f^1k^m^2 - 37188a^6b^8c^2f^1k^m^2 + 13536a^6b^7c^3f^1k^2m + 12672a^6b^8c^2g^2j^2m + 10368a^6b^7c^3g^2k^1 + 5490a^5b^9c^2f^1k^2m - 3456a^5b^8c^3h^2j^1 - 2304a^6b^8c^2e^1m^2 + 810a^4b^9c^3f^2k^m - 270a^3b^11c^2f^2k^m + 6137856a^8b^3c^5d^1^2m - 4423680a^7b^2c^7e^2k^m - 2654208a^8b^3c^5g^2j^1^2 - 2654208a^7b^3c^6g^2j^1 + 1769472a^8b^2c^6g^2j^2 + 1769472a^7b^4c^5g^2j^2 - 1354752a^7b^5c^4d^1^2m - 1327104a^7b^5c^4g^2j^1^2 - 1327104a^6b^5c^5g^2j^1 + 1271808a^8b^3c^5f^1k^1^2 - 1040384a^8b^2c^6f^1j^2m - 697344a^7b^4c^5f^1j^2m - 516096a^8b^2c^6h^2j^2k - 451584a^7b^4c^5h^2j^2k + 442368a^6b^6c^4g^2j^2 + 414720a^7b^5c^4f^1k^1^2 - 138240a^6b^6c^4h^2j^2k - 138240a^6b^4c^6e^2k^m - 121856a^6b^6c^4f^1j^2m + 120960a^6b^7c^3d^1^2m - 17280a^6b^7c^3f^1k^1^2 + 13824a^5b^6c^5e^2k^m - 11520a^5b^8c^3h^2j^2k + 8960a^5b^8c^3f^1j^2m + 10851840a^8b^2c^6d^1k^2m - 10464768a^6b^3c^7d^2k^m - 10275840a^8b^3c^5d^1k^m^2 + 7121088a^5b^5c^6d^2k^m + 3127680a^7b^4c^5d^1k^2m + 1720320a^8b^3c^5e^2j^2m - 1658880a^8b^2c^6e^1k^2 + 1290240a^7b^2c^7f^2j^1 + 1271808a^7b^3c^6g^2h^m - 1222560a^4b^7c^5d^2k^m + 999360a^7b^5c^4d^1k^m^2 - 860160a^6b^4c^6f^2j^1 - 829440a^7b^4c^5e^1k^2 + 705024a^6b^6c^4d^1k^2m - 552960a^8b^2c^6g^2j^2k - 552960a^7b^4c^5g^2j^2k + 414720a^6b^5c^5g^2h^m + 319392a^6b^7c^3d^1k^m^2 + 161280a^7b^5c^4e^2j^2m - 145152a^6b^6c^4g^2j^2k - 85734a^5b^9c^2d^1k^m^2 - 80640a^5b^6c^5f^2j^1 - 25344a^6b^7c^3e^2j^2m + 23490a^3b^9c^4d^2k^m - 20736a^6b^6c^4e^1k^2 + 17280a^5b^7c^4g^2h^m + 14148a^5b^8c^3d^1k^2m + 13716a^2b^11c^3d^2k^m + 12690a^4b^10c^2d^1k^2m + 12672a^4b^8c^4f^2j^1 - 3456a^5b^8c^3g^2j^2k + 768a^5b^9c^2e^2j^2m - 384a^3b^10c^3f^2j^1 + 5308416a^8b^2c^6e^2j^1^2 - 5308416a^6b^3c^7e^2j^1 - 5142528a^8b^3c^5f^1h^m^2 + 5068800a^7b^2c^7f^2h^m - 3755520a^7b^3c^6f^1h^2m - 3538944a^7b^3c^6e^2j^2 + 3000960a^6b^4c^6f^2h^m + 2654208a^7b^4c^5e^2j^1^2 - 2322432a^8b^2c^6d^1k^1^2 + 2125824a^7b^3c^6$

$d*j^2*m - 1990656*a^7*b^4*c^5*d*k^1^2 - 1085760*a^6*b^5*c^5*f*h^2*m - 959040*a^7*b^5*c^4*f*h*m^2 - 884736*a^6*b^5*c^5*e*j^2*1 + 829440*a^7*b^3*c^6*g*h^2*1 + 749568*a^7*b^3*c^6*f*j^2*k + 518400*a^6*b^6*c^4*d*k^1^2 + 414720*a^6*b^5*c^5*g*h^2*1 + 317952*a^6*b^5*c^5*f*j^2*k + 133632*a^6*b^5*c^5*d*j^2*m + 103200*a^6*b^7*c^3*f*h*m^2 - 96768*a^5*b^7*c^4*d*j^2*m - 51840*a^5*b^8*c^3*d*k^1^2 + 41280*a^5*b^6*c^5*f^2*h*m + 38400*a^5*b^7*c^4*f*j^2*k - 37188*a^4*b^8*c^4*f^2*h*m + 13536*a^5*b^7*c^4*f*h^2*m + 13440*a^4*b^9*c^3*d*j^2*m + 10368*a^5*b^7*c^4*g*h^2*1 + 5490*a^4*b^9*c^3*f*h^2*m + 1980*a^3*b^10*c^3*f^2*h*m - 1920*a^4*b^9*c^3*f*j^2*k + 810*a^5*b^9*c^2*f*h*m^2 - 180*a^3*b^11*c^2*f*h^2*m - 30*a^2*b^12*c^2*f^2*h*m + 30067200*a^6*b^2*c^8*d^2*h*m - 11612160*a^6*b^2*c^8*d^2*j*1 + 1658880*a^6*b^3*c^7*e^2*h*m + 1596672*a^4*b^6*c^6*d^2*j*1 - 1419264*a^6*b^4*c^6*f*g^2*m - 1105920*a^7*b^4*c^5*f*h^1^2 + 1105920*a^7*b^3*c^6*e*j*k^2 - 921600*a^7*b^2*c^7*f*g^2*m - 829440*a^6*b^4*c^6*g^2*h*k - 552960*a^8*b^2*c^6*f*h^1^2 - 508032*a^3*b^8*c^5*d^2*j*1 - 331776*a^7*b^2*c^7*g^2*h*k + 290304*a^6*b^5*c^5*e*j*k^2 - 103680*a^5*b^6*c^5*g^2*h*k + 80640*a^5*b^6*c^5*f*g^2*m - 69120*a^5*b^5*c^6*e^2*h*m + 65664*a^2*b^10*c^4*d^2*j*1 - 34560*a^6*b^6*c^4*f*h^1^2 + 6912*a^5*b^7*c^4*e*j*k^2 + 3456*a^5*b^8*c^3*f*h^1^2 + 11930112*a^8*b^2*c^6*d*h*m^2 + 8432640*a^7*b^2*c^7*d*h^2*m + 4450176*a^7*b^4*c^5*d*h*m^2 + 4337280*a^6*b^4*c^6*d*h^2*m - 3870720*a^8*b^2*c^6*e*g*m^2 - 3640320*a^6*b^3*c^7*f^2*h*k - 2885760*a^5*b^4*c^7*d^2*h*m - 2844288*a^4*b^6*c^6*d^2*h*m - 2626560*a^7*b^3*c^6*f*h*k^2 + 2211840*a^7*b^2*c^7*f*h^2*k + 2056320*a^6*b^4*c^6*f*h^2*k + 1935360*a^6*b^3*c^7*f^2*g*1 - 1916928*a^7*b^2*c^7*d*j^2*k - 1687680*a^6*b^6*c^4*d*h*m^2 - 1658880*a^7*b^2*c^7*e*h^2*1 - 1143360*a^5*b^5*c^6*f^2*h*k - 1097280*a^6*b^5*c^5*f*h*k^2 + 1019412*a^3*b^8*c^5*d^2*h*m - 1007424*a^5*b^6*c^5*d*h^2*m - 912384*a^6*b^4*c^6*d*j^2*k - 829440*a^6*b^4*c^6*e*h^2*1 - 645120*a^7*b^4*c^5*e*g*m^2 - 552960*a^7*b^2*c^7*g*h^2*j - 552960*a^6*b^4*c^6*g*h^2*j + 364608*a^5*b^6*c^5*f*h^2*k + 322560*a^5*b^5*c^6*f^2*g*1 + 197460*a^5*b^8*c^3*d*h*m^2 - 145152*a^5*b^6*c^5*g*h^2*j - 143802*a^2*b^10*c^4*d^2*h*m + 80640*a^6*b^6*c^4*e*g*m^2 - 56160*a^5*b^7*c^4*f*h*k^2 + 51948*a^4*b^8*c^4*d*h^2*m - 40320*a^4*b^7*c^5*f^2*g*1 + 34560*a^4*b^8*c^4*d*j^2*k + 27936*a^4*b^7*c^5*f^2*h*k - 20736*a^5*b^6*c^5*e*h^2*1 - 13824*a^5*b^6*c^5*d*j^2*k + 10800*a^3*b^10*c^3*d*h^2*m - 5760*a^3*b^10*c^3*d*j^2*k - 3780*a^4*b^8*c^4*f*h^2*k + 3690*a^3*b^9*c^4*f^2*h*k - 3456*a^4*b^8*c^4*g*h^2*j + 2970*a^4*b^9*c^3*f*h*k^2 - 2304*a^5*b^8*c^3*e*g*m^2 + 1152*a^3*b^9*c^4*f^2*g*1 - 540*a^3*b^10*c^3*f*h^2*k - 540*a^2*b^12*c^2*d*h^2*m - 90*a^4*b^10*c^2*d*h*m^2 - 90*a^2*b^11*c^3*f^2*h*k + 54*a^3*b^11*c^2*f*h*k^2 + 15925248*a^6*b^2*c^8*e^2*g*1 - 7962624*a^7*b^3*c^6*e*g*1^2 - 7962624*a^6*b^3*c^7*e*g^2*1 + 23385600*a^6*b^2*c^8*d*f^2*m + 6137856*a^6*b^3*c^7*d*g^2*m - 5677056*a^6*b^2*c^8*e^2*f*m + 4147200*a^7*b^3*c^6*d*h^1^2 - 3317760*a^6*b^2*c^8*e^2*h*k - 1354752*a^5*b^5*c^6*d*g^2*m + 1271808*a^6*b^3*c^7*f*g^2*k - 737280*a^7*b^2*c^7*f*h*j^2 + 17418240*a^5*b^3*c^8*d^2*g*1 - 568320*a^6*b^4*c^6*f*h*j^2 - 414720*a^6*b^5*c^5*d*h^1^2 + 414720*a^5*b^5*c^6*f*g^2*k - 414720*a^5*b^4*c^7*e^2*h*k + 322560*a^5*b^4*c^7*e^2*f*m - 136704*a^5*b^6*c^5*f*h*j^2 + 120960*a^4*b^7*c^5*d*g^2*m - 31104*a^5*b^7*c^4*d*h^1^2 - 17280*a^4*b^7*c^5*f*g^2*k + 10368*a^4*b^9*c^3*d$

$$\begin{aligned}
& *h^1^2 - 2304a^4b^8c^4f^*h^*j^2 + 384a^3b^{10}c^3f^*h^*j^2 + 50042880a^5 \\
& *b^2c^9d^2f^*k - 13271040a^5b^3c^8d^2h^*k - 13149696a^7b^3c^6d^*f^* \\
& m^2 + 10906560a^4b^5c^7d^2f^*m - 8709120a^4b^5c^7d^2g^*l - 7418880* \\
& a^5b^3c^8d^2f^*m + 7133184a^7b^2c^7d^*h^*k^2 - 6428160a^6b^3c^7d^*h \\
& ^2*k + 5593536a^4b^5c^7d^2h^*k - 3870720a^6b^2c^8e^*f^2*l + 3369600* \\
& a^6b^4c^6d^*h^*k^2 + 3148992a^6b^5c^5d^*f^*m^2 - 2985696a^3b^7c^6d^2 \\
& *f^*m + 1959552a^3b^7c^6d^2g^*l - 1658880a^7b^2c^7e^*g^*k^2 - 1505280* \\
& a^4b^6c^6d^*f^2*m - 1290240a^6b^2c^8f^2g^*j - 34836480a^5b^2c^9d^ \\
& ^2*e^*l + 1105920a^6b^3c^7e^*h^2*j - 860160a^5b^4c^7f^2g^*j - 829440a \\
& ^6b^4c^6e^*g^*k^2 - 692064a^3b^7c^6d^2h^*k - 689472a^5b^5c^6d^*h^2* \\
& k - 645120a^5b^4c^7e^*f^2*l - 388800a^5b^6c^5d^*h^*k^2 + 378954a^2b^ \\
& 9c^5d^2f^*m + 362880a^5b^4c^7d^*f^2*m + 296964a^3b^8c^5d^*f^2*m + 2 \\
& 90304a^5b^5c^6e^*h^2*j + 277344a^4b^7c^5d^*h^2*k - 217728a^2b^9c^5 \\
& *d^2g^*l - 80640a^4b^6c^6f^2g^*j + 80640a^4b^6c^6e^*f^2*l - 77070a^ \\
& 4b^9c^3d^*f^*m^2 - 30240a^5b^7c^4d^*f^*m^2 - 28350a^3b^9c^4d^*h^2*k - \\
& 26406a^2b^9c^5d^2h^*k - 21060a^4b^8c^4d^*h^*k^2 - 20736a^5b^6c^5* \\
& e^*g^*k^2 - 19278a^2b^10c^4d^*f^2*m + 12672a^3b^8c^5f^2g^*j + 10044a^ \\
& 3b^10c^3d^*h^*k^2 + 8820a^3b^11c^2d^*f^*m^2 + 6912a^4b^7c^5e^*h^2*j - \\
& 2304a^3b^8c^5e^*f^2*l - 1620a^2b^11c^3d^*h^2*k - 384a^2b^10c^4f^ \\
& ^2g^*j + 162a^2b^12c^2d^*h^*k^2 - 5419008a^5b^3c^8d^*e^2*m + 5308416a^ \\
& 6b^2c^8e^*g^2*j - 5308416a^5b^3c^8e^2g^*j - 3870720a^7b^2c^7d^*f^*l \\
& ^2 - 3538944a^6b^3c^7e^*g^*j^2 + 2654208a^5b^4c^7e^*g^2*j - 2322432a^ \\
& 6b^2c^8d^*g^2*k - 1990656a^5b^4c^7d^*g^2*k - 1935360a^6b^4c^6d^*f^*l \\
& ^2 + 1658880a^6b^3c^7d^*h^*j^2 + 1658880a^5b^3c^8e^2f^*k - 884736a^5 \\
& *b^5c^6e^*g^*j^2 + 725760a^5b^6c^5d^*f^*l^2 + 17418240a^4b^4c^8d^2e^* \\
& l + 518400a^4b^6c^6d^*g^2*k + 483840a^4b^5c^7d^*e^2*m + 262656a^5b^ \\
& 5c^6d^*h^*j^2 - 96768a^4b^8c^4d^*f^*l^2 - 69120a^4b^5c^7e^2f^*k - 552 \\
& 96a^4b^7c^5d^*h^*j^2 - 51840a^3b^8c^5d^*g^2*k + 3456a^3b^10c^3d^*f^* \\
& l^2 + 1152a^3b^9c^4d^*h^*j^2 + 1152a^2b^11c^3d^*h^*j^2 - 15431040a^4b \\
& ^4c^8d^2f^*k - 13248000a^5b^3c^8d^*f^2*k - 11612160a^5b^2c^9d^2g^* \\
& j - 10063872a^6b^3c^7d^*f^*k^2 - 3919104a^3b^6c^7d^2e^*l + 2554560a^ \\
& 4b^5c^7d^*f^2*k + 1720320a^5b^3c^8e^*f^2*j + 1596672a^3b^6c^7d^2g^* \\
& *j + 1518912a^3b^6c^7d^2f^*k - 1105920a^5b^4c^7f^*g^2*h + 838080a^5 \\
& *b^5c^6d^*f^*k^2 - 552960a^6b^2c^8f^*g^2*h - 508032a^2b^8c^6d^2g^*j \\
& + 435456a^2b^8c^6d^2e^*l + 161280a^4b^5c^7e^*f^2*j + 116640a^4b^7* \\
& c^5d^*f^*k^2 + 106812a^2b^8c^6d^2f^*k - 98208a^3b^7c^6d^*f^2*k - 3456 \\
& 0a^4b^6c^6f^*g^2*h - 27270a^3b^9c^4d^*f^*k^2 - 26334a^2b^9c^5d^*f^2 \\
& *k - 25344a^3b^7c^6e^*f^2*j + 3456a^3b^8c^5f^*g^2*h + 768a^2b^9c^5 \\
& *e^*f^2*j - 702a^2b^11c^3d^*f^*k^2 - 7962624a^5b^2c^9d^*e^2*k - 2580480 \\
& *a^6b^2c^8d^*f^*j^2 + 2073600a^4b^4c^8d^*e^2*k - 1658880a^6b^2c^8e^* \\
& g^*h^2 - 967680a^5b^4c^7d^*f^*j^2 - 829440a^5b^4c^7e^*g^*h^2 - 207360a^ \\
& 3b^6c^7d^*e^2*k + 64512a^4b^6c^6d^*f^*j^2 + 39168a^3b^8c^5d^*f^*j^2 - \\
& 20736a^4b^6c^6e^*g^*h^2 - 9216a^2b^10c^4d^*f^*j^2 - 4423680a^5b^2c^ \\
& 9e^2f^*h + 4147200a^5b^3c^8d^*g^2*h - 3193344a^3b^5c^8d^2e^*j + 101 \\
& 6064a^2b^7c^7d^2e^*j - 414720a^4b^5c^7d^*g^2*h - 138240a^4b^4c^8*
\end{aligned}$$



$$\begin{aligned}
& e^2*f*h - 31104*a^3*b^7*c^6*d*g^2*h + 13824*a^3*b^6*c^7*e^2*f*h + 10368*a^2 \\
& *b^9*c^5*d*g^2*h + 15630336*a^5*b^2*c^9*d*f^2*h - 14459904*a^4*b^3*c^9*d^2* \\
& f*h + 9630144*a^3*b^5*c^8*d^2*f*h - 8764416*a^5*b^3*c^8*d*f*h^2 - 3870720*a \\
& ^5*b^2*c^9*e*f^2*g + 2867328*a^4*b^4*c^8*d*f^2*h - 2095200*a^2*b^7*c^7*d^2* \\
& f*h - 1414080*a^3*b^6*c^7*d*f^2*h - 34836480*a^4*b^2*c^10*d^2*e*g - 645120* \\
& a^4*b^4*c^8*e*f^2*g + 306720*a^3*b^7*c^6*d*f*h^2 + 197820*a^2*b^8*c^6*d*f^2 \\
& *h + 146880*a^4*b^5*c^7*d*f*h^2 + 80640*a^3*b^6*c^7*e*f^2*g - 55350*a^2*b^9 \\
& *c^5*d*f*h^2 - 2304*a^2*b^8*c^6*e*f^2*g - 3870720*a^5*b^2*c^9*d*f*g^2 - 193 \\
& 5360*a^4*b^4*c^8*d*f*g^2 - 1658880*a^4*b^3*c^9*d*e^2*h + 725760*a^3*b^6*c^7 \\
& *d*f*g^2 + 17418240*a^3*b^4*c^9*d^2*e*g - 124416*a^3*b^5*c^8*d*e^2*h - 9676 \\
& 8*a^2*b^8*c^6*d*f*g^2 + 41472*a^2*b^7*c^7*d*e^2*h - 3919104*a^2*b^6*c^8*d^2 \\
& *e*g - 7741440*a^4*b^2*c^10*d*e^2*f + 2903040*a^3*b^4*c^9*d*e^2*f - 387072* \\
& a^2*b^6*c^8*d*e^2*f - 20160*a^8*b^7*c^1^2*m^2 - 1648128*a^10*b^3*c^3*k*m^3 \\
& - 898560*a^9*b^3*c^4*k^3*m - 354240*a^9*b^5*c^2*k*m^3 - 354240*a^8*b^5*c^3* \\
& k^3*m - 21600*a^7*b^7*c^2*k^3*m - 13950*a^7*b^8*c*k^2*m^2 + 430080*a^10*b*c \\
& ^5*j^2*m^2 - 1984*a^6*b^9*c*j^2*m^2 - 884736*a^9*b^3*c^4*j^1^3 - 589824*a^8 \\
& *b^3*c^5*j^3^1 - 442368*a^8*b^5*c^3*j^1^3 - 294912*a^7*b^5*c^4*j^3^1 - 4915 \\
& 2*a^6*b^7*c^3*j^3^1 + 1359360*a^10*b^2*c^4*h*m^3 + 1173120*a^9*b^4*c^3*h*m^ \\
& 3 + 743040*a^7*b^4*c^5*h^3*m + 622080*a^8*b^2*c^6*h^3*m + 184320*a^9*b*c^6* \\
& j^2*k^2 + 107136*a^6*b^6*c^4*h^3*m - 32640*a^8*b^6*c^2*h*m^3 + 540*a^5*b^8* \\
& c^3*h^3*m - 270*a^4*b^10*c^2*h^3*m - 180*a^5*b^10*c*h^2*m^2 - 2293760*a^9*b \\
& ^3*c^4*f*m^3 - 2293760*a^6*b^3*c^7*f^3*m + 1327104*a^8*b^4*c^4*g^1^3 + 1327 \\
& 104*a^6*b^4*c^6*g^3^1 - 622080*a^8*b^3*c^5*h*k^3 - 622080*a^7*b^3*c^6*h^3*k \\
& - 326592*a^7*b^5*c^4*h*k^3 - 326592*a^6*b^5*c^5*h^3*k - 199360*a^8*b^5*c^3 \\
& *f*m^3 - 199360*a^5*b^5*c^6*f^3*m + 61920*a^7*b^7*c^2*f*m^3 + 61920*a^4*b^7 \\
& *c^5*f^3*m - 38880*a^6*b^7*c^3*h*k^3 - 38880*a^5*b^7*c^4*h^3*k - 3682*a^3*b \\
& ^9*c^4*f^3*m - 810*a^5*b^9*c^2*h*k^3 - 810*a^4*b^9*c^3*h^3*k - 70*a^3*b^12* \\
& c*f^2*m^2 + 70*a^2*b^11*c^3*f^3*m + 3870720*a^8*b*c^7*e^2*m^2 + 184320*a^8* \\
& b*c^7*h^2*j^2 - 14152320*a^4*b^4*c^8*d^3*m + 10644480*a^5*b^2*c^9*d^3*m + 5 \\
& 483520*a^9*b^2*c^5*d*m^3 + 4269888*a^3*b^6*c^7*d^3*m - 2654208*a^8*b^3*c^5* \\
& e^1^3 + 1359360*a^6*b^2*c^8*f^3*k + 1330560*a^8*b^4*c^4*d*m^3 + 1173120*a^5 \\
& *b^4*c^7*f^3*k - 884736*a^6*b^3*c^7*g^3*j - 826560*a^7*b^6*c^3*d*m^3 + 7430 \\
& 40*a^7*b^4*c^5*f*k^3 + 622080*a^8*b^2*c^6*f*k^3 - 607068*a^2*b^8*c^6*d^3*m \\
& - 589824*a^7*b^3*c^6*g*j^3 - 442368*a^5*b^5*c^6*g^3*j - 294912*a^6*b^5*c^5* \\
& g*j^3 + 145188*a^6*b^8*c^2*d*m^3 + 107136*a^6*b^6*c^4*f*k^3 - 49152*a^5*b^7 \\
& *c^4*g*j^3 - 32640*a^4*b^6*c^6*f^3*k - 5796*a^3*b^8*c^5*f^3*k + 540*a^5*b^8 \\
& *c^3*f*k^3 - 270*a^4*b^10*c^2*f*k^3 + 210*a^2*b^10*c^4*f^3*k + 19077120*a^4 \\
& *b^3*c^9*d^3*k + 1658880*a^7*b*c^8*e^2*k^2 + 430080*a^7*b*c^8*f^2*j^2 + 353 \\
& 8944*a^5*b^2*c^9*e^3*j - 2488320*a^7*b^3*c^6*d*k^3 - 2379456*a^3*b^5*c^8*d^ \\
& 3*k + 1179648*a^7*b^2*c^7*e*j^3 + 589824*a^6*b^4*c^6*e*j^3 + 98304*a^5*b^6* \\
& c^5*e*j^3 - 95904*a^2*b^7*c^7*d^3*k - 57024*a^6*b^5*c^5*d*k^3 + 49248*a^5*b \\
& ^7*c^4*d*k^3 - 4050*a^4*b^9*c^3*d*k^3 - 810*a^3*b^11*c^2*d*k^3 - 486*a*b^12 \\
& *c^3*d^2*k^2 + 3870720*a^6*b*c^9*d^2*j^2 - 1648128*a^5*b^3*c^8*f^3*h - 8985 \\
& 60*a^6*b^3*c^7*f*h^3 - 354240*a^5*b^5*c^6*f*h^3 - 354240*a^4*b^5*c^7*f^3*h \\
& + 43680*a^3*b^7*c^6*f^3*h - 21600*a^4*b^7*c^5*f*h^3 - 9792*a*b^11*c^4*d^2*j
\end{aligned}$$

$$\begin{aligned}
&^2 + 1350a^3b^9c^4f^3h^3 - 1050a^2b^9c^5f^3h + 1658880a^6b^9c^2h^2 + 16547328a^4b^2c^{10}d^3h - 12306816a^3b^4c^9d^3h + 37310976 \\
&a^3b^3c^{10}d^3f + 3037824a^2b^6c^8d^3h - 2654208a^5b^3c^8e^3g^3 + 1949184a^6b^2c^8d^3h^3 + 1296000a^5b^4c^7d^3h^3 - 155520a^4b^6c \\
&^6d^3h^3 - 40500a^2b^{10}c^5d^2h^2 - 8100a^3b^8c^5d^3h^3 + 4050a^2b^{10}c^4d^3h^3 + 3870720a^5b^9c^{10}e^2f^2 + 34836480a^4b^9c^{11}d^2e^2 - 10 \\
&8864a^2b^9c^6d^2g^2 - 8068032a^2b^5c^9d^3f - 5623296a^4b^3c^9d^3f^3 + 1737792a^3b^5c^8d^3f^3 - 260190a^2b^8c^7d^2f^2 - 211680a^2b^7 \\
&c^7d^3f^3 - 435456a^2b^7c^8d^2e^2 - 245760a^{10}c^6j^2k^2m - 384a^6b^{10}j^2k^2m^2 + 138240a^{10}c^6h^2k^2m - 90a^5b^{11}h^2k^2m^2 + 384000a^{10}c \\
&^6f^2k^2m^2 - 2211840a^8c^8e^2k^2m - 409600a^9c^7f^2j^2m - 147456a^9c^7h^2j^2k - 30a^4b^{12}f^2k^2m^2 + 967680a^9c^7d^2k^2m + 384000a^8c^8 \\
&f^2h^2m - 90a^3b^{13}d^2k^2m^2 + 20321280a^7c^9d^2h^2m - 883200a^{11}b^9c^4k^2m^3 - 317952a^{10}b^9c^5k^3m + 43680a^8b^7c^2k^2m^3 + 1350a^6b^9c \\
&k^3m - 270b^{14}c^2d^2h^2m + 6a^3b^{13}f^2h^2m^2 + 4838400a^9c^7d^2h^2m^2 + 2903040a^8c^8d^2h^2m - 1032192a^8c^8d^2j^2k + 138240a^8c^8f^2h^2 \\
&2k - 3686400a^7c^9e^2f^2m - 1327104a^7c^9e^2h^2k - 393216a^9b^9c^6j^3k^2 - 245760a^8c^8f^2h^2j^2 - 810b^{13}c^3d^2h^2k + 630b^{13}c^3d^2f^2 \\
&m + 18a^2b^{14}d^2h^2m^2 + 2688000a^7c^9d^2f^2m + 580608a^8c^8d^2h^2k^2 - 5796a^7b^8c^2h^2m^3 - 3456b^{12}c^4d^2g^2j + 1890b^{12}c^4d^2f^2k + 67 \\
&73760a^6c^{10}d^2f^2k - 1344000a^{10}b^9c^5f^2m^3 - 1344000a^7b^9c^8f^3m - 207360a^9b^9c^6h^2k^3 - 207360a^8b^9c^7h^3k - 3682a^6b^9c^2f^2m^3 - \\
&9289728a^6c^{10}d^2e^2k - 1720320a^7c^9d^2f^2j^2 - 50803200a^5b^9c^{10}d^3k + 6912b^{11}c^5d^2e^2j - 10616832a^6b^9c^9e^3k^2 - 2211840a^6c^{10} \\
&e^2f^2h - 393216a^8b^9c^7g^2j^3 + 43416a^2b^{10}c^5d^3m - 9576a^5b^{10}c^2d^2m^3 - 9450b^{11}c^5d^2f^2h - 504a^2b^{14}c^2d^2m^2 + 1612800a^6c^{10}d^2 \\
&f^2h - 1036800a^8b^9c^7d^2k^3 + 45198a^2b^9c^6d^3k - 20736b^{10}c^6d^2e^2g - 75188736a^4b^9c^{11}d^3f - 883200a^6b^9c^9f^3h - 317952a^7b^9c^8 \\
&f^2h^3 - 15482880a^5c^{11}d^2e^2f - 10616832a^5b^9c^{10}e^3g - 345060a^2b^8c^7d^3h - 4262400a^5b^9c^{10}d^2f^3 + 852768a^2b^7c^8d^3f + 7350a^2 \\
&b^9c^6d^2f^3 + 967680a^{10}b^3c^3k^2m^2 + 161280a^9b^5c^2k^2m^2 + 1684224a^{10}b^2c^4k^2m^2 + 1264320a^9b^4c^3k^2m^2 + 126720a^8b^6 \\
&c^2k^2m^2 + 501760a^9b^3c^4j^2m^2 + 414720a^9b^3c^4k^2m^2 + 207360a^8b^5c^3k^2m^2 + 170240a^8b^5c^3j^2m^2 + 9216a^7b^7c^2j^2 \\
&2m^2 + 5184a^7b^7c^2k^2m^2 + 884736a^9b^2c^5j^2m^2 + 884736a^8b^4c^4j^2m^2 + 221184a^7b^6c^3j^2m^2 + 1419840a^8b^4c^4h^2m^2 \\
&+ 1387008a^9b^2c^5h^2m^2 + 276480a^8b^3c^5j^2k^2 + 140544a^7b^5c^4j^2k^2 + 84960a^7b^6c^3h^2m^2 + 25344a^6b^7c^3j^2k^2 - 801 \\
&0a^6b^8c^2h^2m^2 + 576a^5b^9c^2j^2k^2 + 967680a^8b^3c^5g^2m^2 + 414720a^8b^3c^5h^2m^2 + 207360a^7b^5c^4h^2m^2 + 161280a^7b^5 \\
&c^4g^2m^2 - 20160a^6b^7c^3g^2m^2 + 5184a^6b^7c^3h^2m^2 + 576a^5b^9c^2g^2m^2 + 3808000a^8b^2c^6f^2m^2 + 1990656a^7b^4c^5g^2 \\
&2m^2 + 1643712a^7b^4c^5f^2m^2 + 803520a^7b^4c^5h^2k^2 + 725760a^8b^2c^6h^2k^2 + 207360a^6b^6c^4h^2k^2 - 125440a^6b^6c^4f^2m^2 \\
&- 13790a^5b^8c^3f^2m^2 + 10530a^5b^8c^3h^2k^2 + 1785a^4b^{10}c^
\end{aligned}$$

$$\begin{aligned}
& 2*f^2*m^2 + 81*a^4*b^{10}*c^2*h^2*k^2 + 18427392*a^7*b^2*c^7*d^2*m^2 + 967680 \\
& *a^7*b^3*c^6*f^2*l^2 + 645120*a^7*b^3*c^6*e^2*m^2 + 414720*a^7*b^3*c^6*g^2* \\
& k^2 + 276480*a^7*b^3*c^6*h^2*j^2 + 207360*a^6*b^5*c^5*g^2*k^2 + 161280*a^6* \\
& b^5*c^5*f^2*l^2 + 140544*a^6*b^5*c^5*h^2*j^2 - 80640*a^6*b^5*c^5*e^2*m^2 + \\
& 25344*a^5*b^7*c^4*h^2*j^2 - 20160*a^5*b^7*c^4*f^2*l^2 + 5184*a^5*b^7*c^4*g^ \\
& 2*k^2 + 2304*a^5*b^7*c^4*e^2*m^2 + 576*a^4*b^9*c^3*h^2*j^2 + 576*a^4*b^9*c^ \\
& 3*f^2*l^2 + 7962624*a^7*b^2*c^7*e^2*l^2 - 4148928*a^6*b^4*c^6*d^2*m^2 + 141 \\
& 9840*a^6*b^4*c^6*f^2*k^2 + 1387008*a^7*b^2*c^7*f^2*k^2 - 1183392*a^5*b^6*c^ \\
& 5*d^2*m^2 + 884736*a^7*b^2*c^7*g^2*j^2 + 884736*a^6*b^4*c^6*g^2*j^2 + 64575 \\
& 0*a^4*b^8*c^4*d^2*m^2 + 221184*a^5*b^6*c^5*g^2*j^2 - 115920*a^3*b^{10}*c^3*d^ \\
& 2*m^2 + 84960*a^5*b^6*c^5*f^2*k^2 + 10836*a^2*b^{12}*c^2*d^2*m^2 - 8010*a^4*b \\
& ^8*c^4*f^2*k^2 - 180*a^3*b^{10}*c^3*f^2*k^2 + 9*a^2*b^{12}*c^2*f^2*k^2 + 870912 \\
& 0*a^6*b^3*c^7*d^2*l^2 - 4354560*a^5*b^5*c^6*d^2*l^2 + 979776*a^4*b^7*c^5*d^ \\
& 2*l^2 + 829440*a^6*b^3*c^7*e^2*k^2 + 17480448*a^6*b^2*c^8*d^2*k^2 + 501760* \\
& a^6*b^3*c^7*f^2*j^2 + 170240*a^5*b^5*c^6*f^2*j^2 - 108864*a^3*b^9*c^4*d^2*l \\
& ^2 + 20736*a^5*b^5*c^6*e^2*k^2 + 9216*a^4*b^7*c^5*f^2*j^2 + 5184*a^2*b^{11}*c \\
& ^3*d^2*l^2 - 1984*a^3*b^9*c^4*f^2*j^2 + 64*a^2*b^{11}*c^3*f^2*j^2 + 3538944*a \\
& ^6*b^2*c^8*e^2*j^2 - 3302208*a^5*b^4*c^7*d^2*k^2 + 884736*a^5*b^4*c^7*e^2*j \\
& ^2 + 414720*a^6*b^3*c^7*g^2*h^2 + 207360*a^5*b^5*c^6*g^2*h^2 - 103680*a^4*b \\
& ^6*c^6*d^2*k^2 + 101250*a^3*b^8*c^5*d^2*k^2 - 5751*a^2*b^{10}*c^4*d^2*k^2 + 5 \\
& 184*a^4*b^7*c^5*g^2*h^2 + 1935360*a^5*b^3*c^8*d^2*j^2 + 1684224*a^6*b^2*c^8 \\
& *f^2*h^2 + 1264320*a^5*b^4*c^7*f^2*h^2 - 532224*a^4*b^5*c^7*d^2*j^2 + 12672 \\
& 0*a^4*b^6*c^6*f^2*h^2 - 96768*a^3*b^7*c^6*d^2*j^2 + 62784*a^2*b^9*c^5*d^2*j \\
& ^2 - 13950*a^3*b^8*c^5*f^2*h^2 + 225*a^2*b^{10}*c^4*f^2*h^2 + 967680*a^5*b^3* \\
& c^8*f^2*g^2 + 829440*a^5*b^3*c^8*e^2*h^2 + 161280*a^4*b^5*c^7*f^2*g^2 + 207 \\
& 36*a^4*b^5*c^7*e^2*h^2 - 20160*a^3*b^7*c^6*f^2*g^2 + 576*a^2*b^9*c^5*f^2*g^ \\
& 2 + 11487744*a^5*b^2*c^9*d^2*h^2 + 7962624*a^5*b^2*c^9*e^2*g^2 + 35525376*a \\
& ^4*b^2*c^10*d^2*f^2 - 1412640*a^3*b^6*c^7*d^2*h^2 + 461376*a^4*b^4*c^8*d^2* \\
& h^2 + 375030*a^2*b^8*c^6*d^2*h^2 + 8709120*a^4*b^3*c^9*d^2*g^2 - 4354560*a^ \\
& 3*b^5*c^8*d^2*g^2 + 979776*a^2*b^7*c^7*d^2*g^2 + 645120*a^4*b^3*c^9*e^2*f^2 \\
& - 80640*a^3*b^5*c^8*e^2*f^2 + 2304*a^2*b^7*c^7*e^2*f^2 - 15269184*a^3*b^4* \\
& c^9*d^2*f^2 + 2870784*a^2*b^6*c^8*d^2*f^2 - 17418240*a^3*b^3*c^10*d^2*e^2 + \\
& 3919104*a^2*b^5*c^9*d^2*e^2 + 54*b^{15}*c*d^2*k*m + 6*a*b^{15}*d*f*m^2 + 11520 \\
& 0*a^{11}*c^5*k^2*m^2 + 576*a^7*b^9*l^2*m^2 + 225*a^6*b^{10}*k^2*m^2 + 64*a^5*b^ \\
& 11*j^2*m^2 + 345600*a^{10}*c^6*h^2*m^2 + 9*a^4*b^{12}*h^2*m^2 + 320000*a^9*c^7* \\
& f^2*m^2 + 41472*a^9*c^7*h^2*k^2 + 16934400*a^8*c^8*d^2*m^2 + 345600*a^8*c^8 \\
& *f^2*k^2 + 81*b^{14}*c^2*d^2*k^2 + 3538944*a^7*c^9*e^2*j^2 + 2032128*a^7*c^9* \\
& d^2*k^2 + 492800*a^{11}*b^2*c^3*m^4 + 351456*a^{10}*b^4*c^2*m^4 + 576*b^{13}*c^3* \\
& d^2*j^2 + 331776*a^9*b^4*c^3*l^4 + 115200*a^7*c^9*f^2*h^2 + 142560*a^8*b^4* \\
& c^4*k^4 + 103680*a^9*b^2*c^5*k^4 + 32400*a^7*b^6*c^3*k^4 + 2025*b^{12}*c^4*d^ \\
& 2*h^2 + 2025*a^6*b^8*c^2*k^4 + 6096384*a^6*c^10*d^2*h^2 + 131072*a^8*b^2*c^ \\
& 6*j^4 + 98304*a^7*b^4*c^5*j^4 + 32768*a^6*b^6*c^4*j^4 + 5184*b^{11}*c^5*d^2*g \\
& ^2 + 4096*a^5*b^8*c^3*j^4 + 11025*b^{10}*c^6*d^2*f^2 + 5644800*a^5*c^{11}*d^2*f \\
& ^2 + 142560*a^6*b^4*c^6*h^4 + 103680*a^7*b^2*c^7*h^4 + 32400*a^5*b^6*c^5*h^ \\
& 4 + 20736*b^9*c^7*d^2*e^2 + 2025*a^4*b^8*c^4*h^4 + 331776*a^5*b^4*c^7*g^4 +
\end{aligned}$$

$$\begin{aligned}
& 492800a^5b^2c^9f^4 + 351456a^4b^4c^8f^4 - 43120a^3b^6c^7f^4 + 1225a^2b^8c^6f^4 - 27433728a^3b^2c^{11}d^4 + 6446304a^2b^4c^{10}d^4 \\
& - 1050a^7b^9k^m^3 + 384000a^{11}c^5h^m^3 + 138240a^9c^7h^3m + 210a^6b^{10}h^m^3 + 47416320a^6c^{10}d^3m - 1134b^{12}c^4d^3m + 70a^5b^{11}f^m^3 \\
& + 2688000a^{10}c^6d^m^3 + 384000a^7c^9f^3k + 138240a^9c^7fk^3 - 3402b^{11}c^5d^3k + 210a^4b^{12}d^m^3 + 7077888a^6c^{10}e^3j + 786432a^8c^8e^j^3 \\
& - 43120a^9b^6c^m^4 + 28449792a^5c^{11}d^3h + 17010b^{10}c^6d^3h + 580608a^7c^9d^h^3 - 39690b^9c^7d^3f - 734832a^6b^6c^9d^4 + 9b^{16}d^2m^2 \\
& + 160000a^{12}c^4m^4 + 1225a^8b^8m^4 + 20736a^{10}c^6k^4 + 65536a^9c^7j^4 + 20736a^8c^8h^4 + 49787136a^4c^{12}d^4 + 160000a^6c^{10}f^4 \\
& + 5308416a^5c^{11}e^4 + 35721b^8c^8d^4 + a^2b^{14}f^2m^2, z, k1) * x * (8388608a^{11}b^c^{10} - 512a^4b^{15}c^3 + 14336a^5b^{13}c^4 - 172032a^6b^{11}c^5 \\
& + 1146880a^7b^9c^6 - 4587520a^8b^7c^7 + 11010048a^9b^5c^8 - 14680064a^{10}b^3c^9) / (64 * (4096a^{10}c^7 + a^4b^{12}c - 24a^5b^{10}c^2 \\
& + 240a^6b^8c^3 - 1280a^7b^6c^4 + 3840a^8b^4c^5 - 6144a^9b^2c^6)) - (983040a^7c^9e^f + 589824a^8c^8e^k + 327680a^8c^8f^j \\
& + 196608a^9c^7j^k - 3244032a^6b^c^9d^e - 884736a^7b^c^8e^h - 491520a^7b^c^8f^g - 1081344a^7b^c^8d^j - 1277952a^8b^c^7e^m \\
& - 491520a^8b^c^7f^l - 294912a^8b^c^7g^k - 294912a^8b^c^7h^j - 425984a^9b^c^6j^m - 294912a^9b^c^6k^l - 4608a^2b^9c^5d^e + 87552a^3b^7c^6d^e \\
& - 681984a^4b^5c^7d^e + 2433024a^5b^3c^8d^e + 2304a^2b^{10}c^4d^g - 43776a^3b^8c^5d^g - 1536a^3b^8c^5e^f + 340992a^4b^6c^6d^g \\
& + 39936a^4b^6c^6e^f - 1216512a^5b^4c^7d^g - 184320a^5b^4c^7e^f + 1622016a^6b^2c^8d^g - 49152a^6b^2c^8e^f + 768a^3b^9c^4f^g \\
& - 4608a^4b^7c^5e^h - 19968a^4b^7c^5f^g - 18432a^5b^5c^6e^h + 92160a^5b^5c^6f^g + 368640a^6b^3c^7e^h + 24576a^6b^3c^7f^g \\
& - 768a^2b^{11}c^3d^j + 13056a^3b^9c^4d^j - 84480a^4b^7c^5d^j + 178176a^5b^5c^6d^j + 270336a^6b^3c^7d^j + 2304a^4b^8c^4g^h + 9216a^5b^6c^5g^h \\
& - 184320a^6b^4c^6g^h + 442368a^7b^2c^7g^h + 2304a^3b^{10}c^3d^l - 256a^3b^{10}c^3f^j - 43776a^4b^8c^4d^l + 6144a^4b^8c^4f^j \\
& + 340992a^5b^6c^5d^l + 27648a^5b^6c^5e^k - 17408a^5b^6c^5f^j - 1216512a^6b^4c^6d^l - 184320a^6b^4c^6e^k - 69632a^6b^4c^6f^j \\
& + 1622016a^7b^2c^7d^l + 147456a^7b^2c^7e^k + 147456a^7b^2c^7f^j + 768a^4b^9c^3f^l - 768a^4b^9c^3h^j + 1536a^5b^7c^4e^m \\
& - 19968a^5b^7c^4f^l - 13824a^5b^7c^4g^k - 4608a^5b^7c^4h^j - 92160a^6b^5c^5e^m + 92160a^6b^5c^5f^l + 92160a^6b^5c^5g^k + 55296a^6b^5c^5h^j \\
& + 663552a^7b^3c^6e^m + 24576a^7b^3c^6f^l - 73728a^7b^3c^6g^k - 24576a^7b^3c^6h^j - 768a^5b^8c^3g^m + 2304a^5b^8c^3h^l \\
& + 46080a^6b^6c^4g^m + 9216a^6b^6c^4h^l - 331776a^7b^4c^5g^m - 184320a^7b^4c^5h^l + 638976a^8b^2c^6g^m + 442368a^8b^2c^6h^l \\
& + 4608a^5b^8c^3j^k - 21504a^6b^6c^4j^k - 36864a^7b^4c^5j^k + 147456a^8b^2c^6j^k + 256a^5b^9c^2j^m - 14848a^6b^7c^3j^m \\
& - 13824a^6b^7c^3k^l + 79872a^7b^5c^4j^m + 92160a^7b^5c^4k^l + 8192a^8b^3c^5j^m - 73728a^8b^3c^5k^l - 768a^6b^8c^2l^m + 46080a^7b^6c^3l^m \\
& - 331776a^8b^4c^4l^m + 638976a^9b^2c^5l^m) / (512 * (
\end{aligned}$$

$$\begin{aligned}
& 4096a^{10}c^7 + a^4b^{12}c - 24a^5b^{10}c^2 + 240a^6b^8c^3 - 1280a^7b^6c^4 + 3840a^8b^4c^5 - 6144a^9b^2c^6) + (x(25600a^7c^9f^2 - 18 \\
& *b^{12}c^4d^2 - 451584a^6c^{10}d^2 - 9216a^8c^8h^2 + 9216a^9c^7k^2 - \\
& 2a^4b^{12}m^2 - 25600a^{10}c^6m^2 + 504a^5b^{10}c^5d^2 + 73728a^6b^8c^9 \\
& *e^2 + 8192a^8b^6c^7j^2 + 88a^5b^{10}c^5m^2 - 6228a^2b^8c^6d^2 + 4262 \\
& 4a^3b^6c^7d^2 - 176256a^4b^4c^8d^2 + 423936a^5b^2c^9d^2 + 4608a^4b^5c^7e^2 - 36864a^5b^3c^8e^2 - 2a^2b^{10}c^4f^2 + 84a^3b^8c^5 \\
& f^2 - 3520a^4b^6c^6f^2 + 26240a^5b^4c^7f^2 - 59904a^6b^2c^8f^2 + 1152a^4b^7c^5g^2 - 9216a^5b^5c^6g^2 + 18432a^6b^3c^7g^2 - \\
& 468a^4b^8c^4h^2 + 3456a^5b^6c^5h^2 - 5760a^6b^4c^6h^2 + 128a^4b^9c^3j^2 - 512a^5b^7c^4j^2 - 1536a^6b^5c^5j^2 + 4096a^7b^3c^6j^2 - 18a^4b^{10}c^2k^2 - 108a^5b^8c^3k^2 + 576a^6b^6c^4k^2 + 5 \\
& 760a^7b^4c^5k^2 - 23040a^8b^2c^6k^2 + 1152a^6b^7c^3l^2 - 9216a^7b^5c^4l^2 + 18432a^8b^3c^5l^2 - 1236a^6b^8c^2m^2 + 5760a^7b^6c^3m^2 - 8320a^8b^4c^4m^2 + 6144a^9b^2c^5m^2 - 129024a^7c^9d \\
& *h - 215040a^8c^8d*m + 30720a^8c^8f*k - 30720a^9c^7h*m - 12a^5b^{11}c^4d*f + 218112a^6b^8c^9d*f + 9216a^7b^6c^8f*h + 156672a^7b^6c^8d*k \\
& + 49152a^7b^6c^8e*j + 25600a^8b^6c^7f*m + 9216a^8b^6c^7h*k - 12a^4b^{11}c^4k*m + 21504a^9b^6c^6k*m + 420a^2b^9c^5d*f - 4992a^3b^7c^6d*f \\
& f + 36480a^4b^5c^7d*f - 144384a^5b^3c^8d*f - 36a^2b^{10}c^4d*h + 360a^3b^8c^5d*h - 3456a^4b^6c^6d*h - 4608a^4b^6c^6e*g + 11520a^5b^4c^7d*h \\
& + 36864a^5b^4c^7e*g + 27648a^6b^2c^8d*h - 73728a^6b^2c^8e*g - 12a^3b^9c^4f*h + 2304a^4b^7c^5f*h - 17280a^5b^5c^6f*h + 30720a^6b^3c^7f*h + 180a^3b^9c^4d*k - 2304a^4b^7c^5d*k + \\
& 1536a^4b^7c^5e*j + 19584a^5b^5c^6d*k - 9216a^5b^5c^6e*j - 92160a^6b^3c^7d*k - 168a^4b^8c^4d*m - 360a^4b^8c^4f*k - 768a^4b^8c^4g*j + 768a^5b^6c^5d*m - 4608a^5b^6c^5e*l - 768a^5b^6c^5f*k \\
& + 4608a^5b^6c^5g*j - 11520a^6b^4c^6d*m + 36864a^6b^4c^6e*l + 25344a^6b^4c^6f*k + 98304a^7b^2c^7d*m - 73728a^7b^2c^7e*l - 73728a^7b^2c^7f*k - 24576a^7b^2c^7g*j - 140a^4b^9c^3f*m + 180a^4b^9c^3h*k + 3584a^5b^7c^4f*m + 2304a^5b^7c^4g*l - 20352a^6b^5c^5f*m - 18432a^6b^5c^5g*l - 8064a^6b^5c^5h*k + 26624a^7b^3c^6f*m + 36864a^7b^3c^6g*l + 18432a^7b^3c^6h*k + 60a^4b^{10}c^2h*m - 1560a^5b^8c^3h*m + 8832a^6b^6c^4h*m - 13056a^7b^4c^5h*m + 3072a^8b^2c^6h*m - 768a^5b^8c^3j*l + 4608a^6b^6c^4j*l - 24576a^8b^2c^6j*l + 228a^5b^9c^2k*m + 384a^6b^7c^3k*m - 9600a^7b^5c^4k*m + 15360a^8b^3c^5k*m))/(64*(4096a^{10}c^7 + a^4b^{12}c - 24a^5b^{10}c^2 + 240a^6b^8c^3 - 1280a^7b^6c^4 + 3840a^8b^4c^5 - 6144a^9b^2c^6)) + (35a^6b^7m^3 - 8000a^5c^8f^3 - 1728a^8c^5k^3 - 567b^7c^6d^3 + 10368a^5b^5c^7d^3 + 169344a^3b^8c^9d^3 + 193536a^4c^9d^3e^2 - 141120a^4c^9d^2f + 1728a^6b^8c^6h^3 + 315b^8c^5d^2f + 27648a^5c^8e^2h - 135b^9c^4d^2h + 21504a^6c^7d^2j^2 - 2880a^6c^7f^2h^2 - 84672a^5c^8d^2k - 1176a^7b^5c^5m^3 + 6400a^9b^3c^3m^3 + 3a^2b^{11}d^2m^2 + 27b^{10}c^3d^2k - 14400a^6c^7f^2k - 8640a^7c^6f^2k^2 + a^3b^{10}f^2m^2 + 46080a^6c^7e^2m + 3072a^7c^6h^2j^2 + 9b^{11}c^2d^2m - 17
\end{aligned}$$

$$\begin{aligned}
& 28a^7c^6h^2k - 8000a^8c^5f^2m^2 + 3a^4b^9h^2m^2 - 15a^5b^8k^2m^2 \\
& + 5120a^8c^5j^2m - 4800a^9c^4k^2m^2 - 67824a^2b^3c^8d^3 + 35a^2b^6c^5f^3 + 84a^3b^4c^6f^3 - 12720a^4b^2c^7f^3 + 540a^4b^5c^4h^3 \\
& + 4320a^5b^3c^5h^3 - 135a^5b^6c^2k^3 - 1620a^6b^4c^3k^3 - 4752a^7b^2c^4k^3 + 9456a^8b^3c^2m^3 - 40320a^5c^8d^2fh + 129024a^5c^8d^2ej \\
& - 67200a^6c^7d^2fm - 24192a^6c^7d^2hk + 18432a^6c^7e^2hj - 9600a^7c^6f^2hm - 40320a^7c^6d^2km + 30720a^7c^6e^2jm - 5760a^8c^5h^2km \\
& - 6237a^2b^6c^6d^2f + 210a^2b^7c^5d^2f^2 + 116160a^4b^2c^8d^2f^2 - 36864a^4b^2c^8e^2f + 2430a^2b^7c^5d^2h + 133056a^4b^2c^8d^2h \\
& + 27648a^5b^2c^7d^2h^2 + 26880a^5b^2c^7f^2h - 297a^2b^8c^4d^2k + 46656a^6b^2c^6d^2k^2 - 27648a^5b^2c^7e^2k - 4096a^6b^2c^6f^2j^2 - 324a^2b^9c^3d^2m \\
& - 132a^3b^9c^3d^2m^2 + 193536a^5b^2c^7d^2m + 63360a^7b^2c^5d^2m^2 - 51a^4b^8c^2f^2m^2 + 40000a^6b^2c^6f^2m + 10368a^7b^2c^5h^2k^2 - 78a^5b^7c^2h^2m^2 \\
& + 8064a^7b^2c^5h^2m - 3072a^7b^2c^5j^2k + 12480a^8b^2c^4h^2m^2 - 90a^5b^7c^2k^2m + 705a^6b^6c^2k^2m^2 + 15552a^8b^2c^4k^2m + 6912a^2b^4c^7d^2e^2 - 62208a^3b^2c^8d^2e^2 + 42372a^2b^4c^7d^2f - 1764a^2b^5c^6d^2f^2 - 96048a^3b^2c^8d^2f - 4608a^3b^3c^7d^2f^2 + 1728a^2b^6c^5d^2g^2 + 2304a^3b^3c^7e^2f - 15552a^3b^4c^6d^2g^2 + 48384a^4b^2c^7d^2g^2 - 13716a^2b^5c^6d^2h + 405a^2b^7c^4d^2h^2 + 12096a^3b^3c^7d^2h - 5400a^3b^5c^5d^2h^2 + 28944a^4b^3c^6d^2h^2 + 576a^3b^5c^5f^2g^2 + 6912a^4b^2c^7e^2h - 9216a^4b^3c^6f^2g^2 - 15a^2b^7c^4f^2h + 192a^2b^8c^3d^2j^2 - 360a^3b^5c^5f^2h - 960a^3b^6c^4d^2j^2 + 135a^3b^6c^4f^2h^2 + 15696a^4b^3c^6f^2h - 768a^4b^4c^5d^2j^2 - 5580a^4b^4c^5f^2h^2 + 14592a^5b^2c^6d^2j^2 - 20592a^5b^2c^6f^2h^2 - 999a^2b^6c^5d^2k + 27a^2b^9c^2d^2k^2 + 23004a^3b^4c^6d^2k - 108a^3b^7c^3d^2k^2 - 84240a^4b^2c^7d^2k + 1728a^4b^4c^5g^2h - 1404a^4b^5c^4d^2k^2 + 6912a^5b^2c^6g^2h + 14688a^5b^3c^5d^2k^2 + 64a^3b^7c^3f^2j^2 - 768a^4b^5c^4f^2j^2 + 1728a^4b^6c^3d^2l^2 - 3840a^5b^3c^5f^2j^2 - 15552a^5b^4c^4d^2l^2 + 48384a^6b^2c^5d^2l^2 + 3717a^2b^7c^4d^2m + 3a^2b^8c^3f^2k - 15192a^3b^5c^5d^2m + 135a^3b^6c^4f^2k + 9a^3b^8c^2f^2k^2 - 7920a^4b^3c^6d^2m - 2988a^4b^4c^5f^2k - 99a^4b^6c^3f^2k^2 + 2079a^4b^7c^2d^2m^2 - 28272a^5b^2c^6f^2k - 4500a^5b^4c^4f^2k^2 - 14448a^5b^5c^3d^2m^2 - 20304a^6b^2c^5f^2k^2 + 37104a^6b^3c^4d^2m^2 + 192a^4b^6c^3h^2j^2 + 2304a^5b^2c^6e^2m - 6912a^5b^3c^5g^2k + 1536a^5b^4c^4h^2j^2 + 576a^5b^5c^3f^2l^2 + 3840a^6b^2c^5h^2j^2 - 9216a^6b^3c^4f^2l^2 + a^2b^9c^2f^2m + 20a^3b^7c^3f^2m - 1596a^4b^5c^4f^2m - 243a^4b^6c^3h^2k + 27a^4b^7c^2h^2k^2 + 16736a^5b^3c^5f^2m - 5940a^5b^4c^4h^2k + 1728a^5b^5c^3h^2k^2 + 875a^5b^6c^2f^2m^2 - 13392a^6b^2c^5h^2k + 10800a^6b^3c^4h^2k^2 - 2716a^6b^4c^3f^2m^2 - 39600a^7b^2c^4f^2m^2 + 576a^5b^4c^4g^2m + 11520a^6b^2c^5g^2m + 1728a^6b^4c^3h^2l^2 + 6912a^7b^2c^4h^2l^2 - 81a^4b^7c^2h^2m + 720a^5b^5c^3h^2m - 768a^5b^5c^3j^2k + 17136a^6b^3c^4h^2m - 3072a^6b^3c^4j^2k - 900a^6b^5c^2h^2m^2 + 22272a^7b^3c^3h^2m^2 + 64a^5b^6c^2j^2m + 1536a^6b^4c^3j^2m
\end{aligned}$$

$$\begin{aligned}
& + 5376a^7b^2c^4j^2m - 6912a^7b^3c^3k^1l^2 + 1260a^6b^5c^2k^2m \\
& + 13248a^7b^3c^3k^2m - 6084a^7b^4c^2k^2m^2 - 26256a^8b^2c^3k^2m^2 \\
& + 576a^7b^4c^2l^2m + 11520a^8b^2c^3l^2m - 193536a^4b^8c^8deeg \\
& - 90a^8b^8c^4d^2f^2h - 27648a^5b^8c^7e^2g^2h + 18a^9b^9c^3d^2f^2k - 19353 \\
& 6a^5b^8c^7d^2e^2l + 147456a^5b^8c^7d^2f^2k - 64512a^5b^8c^7d^2g^2j - 24576 \\
& a^5b^8c^7e^2f^2j + 6a^8b^10c^2d^2f^2m + 84096a^6b^8c^6d^2h^2m - 46080a^6b^8 \\
& c^6e^2g^2m - 27648a^6b^8c^6e^2h^2l + 33408a^6b^8c^6f^2h^2k - 9216a^6b^8c^6 \\
& g^2h^2j - 64512a^6b^8c^6d^2j^2l - 18432a^6b^8c^6e^2j^2k + 18a^2b^10c^2d^2k^2m \\
& + 6a^3b^9c^2f^2k^2m - 46080a^7b^8c^5e^2l^2m + 49920a^7b^8c^5f^2k^2m - 1536 \\
& 0a^7b^8c^5g^2j^2m - 9216a^7b^8c^5h^2j^2l + 18a^4b^8c^2h^2k^2m - 15360a^8b^8 \\
& c^4j^2l^2m - 6912a^2b^5c^6d^2e^2g + 62208a^3b^3c^7d^2e^2g - 270a^2b^6 \\
& c^5d^2f^2h + 16056a^3b^4c^6d^2f^2h - 2304a^3b^4c^6e^2f^2g - 127008a^4b^2 \\
& c^7d^2f^2h + 36864a^4b^2c^7e^2f^2g + 2304a^2b^6c^5d^2e^2j - 16128a^3 \\
& b^4c^6d^2e^2j + 23040a^4b^2c^7d^2e^2j - 6912a^4b^3c^6e^2g^2h + 306a^2 \\
& b^7c^4d^2f^2k - 1152a^2b^7c^4d^2g^2j - 6912a^3b^5c^5d^2e^2l - 5328a^3 \\
& b^5c^5d^2f^2k + 8064a^3b^5c^5d^2g^2j + 768a^3b^5c^5e^2f^2j + 62208a^4 \\
& b^3c^6d^2e^2l + 19872a^4b^3c^6d^2f^2k - 11520a^4b^3c^6d^2g^2j - 10752 \\
& a^4b^3c^6e^2f^2j - 48a^2b^8c^3d^2f^2m - 216a^2b^8c^3d^2h^2k - 2226a^3 \\
& b^6c^4d^2f^2m + 3456a^3b^6c^4d^2g^2l + 1998a^3b^6c^4d^2h^2k - 384a^3 \\
& b^6c^4f^2g^2j + 33384a^4b^4c^5d^2f^2m - 31104a^4b^4c^5d^2g^2l - 1944a^4 \\
& b^4c^5d^2h^2k - 2304a^4b^4c^5e^2f^2l + 2304a^4b^4c^5e^2h^2j + 5376a^4 \\
& b^4c^5f^2g^2j - 162528a^5b^2c^6d^2f^2m + 96768a^5b^2c^6d^2g^2l - 872 \\
& 64a^5b^2c^6d^2h^2k + 36864a^5b^2c^6e^2f^2l + 27648a^5b^2c^6e^2g^2k + \\
& 13824a^5b^2c^6e^2h^2j + 12288a^5b^2c^6f^2g^2j - 72a^2b^9c^2d^2h^2m + \\
& 2016a^3b^7c^3d^2h^2m - 72a^3b^7c^3f^2h^2k - 18648a^4b^5c^4d^2h^2m + 1 \\
& 152a^4b^5c^4f^2g^2l + 1800a^4b^5c^4f^2h^2k - 1152a^4b^5c^4g^2h^2j + 6 \\
& 7392a^5b^3c^5d^2h^2m - 2304a^5b^3c^5e^2g^2m - 6912a^5b^3c^5e^2h^2l - \\
& 18432a^5b^3c^5f^2g^2l + 27072a^5b^3c^5f^2h^2k - 6912a^5b^3c^5g^2h^2j \\
& - 1152a^3b^7c^3d^2j^2l + 8064a^4b^5c^4d^2j^2l - 11520a^5b^3c^5d^2j^2l \\
& - 9216a^5b^3c^5e^2j^2k - 24a^3b^8c^2f^2h^2m + 1050a^4b^6c^3f^2h^2m - \\
& 9576a^5b^4c^4f^2h^2m + 3456a^5b^4c^4g^2h^2l - 57504a^6b^2c^5f^2h^2m \\
& + 13824a^6b^2c^5g^2h^2l - 432a^3b^8c^2d^2k^2m + 2394a^4b^6c^3d^2k^2m \\
& - 384a^4b^6c^3f^2j^2l + 6552a^5b^4c^4d^2k^2m + 768a^5b^4c^4e^2j^2m + \\
& 5376a^5b^4c^4f^2j^2l + 4608a^5b^4c^4g^2j^2k - 114336a^6b^2c^5d^2k^2m \\
& + 16896a^6b^2c^5e^2j^2m + 27648a^6b^2c^5e^2k^2l + 12288a^6b^2c^5f^2j^2 \\
& l + 9216a^6b^2c^5g^2j^2k - 186a^4b^7c^2f^2k^2m - 384a^5b^5c^3g^2j^2m \\
& - 1152a^5b^5c^3h^2j^2l - 2304a^6b^3c^4e^2l^2m + 31584a^6b^3c^4f^2k^2 \\
& m - 8448a^6b^3c^4g^2j^2m - 13824a^6b^3c^4g^2k^2l - 6912a^6b^3c^4h^2j^2 \\
& l + 342a^5b^6c^2h^2k^2m + 1152a^6b^4c^3g^2l^2m - 12600a^6b^4c^3h^2k^2 \\
& m + 23040a^7b^2c^4g^2l^2m - 37728a^7b^2c^4h^2k^2m + 4608a^6b^4c^3j^2 \\
& k^2l + 9216a^7b^2c^4j^2k^2l - 384a^6b^5c^2j^2l^2m - 8448a^7b^3c^3j^2 \\
& l^2m)/(512(4096a^10c^7 + a^4b^12c - 24a^5b^10c^2 + 240a^6b^8c^3 - \\
& 1280a^7b^6c^4 + 3840a^8b^4c^5 - 6144a^9b^2c^6)) + (x*(13824a^4c^9 \\
& e^3 + 512a^7c^6j^3 - 54b^7c^6d^2e + 27b^8c^5d^2g + 13824a^5c^8 \\
& e^2j + 4608a^6c^7e^2j^2 - 9b^9c^4d^2j + a^4b^9j^2m^2 - 3a^5b^
\end{aligned}$$

$$\begin{aligned}
& 8*1*m^2 - 1728*a^4*b^3*c^6*g^3 + 64*a^4*b^6*c^3*j^3 + 384*a^5*b^4*c^4*j^3 + \\
& 768*a^6*b^2*c^5*j^3 - 1728*a^7*b^3*c^3*1^3 - 20160*a^4*c^9*d*e*f - 2880*a^5*c^8*e*f*h - 12096*a^5*c^8*d*e*k - 6720*a^5*c^8*d*f*j - 4800*a^6*c^7*e*f*m \\
& - 1728*a^6*c^7*e*h*k - 960*a^6*c^7*f*h*j - 4032*a^6*c^7*d*j*k - 2880*a^7*c^6*e*k*m - 1600*a^7*c^6*f*j*m - 576*a^7*c^6*h*j*k - 960*a^8*c^5*j*k*m + 972 \\
& *a*b^5*c^7*d^2*e + 24192*a^3*b*c^9*d^2*e - 486*a*b^6*c^6*d^2*g + 6240*a^4*b*c^8*e*f^2 - 20736*a^4*b*c^8*e^2*g + 1728*a^5*b*c^7*e*h^2 + 144*a*b^7*c^5*d^2*j + 8064*a^4*b*c^8*d^2*j + 27*a*b^8*c^4*d^2*1 + 2080*a^5*b*c^7*f^2*j + 2 \\
& 592*a^6*b*c^6*e*k^2 - 20736*a^5*b*c^7*e^2*1 - 2304*a^6*b*c^6*g*j^2 + 576*a^6*b*c^6*h^2*j + 3840*a^7*b*c^5*e*m^2 - 3*a^4*b^8*c*g*m^2 + 864*a^7*b*c^5*j*k^2 - 2304*a^7*b*c^5*j^2*1 - 32*a^5*b^7*c*j*m^2 + 1280*a^8*b*c^4*j*m^2 + 10 \\
& 2*a^6*b^6*c*1*m^2 - 7344*a^2*b^3*c^8*d^2*e + 3672*a^2*b^4*c^7*d^2*g - 6*a^2*b^5*c^6*e*f^2 - 12096*a^3*b^2*c^8*d^2*g + 192*a^3*b^3*c^7*e*f^2 + 10368*a^4*b^2*c^7*e*g^2 + 3*a^2*b^6*c^5*f^2*g - 96*a^3*b^4*c^6*f^2*g - 3120*a^4*b^2*c^7*f^2*g + 1296*a^4*b^3*c^6*e*h^2 - 900*a^2*b^5*c^6*d^2*j + 1584*a^3*b^3*c^7*d^2*j + 6912*a^4*b^2*c^7*e^2*j + 1152*a^4*b^4*c^5*e*j^2 - 648*a^4*b^4*c^5*g*h^2 + 4608*a^5*b^2*c^6*e*j^2 - 864*a^5*b^2*c^6*g*h^2 - 486*a^2*b^6*c^5*d^2*1 - a^2*b^7*c^4*f^2*j + 3672*a^3*b^4*c^6*d^2*1 + 30*a^3*b^5*c^5*f^2*j - 12096*a^4*b^2*c^7*d^2*1 + 1104*a^4*b^3*c^6*f^2*j + 54*a^4*b^5*c^4*e*k^2 + 864*a^5*b^3*c^5*e*k^2 + 1728*a^4*b^4*c^5*g^2*j - 576*a^4*b^5*c^4*g*j^2 + 3 \\
& 456*a^5*b^2*c^6*g^2*j - 2304*a^5*b^3*c^5*g*j^2 + 10368*a^6*b^2*c^5*e*1^2 + 3*a^3*b^6*c^4*f^2*1 - 96*a^4*b^4*c^5*f^2*1 + 216*a^4*b^5*c^4*h^2*j - 27*a^4*b^6*c^3*g*k^2 + 6*a^4*b^7*c^2*e*m^2 - 3120*a^5*b^2*c^6*f^2*1 + 720*a^5*b^3*c^5*h^2*j - 432*a^5*b^4*c^4*g*k^2 - 204*a^5*b^5*c^3*e*m^2 - 1296*a^6*b^2*c^5*g*k^2 + 1488*a^6*b^3*c^4*e*m^2 - 5184*a^5*b^3*c^5*g^2*1 - 5184*a^6*b^3*c^4*g*1^2 - 648*a^5*b^4*c^4*h^2*1 + 102*a^5*b^6*c^2*g*m^2 - 864*a^6*b^2*c^5*h^2*1 - 744*a^6*b^4*c^3*g*m^2 - 1920*a^7*b^2*c^4*g*m^2 + 9*a^4*b^7*c^2*j*k^2 + 162*a^5*b^5*c^3*j*k^2 + 720*a^6*b^3*c^4*j*k^2 - 576*a^5*b^5*c^3*j^2*1 - 2304*a^6*b^3*c^4*j^2*1 + 1728*a^6*b^4*c^3*j*1^2 + 3456*a^7*b^2*c^4*j*1^2 - 27*a^5*b^6*c^2*k^2*1 - 432*a^6*b^4*c^3*k^2*1 + 180*a^6*b^5*c^2*j*m^2 - 129 \\
& 6*a^7*b^2*c^4*k^2*1 + 1136*a^7*b^3*c^3*j*m^2 - 744*a^7*b^4*c^2*1*m^2 - 1920*a^8*b^2*c^3*1*m^2 - 36*a*b^6*c^6*d*e*f + 18*a*b^7*c^5*d*f*g + 15552*a^4*b*c^8*d*e*h + 10080*a^4*b*c^8*d*f*g - 6*a*b^8*c^4*d*f*j + 1440*a^5*b*c^7*f*g*h + 21888*a^5*b*c^7*d*e*m + 10080*a^5*b*c^7*d*f*1 + 6048*a^5*b*c^7*d*g*k + 5184*a^5*b*c^7*d*h*j + 8064*a^5*b*c^7*e*f*k - 13824*a^5*b*c^7*e*g*j + 5184*a^6*b*c^6*e*h*m + 2400*a^6*b*c^6*f*g*m + 1440*a^6*b*c^6*f*h*1 + 864*a^6*b*c^6*g*h*k + 7296*a^6*b*c^6*d*j*m + 6048*a^6*b*c^6*d*k*1 - 13824*a^6*b*c^6*e*j*1 + 2688*a^6*b*c^6*f*j*k + 2400*a^7*b*c^5*f*1*m + 1440*a^7*b*c^5*g*k*m + 1728*a^7*b*c^5*h*j*m + 864*a^7*b*c^5*h*k*1 + 6*a^4*b^8*c*j*k*m - 18*a^5*b^7*c*k*1*m + 1440*a^8*b*c^4*k*1*m + 900*a^2*b^4*c^7*d*e*f - 4896*a^3*b^2*c^8*d*e*f - 108*a^2*b^5*c^6*d*e*h - 450*a^2*b^5*c^6*d*f*g + 2448*a^3*b^3*c^7*d*f*g + 54*a^2*b^6*c^5*d*g*h - 36*a^3*b^4*c^6*e*f*h - 7776*a^4*b^2*c^7*d*g*h - 6048*a^4*b^2*c^7*e*f*h + 138*a^2*b^6*c^5*d*f*j + 540*a^3*b^4*c^6*d*e*k - 516*a^3*b^4*c^6*d*f*j - 6048*a^4*b^2*c^7*d*e*k - 4992*a^4*b^2*c^7*d*f*j + 1 \\
& 8*a^3*b^5*c^5*f*g*h + 3024*a^4*b^3*c^6*f*g*h + 18*a^2*b^7*c^4*d*f*1 - 18*a^
\end{aligned}$$



$$\begin{aligned}
& 2*b^7*c^4*d*h*j - 450*a^3*b^5*c^5*d*f*1 - 270*a^3*b^5*c^5*d*g*k - 36*a^3*b^5*c^5*d*h*j - 2016*a^4*b^3*c^6*d*e*m + 2448*a^4*b^3*c^6*d*f*1 + 3024*a^4*b^3*c^6*d*g*k + 2592*a^4*b^3*c^6*d*h*j + 1440*a^4*b^3*c^6*e*f*k - 6912*a^4*b^3*c^6*e*g*j + 54*a^3*b^6*c^4*d*h*1 - 6*a^3*b^6*c^4*f*h*j + 1008*a^4*b^4*c^5*d*g*m + 420*a^4*b^4*c^5*e*f*m - 540*a^4*b^4*c^5*e*h*k - 720*a^4*b^4*c^5*f*g*k - 1020*a^4*b^4*c^5*f*h*j - 10944*a^5*b^2*c^6*d*g*m - 7776*a^5*b^2*c^6*d*h*1 - 7392*a^5*b^2*c^6*e*f*m + 20736*a^5*b^2*c^6*e*g*1 - 4320*a^5*b^2*c^6*e*h*k - 4032*a^5*b^2*c^6*f*g*k - 2496*a^5*b^2*c^6*f*h*j + 90*a^3*b^6*c^4*d*j*k - 828*a^4*b^4*c^5*d*j*k - 4032*a^5*b^2*c^6*d*j*k - 180*a^4*b^5*c^4*e*h*m - 210*a^4*b^5*c^4*f*g*m + 18*a^4*b^5*c^4*f*h*1 + 270*a^4*b^5*c^4*g*h*k + 2880*a^5*b^3*c^5*e*h*m + 3696*a^5*b^3*c^5*f*g*m + 3024*a^5*b^3*c^5*f*h*1 + 2160*a^5*b^3*c^5*g*h*k - 336*a^4*b^5*c^4*d*j*m - 270*a^4*b^5*c^4*d*k*1 + 240*a^4*b^5*c^4*f*j*k + 2976*a^5*b^3*c^5*d*j*m + 3024*a^5*b^3*c^5*d*k*1 - 6912*a^5*b^3*c^5*e*j*1 + 1824*a^5*b^3*c^5*f*j*k + 90*a^4*b^6*c^3*g*h*m - 1440*a^5*b^4*c^4*g*h*m - 2592*a^6*b^2*c^5*g*h*m + 36*a^4*b^6*c^3*e*k*m + 70*a^4*b^6*c^3*f*j*m - 90*a^4*b^6*c^3*h*j*k + 1008*a^5*b^4*c^4*d*1*m - 324*a^5*b^4*c^4*e*k*m - 1092*a^5*b^4*c^4*f*j*m - 720*a^5*b^4*c^4*f*k*1 + 3456*a^5*b^4*c^4*g*j*1 - 900*a^5*b^4*c^4*h*j*k - 10944*a^6*b^2*c^5*d*1*m - 5472*a^6*b^2*c^5*e*k*m - 3264*a^6*b^2*c^5*f*j*m - 4032*a^6*b^2*c^5*f*k*1 + 6912*a^6*b^2*c^5*g*j*1 - 1728*a^6*b^2*c^5*h*j*k - 18*a^4*b^7*c^2*g*k*m - 30*a^4*b^7*c^2*h*j*m - 210*a^5*b^5*c^3*f*1*m + 162*a^5*b^5*c^3*g*k*m + 420*a^5*b^5*c^3*h*j*m + 270*a^5*b^5*c^3*h*k*1 + 3696*a^6*b^3*c^4*f*1*m + 2736*a^6*b^3*c^4*g*k*m + 1824*a^6*b^3*c^4*h*j*m + 2160*a^6*b^3*c^4*h*k*1 + 90*a^5*b^6*c^2*h*1*m - 1440*a^6*b^4*c^3*h*1*m - 2592*a^7*b^2*c^4*h*1*m - 42*a^5*b^6*c^2*j*k*m - 1020*a^6*b^4*c^3*j*k*m - 2304*a^7*b^2*c^4*j*k*m + 162*a^6*b^5*c^2*k*1*m + 2736*a^7*b^3*c^3*k*1*m)/(64*(4096*a^10*c^7 + a^4*b^12*c - 24*a^5*b^10*c^2 + 240*a^6*b^8*c^3 - 1280*a^7*b^6*c^4 + 3840*a^8*b^4*c^5 - 6144*a^9*b^2*c^6)))*root(56371445760*a^11*b^8*c^9*z^4 - 503316480*a^8*b^14*c^6*z^4 + 47185920*a^7*b^16*c^5*z^4 - 2621440*a^6*b^18*c^4*z^4 + 65536*a^5*b^20*c^3*z^4 - 171798691840*a^14*b^2*c^12*z^4 + 193273528320*a^13*b^4*c^11*z^4 - 128849018880*a^12*b^6*c^10*z^4 - 16911433728*a^10*b^10*c^8*z^4 + 3523215360*a^9*b^12*c^7*z^4 + 68719476736*a^15*c^13*z^4 + 1536*a^5*b^16*c*k*m*z^2 + 1536*a*b^18*c^3*d*f*z^2 - 2571632640*a^9*b^5*c^8*d*m*z^2 + 2548039680*a^9*b^3*c^10*d*h*z^2 + 1509949440*a^10*b^3*c^9*e*1*z^2 + 1509949440*a^9*b^3*c^10*e*g*z^2 - 1401421824*a^8*b^5*c^9*d*h*z^2 - 1321205760*a^9*b^2*c^11*d*f*z^2 - 2793406464*a^11*b*c^10*d*m*z^2 + 890634240*a^8*b^7*c^7*d*m*z^2 - 754974720*a^10*b^4*c^8*g*1*z^2 - 754974720*a^9*b^5*c^8*e*1*z^2 + 719585280*a^8*b^6*c^8*d*k*z^2 - 707788800*a^9*b^4*c^9*d*k*z^2 - 754974720*a^8*b^5*c^9*e*g*z^2 + 603979776*a^11*b^2*c^9*g*1*z^2 - 581959680*a^10*b^4*c^8*f*m*z^2 + 732168192*a^7*b^6*c^9*d*f*z^2 + 534773760*a^11*b^3*c^8*h*m*z^2 - 456130560*a^11*b^4*c^7*k*m*z^2 - 603979776*a^10*b^2*c^10*e*j*z^2 + 534773760*a^10*b^3*c^9*f*k*z^2 + 384040960*a^9*b^6*c^7*f*m*z^2 + 377487360*a^9*b^6*c^7*g*1*z^2 - 456130560*a^9*b^4*c^9*f*h*z^2 + 301989888*a^11*b^3*c^8*j*1*z^2 - 415236096*a^10*b^2*c^10*d*k*z^2 + 254017536*a^10*b^6*c^6*k*m*z^2 - 330301440*a^10*b^4*c^8*h*k*z^2 + 390463488*a^7*b^7*c^8*d*h*z^2 + 188743680*a^12*b^2*c^8*k*m*z^2 + 301989888
\end{aligned}$$

$$\begin{aligned}
& *a^{10}b^3c^9g^*jz^2 - 297861120a^7b^8c^7d^*kz^2 - 366280704a^6b^8c^8d^*fz^2 + 188743680a^{11}b^2c^9h^*kz^2 - 330301440a^8b^4c^{10}d^*fz^2 \\
& + 254017536a^8b^6c^8f^*hz^2 - 1887436800a^{10}b^*c^{11}d^*hz^2 + 188743680a^8b^7c^7e^*lz^2 + 153354240a^9b^6c^7h^*kz^2 - 185303040a^7b^9c^6d^*mz^2 \\
& - 117964800a^{10}b^5c^7h^*mz^2 - 61931520a^9b^8c^5k^*mz^2 + 121634816a^{11}b^2c^9f^*mz^2 - 115671040a^8b^8c^6f^*mz^2 - 62914560a^9b^7c^6j^*lz^2 \\
& + 188743680a^{10}b^2c^{10}f^*hz^2 - 94371840a^8b^8c^6g^*lz^2 + 6144000a^8b^{10}c^4k^*mz^2 - 117964800a^9b^5c^8f^*kz^2 + 61440a^7b^{12}c^3k^*mz^2 \\
& - 46080a^6b^{14}c^2k^*mz^2 + 23592960a^8b^9c^5j^*lz^2 + 188743680a^7b^7c^8e^*gz^2 - 37355520a^9b^7c^6h^*mz^2 + 125829120a^8b^6c^8e^*jz^2 \\
& + 23101440a^8b^9c^5h^*mz^2 - 3538944a^7b^{11}c^4j^*lz^2 + 196608a^6b^{13}c^3j^*lz^2 - 4349952a^7b^{11}c^4h^*mz^2 + 337920a^6b^{13}c^3h^*mz^2 \\
& - 7680a^5b^{15}c^2h^*mz^2 - 62914560a^8b^7c^7g^*jz^2 - 26542080a^8b^8c^6h^*kz^2 + 17940480a^7b^{10}c^5f^*mz^2 + 11796480a^7b^{10}c^5g^*lz^2 \\
& - 37355520a^8b^7c^7f^*kz^2 - 1347584a^6b^{12}c^4f^*mz^2 + 68272128a^6b^{10}c^6d^*kz^2 - 589824a^6b^{12}c^4g^*lz^2 + 552960a^6b^{12}c^4h^*kz^2 \\
& - 147456a^7b^{10}c^5h^*kz^2 - 46080a^5b^{14}c^3h^*kz^2 + 35840a^5b^{14}c^3f^*mz^2 + 23592960a^7b^9c^6g^*jz^2 - 23592960a^7b^9c^6e^*lz^2 \\
& + 23371776a^6b^{11}c^5d^*mz^2 + 23101440a^7b^9c^6f^*kz^2 - 47185920a^7b^8c^7e^*jz^2 - 61931520a^7b^8c^7f^*hz^2 \\
& - 4349952a^6b^{11}c^5f^*kz^2 - 3538944a^6b^{11}c^5g^*jz^2 - 1677312a^5b^{13}c^4d^*mz^2 + 1179648a^6b^{11}c^5e^*lz^2 + 337920a^5b^{13}c^4f^*kz^2 \\
& + 196608a^5b^{13}c^4g^*jz^2 + 53760a^4b^{15}c^3d^*mz^2 - 7680a^4b^{15}c^3f^*kz^2 + 96583680a^5b^{10}c^7d^*fz^2 - 9179136a^5b^{12}c^5d^*kz^2 \\
& + 7077888a^6b^{10}c^6e^*jz^2 - 51609600a^6b^9c^7d^*hz^2 + 691200a^4b^{14}c^4d^*kz^2 - 393216a^5b^{12}c^5e^*jz^2 - 23040a^3b^{16}c^3d^*kz^2 \\
& + 6144000a^6b^{10}c^6f^*hz^2 + 61440a^5b^{12}c^5f^*hz^2 - 46080a^4b^{14}c^4f^*hz^2 + 1536a^3b^{16}c^3f^*hz^2 - 23592960a^6b^9c^7e^*gz^2 \\
& + 1179648a^5b^{11}c^6e^*gz^2 + 829440a^4b^{13}c^5d^*hz^2 + 368640a^5b^{11}c^6d^*hz^2 - 105984a^3b^{15}c^4d^*hz^2 + 4608a^2b^{17}c^3d^*hz^2 \\
& - 15175680a^4b^{12}c^6d^*fz^2 + 1428480a^3b^{14}c^5d^*fz^2 - 73728a^2b^{16}c^4d^*fz^2 + 4108320768a^{10}b^3c^9d^*mz^2 - 1207959552a^{11}b^*c^{10}e^*lz^2 \\
& - 1207959552a^{10}b^*c^{11}e^*gz^2 - 578813952a^{12}b^*c^9h^*mz^2 - 578813952a^{11}b^*c^{10}f^*kz^2 - 402653184a^{12}b^*c^9j^*lz^2 \\
& - 402653184a^{11}b^*c^{10}g^*jz^2 - 440401920a^{10}b^*c^{11}f^2z^2 - 188743680a^{12}b^*c^9k^2z^2 - 188743680a^{11}b^*c^{10}h^2z^2 + 1761607680a^{10}c^{12}d^*fz^2 \\
& - 14080a^6b^{15}c^m^2z^2 - 94464a^*b^{17}c^4d^2z^2 + 6936330240a^8b^3c^{11}d^2z^2 + 2464874496a^6b^7c^9d^2z^2 - 3963617280a^9b^*c^{12}d^2z^2 + 1056964608a^{11}c^{11}d^*kz^2 \\
& + 805306368a^{11}c^{11}e^*jz^2 + 419430400a^{12}c^{10}f^*mz^2 + 251658240a^{13}c^9k^*mz^2 - 1509949440a^9b^2c^{11}e^2z^2 + 251658240a^{11}c^{11}f^*hz^2 + 150994944a^{12}c^{10}h^*kz^2 \\
& - 5400428544a^7b^5c^{10}d^2z^2 + 754974720a^8b^4c^{10}e^2z^2 - 730054656a^5b^9c^8d^2z^2 + 477102080a^{12}b^3c^7m^2z^2 - 377487360a^{11}b^4c^7l^2z^2 \\
& + 477102080a^9b^3c^{10}f^2z^2 + 301989888a^{12}b^2c^8l^2z^2 - 377487360a^9b^4c^9g^2z^2 + 301989888a^{10}b^2c^{10}g^
\end{aligned}$$

$2z^2 - 174325760a^{11}b^5c^6m^2z^2 + 188743680a^{10}b^6c^6l^2z^2 + 141557760a^{11}b^3c^8k^2z^2 + 188743680a^8b^6c^8g^2z^2 + 141557760a^{10}b^3c^9h^2z^2 - 174325760a^8b^5c^9f^2z^2 - 188743680a^7b^6c^9e^2z^2 - 47185920a^9b^8c^5l^2z^2 + 11206656a^{10}b^7c^5m^2z^2 + 8929280a^9b^9c^4m^2z^2 - 2600960a^8b^{11}c^3m^2z^2 + 291840a^7b^{13}c^2m^2z^2 - 50331648a^{10}b^4c^8j^2z^2 + 146165760a^4b^{11}c^7d^2z^2 - 26542080a^9b^7c^6k^2z^2 + 5898240a^8b^{10}c^4l^2z^2 - 294912a^7b^{12}c^3l^2z^2 - 33554432a^{11}b^2c^9j^2z^2 + 9584640a^8b^9c^5k^2z^2 + 20971520a^9b^6c^7j^2z^2 - 2359296a^{10}b^5c^7k^2z^2 - 1290240a^7b^{11}c^4k^2z^2 + 46080a^6b^{13}c^3k^2z^2 + 2304a^5b^{15}c^2k^2z^2 - 2752512a^7b^{10}c^5j^2z^2 + 2621440a^8b^8c^6j^2z^2 + 524288a^6b^{12}c^4j^2z^2 - 32768a^5b^{14}c^3j^2z^2 - 47185920a^7b^8c^7g^2z^2 - 26542080a^8b^7c^7h^2z^2 + 9584640a^7b^9c^6h^2z^2 - 2359296a^9b^5c^8h^2z^2 - 1290240a^6b^{11}c^5h^2z^2 + 46080a^5b^{13}c^4h^2z^2 + 2304a^4b^{15}c^3h^2z^2 + 5898240a^6b^{10}c^6g^2z^2 - 294912a^5b^{12}c^5g^2z^2 + 11206656a^7b^7c^8f^2z^2 + 8929280a^6b^9c^7f^2z^2 + 23592960a^6b^8c^8e^2z^2 - 2600960a^5b^{11}c^6f^2z^2 + 291840a^4b^{13}c^5f^2z^2 - 14080a^3b^{15}c^4f^2z^2 + 256a^2b^{17}c^3f^2z^2 - 19860480a^3b^{13}c^6d^2z^2 - 1179648a^5b^{10}c^7e^2z^2 + 1771776a^2b^{15}c^5d^2z^2 - 440401920a^{13}b^c^8m^2z^2 + 1207959552a^{10}c^{12}e^2z^2 + 134217728a^{12}c^{10}j^2z^2 + 256a^5b^{17}m^2z^2 + 2304b^{19}c^3d^2z^2 - 23592960a^{10}b^c^8f^k^1z + 99090432a^9b^c^9d^h^1z + 9437184a^{10}b^c^8e^k^m^z + 23592960a^{10}b^c^8g^h^m^z + 141557760a^8b^c^{10}d^e^k^z + 47185920a^9b^c^9d^j^k^z - 23592960a^9b^c^9f^g^k^z + 169869312a^7b^c^{11}d^e^f^z + 99090432a^8b^c^{10}d^g^h^z - 3145728a^9b^c^9f^h^j^z + 56623104a^8b^c^{10}d^f^j^z + 1536a^b^{15}c^3d^f^j^z - 9437184a^8b^c^{10}e^f^h^z - 4608a^b^{14}c^4d^f^g^z + 9216a^b^{13}c^5d^e^f^z + 412876800a^8b^2c^9d^e^m^z - 206438400a^9b^3c^7d^l^m^z + 5898240a^{10}b^4c^5k^l^m^z - 206438400a^8b^3c^8d^g^m^z - 4718592a^{11}b^2c^6k^l^m^z - 2949120a^9b^6c^4k^l^m^z + 737280a^8b^8c^3k^l^m^z - 92160a^7b^{10}c^2k^l^m^z + 103219200a^8b^5c^6d^l^m^z - 29491200a^{10}b^3c^6h^l^m^z - 206438400a^7b^4c^8d^e^m^z - 2359296a^{10}b^3c^6j^k^m^z + 491520a^8b^7c^4j^k^m^z - 184320a^7b^9c^3j^k^m^z + 27648a^6b^{11}c^2j^k^m^z + 14745600a^9b^5c^5h^l^m^z - 3686400a^8b^7c^4h^l^m^z + 460800a^7b^9c^3h^l^m^z - 23040a^6b^{11}c^2h^l^m^z + 88473600a^8b^4c^7d^k^l^z + 82575360a^9b^2c^8d^j^m^z + 11796480a^{10}b^2c^7h^j^m^z + 5898240a^9b^4c^6g^k^m^z - 4718592a^{10}b^2c^7g^k^m^z - 70778880a^9b^2c^8d^k^l^z - 2949120a^8b^6c^5g^k^m^z - 2457600a^8b^6c^5h^j^m^z + 921600a^7b^8c^4h^j^m^z + 737280a^7b^8c^4g^k^m^z - 138240a^6b^{10}c^3h^j^m^z - 92160a^6b^{10}c^3g^k^m^z + 7680a^5b^{12}c^2h^j^m^z + 4608a^5b^{12}c^2g^k^m^z + 29491200a^9b^3c^7f^k^l^z - 176947200a^7b^3c^9d^e^k^z - 109707264a^8b^3c^8d^h^l^z - 25804800a^7b^7c^5d^l^m^z + 103219200a^7b^5c^7d^g^m^z + 219414528a^7b^2c^{10}d^e^h^z - 14745600a^8b^5c^6f^k^l^z - 29491200a^9b^3c^7g^h^m^z - 11796480a^9b^3c^7e^k^m^z - 44236800a^7b^6c^6d^k^l^z + 58982400a^9b^2c^8e^h^m^z + 589824$

$0*a^8*b^5*c^6*e*k*m*z + 3686400*a^7*b^7*c^5*f*k*l*z + 3225600*a^6*b^9*c^4*d$   
 $*l*m*z - 1474560*a^7*b^7*c^5*e*k*m*z - 460800*a^6*b^9*c^4*f*k*l*z + 184320*$   
 $a^6*b^9*c^4*e*k*m*z - 161280*a^5*b^11*c^3*d*l*m*z + 23040*a^5*b^11*c^3*f*k*$   
 $l*z - 9216*a^5*b^11*c^3*e*k*m*z + 1474560*a^8*b^5*c^6*g*h*m*z + 110886912*$   
 $a^7*b^4*c^8*d*f*l*z - 3686400*a^7*b^7*c^5*g*h*m*z - 221773824*a^6*b^3*c^10*$   
 $d*e*f*z + 460800*a^6*b^9*c^4*g*h*m*z - 17203200*a^7*b^6*c^6*d*j*m*z - 23040$   
 $*a^5*b^11*c^3*g*h*m*z - 29491200*a^8*b^4*c^7*e*h*m*z - 11796480*a^9*b^2*c^8$   
 $*f*j*k*z + 11059200*a^6*b^8*c^5*d*k*l*z + 6451200*a^6*b^8*c^5*d*j*m*z + 884$   
 $73600*a^7*b^4*c^8*d*g*k*z + 2457600*a^7*b^6*c^6*f*j*k*z - 35389440*a^8*b^3*$   
 $c^8*d*j*k*z - 1382400*a^5*b^10*c^4*d*k*l*z - 84934656*a^8*b^2*c^9*d*f*l*z -$   
 $967680*a^5*b^10*c^4*d*j*m*z - 921600*a^6*b^8*c^5*f*j*k*z + 138240*a^5*b^10$   
 $*c^4*f*j*k*z + 69120*a^4*b^12*c^3*d*k*l*z + 53760*a^4*b^12*c^3*d*j*m*z - 76$   
 $80*a^4*b^12*c^3*f*j*k*z + 44236800*a^7*b^5*c^7*d*h*l*z + 7372800*a^7*b^6*c^6$   
 $*e*h*m*z - 5898240*a^8*b^4*c^7*f*h*l*z + 4718592*a^9*b^2*c^8*f*h*l*z - 707$   
 $78880*a^8*b^2*c^9*d*g*k*z + 2949120*a^7*b^6*c^6*f*h*l*z - 921600*a^6*b^8*c^5$   
 $*e*h*m*z - 737280*a^6*b^8*c^5*f*h*l*z + 92160*a^5*b^10*c^4*f*h*l*z + 46080$   
 $*a^5*b^10*c^4*e*h*m*z - 4608*a^4*b^12*c^3*f*h*l*z + 29491200*a^8*b^3*c^8*f*$   
 $g*k*z - 109707264*a^7*b^3*c^9*d*g*h*z - 25804800*a^6*b^7*c^6*d*g*m*z - 5898$   
 $2400*a^8*b^2*c^9*e*f*k*z - 58982400*a^6*b^6*c^7*d*f*l*z + 7372800*a^6*b^7*c^6$   
 $*d*j*k*z + 88473600*a^6*b^5*c^8*d*e*k*z - 2764800*a^5*b^9*c^5*d*j*k*z + 5$   
 $1609600*a^6*b^6*c^7*d*e*m*z + 414720*a^4*b^11*c^4*d*j*k*z - 23040*a^3*b^13*$   
 $c^3*d*j*k*z - 14745600*a^7*b^5*c^7*f*g*k*z - 44236800*a^6*b^6*c^7*d*g*k*z -$   
 $6635520*a^6*b^7*c^6*d*h*l*z + 40108032*a^8*b^2*c^9*d*h*j*z + 3686400*a^6*b$   
 $^7*c^6*f*g*k*z + 3225600*a^5*b^9*c^5*d*g*m*z + 2359296*a^8*b^3*c^8*f*h*j*z$   
 $- 491520*a^6*b^7*c^6*f*h*j*z - 460800*a^5*b^9*c^5*f*g*k*z - 276480*a^5*b^9*$   
 $c^5*d*h*l*z + 184320*a^5*b^9*c^5*f*h*j*z + 179712*a^4*b^11*c^4*d*h*l*z - 16$   
 $1280*a^4*b^11*c^4*d*g*m*z - 27648*a^4*b^11*c^4*f*h*j*z + 23040*a^4*b^11*c^4$   
 $*f*g*k*z - 13824*a^3*b^13*c^3*d*h*l*z + 1536*a^3*b^13*c^3*f*h*j*z + 2949120$   
 $0*a^7*b^4*c^8*e*f*k*z + 110886912*a^6*b^4*c^9*d*f*g*z + 16220160*a^5*b^8*c^6$   
 $*d*f*l*z - 45613056*a^7*b^3*c^9*d*f*j*z + 11059200*a^5*b^8*c^6*d*g*k*z - 1$   
 $0321920*a^6*b^6*c^7*d*h*j*z - 7372800*a^6*b^6*c^7*e*f*k*z + 7077888*a^7*b^4$   
 $*c^8*d*h*j*z - 6451200*a^5*b^8*c^6*d*e*m*z - 88473600*a^6*b^4*c^9*d*e*h*z +$   
 $2396160*a^5*b^8*c^6*d*h*j*z - 2396160*a^4*b^10*c^5*d*f*l*z - 1382400*a^4*b$   
 $^10*c^5*d*g*k*z - 84934656*a^7*b^2*c^10*d*f*g*z + 921600*a^5*b^8*c^6*e*f*k*$   
 $z + 117964800*a^5*b^5*c^9*d*e*f*z + 322560*a^4*b^10*c^5*d*e*m*z + 175104*a^3$   
 $b^12*c^4*d*f*l*z + 69120*a^3*b^12*c^4*d*g*k*z - 50688*a^3*b^12*c^4*d*h*j*$   
 $z - 46080*a^4*b^10*c^5*e*f*k*z - 27648*a^4*b^10*c^5*d*h*j*z + 4608*a^2*b^14$   
 $*c^3*d*h*j*z - 4608*a^2*b^14*c^3*d*f*l*z + 44236800*a^6*b^5*c^8*d*g*h*z - 5$   
 $898240*a^7*b^4*c^8*f*g*h*z - 22118400*a^5*b^7*c^7*d*e*k*z + 4718592*a^8*b^2$   
 $*c^9*f*g*h*z + 2949120*a^6*b^6*c^7*f*g*h*z - 737280*a^5*b^8*c^6*f*g*h*z + 9$   
 $2160*a^4*b^10*c^5*f*g*h*z - 4608*a^3*b^12*c^4*f*g*h*z + 8847360*a^5*b^7*c^7$   
 $*d*f*j*z - 58982400*a^5*b^6*c^8*d*f*g*z - 3809280*a^4*b^9*c^6*d*f*j*z + 276$   
 $4800*a^4*b^9*c^6*d*e*k*z + 2359296*a^6*b^5*c^8*d*f*j*z + 681984*a^3*b^11*c^5$   
 $*d*f*j*z - 138240*a^3*b^11*c^5*d*e*k*z - 55296*a^2*b^13*c^4*d*f*j*z + 1179$   
 $6480*a^7*b^3*c^9*e*f*h*z - 6635520*a^5*b^7*c^7*d*g*h*z - 5898240*a^6*b^5*c^6$

$8 * e * f * h * z + 1474560 * a^5 * b^7 * c^7 * e * f * h * z - 276480 * a^4 * b^9 * c^6 * d * g * h * z - 1843$   
 $20 * a^4 * b^9 * c^6 * e * f * h * z + 179712 * a^3 * b^11 * c^5 * d * g * h * z - 13824 * a^2 * b^13 * c^4 * d$   
 $* g * h * z + 9216 * a^3 * b^11 * c^5 * e * f * h * z + 16220160 * a^4 * b^8 * c^7 * d * f * g * z + 1327104$   
 $0 * a^5 * b^6 * c^8 * d * e * h * z - 2396160 * a^3 * b^10 * c^6 * d * f * g * z + 552960 * a^4 * b^8 * c^7 * d$   
 $* e * h * z - 359424 * a^3 * b^10 * c^6 * d * e * h * z + 175104 * a^2 * b^12 * c^5 * d * f * g * z + 27648 *$   
 $a^2 * b^12 * c^5 * d * e * h * z - 32440320 * a^4 * b^7 * c^8 * d * e * f * z + 4792320 * a^3 * b^9 * c^7 * d$   
 $* e * f * z - 350208 * a^2 * b^11 * c^6 * d * e * f * z + 165150720 * a^10 * b * c^8 * d * l * m * z + 4608 *$   
 $a^6 * b^12 * c * k * l * m * z + 23592960 * a^11 * b * c^7 * h * l * m * z + 3145728 * a^11 * b * c^7 * j * k * m$   
 $* z - 1536 * a^5 * b^13 * c * j * k * m * z + 165150720 * a^9 * b * c^9 * d * g * m * z + 346816512 * a^7 *$   
 $b * c^11 * d^2 * g * z + 19660800 * a^12 * b * c^6 * l * m^2 * z - 34560 * a^7 * b^11 * c * l * m^2 * z - 7$   
 $077888 * a^11 * b * c^7 * k^2 * l * z + 11008 * a^6 * b^12 * c * j * m^2 * z + 19660800 * a^11 * b * c^7 * g$   
 $* m^2 * z + 7077888 * a^10 * b * c^8 * h^2 * l * z + 768 * a^5 * b^13 * c * g * m^2 * z - 19660800 * a^9$   
 $* b * c^9 * f^2 * l * z - 7077888 * a^10 * b * c^8 * g * k^2 * z - 6912 * a * b^15 * c^3 * d^2 * l * z + 70$   
 $77888 * a^9 * b * c^9 * g * h^2 * z - 19660800 * a^8 * b * c^10 * f^2 * g * z - 66816 * a * b^14 * c^4 * d^$   
 $2 * j * z + 214272 * a * b^13 * c^5 * d^2 * g * z - 428544 * a * b^12 * c^6 * d^2 * e * z - 330301440 * a$   
 $^9 * c^10 * d * e * m * z - 110100480 * a^10 * c^9 * d * j * m * z - 15728640 * a^11 * c^8 * h * j * m * z -$   
 $47185920 * a^10 * c^9 * e * h * m * z - 198180864 * a^8 * c^11 * d * e * h * z + 15728640 * a^10 * c^9 * f$   
 $* j * k * z - 66060288 * a^9 * c^10 * d * h * j * z + 47185920 * a^9 * c^10 * e * f * k * z + 102275481$   
 $6 * a^6 * b^2 * c^11 * d^2 * e * z - 642318336 * a^5 * b^4 * c^10 * d^2 * e * z - 511377408 * a^7 * b^3$   
 $* c^9 * d^2 * l * z - 511377408 * a^6 * b^3 * c^10 * d^2 * g * z + 321159168 * a^6 * b^5 * c^8 * d^2 * l$   
 $* z + 321159168 * a^5 * b^5 * c^9 * d^2 * g * z + 225312768 * a^7 * b^2 * c^10 * d^2 * j * z - 25362$   
 $432 * a^11 * b^3 * c^5 * l * m^2 * z + 13271040 * a^10 * b^5 * c^4 * l * m^2 * z - 3563520 * a^9 * b^7 * c$   
 $^3 * l * m^2 * z + 506880 * a^8 * b^9 * c^2 * l * m^2 * z + 10354688 * a^11 * b^2 * c^6 * j * m^2 * z +$   
 $8847360 * a^10 * b^3 * c^6 * k^2 * l * z - 4423680 * a^9 * b^5 * c^5 * k^2 * l * z - 2048000 * a^9 * b^6$   
 $* c^4 * j * m^2 * z + 1105920 * a^8 * b^7 * c^4 * k^2 * l * z + 849920 * a^8 * b^8 * c^3 * j * m^2 * z -$   
 $393216 * a^10 * b^4 * c^5 * j * m^2 * z - 145920 * a^7 * b^10 * c^2 * j * m^2 * z - 138240 * a^7 * b^9 * c$   
 $^3 * k^2 * l * z + 6912 * a^6 * b^11 * c^2 * k^2 * l * z - 111697920 * a^5 * b^7 * c^7 * d^2 * l * z + 2$   
 $23395840 * a^4 * b^6 * c^9 * d^2 * e * z - 25362432 * a^10 * b^3 * c^6 * g * m^2 * z - 3538944 * a^10$   
 $* b^2 * c^7 * j * k^2 * z + 737280 * a^8 * b^6 * c^5 * j * k^2 * z + 50724864 * a^10 * b^2 * c^7 * e * m^2$   
 $* z - 276480 * a^7 * b^8 * c^4 * j * k^2 * z + 41472 * a^6 * b^10 * c^3 * j * k^2 * z - 2304 * a^5 * b^1$   
 $2 * c^2 * j * k^2 * z + 13271040 * a^9 * b^5 * c^5 * g * m^2 * z - 8847360 * a^9 * b^3 * c^7 * h^2 * l * z$   
 $+ 4423680 * a^8 * b^5 * c^6 * h^2 * l * z - 3563520 * a^8 * b^7 * c^4 * g * m^2 * z - 1105920 * a^7 * b$   
 $^7 * c^5 * h^2 * l * z + 506880 * a^7 * b^9 * c^3 * g * m^2 * z + 138240 * a^6 * b^9 * c^4 * h^2 * l * z -$   
 $34560 * a^6 * b^11 * c^2 * g * m^2 * z - 6912 * a^5 * b^11 * c^3 * h^2 * l * z - 26542080 * a^9 * b^4 * c$   
 $^6 * e * m^2 * z + 25362432 * a^8 * b^3 * c^8 * f^2 * l * z - 13271040 * a^7 * b^5 * c^7 * f^2 * l * z +$   
 $8847360 * a^9 * b^3 * c^7 * g * k^2 * z + 7127040 * a^8 * b^6 * c^5 * e * m^2 * z - 4423680 * a^8 * b^5$   
 $* c^6 * g * k^2 * z + 3563520 * a^6 * b^7 * c^6 * f^2 * l * z + 3538944 * a^9 * b^2 * c^8 * h^2 * j * z +$   
 $1105920 * a^7 * b^7 * c^5 * g * k^2 * z - 1013760 * a^7 * b^8 * c^4 * e * m^2 * z - 737280 * a^7 * b^6 * c$   
 $^6 * h^2 * j * z - 506880 * a^5 * b^9 * c^5 * f^2 * l * z + 276480 * a^6 * b^8 * c^5 * h^2 * j * z - 138$   
 $240 * a^6 * b^9 * c^4 * g * k^2 * z + 69120 * a^6 * b^10 * c^3 * e * m^2 * z - 41472 * a^5 * b^10 * c^4 * h$   
 $^2 * j * z + 34560 * a^4 * b^11 * c^4 * f^2 * l * z + 6912 * a^5 * b^11 * c^3 * g * k^2 * z + 2304 * a^4 * b$   
 $^12 * c^3 * h^2 * j * z - 1536 * a^5 * b^12 * c^2 * e * m^2 * z - 768 * a^3 * b^13 * c^3 * f^2 * l * z - 1$   
 $11697920 * a^4 * b^7 * c^8 * d^2 * g * z + 23362560 * a^4 * b^9 * c^6 * d^2 * l * z - 17694720 * a^9 * b$   
 $^2 * c^8 * e * k^2 * z - 10354688 * a^8 * b^2 * c^9 * f^2 * j * z - 43646976 * a^6 * b^4 * c^9 * d^2 * j$   
 $* z + 8847360 * a^8 * b^4 * c^7 * e * k^2 * z - 2965248 * a^3 * b^11 * c^5 * d^2 * l * z - 2211840 * a$

$$\begin{aligned}
& ^7b^6c^6e^k^2z + 2048000a^6b^6c^7f^2jz - 849920a^5b^8c^6f^2j \\
& *z + 393216a^7b^4c^8f^2jz + 276480a^6b^8c^5e^k^2z + 214272a^2b \\
& ^13c^4d^2l^2z + 145920a^4b^10c^5f^2jz - 13824a^5b^10c^4e^k^2z \\
& - 11008a^3b^12c^4f^2jz + 256a^2b^14c^3f^2jz - 32587776a^5b^6c \\
& ^8d^2jz - 8847360a^8b^3c^8g^h^2z + 21657600a^4b^8c^7d^2jz + \\
& 4423680a^7b^5c^7g^h^2z - 1105920a^6b^7c^6g^h^2z + 138240a^5b^9c \\
& ^5g^h^2z - 6912a^4b^11c^4g^h^2z + 25362432a^7b^3c^9f^2g^z - 58 \\
& 10688a^3b^10c^6d^2jz + 17694720a^8b^2c^9e^h^2z + 845568a^2b^12 \\
& *c^5d^2jz - 50724864a^7b^2c^10e^f^2z - 13271040a^6b^5c^8f^2g^z \\
& - 8847360a^7b^4c^8e^h^2z + 3563520a^5b^7c^7f^2g^z + 2211840a^6b \\
& ^6c^7e^h^2z - 506880a^4b^9c^6f^2g^z - 276480a^5b^8c^6e^h^2z + \\
& 34560a^3b^11c^5f^2g^z + 13824a^4b^10c^5e^h^2z - 768a^2b^13c^4 \\
& *f^2g^z + 26542080a^6b^4c^9e^f^2z + 23362560a^3b^9c^7d^2g^z - 46 \\
& 725120a^3b^8c^8d^2e^z - 7127040a^5b^6c^8e^f^2z - 2965248a^2b^11 \\
& *c^6d^2g^z + 1013760a^4b^8c^7e^f^2z - 69120a^3b^10c^6e^f^2z + 1 \\
& 536a^2b^12c^5e^f^2z + 5930496a^2b^10c^7d^2e^z + 346816512a^8b^c \\
& ^10d^2l^2z - 693633024a^7c^12d^2e^z - 231211008a^8c^11d^2jz + 768 \\
& *a^6b^13l^2m^2z - 13107200a^12c^7j^2m^2z - 256a^5b^14j^2m^2z + 4718 \\
& 592a^11c^8j^2k^2z - 39321600a^11c^8e^2m^2z - 4718592a^10c^9h^2jz \\
& + 14155776a^10c^9e^2k^2z + 13107200a^9c^10f^2jz + 2304b^16c^3d^ \\
& 2jz - 14155776a^9c^10e^2h^2z + 39321600a^8c^11e^2f^2z - 6912b^15c \\
& ^4d^2g^z + 13824b^14c^5d^2e^z + 737280a^10b^c^5j^2k^2l^2m - 2304a^6b \\
& ^9c^2j^2k^2l^2m + 2211840a^9b^c^6e^2k^2l^2m + 1228800a^9b^c^6f^2j^2l^2m + 737 \\
& 280a^9b^c^6g^2j^2k^2m + 442368a^9b^c^6h^2j^2k^2l + 36a^3b^12c^2f^2h^2k^2m + \\
& 3096576a^8b^c^7d^2j^2k^2l - 12745728a^8b^c^7d^2h^2k^2m + 3686400a^8b^c^7e \\
& ^2f^2l^2m + 3391488a^8b^c^7e^2h^2j^2m + 2211840a^8b^c^7e^2g^2k^2m + 1327104a \\
& ^8b^c^7e^2h^2k^2l + 1228800a^8b^c^7f^2g^2j^2m + 737280a^8b^c^7f^2h^2j^2l + 4 \\
& 42368a^8b^c^7g^2h^2j^2k + 108a^2b^13c^2d^2h^2k^2m + 16367616a^7b^c^8d^2e^2j \\
& ^2m + 9289728a^7b^c^8d^2e^2k^2l + 5160960a^7b^c^8d^2f^2j^2l + 3391488a^7b^c \\
& ^8e^2e^2f^2j^2k + 3096576a^7b^c^8d^2g^2j^2k - 19307520a^7b^c^8d^2f^2h^2m + 3686 \\
& 400a^7b^c^8e^2e^2f^2g^2m + 2211840a^7b^c^8e^2e^2f^2h^2l + 1327104a^7b^c^8e^2g^2h \\
& ^2k + 737280a^7b^c^8f^2g^2h^2j - 180a^2b^13c^2d^2f^2h^2m - 540a^2b^12c^3d^2f \\
& ^2h^2k + 15482880a^6b^c^9d^2e^2f^2l + 11059200a^6b^c^9d^2e^2h^2j + 9289728a^ \\
& 6b^c^9d^2e^2g^2k + 5160960a^6b^c^9d^2f^2g^2j - 2304a^2b^11c^4d^2f^2g^2j + 221 \\
& 1840a^6b^c^9e^2e^2f^2g^2h + 4608a^2b^10c^5d^2e^2f^2j + 15482880a^5b^c^10d^2e^2 \\
& f^2g - 13824a^2b^9c^6d^2e^2f^2g + 36a^2b^14c^2d^2f^2k^2m + 1843200a^9b^3c^4j \\
& ^2k^2l^2m + 783360a^8b^5c^3j^2k^2l^2m + 18432a^7b^7c^2j^2k^2l^2m - 2211840a \\
& ^8b^4c^4g^2k^2l^2m - 1695744a^9b^2c^5h^2j^2l^2m - 1400832a^8b^4c^4h^2j^2 \\
& l^2m - 1105920a^9b^2c^5g^2k^2l^2m - 253440a^7b^6c^3h^2j^2l^2m - 69120a^7b \\
& ^6c^3g^2k^2l^2m + 11520a^6b^8c^2h^2j^2l^2m + 6912a^6b^8c^2g^2k^2l^2m + 44 \\
& 23680a^8b^3c^5e^2k^2l^2m + 2506752a^8b^3c^5f^2j^2l^2m + 1843200a^8b^3c \\
& ^5g^2j^2k^2m + 1327104a^8b^3c^5h^2j^2k^2l + 838656a^7b^5c^4f^2j^2l^2m + 783 \\
& 360a^7b^5c^4g^2j^2k^2m + 691200a^7b^5c^4h^2j^2k^2l + 138240a^7b^5c^4e \\
& ^2k^2l^2m + 69120a^6b^7c^3h^2j^2k^2l - 53760a^6b^7c^3f^2j^2l^2m + 18432a^6b \\
& ^7c^3g^2j^2k^2m - 13824a^6b^7c^3e^2k^2l^2m - 2304a^5b^9c^2g^2j^2k^2m + 25
\end{aligned}$$

$43616a^8b^3c^5g^*h^*l^*m + 829440a^7b^5c^4g^*h^*l^*m - 34560a^6b^7c^3g^*h^*l^*m - 8183808a^8b^2c^6d^*j^*l^*m - 3686400a^8b^2c^6e^*j^*k^*m - 2285568a^7b^4c^5d^*j^*l^*m - 1695744a^8b^2c^6f^*j^*k^*l - 1566720a^7b^4c^5e^*j^*k^*m - 1400832a^7b^4c^5f^*j^*k^*l + 741888a^6b^6c^4d^*j^*l^*m - 253440a^6b^6c^4f^*j^*k^*l - 80640a^5b^8c^3d^*j^*l^*m - 36864a^6b^6c^4e^*j^*k^*m + 11520a^5b^8c^3f^*j^*k^*l + 4608a^5b^8c^3e^*j^*k^*m + 6700032a^8b^2c^6f^*h^*k^*m + 5103360a^7b^4c^5f^*h^*k^*m - 5087232a^8b^2c^6e^*h^*l^*m - 2838528a^7b^4c^5f^*g^*l^*m - 1843200a^8b^2c^6f^*g^*l^*m - 1695744a^8b^2c^6g^*h^*j^*m - 1658880a^7b^4c^5g^*h^*k^*l - 1658880a^7b^4c^5e^*h^*l^*m - 1400832a^7b^4c^5g^*h^*j^*m - 663552a^8b^2c^6g^*h^*k^*l + 483840a^6b^6c^4f^*h^*k^*m - 253440a^6b^6c^4g^*h^*j^*m - 207360a^6b^6c^4g^*h^*k^*l + 161280a^6b^6c^4f^*g^*l^*m + 69120a^6b^6c^4e^*h^*l^*m - 50040a^5b^8c^3f^*h^*k^*m + 11520a^5b^8c^3g^*h^*j^*m + 180a^4b^10c^2f^*h^*k^*m + 4202496a^7b^3c^6d^*j^*k^*l + 635904a^6b^5c^5d^*j^*k^*l - 276480a^5b^7c^4d^*j^*k^*l + 34560a^4b^9c^3d^*j^*k^*l - 16671744a^7b^3c^6d^*h^*k^*m + 12275712a^7b^3c^6d^*g^*l^*m + 5677056a^7b^3c^6e^*f^*l^*m + 4423680a^7b^3c^6e^*g^*k^*m + 3317760a^7b^3c^6e^*h^*k^*l + 2801664a^7b^3c^6e^*h^*j^*m - 2709504a^6b^5c^5d^*g^*l^*m + 2543616a^7b^3c^6f^*g^*k^*l + 2506752a^7b^3c^6f^*g^*j^*m + 1843200a^7b^3c^6f^*h^*j^*l + 1327104a^7b^3c^6g^*h^*j^*k + 838656a^6b^5c^5f^*g^*j^*m + 829440a^6b^5c^5f^*g^*k^*l + 783360a^6b^5c^5f^*h^*j^*l + 691200a^6b^5c^5g^*h^*j^*k + 665280a^5b^7c^4d^*h^*k^*m + 506880a^6b^5c^5e^*h^*j^*m + 414720a^6b^5c^5e^*h^*k^*l - 322560a^6b^5c^5e^*f^*l^*m + 241920a^5b^7c^4d^*g^*l^*m + 138240a^6b^5c^5e^*g^*k^*m - 108540a^4b^9c^3d^*h^*k^*m + 69120a^5b^7c^4g^*h^*j^*k - 53760a^5b^7c^4f^*g^*j^*m - 51840a^6b^5c^5d^*h^*k^*m - 34560a^5b^7c^4f^*g^*k^*l - 23040a^5b^7c^4e^*h^*j^*m + 18432a^5b^7c^4f^*h^*j^*l - 13824a^5b^7c^4e^*g^*k^*m - 2304a^4b^9c^3f^*h^*j^*l + 1296a^3b^11c^2d^*h^*k^*m + 31924224a^7b^2c^7d^*f^*k^*m - 24551424a^7b^2c^7d^*e^*l^*m + 10616832a^7b^2c^7e^*g^*j^*l - 8183808a^7b^2c^7d^*g^*j^*m - 5529600a^7b^2c^7d^*h^*j^*l + 5419008a^6b^4c^6d^*e^*l^*m + 5308416a^6b^4c^6e^*g^*j^*l - 5087232a^7b^2c^7e^*f^*k^*l - 5013504a^7b^2c^7e^*f^*j^*m + 4868352a^6b^4c^6d^*f^*k^*m - 4644864a^7b^2c^7d^*g^*k^*l - 3981312a^6b^4c^6d^*g^*k^*l - 2654208a^7b^2c^7e^*h^*j^*k - 2367360a^5b^6c^5d^*f^*k^*m - 2285568a^6b^4c^6d^*g^*j^*m - 2211840a^6b^4c^6d^*h^*j^*l - 1695744a^7b^2c^7f^*g^*j^*k - 1677312a^6b^4c^6e^*f^*j^*m - 1658880a^6b^4c^6e^*f^*k^*l - 1400832a^6b^4c^6f^*g^*j^*k - 1382400a^6b^4c^6e^*h^*j^*k + 1036800a^5b^6c^5d^*g^*k^*l + 741888a^5b^6c^5d^*g^*j^*m - 483840a^5b^6c^5d^*e^*l^*m + 317952a^5b^6c^5d^*h^*j^*l + 268920a^4b^8c^4d^*f^*k^*m - 253440a^5b^6c^5f^*g^*j^*k - 138240a^5b^6c^5e^*h^*j^*k + 107520a^5b^6c^5e^*f^*j^*m - 103680a^4b^8c^4d^*g^*k^*l - 80640a^4b^8c^4d^*g^*j^*m + 69120a^5b^6c^5e^*f^*k^*l + 11520a^4b^8c^4f^*g^*j^*k + 6912a^4b^8c^4d^*h^*j^*l - 6912a^3b^10c^3d^*h^*j^*l + 6120a^3b^10c^3d^*f^*k^*m - 1368a^2b^12c^2d^*f^*k^*m - 5087232a^7b^2c^7e^*g^*h^*m - 2211840a^6b^4c^6f^*g^*h^*l - 1658880a^6b^4c^6e^*g^*h^*m - 1105920a^7b^2c^7f^*g^*h^*l - 69120a^5b^6c^5f^*g^*h^*l + 69120a^5b^6c^5e^*g^*h^*m + 6912a^4b^8c^4f^*g^*h^*l + 7962624a^6b^3c^7d^*e^*k^*l - 22164480a^6b^3c^7d^*f^*h^*m + 5160960a^6b^3c^7d^*f^*j^*l + 4571136a^6b$

$$\begin{aligned}
& ^3c^7d^*e^*j^*m + 4202496a^6b^3c^7d^*g^*j^*k + 2801664a^6b^3c^7e^*f^*j^*k \\
& - 2073600a^5b^5c^6d^*e^*k^*l - 1483776a^5b^5c^6d^*e^*j^*m + 635904a^5b^5 \\
& c^6d^*g^*j^*k + 506880a^5b^5c^6e^*f^*j^*k - 354816a^4b^7c^5d^*f^*j^*l + 3 \\
& 22560a^5b^5c^6d^*f^*j^*l - 276480a^4b^7c^5d^*g^*j^*k + 207360a^4b^7c^5 \\
& d^*e^*k^*l + 161280a^4b^7c^5d^*e^*j^*m + 59904a^3b^9c^4d^*f^*j^*l + 34560a \\
& ^3b^9c^4d^*g^*j^*k - 23040a^4b^7c^5e^*f^*j^*k - 2304a^2b^11c^3d^*f^*j^*l \\
& + 8294400a^6b^3c^7d^*g^*h^*l + 5677056a^6b^3c^7e^*f^*g^*m + 4423680a^6b \\
& ^3c^7e^*f^*h^*l + 3317760a^6b^3c^7e^*g^*h^*k + 2805120a^5b^5c^6d^*f^*h^*m \\
& + 1843200a^6b^3c^7f^*g^*h^*j - 829440a^5b^5c^6d^*g^*h^*l + 783360a^5b^5 \\
& c^6f^*g^*h^*j + 437184a^4b^7c^5d^*f^*h^*m + 414720a^5b^5c^6e^*g^*h^*k - 32 \\
& 2560a^5b^5c^6e^*f^*g^*m - 146268a^3b^9c^4d^*f^*h^*m + 138240a^5b^5c^6e \\
& e^*f^*h^*l - 62208a^4b^7c^5d^*g^*h^*l + 20736a^3b^9c^4d^*g^*h^*l + 18432a^4 \\
& b^7c^5f^*g^*h^*j - 13824a^4b^7c^5e^*f^*h^*l + 9360a^2b^11c^3d^*f^*h^*m - \\
& 2304a^3b^9c^4f^*g^*h^*j - 8404992a^6b^2c^8d^*e^*j^*k - 24551424a^6b^2c \\
& ^8d^*e^*g^*m + 21150720a^6b^2c^8d^*f^*h^*k - 1271808a^5b^4c^7d^*e^*j^*k + 5 \\
& 52960a^4b^6c^6d^*e^*j^*k - 69120a^3b^8c^5d^*e^*j^*k - 16588800a^6b^2c^8 \\
& d^*e^*h^*l - 7741440a^6b^2c^8d^*f^*g^*l + 6946560a^5b^4c^7d^*f^*h^*k - 552 \\
& 9600a^6b^2c^8d^*g^*h^*j + 5419008a^5b^4c^7d^*e^*g^*m - 5087232a^6b^2c^8 \\
& e^*f^*g^*k - 3870720a^5b^4c^7d^*f^*g^*l - 3686400a^6b^2c^8e^*f^*h^*j - 221 \\
& 1840a^5b^4c^7d^*g^*h^*j - 1755648a^4b^6c^6d^*f^*h^*k - 1658880a^5b^4c^7 \\
& e^*f^*g^*k + 1658880a^5b^4c^7d^*e^*h^*l - 1566720a^5b^4c^7e^*f^*h^*j + 145 \\
& 1520a^4b^6c^6d^*f^*g^*l - 483840a^4b^6c^6d^*e^*g^*m + 317952a^4b^6c^6d \\
& d^*g^*h^*j - 193536a^3b^8c^5d^*f^*g^*l + 124416a^4b^6c^6d^*e^*h^*l + 114696a \\
& ^3b^8c^5d^*f^*h^*k + 69120a^4b^6c^6e^*f^*g^*k - 41472a^3b^8c^5d^*e^*h^*l \\
& - 36864a^4b^6c^6e^*f^*h^*j + 14580a^2b^10c^4d^*f^*h^*k + 6912a^3b^8c^5 \\
& d^*g^*h^*j - 6912a^2b^10c^4d^*g^*h^*j + 6912a^2b^10c^4d^*f^*g^*l + 4608a^3 \\
& b^8c^5e^*f^*h^*j + 7962624a^5b^3c^8d^*e^*g^*k + 7741440a^5b^3c^8d^*e^*f \\
& ^*l + 5160960a^5b^3c^8d^*f^*g^*j + 4423680a^5b^3c^8d^*e^*h^*j - 2903040a^4 \\
& b^5c^7d^*e^*f^*l - 2073600a^4b^5c^7d^*e^*g^*k - 635904a^4b^5c^7d^*e^*h^* \\
& j + 387072a^3b^7c^6d^*e^*f^*l - 354816a^3b^7c^6d^*f^*g^*j + 322560a^4b^5 \\
& c^7d^*f^*g^*j + 207360a^3b^7c^6d^*e^*g^*k + 59904a^2b^9c^5d^*f^*g^*j - 13 \\
& 824a^3b^7c^6d^*e^*h^*j + 13824a^2b^9c^5d^*e^*h^*j - 13824a^2b^9c^5d^*e \\
& ^*f^*l + 4423680a^5b^3c^8e^*f^*g^*h + 138240a^4b^5c^7e^*f^*g^*h - 13824a^3 \\
& b^7c^6e^*f^*g^*h - 10321920a^5b^2c^9d^*e^*f^*j + 709632a^3b^6c^7d^*e^*f^* \\
& j - 645120a^4b^4c^8d^*e^*f^*j - 119808a^2b^8c^6d^*e^*f^*j - 16588800a^5b \\
& ^2c^9d^*e^*g^*h + 1658880a^4b^4c^8d^*e^*g^*h + 124416a^3b^6c^7d^*e^*g^*h \\
& - 41472a^2b^8c^6d^*e^*g^*h + 7741440a^4b^3c^9d^*e^*f^*g - 2903040a^3b^5 \\
& c^8d^*e^*f^*g + 387072a^2b^7c^7d^*e^*f^*g + 3456a^7b^8c^*k^*l^2*m + 12672* \\
& a^7b^8c^*j^*l^2*m + 384a^5b^10c^*j^2*k^*m - 1635840a^10b^*c^5*h^*k^*m^2 - 1 \\
& 009152a^9b^*c^6*h^2*k^*m + 3690a^6b^9c^*h^*k^*m^2 + 1152a^6b^9c^*g^*l^2*m^2 \\
& - 540a^5b^10c^*h^*k^2*m + 54a^4b^11c^*h^2*k^*m + 565248a^9b^*c^6*h^*j^2*m \\
& - 39771648a^7b^*c^8*d^2*k^*m - 2496000a^8b^*c^7*f^2*k^*m - 1543680a^9b^*c \\
& ^6*f^*k^2*m + 1980a^5b^10c^*f^*k^*m^2 - 384a^5b^10c^*g^*j^*m^2 - 180a^4b^1 \\
& 1c^*f^*k^2*m + 6a^2b^13c^*f^2*k^*m - 10298880a^9b^*c^6*d^*k^*m^2 + 2580480a \\
& ^9b^*c^6*e^*j^*m^2 + 5310a^4b^11c^*d^*k^*m^2 - 1674a^*b^13c^2*d^2*k^*m - 540*
\end{aligned}$$



$$\begin{aligned}
& a^3 b^{12} c^d k^2 m - 10616832 a^7 b^c^8 e^2 j^* l - 3538944 a^8 b^c^7 e^* j^2 m^* l \\
& + 2727936 a^8 b^c^7 d^* j^2 m - 2496000 a^9 b^c^6 f^* h^* m^2 - 1543680 a^8 b^c^7 f^* h^2 m^* \\
& + 565248 a^8 b^c^7 f^* j^2 k - 270 a^4 b^{11} c^* f^* h^* m^2 - 59512320 a^6 b^c^9 d^2 f^* m^* \\
& + 5087232 a^7 b^c^8 e^2 h^* m + 1105920 a^8 b^c^7 e^* j^* k^2 - 3456 a^* b^{12} c^3 d^2 j^* l \\
& - 1635840 a^7 b^c^8 f^2 h^* k - 1009152 a^8 b^c^7 f^* h^* k^2 + 10260 a^* b^{12} c^3 d^2 h^* m \\
& - 684 a^3 b^{12} c^d h^* m^2 - 24675840 a^6 b^c^9 d^2 h^* k - 15552000 a^8 b^c^7 d^* f^* m^2 \\
& + 24551424 a^6 b^c^9 d^* e^2 m - 3939840 a^7 b^c^8 d^* h^2 k + 1105920 a^7 b^c^8 e^* h^2 j^* \\
& - 25074 a^* b^{11} c^4 d^2 f^* m + 10530 a^* b^{11} c^4 d^2 h^* k + 10368 a^* b^{11} c^4 d^2 g^* l \\
& + 420 a^* b^{12} c^3 d^* f^2 m - 378 a^2 b^{13} c^d f^* m^2 - 10616832 a^6 b^c^9 e^2 g^* j^* \\
& + 5087232 a^6 b^c^9 e^2 f^* k - 3538944 a^7 b^c^8 e^* g^* j^2 + 1843200 a^7 b^c^8 d^* h^* j^2 \\
& - 7994880 a^6 b^c^9 d^* f^2 k - 4990464 a^7 b^c^8 d^* f^* k^2 + 2580480 a^6 b^c^9 e^* f^2 j^* \\
& + 65664 a^* b^{10} c^5 d^2 g^* j^* - 27972 a^* b^{10} c^5 d^2 f^* k - 20736 a^* b^{10} c^5 d^2 e^* l \\
& + 1260 a^* b^{11} c^4 d^* f^2 k + 54 a^* b^{13} c^2 d^* f^* k^2 + 23224320 a^5 b^c^{10} d^2 e^* j^* \\
& - 37062144 a^5 b^c^{10} d^2 f^* h + 384 a^* b^{12} c^3 d^* f^* j^2 - 131328 a^* b^9 c^6 d^2 e^* j^* \\
& - 5985792 a^6 b^c^9 d^* f^* h^2 + 206010 a^* b^9 c^6 d^2 f^* h - 6300 a^* b^{10} c^5 d^* f^2 h \\
& + 1350 a^* b^{11} c^4 d^* f^* h^2 + 16588800 a^5 b^c^{10} d^* e^2 h + 3456 a^* b^{10} c^5 d^* f^* g^2 \\
& + 435456 a^* b^8 c^7 d^2 e^* g + 13824 a^* b^8 c^7 d^* e^2 f - 1474560 a^9 c^7 e^* j^* k^* m \\
& + 460800 a^9 c^7 f^* h^* k^* m + 3225600 a^8 c^8 d^* f^* k^* m - 2457600 a^8 c^8 e^* f^* j^* m \\
& - 884736 a^8 c^8 e^* h^* j^* k - 6193152 a^7 c^9 d^* e^* j^* k + 1935360 a^7 c^9 d^* f^* h^* k \\
& - 1474560 a^7 c^9 e^* f^* h^* j - 10321920 a^6 c^{10} d^* e^* f^* j - 1105920 a^9 b^4 c^3 k^* l^2 m - 552960 a^{10} b^2 c^4 k^* l^2 m \\
& - 34560 a^8 b^6 c^2 k^* l^2 m - 1290240 a^{10} b^2 c^4 j^* l^2 m - 860160 a^9 b^4 c^3 j^* l^2 m \\
& - 80640 a^8 b^6 c^2 j^* l^2 m - 737280 a^9 b^2 c^5 j^2 k^* m - 568320 a^8 b^4 c^4 j^2 k^* m \\
& - 136704 a^7 b^6 c^3 j^2 k^* m - 2304 a^6 b^8 c^2 j^2 k^* m + 1271808 a^9 b^3 c^4 h^* l^2 m \\
& - 552960 a^9 b^2 c^5 j^* k^2 l - 552960 a^8 b^4 c^4 j^* k^2 l + 414720 a^8 b^5 c^3 h^* l^2 m \\
& - 145152 a^7 b^6 c^3 j^* k^2 l - 17280 a^7 b^7 c^2 h^* l^2 m - 3456 a^6 b^8 c^2 j^* k^2 l - 3640320 a^9 b^3 c^4 h^* k^* m^2 \\
& - 2626560 a^8 b^3 c^5 h^2 k^* m + 2211840 a^9 b^2 c^5 h^* k^2 m + 2056320 a^8 b^4 c^4 h^* k^2 m \\
& + 1935360 a^9 b^3 c^4 g^* l^2 m - 1143360 a^8 b^5 c^3 h^* k^* m^2 - 1097280 a^7 b^5 c^4 h^2 k^* m \\
& + 364608 a^7 b^6 c^3 h^* k^2 m + 322560 a^8 b^5 c^3 g^* l^2 m - 56160 a^6 b^7 c^3 h^2 k^* m \\
& - 40320 a^7 b^7 c^2 g^* l^2 m + 27936 a^7 b^7 c^2 h^* k^* m^2 - 3780 a^6 b^8 c^2 h^* k^2 m \\
& + 2970 a^5 b^9 c^2 h^2 k^* m - 1419264 a^8 b^4 c^4 f^* l^2 m - 1105920 a^7 b^4 c^5 g^2 k^* m \\
& - 921600 a^9 b^2 c^5 f^* l^2 m - 829440 a^8 b^4 c^4 h^* k^* l^2 + 749568 a^8 b^3 c^5 h^* j^2 m \\
& - 552960 a^8 b^2 c^6 g^2 k^* m - 331776 a^9 b^2 c^5 h^* k^* l^2 + 317952 a^7 b^5 c^4 h^* j^2 m \\
& - 103680 a^7 b^6 c^3 h^* k^* l^2 + 80640 a^7 b^6 c^3 f^* l^2 m + 38400 a^6 b^7 c^3 h^* j^2 m \\
& - 34560 a^6 b^6 c^4 g^2 k^* m + 3456 a^5 b^8 c^3 g^2 k^* m - 1920 a^5 b^9 c^2 h^* j^2 m \\
& - 5142528 a^7 b^3 c^6 f^2 k^* m + 5068800 a^9 b^2 c^5 f^* k^* m^2 - 3870720 a^9 b^2 c^5 e^* l^2 m \\
& - 3755520 a^8 b^3 c^5 f^* k^2 m + 3000960 a^8 b^4 c^4 f^* k^* m^2 - 1290240 a^9 b^2 c^5 g^* j^* m^2 \\
& - 1085760 a^7 b^5 c^4 f^* k^2 m - 959040 a^6 b^5 c^5 f^2 k^* m - 860160 a^8 b^4 c^4 g^* j^* m^2 \\
& + 829440 a^8 b^3 c^5 g^* k^2 l - 645120 a^8 b^4 c^4 e^* l^2 m - 552960 a^8 b^2 c^6 h^2 j^* l \\
& - 552960 a^7 b^4 c^5 h^2 j^* l + 414720 a^7 b^5 c^4 g^* k^2 l - 145152 a^6 b^6 c^4 h^2 j^* l \\
& + 103200 a^5 b^7 c^4 f^2 k^* m - 80640 a^7
\end{aligned}$$

$$\begin{aligned}
& *b^6*c^3*g*j*m^2 + 80640*a^7*b^6*c^3*e*l*m^2 + 41280*a^7*b^6*c^3*f*k*m^2 - \\
& 37188*a^6*b^8*c^2*f*k*m^2 + 13536*a^6*b^7*c^3*f*k^2*m + 12672*a^6*b^8*c^2*g \\
& *j*m^2 + 10368*a^6*b^7*c^3*g*k^2*1 + 5490*a^5*b^9*c^2*f*k^2*m - 3456*a^5*b^ \\
& 8*c^3*h^2*j*1 - 2304*a^6*b^8*c^2*e*l*m^2 + 810*a^4*b^9*c^3*f^2*k*m - 270*a^ \\
& 3*b^11*c^2*f^2*k*m + 6137856*a^8*b^3*c^5*d*1^2*m - 4423680*a^7*b^2*c^7*e^2* \\
& k*m - 2654208*a^8*b^3*c^5*g*j*1^2 - 2654208*a^7*b^3*c^6*g^2*j*1 + 1769472*a \\
& ^8*b^2*c^6*g*j^2*1 + 1769472*a^7*b^4*c^5*g*j^2*1 - 1354752*a^7*b^5*c^4*d*1^ \\
& 2*m - 1327104*a^7*b^5*c^4*g*j*1^2 - 1327104*a^6*b^5*c^5*g^2*j*1 + 1271808*a \\
& ^8*b^3*c^5*f*k*1^2 - 1040384*a^8*b^2*c^6*f*j^2*m - 697344*a^7*b^4*c^5*f*j^2 \\
& *m - 516096*a^8*b^2*c^6*h*j^2*k - 451584*a^7*b^4*c^5*h*j^2*k + 442368*a^6*b \\
& ^6*c^4*g*j^2*1 + 414720*a^7*b^5*c^4*f*k*1^2 - 138240*a^6*b^6*c^4*h*j^2*k - \\
& 138240*a^6*b^4*c^6*e^2*k*m - 121856*a^6*b^6*c^4*f*j^2*m + 120960*a^6*b^7*c^ \\
& 3*d*1^2*m - 17280*a^6*b^7*c^3*f*k*1^2 + 13824*a^5*b^6*c^5*e^2*k*m - 11520*a \\
& ^5*b^8*c^3*h*j^2*k + 8960*a^5*b^8*c^3*f*j^2*m + 10851840*a^8*b^2*c^6*d*k^2* \\
& m - 10464768*a^6*b^3*c^7*d^2*k*m - 10275840*a^8*b^3*c^5*d*k*m^2 + 7121088*a \\
& ^5*b^5*c^6*d^2*k*m + 3127680*a^7*b^4*c^5*d*k^2*m + 1720320*a^8*b^3*c^5*e*j* \\
& m^2 - 1658880*a^8*b^2*c^6*e*k^2*1 - 1290240*a^7*b^2*c^7*f^2*j*1 + 1271808*a \\
& ^7*b^3*c^6*g^2*h*m - 1222560*a^4*b^7*c^5*d^2*k*m + 999360*a^7*b^5*c^4*d*k*m \\
& ^2 - 860160*a^6*b^4*c^6*f^2*j*1 - 829440*a^7*b^4*c^5*e*k^2*1 - 705024*a^6*b \\
& ^6*c^4*d*k^2*m - 552960*a^8*b^2*c^6*g*j*k^2 - 552960*a^7*b^4*c^5*g*j*k^2 + \\
& 414720*a^6*b^5*c^5*g^2*h*m + 319392*a^6*b^7*c^3*d*k*m^2 + 161280*a^7*b^5*c^ \\
& 4*e*j*m^2 - 145152*a^6*b^6*c^4*g*j*k^2 - 85734*a^5*b^9*c^2*d*k*m^2 - 80640* \\
& a^5*b^6*c^5*f^2*j*1 - 25344*a^6*b^7*c^3*e*j*m^2 + 23490*a^3*b^9*c^4*d^2*k*m \\
& - 20736*a^6*b^6*c^4*e*k^2*1 - 17280*a^5*b^7*c^4*g^2*h*m + 14148*a^5*b^8*c^ \\
& 3*d*k^2*m + 13716*a^2*b^11*c^3*d^2*k*m + 12690*a^4*b^10*c^2*d*k^2*m + 12672 \\
& *a^4*b^8*c^4*f^2*j*1 - 3456*a^5*b^8*c^3*g*j*k^2 + 768*a^5*b^9*c^2*e*j*m^2 - \\
& 384*a^3*b^10*c^3*f^2*j*1 + 5308416*a^8*b^2*c^6*e*j*1^2 - 5308416*a^6*b^3*c \\
& ^7*e^2*j*1 - 5142528*a^8*b^3*c^5*f*h*m^2 + 5068800*a^7*b^2*c^7*f^2*h*m - 37 \\
& 55520*a^7*b^3*c^6*f*h^2*m - 3538944*a^7*b^3*c^6*e*j^2*1 + 3000960*a^6*b^4*c \\
& ^6*f^2*h*m + 2654208*a^7*b^4*c^5*e*j*1^2 - 2322432*a^8*b^2*c^6*d*k*1^2 + 21 \\
& 25824*a^7*b^3*c^6*d*j^2*m - 1990656*a^7*b^4*c^5*d*k*1^2 - 1085760*a^6*b^5*c \\
& ^5*f*h^2*m - 959040*a^7*b^5*c^4*f*h*m^2 - 884736*a^6*b^5*c^5*e*j^2*1 + 8294 \\
& 40*a^7*b^3*c^6*g*h^2*1 + 749568*a^7*b^3*c^6*f*j^2*k + 518400*a^6*b^6*c^4*d* \\
& k*1^2 + 414720*a^6*b^5*c^5*g*h^2*1 + 317952*a^6*b^5*c^5*f*j^2*k + 133632*a^ \\
& 6*b^5*c^5*d*j^2*m + 103200*a^6*b^7*c^3*f*h*m^2 - 96768*a^5*b^7*c^4*d*j^2*m \\
& - 51840*a^5*b^8*c^3*d*k*1^2 + 41280*a^5*b^6*c^5*f^2*h*m + 38400*a^5*b^7*c^4 \\
& *f*j^2*k - 37188*a^4*b^8*c^4*f^2*h*m + 13536*a^5*b^7*c^4*f*h^2*m + 13440*a^ \\
& 4*b^9*c^3*d*j^2*m + 10368*a^5*b^7*c^4*g*h^2*1 + 5490*a^4*b^9*c^3*f*h^2*m + \\
& 1980*a^3*b^10*c^3*f^2*h*m - 1920*a^4*b^9*c^3*f*j^2*k + 810*a^5*b^9*c^2*f*h* \\
& m^2 - 180*a^3*b^11*c^2*f*h^2*m - 30*a^2*b^12*c^2*f^2*h*m + 30067200*a^6*b^2 \\
& *c^8*d^2*h*m - 11612160*a^6*b^2*c^8*d^2*j*1 + 1658880*a^6*b^3*c^7*e^2*h*m + \\
& 1596672*a^4*b^6*c^6*d^2*j*1 - 1419264*a^6*b^4*c^6*f*g^2*m - 1105920*a^7*b^ \\
& 4*c^5*f*h*1^2 + 1105920*a^7*b^3*c^6*e*j*k^2 - 921600*a^7*b^2*c^7*f*g^2*m - \\
& 829440*a^6*b^4*c^6*g^2*h*k - 552960*a^8*b^2*c^6*f*h*1^2 - 508032*a^3*b^8*c^ \\
& 5*d^2*j*1 - 331776*a^7*b^2*c^7*g^2*h*k + 290304*a^6*b^5*c^5*e*j*k^2 - 10368
\end{aligned}$$

$$\begin{aligned}
& 0*a^5*b^6*c^5*g^2*h*k + 80640*a^5*b^6*c^5*f*g^2*m - 69120*a^5*b^5*c^6*e^2*h \\
& *m + 65664*a^2*b^10*c^4*d^2*j*1 - 34560*a^6*b^6*c^4*f*h*1^2 + 6912*a^5*b^7* \\
& c^4*e*j*k^2 + 3456*a^5*b^8*c^3*f*h*1^2 + 11930112*a^8*b^2*c^6*d*h*m^2 + 843 \\
& 2640*a^7*b^2*c^7*d*h^2*m + 4450176*a^7*b^4*c^5*d*h*m^2 + 4337280*a^6*b^4*c^ \\
& 6*d*h^2*m - 3870720*a^8*b^2*c^6*e*g*m^2 - 3640320*a^6*b^3*c^7*f^2*h*k - 288 \\
& 5760*a^5*b^4*c^7*d^2*h*m - 2844288*a^4*b^6*c^6*d^2*h*m - 2626560*a^7*b^3*c^ \\
& 6*f*h*k^2 + 2211840*a^7*b^2*c^7*f*h^2*k + 2056320*a^6*b^4*c^6*f*h^2*k + 193 \\
& 5360*a^6*b^3*c^7*f^2*g*1 - 1916928*a^7*b^2*c^7*d*j^2*k - 1687680*a^6*b^6*c^ \\
& 4*d*h*m^2 - 1658880*a^7*b^2*c^7*e*h^2*1 - 1143360*a^5*b^5*c^6*f^2*h*k - 109 \\
& 7280*a^6*b^5*c^5*f*h*k^2 + 1019412*a^3*b^8*c^5*d^2*h*m - 1007424*a^5*b^6*c^ \\
& 5*d*h^2*m - 912384*a^6*b^4*c^6*d*j^2*k - 829440*a^6*b^4*c^6*e*h^2*1 - 64512 \\
& 0*a^7*b^4*c^5*e*g*m^2 - 552960*a^7*b^2*c^7*g*h^2*j - 552960*a^6*b^4*c^6*g*h \\
& ^2*j + 364608*a^5*b^6*c^5*f*h^2*k + 322560*a^5*b^5*c^6*f^2*g*1 + 197460*a^5 \\
& *b^8*c^3*d*h*m^2 - 145152*a^5*b^6*c^5*g*h^2*j - 143802*a^2*b^10*c^4*d^2*h*m \\
& + 80640*a^6*b^6*c^4*e*g*m^2 - 56160*a^5*b^7*c^4*f*h*k^2 + 51948*a^4*b^8*c^ \\
& 4*d*h^2*m - 40320*a^4*b^7*c^5*f^2*g*1 + 34560*a^4*b^8*c^4*d*j^2*k + 27936*a \\
& ^4*b^7*c^5*f^2*h*k - 20736*a^5*b^6*c^5*e*h^2*1 - 13824*a^5*b^6*c^5*d*j^2*k \\
& + 10800*a^3*b^10*c^3*d*h^2*m - 5760*a^3*b^10*c^3*d*j^2*k - 3780*a^4*b^8*c^4 \\
& *f*h^2*k + 3690*a^3*b^9*c^4*f^2*h*k - 3456*a^4*b^8*c^4*g*h^2*j + 2970*a^4*b \\
& ^9*c^3*f*h*k^2 - 2304*a^5*b^8*c^3*e*g*m^2 + 1152*a^3*b^9*c^4*f^2*g*1 - 540* \\
& a^3*b^10*c^3*f*h^2*k - 540*a^2*b^12*c^2*d*h^2*m - 90*a^4*b^10*c^2*d*h*m^2 - \\
& 90*a^2*b^11*c^3*f^2*h*k + 54*a^3*b^11*c^2*f*h*k^2 + 15925248*a^6*b^2*c^8*e \\
& ^2*g*1 - 7962624*a^7*b^3*c^6*e*g*1^2 - 7962624*a^6*b^3*c^7*e*g^2*1 + 233856 \\
& 00*a^6*b^2*c^8*d*f^2*m + 6137856*a^6*b^3*c^7*d*g^2*m - 5677056*a^6*b^2*c^8* \\
& e^2*f*m + 4147200*a^7*b^3*c^6*d*h*1^2 - 3317760*a^6*b^2*c^8*e^2*h*k - 13547 \\
& 52*a^5*b^5*c^6*d*g^2*m + 1271808*a^6*b^3*c^7*f*g^2*k - 737280*a^7*b^2*c^7*f \\
& *h*j^2 + 17418240*a^5*b^3*c^8*d^2*g*1 - 568320*a^6*b^4*c^6*f*h*j^2 - 414720 \\
& *a^6*b^5*c^5*d*h*1^2 + 414720*a^5*b^5*c^6*f*g^2*k - 414720*a^5*b^4*c^7*e^2* \\
& h*k + 322560*a^5*b^4*c^7*e^2*f*m - 136704*a^5*b^6*c^5*f*h*j^2 + 120960*a^4* \\
& b^7*c^5*d*g^2*m - 31104*a^5*b^7*c^4*d*h*1^2 - 17280*a^4*b^7*c^5*f*g^2*k + 1 \\
& 0368*a^4*b^9*c^3*d*h*1^2 - 2304*a^4*b^8*c^4*f*h*j^2 + 384*a^3*b^10*c^3*f*h* \\
& j^2 + 50042880*a^5*b^2*c^9*d^2*f*k - 13271040*a^5*b^3*c^8*d^2*h*k - 1314969 \\
& 6*a^7*b^3*c^6*d*f*m^2 + 10906560*a^4*b^5*c^7*d^2*f*m - 8709120*a^4*b^5*c^7* \\
& d^2*g*1 - 7418880*a^5*b^3*c^8*d^2*f*m + 7133184*a^7*b^2*c^7*d*h*k^2 - 64281 \\
& 60*a^6*b^3*c^7*d*h^2*k + 5593536*a^4*b^5*c^7*d^2*h*k - 3870720*a^6*b^2*c^8* \\
& e*f^2*1 + 3369600*a^6*b^4*c^6*d*h*k^2 + 3148992*a^6*b^5*c^5*d*f*m^2 - 29856 \\
& 96*a^3*b^7*c^6*d^2*f*m + 1959552*a^3*b^7*c^6*d^2*g*1 - 1658880*a^7*b^2*c^7* \\
& e*g*k^2 - 1505280*a^4*b^6*c^6*d*f^2*m - 1290240*a^6*b^2*c^8*f^2*g*j - 34836 \\
& 480*a^5*b^2*c^9*d^2*e*1 + 1105920*a^6*b^3*c^7*e*h^2*j - 860160*a^5*b^4*c^7* \\
& f^2*g*j - 829440*a^6*b^4*c^6*e*g*k^2 - 692064*a^3*b^7*c^6*d^2*h*k - 689472* \\
& a^5*b^5*c^6*d*h^2*k - 645120*a^5*b^4*c^7*e*f^2*1 - 388800*a^5*b^6*c^5*d*h*k \\
& ^2 + 378954*a^2*b^9*c^5*d^2*f*m + 362880*a^5*b^4*c^7*d*f^2*m + 296964*a^3*b \\
& ^8*c^5*d*f^2*m + 290304*a^5*b^5*c^6*e*h^2*j + 277344*a^4*b^7*c^5*d*h^2*k - \\
& 217728*a^2*b^9*c^5*d^2*g*1 - 80640*a^4*b^6*c^6*f^2*g*j + 80640*a^4*b^6*c^6* \\
& e*f^2*1 - 77070*a^4*b^9*c^3*d*f*m^2 - 30240*a^5*b^7*c^4*d*f*m^2 - 28350*a^3
\end{aligned}$$

$$\begin{aligned}
& *b^9*c^4*d*h^2*k - 26406*a^2*b^9*c^5*d^2*h*k - 21060*a^4*b^8*c^4*d*h*k^2 - \\
& 20736*a^5*b^6*c^5*e*g*k^2 - 19278*a^2*b^10*c^4*d*f^2*m + 12672*a^3*b^8*c^5* \\
& f^2*g*j + 10044*a^3*b^10*c^3*d*h*k^2 + 8820*a^3*b^11*c^2*d*f*m^2 + 6912*a^4 \\
& *b^7*c^5*e*h^2*j - 2304*a^3*b^8*c^5*e*f^2*1 - 1620*a^2*b^11*c^3*d*h^2*k - 3 \\
& 84*a^2*b^10*c^4*f^2*g*j + 162*a^2*b^12*c^2*d*h*k^2 - 5419008*a^5*b^3*c^8*d* \\
& e^2*m + 5308416*a^6*b^2*c^8*e*g^2*j - 5308416*a^5*b^3*c^8*e^2*g*j - 3870720 \\
& *a^7*b^2*c^7*d*f*1^2 - 3538944*a^6*b^3*c^7*e*g*j^2 + 2654208*a^5*b^4*c^7*e* \\
& g^2*j - 2322432*a^6*b^2*c^8*d*g^2*k - 1990656*a^5*b^4*c^7*d*g^2*k - 1935360 \\
& *a^6*b^4*c^6*d*f*1^2 + 1658880*a^6*b^3*c^7*d*h*j^2 + 1658880*a^5*b^3*c^8*e^ \\
& 2*f*k - 884736*a^5*b^5*c^6*e*g*j^2 + 725760*a^5*b^6*c^5*d*f*1^2 + 17418240* \\
& a^4*b^4*c^8*d^2*e*1 + 518400*a^4*b^6*c^6*d*g^2*k + 483840*a^4*b^5*c^7*d*e^2 \\
& *m + 262656*a^5*b^5*c^6*d*h*j^2 - 96768*a^4*b^8*c^4*d*f*1^2 - 69120*a^4*b^5 \\
& *c^7*e^2*f*k - 55296*a^4*b^7*c^5*d*h*j^2 - 51840*a^3*b^8*c^5*d*g^2*k + 3456 \\
& *a^3*b^10*c^3*d*f*1^2 + 1152*a^3*b^9*c^4*d*h*j^2 + 1152*a^2*b^11*c^3*d*h*j^ \\
& 2 - 15431040*a^4*b^4*c^8*d^2*f*k - 13248000*a^5*b^3*c^8*d*f^2*k - 11612160* \\
& a^5*b^2*c^9*d^2*g*j - 10063872*a^6*b^3*c^7*d*f*k^2 - 3919104*a^3*b^6*c^7*d^ \\
& 2*e*1 + 2554560*a^4*b^5*c^7*d*f^2*k + 1720320*a^5*b^3*c^8*e*f^2*j + 1596672 \\
& *a^3*b^6*c^7*d^2*g*j + 1518912*a^3*b^6*c^7*d^2*f*k - 1105920*a^5*b^4*c^7*f* \\
& g^2*h + 838080*a^5*b^5*c^6*d*f*k^2 - 552960*a^6*b^2*c^8*f*g^2*h - 508032*a^ \\
& 2*b^8*c^6*d^2*g*j + 435456*a^2*b^8*c^6*d^2*e*1 + 161280*a^4*b^5*c^7*e*f^2*j \\
& + 116640*a^4*b^7*c^5*d*f*k^2 + 106812*a^2*b^8*c^6*d^2*f*k - 98208*a^3*b^7* \\
& c^6*d*f^2*k - 34560*a^4*b^6*c^6*f*g^2*h - 27270*a^3*b^9*c^4*d*f*k^2 - 26334 \\
& *a^2*b^9*c^5*d*f^2*k - 25344*a^3*b^7*c^6*e*f^2*j + 3456*a^3*b^8*c^5*f*g^2*h \\
& + 768*a^2*b^9*c^5*e*f^2*j - 702*a^2*b^11*c^3*d*f*k^2 - 7962624*a^5*b^2*c^9 \\
& *d*e^2*k - 2580480*a^6*b^2*c^8*d*f*j^2 + 2073600*a^4*b^4*c^8*d*e^2*k - 1658 \\
& 880*a^6*b^2*c^8*e*g*h^2 - 967680*a^5*b^4*c^7*d*f*j^2 - 829440*a^5*b^4*c^7*e \\
& *g*h^2 - 207360*a^3*b^6*c^7*d*e^2*k + 64512*a^4*b^6*c^6*d*f*j^2 + 39168*a^3 \\
& *b^8*c^5*d*f*j^2 - 20736*a^4*b^6*c^6*e*g*h^2 - 9216*a^2*b^10*c^4*d*f*j^2 - \\
& 4423680*a^5*b^2*c^9*e^2*f*h + 4147200*a^5*b^3*c^8*d*g^2*h - 3193344*a^3*b^5 \\
& *c^8*d^2*e*j + 1016064*a^2*b^7*c^7*d^2*e*j - 414720*a^4*b^5*c^7*d*g^2*h - 1 \\
& 38240*a^4*b^4*c^8*e^2*f*h - 31104*a^3*b^7*c^6*d*g^2*h + 13824*a^3*b^6*c^7*e \\
& ^2*f*h + 10368*a^2*b^9*c^5*d*g^2*h + 15630336*a^5*b^2*c^9*d*f^2*h - 1445990 \\
& 4*a^4*b^3*c^9*d^2*f*h + 9630144*a^3*b^5*c^8*d^2*f*h - 8764416*a^5*b^3*c^8*d \\
& *f*h^2 - 3870720*a^5*b^2*c^9*e*f^2*g + 2867328*a^4*b^4*c^8*d*f^2*h - 209520 \\
& 0*a^2*b^7*c^7*d^2*f*h - 1414080*a^3*b^6*c^7*d*f^2*h - 34836480*a^4*b^2*c^10 \\
& *d^2*e*g - 645120*a^4*b^4*c^8*e*f^2*g + 306720*a^3*b^7*c^6*d*f*h^2 + 197820 \\
& *a^2*b^8*c^6*d*f^2*h + 146880*a^4*b^5*c^7*d*f*h^2 + 80640*a^3*b^6*c^7*e*f^2 \\
& *g - 55350*a^2*b^9*c^5*d*f*h^2 - 2304*a^2*b^8*c^6*e*f^2*g - 3870720*a^5*b^2 \\
& *c^9*d*f*g^2 - 1935360*a^4*b^4*c^8*d*f*g^2 - 1658880*a^4*b^3*c^9*d*e^2*h + \\
& 725760*a^3*b^6*c^7*d*f*g^2 + 17418240*a^3*b^4*c^9*d^2*e*g - 124416*a^3*b^5* \\
& c^8*d*e^2*h - 96768*a^2*b^8*c^6*d*f*g^2 + 41472*a^2*b^7*c^7*d*e^2*h - 39191 \\
& 04*a^2*b^6*c^8*d^2*e*g - 7741440*a^4*b^2*c^10*d*e^2*f + 2903040*a^3*b^4*c^9 \\
& *d*e^2*f - 387072*a^2*b^6*c^8*d*e^2*f - 20160*a^8*b^7*c*1^2*m^2 - 1648128*a \\
& ^10*b^3*c^3*k*m^3 - 898560*a^9*b^3*c^4*k^3*m - 354240*a^9*b^5*c^2*k*m^3 - 3 \\
& 54240*a^8*b^5*c^3*k^3*m - 21600*a^7*b^7*c^2*k^3*m - 13950*a^7*b^8*c*k^2*m^2
\end{aligned}$$

$$\begin{aligned}
& + 430080*a^{10}*b*c^5*j^2*m^2 - 1984*a^6*b^9*c*j^2*m^2 - 884736*a^9*b^3*c^4* \\
& j*1^3 - 589824*a^8*b^3*c^5*j^3*1 - 442368*a^8*b^5*c^3*j*1^3 - 294912*a^7*b^ \\
& 5*c^4*j^3*1 - 49152*a^6*b^7*c^3*j^3*1 + 1359360*a^{10}*b^2*c^4*h*m^3 + 117312 \\
& 0*a^9*b^4*c^3*h*m^3 + 743040*a^7*b^4*c^5*h^3*m + 622080*a^8*b^2*c^6*h^3*m + \\
& 184320*a^9*b*c^6*j^2*k^2 + 107136*a^6*b^6*c^4*h^3*m - 32640*a^8*b^6*c^2*h* \\
& m^3 + 540*a^5*b^8*c^3*h^3*m - 270*a^4*b^10*c^2*h^3*m - 180*a^5*b^10*c*h^2*m \\
& ^2 - 2293760*a^9*b^3*c^4*f*m^3 - 2293760*a^6*b^3*c^7*f^3*m + 1327104*a^8*b^ \\
& 4*c^4*g*1^3 + 1327104*a^6*b^4*c^6*g^3*1 - 622080*a^8*b^3*c^5*h*k^3 - 622080 \\
& *a^7*b^3*c^6*h^3*k - 326592*a^7*b^5*c^4*h*k^3 - 326592*a^6*b^5*c^5*h^3*k - \\
& 199360*a^8*b^5*c^3*f*m^3 - 199360*a^5*b^5*c^6*f^3*m + 61920*a^7*b^7*c^2*f*m \\
& ^3 + 61920*a^4*b^7*c^5*f^3*m - 38880*a^6*b^7*c^3*h*k^3 - 38880*a^5*b^7*c^4* \\
& h^3*k - 3682*a^3*b^9*c^4*f^3*m - 810*a^5*b^9*c^2*h*k^3 - 810*a^4*b^9*c^3*h^ \\
& 3*k - 70*a^3*b^12*c*f^2*m^2 + 70*a^2*b^11*c^3*f^3*m + 3870720*a^8*b*c^7*e^2 \\
& *m^2 + 184320*a^8*b*c^7*h^2*j^2 - 14152320*a^4*b^4*c^8*d^3*m + 10644480*a^5 \\
& *b^2*c^9*d^3*m + 5483520*a^9*b^2*c^5*d*m^3 + 4269888*a^3*b^6*c^7*d^3*m - 26 \\
& 54208*a^8*b^3*c^5*e*1^3 + 1359360*a^6*b^2*c^8*f^3*k + 1330560*a^8*b^4*c^4*d \\
& *m^3 + 1173120*a^5*b^4*c^7*f^3*k - 884736*a^6*b^3*c^7*g^3*j - 826560*a^7*b^ \\
& 6*c^3*d*m^3 + 743040*a^7*b^4*c^5*f*k^3 + 622080*a^8*b^2*c^6*f*k^3 - 607068* \\
& a^2*b^8*c^6*d^3*m - 589824*a^7*b^3*c^6*g*j^3 - 442368*a^5*b^5*c^6*g^3*j - 2 \\
& 94912*a^6*b^5*c^5*g*j^3 + 145188*a^6*b^8*c^2*d*m^3 + 107136*a^6*b^6*c^4*f*k \\
& ^3 - 49152*a^5*b^7*c^4*g*j^3 - 32640*a^4*b^6*c^6*f^3*k - 5796*a^3*b^8*c^5*f \\
& ^3*k + 540*a^5*b^8*c^3*f*k^3 - 270*a^4*b^10*c^2*f*k^3 + 210*a^2*b^10*c^4*f^ \\
& 3*k + 19077120*a^4*b^3*c^9*d^3*k + 1658880*a^7*b*c^8*e^2*k^2 + 430080*a^7*b \\
& *c^8*f^2*j^2 + 3538944*a^5*b^2*c^9*e^3*j - 2488320*a^7*b^3*c^6*d*k^3 - 2379 \\
& 456*a^3*b^5*c^8*d^3*k + 1179648*a^7*b^2*c^7*e*j^3 + 589824*a^6*b^4*c^6*e*j^ \\
& 3 + 98304*a^5*b^6*c^5*e*j^3 - 95904*a^2*b^7*c^7*d^3*k - 57024*a^6*b^5*c^5*d \\
& *k^3 + 49248*a^5*b^7*c^4*d*k^3 - 4050*a^4*b^9*c^3*d*k^3 - 810*a^3*b^11*c^2* \\
& d*k^3 - 486*a*b^12*c^3*d^2*k^2 + 3870720*a^6*b*c^9*d^2*j^2 - 1648128*a^5*b^ \\
& 3*c^8*f^3*h - 898560*a^6*b^3*c^7*f*h^3 - 354240*a^5*b^5*c^6*f*h^3 - 354240* \\
& a^4*b^5*c^7*f^3*h + 43680*a^3*b^7*c^6*f^3*h - 21600*a^4*b^7*c^5*f*h^3 - 979 \\
& 2*a*b^11*c^4*d^2*j^2 + 1350*a^3*b^9*c^4*f*h^3 - 1050*a^2*b^9*c^5*f^3*h + 16 \\
& 58880*a^6*b*c^9*e^2*h^2 + 16547328*a^4*b^2*c^10*d^3*h - 12306816*a^3*b^4*c^ \\
& 9*d^3*h + 37310976*a^3*b^3*c^10*d^3*f + 3037824*a^2*b^6*c^8*d^3*h - 2654208 \\
& *a^5*b^3*c^8*e*g^3 + 1949184*a^6*b^2*c^8*d*h^3 + 1296000*a^5*b^4*c^7*d*h^3 \\
& - 155520*a^4*b^6*c^6*d*h^3 - 40500*a*b^10*c^5*d^2*h^2 - 8100*a^3*b^8*c^5*d* \\
& h^3 + 4050*a^2*b^10*c^4*d*h^3 + 3870720*a^5*b*c^10*e^2*f^2 + 34836480*a^4*b \\
& *c^11*d^2*e^2 - 108864*a*b^9*c^6*d^2*g^2 - 8068032*a^2*b^5*c^9*d^3*f - 5623 \\
& 296*a^4*b^3*c^9*d*f^3 + 1737792*a^3*b^5*c^8*d*f^3 - 260190*a*b^8*c^7*d^2*f^ \\
& 2 - 211680*a^2*b^7*c^7*d*f^3 - 435456*a*b^7*c^8*d^2*e^2 - 245760*a^10*c^6*j \\
& ^2*k*m - 384*a^6*b^10*j*1*m^2 + 138240*a^10*c^6*h*k^2*m - 90*a^5*b^11*h*k*m \\
& ^2 + 384000*a^10*c^6*f*k*m^2 - 2211840*a^8*c^8*e^2*k*m - 409600*a^9*c^7*f*j \\
& ^2*m - 147456*a^9*c^7*h*j^2*k - 30*a^4*b^12*f*k*m^2 + 967680*a^9*c^7*d*k^2* \\
& m + 384000*a^8*c^8*f^2*h*m - 90*a^3*b^13*d*k*m^2 + 20321280*a^7*c^9*d^2*h*m \\
& - 883200*a^11*b*c^4*k*m^3 - 317952*a^10*b*c^5*k^3*m + 43680*a^8*b^7*c*k*m^ \\
& 3 + 1350*a^6*b^9*c*k^3*m - 270*b^14*c^2*d^2*h*m + 6*a^3*b^13*f*h*m^2 + 4838
\end{aligned}$$

$400a^9c^7d^2h^2m^2 + 2903040a^8c^8d^2h^2m - 1032192a^8c^8d^2j^2k + 1$   
 $38240a^8c^8f^2h^2k - 3686400a^7c^9e^2f^2m - 1327104a^7c^9e^2h^2k -$   
 $393216a^9b^3c^6j^3l - 245760a^8c^8f^2h^2j^2 - 810b^{13}c^3d^2h^2k + 6$   
 $30b^{13}c^3d^2f^2m + 18a^2b^{14}d^2h^2m^2 + 2688000a^7c^9d^2f^2m + 58060$   
 $8a^8c^8d^2h^2k^2 - 5796a^7b^8c^8h^2m^3 - 3456b^{12}c^4d^2g^2j + 1890b^{1$   
 $2c^4d^2f^2k + 6773760a^6c^10d^2f^2k - 1344000a^{10}b^3c^5f^2m^3 - 13440$   
 $00a^7b^3c^8f^3m - 207360a^9b^3c^6h^2k^3 - 207360a^8b^3c^7h^3k - 3682$   
 $a^6b^9c^2f^2m^3 - 9289728a^6c^10d^2e^2k - 1720320a^7c^9d^2f^2j^2 - 508$   
 $03200a^5b^3c^10d^3k + 6912b^{11}c^5d^2e^2j - 10616832a^6b^3c^9e^3l -$   
 $2211840a^6c^10e^2f^2h - 393216a^8b^3c^7g^2j^3 + 43416a^2b^{10}c^5d^3m$   
 $- 9576a^5b^{10}c^2d^2m^3 - 9450b^{11}c^5d^2f^2h - 504a^2b^{14}c^2d^2m^2 + 1$   
 $612800a^6c^10d^2f^2h - 1036800a^8b^3c^7d^2k^3 + 45198a^2b^9c^6d^3k -$   
 $20736b^{10}c^6d^2e^2g - 75188736a^4b^3c^{11}d^3f - 883200a^6b^3c^9f^3h$   
 $- 317952a^7b^3c^8f^2h^3 - 15482880a^5c^{11}d^2e^2f - 10616832a^5b^3c^{1$   
 $0e^3g - 345060a^2b^8c^7d^3h - 4262400a^5b^3c^{10}d^2f^3 + 852768a^2b^7c^$   
 $8d^3f + 7350a^2b^9c^6d^2f^3 + 967680a^{10}b^3c^3l^2m^2 + 161280a^9$   
 $b^5c^2l^2m^2 + 1684224a^{10}b^2c^4k^2m^2 + 1264320a^9b^4c^3k^2m$   
 $^2 + 126720a^8b^6c^2k^2m^2 + 501760a^9b^3c^4j^2m^2 + 414720a^9b$   
 $^3c^4k^2l^2 + 207360a^8b^5c^3k^2l^2 + 170240a^8b^5c^3j^2m^2 +$   
 $9216a^7b^7c^2j^2m^2 + 5184a^7b^7c^2k^2l^2 + 884736a^9b^2c^5j^$   
 $2l^2 + 884736a^8b^4c^4j^2l^2 + 221184a^7b^6c^3j^2l^2 + 1419840a$   
 $^8b^4c^4h^2m^2 + 1387008a^9b^2c^5h^2m^2 + 276480a^8b^3c^5j^2k$   
 $^2 + 140544a^7b^5c^4j^2k^2 + 84960a^7b^6c^3h^2m^2 + 25344a^6b^7$   
 $c^3j^2k^2 - 8010a^6b^8c^2h^2m^2 + 576a^5b^9c^2j^2k^2 + 967680a$   
 $^8b^3c^5g^2m^2 + 414720a^8b^3c^5h^2l^2 + 207360a^7b^5c^4h^2l$   
 $^2 + 161280a^7b^5c^4g^2m^2 - 20160a^6b^7c^3g^2m^2 + 5184a^6b^7c^$   
 $3h^2l^2 + 576a^5b^9c^2g^2m^2 + 3808000a^8b^2c^6f^2m^2 + 19906$   
 $56a^7b^4c^5g^2l^2 + 1643712a^7b^4c^5f^2m^2 + 803520a^7b^4c^5h$   
 $^2k^2 + 725760a^8b^2c^6h^2k^2 + 207360a^6b^6c^4h^2k^2 - 125440a$   
 $^6b^6c^4f^2m^2 - 13790a^5b^8c^3f^2m^2 + 10530a^5b^8c^3h^2k^2$   
 $+ 1785a^4b^{10}c^2f^2m^2 + 81a^4b^{10}c^2h^2k^2 + 18427392a^7b^2c^$   
 $7d^2m^2 + 967680a^7b^3c^6f^2l^2 + 645120a^7b^3c^6e^2m^2 + 41472$   
 $0a^7b^3c^6g^2k^2 + 276480a^7b^3c^6h^2j^2 + 207360a^6b^5c^5g^2$   
 $k^2 + 161280a^6b^5c^5f^2l^2 + 140544a^6b^5c^5h^2j^2 - 80640a^6b$   
 $^5c^5e^2m^2 + 25344a^5b^7c^4h^2j^2 - 20160a^5b^7c^4f^2l^2 + 5$   
 $184a^5b^7c^4g^2k^2 + 2304a^5b^7c^4e^2m^2 + 576a^4b^9c^3h^2j^$   
 $2 + 576a^4b^9c^3f^2l^2 + 7962624a^7b^2c^7e^2l^2 - 4148928a^6b^4$   
 $c^6d^2m^2 + 1419840a^6b^4c^6f^2k^2 + 1387008a^7b^2c^7f^2k^2 -$   
 $1183392a^5b^6c^5d^2m^2 + 884736a^7b^2c^7g^2j^2 + 884736a^6b^4c$   
 $^6g^2j^2 + 645750a^4b^8c^4d^2m^2 + 221184a^5b^6c^5g^2j^2 - 1159$   
 $20a^3b^{10}c^3d^2m^2 + 84960a^5b^6c^5f^2k^2 + 10836a^2b^{12}c^2d^$   
 $2m^2 - 8010a^4b^8c^4f^2k^2 - 180a^3b^{10}c^3f^2k^2 + 9a^2b^{12}c^$   
 $2f^2k^2 + 8709120a^6b^3c^7d^2l^2 - 4354560a^5b^5c^6d^2l^2 + 979$   
 $776a^4b^7c^5d^2l^2 + 829440a^6b^3c^7e^2k^2 + 17480448a^6b^2c^8$   
 $d^2k^2 + 501760a^6b^3c^7f^2j^2 + 170240a^5b^5c^6f^2j^2 - 108864$

$$\begin{aligned}
& *a^3*b^9*c^4*d^2*1^2 + 20736*a^5*b^5*c^6*e^2*k^2 + 9216*a^4*b^7*c^5*f^2*j^2 \\
& + 5184*a^2*b^11*c^3*d^2*1^2 - 1984*a^3*b^9*c^4*f^2*j^2 + 64*a^2*b^11*c^3*f \\
& ^2*j^2 + 3538944*a^6*b^2*c^8*e^2*j^2 - 3302208*a^5*b^4*c^7*d^2*k^2 + 884736 \\
& *a^5*b^4*c^7*e^2*j^2 + 414720*a^6*b^3*c^7*g^2*h^2 + 207360*a^5*b^5*c^6*g^2* \\
& h^2 - 103680*a^4*b^6*c^6*d^2*k^2 + 101250*a^3*b^8*c^5*d^2*k^2 - 5751*a^2*b^ \\
& 10*c^4*d^2*k^2 + 5184*a^4*b^7*c^5*g^2*h^2 + 1935360*a^5*b^3*c^8*d^2*j^2 + 1 \\
& 684224*a^6*b^2*c^8*f^2*h^2 + 1264320*a^5*b^4*c^7*f^2*h^2 - 532224*a^4*b^5*c \\
& ^7*d^2*j^2 + 126720*a^4*b^6*c^6*f^2*h^2 - 96768*a^3*b^7*c^6*d^2*j^2 + 62784 \\
& *a^2*b^9*c^5*d^2*j^2 - 13950*a^3*b^8*c^5*f^2*h^2 + 225*a^2*b^10*c^4*f^2*h^2 \\
& + 967680*a^5*b^3*c^8*f^2*g^2 + 829440*a^5*b^3*c^8*e^2*h^2 + 161280*a^4*b^5 \\
& *c^7*f^2*g^2 + 20736*a^4*b^5*c^7*e^2*h^2 - 20160*a^3*b^7*c^6*f^2*g^2 + 576* \\
& a^2*b^9*c^5*f^2*g^2 + 11487744*a^5*b^2*c^9*d^2*h^2 + 7962624*a^5*b^2*c^9*e^ \\
& 2*g^2 + 35525376*a^4*b^2*c^10*d^2*f^2 - 1412640*a^3*b^6*c^7*d^2*h^2 + 46137 \\
& 6*a^4*b^4*c^8*d^2*h^2 + 375030*a^2*b^8*c^6*d^2*h^2 + 8709120*a^4*b^3*c^9*d^ \\
& 2*g^2 - 4354560*a^3*b^5*c^8*d^2*g^2 + 979776*a^2*b^7*c^7*d^2*g^2 + 645120*a \\
& ^4*b^3*c^9*e^2*f^2 - 80640*a^3*b^5*c^8*e^2*f^2 + 2304*a^2*b^7*c^7*e^2*f^2 - \\
& 15269184*a^3*b^4*c^9*d^2*f^2 + 2870784*a^2*b^6*c^8*d^2*f^2 - 17418240*a^3* \\
& b^3*c^10*d^2*e^2 + 3919104*a^2*b^5*c^9*d^2*e^2 + 54*b^15*c*d^2*k*m + 6*a*b^ \\
& 15*d*f*m^2 + 115200*a^11*c^5*k^2*m^2 + 576*a^7*b^9*1^2*m^2 + 225*a^6*b^10*k \\
& ^2*m^2 + 64*a^5*b^11*j^2*m^2 + 345600*a^10*c^6*h^2*m^2 + 9*a^4*b^12*h^2*m^2 \\
& + 320000*a^9*c^7*f^2*m^2 + 41472*a^9*c^7*h^2*k^2 + 16934400*a^8*c^8*d^2*m^ \\
& 2 + 345600*a^8*c^8*f^2*k^2 + 81*b^14*c^2*d^2*k^2 + 3538944*a^7*c^9*e^2*j^2 \\
& + 2032128*a^7*c^9*d^2*k^2 + 492800*a^11*b^2*c^3*m^4 + 351456*a^10*b^4*c^2*m \\
& ^4 + 576*b^13*c^3*d^2*j^2 + 331776*a^9*b^4*c^3*1^4 + 115200*a^7*c^9*f^2*h^2 \\
& + 142560*a^8*b^4*c^4*k^4 + 103680*a^9*b^2*c^5*k^4 + 32400*a^7*b^6*c^3*k^4 \\
& + 2025*b^12*c^4*d^2*h^2 + 2025*a^6*b^8*c^2*k^4 + 6096384*a^6*c^10*d^2*h^2 + \\
& 131072*a^8*b^2*c^6*j^4 + 98304*a^7*b^4*c^5*j^4 + 32768*a^6*b^6*c^4*j^4 + 5 \\
& 184*b^11*c^5*d^2*g^2 + 4096*a^5*b^8*c^3*j^4 + 11025*b^10*c^6*d^2*f^2 + 5644 \\
& 800*a^5*c^11*d^2*f^2 + 142560*a^6*b^4*c^6*h^4 + 103680*a^7*b^2*c^7*h^4 + 32 \\
& 400*a^5*b^6*c^5*h^4 + 20736*b^9*c^7*d^2*e^2 + 2025*a^4*b^8*c^4*h^4 + 331776 \\
& *a^5*b^4*c^7*g^4 + 492800*a^5*b^2*c^9*f^4 + 351456*a^4*b^4*c^8*f^4 - 43120* \\
& a^3*b^6*c^7*f^4 + 1225*a^2*b^8*c^6*f^4 - 27433728*a^3*b^2*c^11*d^4 + 644630 \\
& 4*a^2*b^4*c^10*d^4 - 1050*a^7*b^9*k*m^3 + 384000*a^11*c^5*h*m^3 + 138240*a^ \\
& 9*c^7*h^3*m + 210*a^6*b^10*h*m^3 + 47416320*a^6*c^10*d^3*m - 1134*b^12*c^4* \\
& d^3*m + 70*a^5*b^11*f*m^3 + 2688000*a^10*c^6*d*m^3 + 384000*a^7*c^9*f^3*k + \\
& 138240*a^9*c^7*f*k^3 - 3402*b^11*c^5*d^3*k + 210*a^4*b^12*d*m^3 + 7077888* \\
& a^6*c^10*e^3*j + 786432*a^8*c^8*e*j^3 - 43120*a^9*b^6*c*m^4 + 28449792*a^5* \\
& c^11*d^3*h + 17010*b^10*c^6*d^3*h + 580608*a^7*c^9*d*h^3 - 39690*b^9*c^7*d^ \\
& 3*f - 734832*a*b^6*c^9*d^4 + 9*b^16*d^2*m^2 + 160000*a^12*c^4*m^4 + 1225*a^ \\
& 8*b^8*m^4 + 20736*a^10*c^6*k^4 + 65536*a^9*c^7*j^4 + 20736*a^8*c^8*h^4 + 49 \\
& 787136*a^4*c^12*d^4 + 160000*a^6*c^10*f^4 + 5308416*a^5*c^11*e^4 + 35721*b^ \\
& 8*c^8*d^4 + a^2*b^14*f^2*m^2, z, k1), k1, 1, 4) - ((8*a^2*c^2*g + a^2*b^2*1 \\
& + b^3*c*e + 8*a^3*c*1 - 10*a*b*c^2*e + a*b^2*c*g - 6*a^2*b*c*j)/(4*c*(b^4 \\
& + 16*a^2*c^2 - 8*a*b^2*c)) + (x^4*(b^4*1 + 9*b^2*c^2*g + 16*a^2*c^2*1 - 18* \\
& b*c^3*e - 3*b^3*c*j - 6*a*b*c^2*j + a*b^2*c*1))/(4*c*(b^4 + 16*a^2*c^2 - 8*
\end{aligned}$$

$$\begin{aligned}
& a*b^2*c)) - (x^7*(3*b^3*c^2*d + 20*a^2*c^3*f + 12*a^3*c^2*k + a^2*b^3*m - 2 \\
& 4*a*b*c^3*d - 16*a^3*b*c*m + a*b^2*c^2*f - 12*a^2*b*c^2*h + 3*a^2*b^2*c*k)) \\
& / (8*a^2*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) + (x^2*(2*a^2*c^2*j - 2*b^2*c^2*e - \\
& 10*a*c^3*e + b^3*c*g + a*b^3*1 + 5*a*b*c^2*g - 5*a*b^2*c*j + 5*a^2*b*c*1)) \\
& / (2*c*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) - (c*x^6*(6*c^2*e + b^2*j - 3*b*c*g + \\
& 2*a*c*j - 3*a*b*1)) / (2*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) + (x^3*(4*a^4*c^2*k \\
& - 36*a^3*c^3*f + 2*a^3*b^3*m - 3*b^5*c*d - 5*a^2*b^2*c^2*f - a*b^4*c*f + 2 \\
& 8*a^4*b*c*m + 20*a*b^3*c^2*d + 4*a^2*b*c^3*d + 5*a^2*b^3*c*h + 16*a^3*b*c^2 \\
& *h - 19*a^3*b^2*c*k)) / (8*a^2*c*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) + (x*(12*a^3 \\
& *c^2*h - 44*a^2*c^3*d + a^3*b^2*m - 5*b^4*c*d + 20*a^4*c*m + a*b^3*c*f - 12 \\
& *a^3*b*c*k + 37*a*b^2*c^2*d - 16*a^2*b*c^2*f + 3*a^2*b^2*c*h)) / (8*a*c*(b^4 \\
& + 16*a^2*c^2 - 8*a*b^2*c)) - (x^5*(28*a^2*c^4*d + 6*b^4*c^2*d + 4*a^3*c^3*h \\
& - a^2*b^4*m - 36*a^4*c^2*m - 19*a^2*b^2*c^2*h - 49*a*b^2*c^3*d + 2*a*b^3*c \\
& ^2*f + 28*a^2*b*c^3*f + 5*a^2*b^3*c*k + 16*a^3*b*c^2*k - 5*a^3*b^2*c*m)) / (8 \\
& *a^2*c*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) / (x^4*(2*a*c + b^2) + a^2 + c^2*x^8 \\
& + 2*a*b*x^2 + 2*b*c*x^6)
\end{aligned}$$



$$3.58 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5+jx^6+kx^7}{(a+bx^2+cx^4)^2} dx$$

Optimal result	761
Rubi [A] (verified)	762
Mathematica [A] (verified)	766
Maple [C] (verified)	767
Fricas [F(-1)]	768
Sympy [F(-1)]	768
Maxima [F]	768
Giac [B] (verification not implemented)	769
Mupad [B] (verification not implemented)	777

### Optimal result

Integrand size = 50, antiderivative size = 645

$$\begin{aligned} & \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5+jx^6+kx^7}{(a+bx^2+cx^4)^2} dx \\ &= \frac{x \left( c \left( b^2 d - 2a(cd - ah) - \frac{ab(cf+aj)}{c} \right) + (bc(cd+ah) - ab^2 j - 2ac(cf - aj)) x^2 \right)}{2ac(b^2 - 4ac)(a+bx^2+cx^4)} \\ & - \frac{bc(ce+ai) - ab^2 k - 2ac(cg - ak) + (2c^3 e - c^2(bg+2ai) - b^3 k + bc(bi+3ak)) x^2}{2c^2(b^2 - 4ac)(a+bx^2+cx^4)} \\ & + \frac{\left( b(cd+ah) + \frac{ab^2 j}{c} - 2a(cf+3aj) + \frac{b^2 c(cd-ah) - 4ac^2(3cd+ah) - ab^3 j + 4abc(cf+2aj)}{c\sqrt{b^2-4ac}} \right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} \\ & + \frac{\left( b(cd+ah) + \frac{ab^2 j}{c} - 2a(cf+3aj) - \frac{b^2 c(cd-ah) - 4ac^2(3cd+ah) - ab^3 j + 4abc(cf+2aj)}{c\sqrt{b^2-4ac}} \right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a\sqrt{c}(b^2-4ac)\sqrt{b+\sqrt{b^2-4ac}}} \\ & + \frac{(4c^3 e - c^2(2bg - 4ai) + b^3 k - 6abck) \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right) + \frac{k \log(a+bx^2+cx^4)}{4c^2}}{2c^2(b^2-4ac)^{3/2}} \end{aligned}$$

[Out] 1/2\*x\*(c\*(b^2\*d-2\*a\*(-a\*h+c\*d)-a\*b\*(a\*j+c\*f)/c)+(b\*c\*(a\*h+c\*d)-a\*b^2\*j-2\*a\*c\*(-a\*j+c\*f))\*x^2)/a/c/(-4\*a\*c+b^2)/(c\*x^4+b\*x^2+a)+1/2\*(-b\*c\*(a\*i+c\*e)+a\*b^2\*k+2\*a\*c\*(-a\*k+c\*g)-(2\*c^3\*e-c^2\*(2\*a\*i+b\*g)-b^3\*k+b\*c\*(3\*a\*k+b\*i))\*x^2)/c^2/(-4\*a\*c+b^2)/(c\*x^4+b\*x^2+a)+1/2\*(4\*c^3\*e-c^2\*(-4\*a\*i+2\*b\*g)+b^3\*k-6\*a\*b\*c\*k)\*arctanh((2\*c\*x^2+b)/(-4\*a\*c+b^2)^(1/2))/c^2/(-4\*a\*c+b^2)^(3/2)+1/4\*k\*ln(c\*x^4+b\*x^2+a)/c^2+1/4\*arctan(x^2^(1/2)\*c^(1/2)/(b-(-4\*a\*c+b^2)^(1/2))^(1/2))\*(b\*(a\*h+c\*d)+a\*b^2\*j/c-2\*a\*(3\*a\*j+c\*f)+(b^2\*c\*(-a\*h+c\*d)-4\*a\*c^2\*(a\*h+3\*c\*d)-a\*b^3\*j+4\*a\*b\*c\*(2\*a\*j+c\*f))/c/(-4\*a\*c+b^2)^(1/2))/a/(-4\*a\*c+b^2)^2^(1/2)/c^(1/2)/(b-(-4\*a\*c+b^2)^(1/2))^(1/2)+1/4\*arctan(x^2^(1/2)\*c^(1/2)/(

$$b+(-4*a*c+b^2)^{(1/2)}^{(1/2)}*(b*(a*h+c*d)+a*b^2*j/c-2*a*(3*a*j+c*f)+(-b^2*c*(-a*h+c*d)+4*a*c^2*(a*h+3*c*d)+a*b^3*j-4*a*b*c*(2*a*j+c*f))/c/(-4*a*c+b^2)^{(1/2)}/a/(-4*a*c+b^2)*2^{(1/2)}/c^{(1/2)}/(b+(-4*a*c+b^2)^{(1/2)}^{(1/2)})$$

## Rubi [A] (verified)

Time = 2.16 (sec) , antiderivative size = 645, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$ , Rules used = {1687, 1692, 1180, 211, 1677, 1674, 648, 632, 212, 642}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^6 + kx^7}{(a + bx^2 + cx^4)^2} dx$$

$$= \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{ab^2j}{c} + \frac{-ab^3j+b^2c(cd-ah)+4abc(2aj+cf)-4ac^2(ah+3cd)}{c\sqrt{b^2-4ac}} + b(ah+cd) - 2a(3aj+cf)\right)}{2\sqrt{2}a\sqrt{c}(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left(\frac{ab^2j}{c} - \frac{-ab^3j+b^2c(cd-ah)+4abc(2aj+cf)-4ac^2(ah+3cd)}{c\sqrt{b^2-4ac}} + b(ah+cd) - 2a(3aj+cf)\right)}{2\sqrt{2}a\sqrt{c}(b^2-4ac)\sqrt{\sqrt{b^2-4ac}+b}} + \frac{\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right) (-c^2(2bg-4ai) - 6abck + b^3k + 4c^3e)}{2c^2(b^2-4ac)^{3/2}} + \frac{x\left(x^2(-ab^2j + bc(ah+cd) - 2ac(cf-aj)) + c\left(-\frac{ab(aj+cf)}{c} - 2a(cd-ah) + b^2d\right)\right)}{2ac(b^2-4ac)(a+bx^2+cx^4)} - \frac{x^2(-c^2(2ai+bg) + bc(3ak+bi) + b^3(-k) + 2c^3e) - ab^2k + bc(ai+ce) - 2ac(CG-ak)}{2c^2(b^2-4ac)(a+bx^2+cx^4)} + \frac{k \log(a + bx^2 + cx^4)}{4c^2}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5 + j\*x^6 + k\*x^7)/(a + b\*x^2 + c\*x^4)^2,x]

[Out] (x\*(c\*(b^2\*d - 2\*a\*(c\*d - a\*h) - (a\*b\*(c\*f + a\*j))/c) + (b\*c\*(c\*d + a\*h) - a\*b^2\*j - 2\*a\*c\*(c\*f - a\*j))\*x^2)/(2\*a\*c\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4) - (b\*c\*(c\*e + a\*i) - a\*b^2\*k - 2\*a\*c\*(c\*g - a\*k) + (2\*c^3\*e - c^2\*(b\*g + 2\*a\*i) - b^3\*k + b\*c\*(b\*i + 3\*a\*k))\*x^2)/(2\*c^2\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + ((b\*(c\*d + a\*h) + (a\*b^2\*j)/c - 2\*a\*(c\*f + 3\*a\*j) + (b^2\*c\*(c\*d - a\*h) - 4\*a\*c^2\*(3\*c\*d + a\*h) - a\*b^3\*j + 4\*a\*b\*c\*(c\*f + 2\*a\*j))/(c\*Sqrt[b^2 - 4\*a\*c]))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]]]/(2\*Sqrt[2]\*a\*Sqrt[c]\*(b^2 - 4\*a\*c)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + ((b\*(c\*d + a\*h) + (a\*b^2\*j)/c - 2\*a\*(c\*f + 3\*a\*j) - (b^2\*c\*(c\*d - a\*h) - 4\*a\*c^2\*(3\*c\*d + a\*h) - a\*b^3\*j + 4\*a\*b\*c\*(c\*f + 2\*a\*j))/(c\*Sqrt[b^2 - 4\*a\*c]))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]]]/(2\*Sqrt[2]\*a\*Sqrt[c]\*(b^2 - 4\*a\*c)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) + ((4\*c^3\*e - c^2\*(2\*b\*g - 4\*a\*i) + b^3\*k

$k - 6*a*b*c*k)*\text{ArcTanh}[(b + 2*c*x^2)/\text{Sqrt}[b^2 - 4*a*c]]/(2*c^2*(b^2 - 4*a*c)^{(3/2)}) + (k*\text{Log}[a + b*x^2 + c*x^4])/(4*c^2)$

#### Rule 211

$\text{Int}[(a_ + (b_)*x_)^{-1}, x\_Symbol] := \text{Simp}[(\text{Rt}[a/b, 2]/a)*\text{ArcTan}[x/\text{Rt}[a/b, 2]], x] /; \text{FreeQ}\{a, b\}, x] \ \&\& \ \text{PosQ}[a/b]$

#### Rule 212

$\text{Int}[(a_ + (b_)*x_)^{-1}, x\_Symbol] := \text{Simp}[(1/(\text{Rt}[a, 2]*\text{Rt}[-b, 2]))*\text{ArcTanh}[\text{Rt}[-b, 2]*(x/\text{Rt}[a, 2])], x] /; \text{FreeQ}\{a, b\}, x] \ \&\& \ \text{NegQ}[a/b] \ \&\& \ (\text{GtQ}[a, 0] \ || \ \text{LtQ}[b, 0])$

#### Rule 632

$\text{Int}[(a_ + (b_)*x_ + (c_)*x_^2)^{-1}, x\_Symbol] := \text{Dist}[-2, \text{Subst}[\text{Int}[1/\text{Simp}[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; \text{FreeQ}\{a, b, c\}, x] \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0]$

#### Rule 642

$\text{Int}[(d_ + (e_)*x_)/((a_ + (b_)*x_ + (c_)*x_^2)), x\_Symbol] := \text{Simp}[d*(\text{Log}[\text{RemoveContent}[a + b*x + c*x^2, x]]/b), x] /; \text{FreeQ}\{a, b, c, d, e\}, x] \ \&\& \ \text{EqQ}[2*c*d - b*e, 0]$

#### Rule 648

$\text{Int}[(d_ + (e_)*x_)/((a_ + (b_)*x_ + (c_)*x_^2)), x\_Symbol] := \text{Dist}[(2*c*d - b*e)/(2*c), \text{Int}[1/(a + b*x + c*x^2), x], x] + \text{Dist}[e/(2*c), \text{Int}[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; \text{FreeQ}\{a, b, c, d, e\}, x] \ \&\& \ \text{NeQ}[2*c*d - b*e, 0] \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0] \ \&\& \ !\text{NiceSqrtQ}[b^2 - 4*a*c]$

#### Rule 1180

$\text{Int}[(d_ + (e_)*x_^2)/((a_ + (b_)*x_^2 + (c_)*x_^4)), x\_Symbol] := \text{With}\{q = \text{Rt}[b^2 - 4*a*c, 2]\}, \text{Dist}[e/2 + (2*c*d - b*e)/(2*q), \text{Int}[1/(b/2 - q/2 + c*x^2), x], x] + \text{Dist}[e/2 - (2*c*d - b*e)/(2*q), \text{Int}[1/(b/2 + q/2 + c*x^2), x], x] /; \text{FreeQ}\{a, b, c, d, e\}, x] \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0] \ \&\& \ \text{NeQ}[c*d^2 - a*e^2, 0] \ \&\& \ \text{PosQ}[b^2 - 4*a*c]$

#### Rule 1674

$\text{Int}[(Pq_)*((a_ + (b_)*x_ + (c_)*x_^2)^{p_}), x\_Symbol] := \text{With}\{Q = \text{PolynomialQuotient}[Pq, a + b*x + c*x^2, x], f = \text{Coeff}[\text{PolynomialRemainder}[Pq, a + b*x + c*x^2, x], x, 0], g = \text{Coeff}[\text{PolynomialRemainder}[Pq, a + b*x + c*x^2, x], x, 1]\}, \text{Simp}[(b*f - 2*a*g + (2*c*f - b*g)*x)*((a + b*x + c*x^2)^{p_})]$



$$\begin{aligned}
&= \frac{x \left( c \left( b^2 d - 2a(cd - ah) - \frac{ab(cf + aj)}{c} \right) + (bc(cd + ah) - ab^2 j - 2ac(cf - aj)) x^2 \right)}{2ac(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad - \frac{bc(ce + ai) - ab^2 k - 2ac(CG - ak) + (2c^3 e - c^2(bg + 2ai) - b^3 k + bc(bi + 3ak)) x^2}{2c^2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad - \frac{\text{Subst} \left( \int \frac{2ce - bg + 2ai - \frac{abk}{c} + \left(4a - \frac{b^2}{c}\right) kx}{a + bx + cx^2} dx, x, x^2 \right)}{2(b^2 - 4ac)} \\
&\quad + \frac{\left( b(cd + ah) + \frac{ab^2 j}{c} - 2a(cf + 3aj) - \frac{b^2 c(cd - ah) - 4ac^2(3cd + ah) - ab^3 j + 4abc(cf + 2aj)}{c\sqrt{b^2 - 4ac}} \right) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)} \\
&\quad + \frac{\left( b(cd + ah) + \frac{ab^2 j}{c} - 2a(cf + 3aj) + \frac{b^2 c(cd - ah) - 4ac^2(3cd + ah) - ab^3 j + 4abc(cf + 2aj)}{c\sqrt{b^2 - 4ac}} \right) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)} \\
&= \frac{x \left( c \left( b^2 d - 2a(cd - ah) - \frac{ab(cf + aj)}{c} \right) + (bc(cd + ah) - ab^2 j - 2ac(cf - aj)) x^2 \right)}{2ac(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad - \frac{bc(ce + ai) - ab^2 k - 2ac(CG - ak) + (2c^3 e - c^2(bg + 2ai) - b^3 k + bc(bi + 3ak)) x^2}{2c^2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{\left( b(cd + ah) + \frac{ab^2 j}{c} - 2a(cf + 3aj) + \frac{b^2 c(cd - ah) - 4ac^2(3cd + ah) - ab^3 j + 4abc(cf + 2aj)}{c\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\left( b(cd + ah) + \frac{ab^2 j}{c} - 2a(cf + 3aj) - \frac{b^2 c(cd - ah) - 4ac^2(3cd + ah) - ab^3 j + 4abc(cf + 2aj)}{c\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{k \text{Subst} \left( \int \frac{b + 2cx}{a + bx + cx^2} dx, x, x^2 \right)}{4c^2} \\
&\quad - \frac{(4c^3 e - c^2(2bg - 4ai) + b^3 k - 6abck) \text{Subst} \left( \int \frac{1}{a + bx + cx^2} dx, x, x^2 \right)}{4c^2(b^2 - 4ac)}
\end{aligned}$$

$$\begin{aligned}
&= \frac{x \left( c \left( b^2 d - 2a(cd - ah) - \frac{ab(cf+aj)}{c} \right) + (bc(cd + ah) - ab^2 j - 2ac(cf - aj)) x^2 \right)}{2ac(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad - \frac{bc(ce + ai) - ab^2 k - 2ac(cg - ak) + (2c^3 e - c^2(bg + 2ai) - b^3 k + bc(bi + 3ak)) x^2}{2c^2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{\left( b(cd + ah) + \frac{ab^2 j}{c} - 2a(cf + 3aj) + \frac{b^2 c(cd-ah) - 4ac^2(3cd+ah) - ab^3 j + 4abc(cf+2aj)}{c\sqrt{b^2-4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}} \right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\left( b(cd + ah) + \frac{ab^2 j}{c} - 2a(cf + 3aj) - \frac{b^2 c(cd-ah) - 4ac^2(3cd+ah) - ab^3 j + 4abc(cf+2aj)}{c\sqrt{b^2-4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}} \right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{k \log(a + bx^2 + cx^4)}{4c^2} \\
&\quad + \frac{(4c^3 e - c^2(2bg - 4ai) + b^3 k - 6abck) \text{Subst}\left(\int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2\right)}{2c^2(b^2 - 4ac)} \\
&= \frac{x \left( c \left( b^2 d - 2a(cd - ah) - \frac{ab(cf+aj)}{c} \right) + (bc(cd + ah) - ab^2 j - 2ac(cf - aj)) x^2 \right)}{2ac(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad - \frac{bc(ce + ai) - ab^2 k - 2ac(cg - ak) + (2c^3 e - c^2(bg + 2ai) - b^3 k + bc(bi + 3ak)) x^2}{2c^2(b^2 - 4ac)(a + bx^2 + cx^4)} \\
&\quad + \frac{\left( b(cd + ah) + \frac{ab^2 j}{c} - 2a(cf + 3aj) + \frac{b^2 c(cd-ah) - 4ac^2(3cd+ah) - ab^3 j + 4abc(cf+2aj)}{c\sqrt{b^2-4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}} \right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{\left( b(cd + ah) + \frac{ab^2 j}{c} - 2a(cf + 3aj) - \frac{b^2 c(cd-ah) - 4ac^2(3cd+ah) - ab^3 j + 4abc(cf+2aj)}{c\sqrt{b^2-4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}} \right)}{2\sqrt{2}a\sqrt{c}(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{(4c^3 e - c^2(2bg - 4ai) + b^3 k - 6abck) \tanh^{-1} \left( \frac{b+2cx^2}{\sqrt{b^2-4ac}} \right) + \frac{k \log(a + bx^2 + cx^4)}{4c^2}}{2c^2(b^2 - 4ac)^{3/2}}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 2.47 (sec) , antiderivative size = 775, normalized size of antiderivative = 1.20

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^6 + kx^7}{(a + bx^2 + cx^4)^2} dx$$

$$= \frac{2(2a^3ck - bc^2dx(b+cx^2) + a(-b^3kx^2 + b^2cx^2(i+jx) + 2c^3x(d+x(e+fx)) + bc^2(e+x(f-x(g+hx)))) + a^2(-b^2k + bc(i+x(j+3kx)) - 2c^2(g+x(h+x(i+jx))))}{a(-b^2+4ac)(a+bx^2+cx^4)}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5 + j\*x^6 + k\*x^7)/(a + b\*x^2 + c\*x^4)^2, x]

```
[Out] ((2*(2*a^3*c*k - b*c^2*d*x*(b + c*x^2) + a*(-(b^3*k*x^2) + b^2*c*x^2*(i + j*x) + 2*c^3*x*(d + x*(e + f*x)) + b*c^2*(e + x*(f - x*(g + h*x)))) + a^2*(-(b^2*k) + b*c*(i + x*(j + 3*k*x)) - 2*c^2*(g + x*(h + x*(i + j*x)))))/(a*(-b^2 + 4*a*c)*(a + b*x^2 + c*x^4) - (Sqrt[2]*Sqrt[c]*(a*b^3*j - b*c*(c*Sqrt[b^2 - 4*a*c]*d + 4*a*c*f + a*Sqrt[b^2 - 4*a*c]*h + 8*a^2*j) - b^2*(c^2*d - a*c*h + a*Sqrt[b^2 - 4*a*c]*j) + 2*a*c*(6*c^2*d + c*Sqrt[b^2 - 4*a*c]*f + 2*a*c*h + 3*a*Sqrt[b^2 - 4*a*c]*j))*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b - Sqrt[b^2 - 4*a*c]])/(a*(b^2 - 4*a*c)^(3/2)*Sqrt[b - Sqrt[b^2 - 4*a*c]]) + (Sqrt[2]*Sqrt[c]*(a*b^3*j + b*c*(c*Sqrt[b^2 - 4*a*c]*d - 4*a*c*f + a*Sqrt[b^2 - 4*a*c]*h - 8*a^2*j) + 2*a*c*(6*c^2*d - c*Sqrt[b^2 - 4*a*c]*f + 2*a*c*h - 3*a*Sqrt[b^2 - 4*a*c]*j) + b^2*(-(c^2*d) + a*c*h + a*Sqrt[b^2 - 4*a*c]*j))*ArcTan[(Sqrt[2]*Sqrt[c]*x)/Sqrt[b + Sqrt[b^2 - 4*a*c]])/(a*(b^2 - 4*a*c)^(3/2)*Sqrt[b + Sqrt[b^2 - 4*a*c]]) + ((-4*c^3*e + 2*c^2*(b*g - 2*a*i) + b^2*(-b + Sqrt[b^2 - 4*a*c])*k + a*c*(6*b*k - 4*Sqrt[b^2 - 4*a*c]*k))*Log[-b + Sqrt[b^2 - 4*a*c] - 2*c*x^2])/(b^2 - 4*a*c)^(3/2) + ((4*c^3*e + c^2*(-2*b*g + 4*a*i) + b^2*(b + Sqrt[b^2 - 4*a*c])*k - 2*a*c*(3*b + 2*Sqrt[b^2 - 4*a*c])*k)*Log[b + Sqrt[b^2 - 4*a*c] + 2*c*x^2])/(b^2 - 4*a*c)^(3/2))/(4*c^2)
```

## Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.58 (sec) , antiderivative size = 422, normalized size of antiderivative = 0.65

method	result
risch	$\frac{-\frac{(2a^2cj - ab^2j + abch - 2ac^2f + bc^2d)x^3}{2a(4ac - b^2)c} + \frac{(3abck - 2ac^2i - b^3k + b^2ci - bc^2g + 2c^3e)x^2}{2(4ac - b^2)c^2} + \frac{(a^2bj - 2a^2ch + abcf + 2ac^2d - b^2cd)x}{2ac(4ac - b^2)} + \frac{2a^2ck - ab^2k + abc}{2(4ac - b^2)}}{cx^4 + bx^2 + a}$
default	Expression too large to display

```
[In] int((k*x^7+j*x^6+i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^2,x,method=_RETURNVERBOSE)
```

```
[Out] (-1/2/a*(2*a^2*c*j-a*b^2*j+a*b*c*h-2*a*c^2*f+b*c^2*d)/(4*a*c-b^2)/c*x^3+1/2*(3*a*b*c*k-2*a*c^2*i-b^3*k+b^2*c*i-b*c^2*g+2*c^3*e)/(4*a*c-b^2)/c^2*x^2+1/2*(a^2*b*j-2*a^2*c*h+a*b*c*f+2*a*c^2*d-b^2*c*d)/a/c/(4*a*c-b^2)*x+1/2*(2*a^2*c*k-a*b^2*k+a*b*c*i-2*a*c^2*g+b*c^2*e)/(4*a*c-b^2)/c^2)/(c*x^4+b*x^2+a)+1/4/c*sum((2*k*_R^3+1/a*(6*a^2*c*j-a*b^2*j-a*b*c*h+2*a*c^2*f-b*c^2*d)/(4*a*c-b^2)*_R^2-2*(a*b*k-2*a*c*i+b*c*g-2*c^2*e)/(4*a*c-b^2)*_R-1/a*(a^2*b*j-2*a^2*c*h+a*b*c*f-6*a*c^2*d+b^2*c*d)/(4*a*c-b^2))/(2*_R^3*c+_R*b)*ln(x-_R),_R=RootOf(_Z^4*c+_Z^2*b+a))
```

**Fricas [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^6 + kx^7}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

[In] integrate((k\*x^7+j\*x^6+i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x,  
algorithm="fricas")

[Out] Timed out

**Sympy [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^6 + kx^7}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

[In] integrate((k\*x\*\*7+j\*x\*\*6+i\*x\*\*5+h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a)\*\*2,x)

[Out] Timed out

**Maxima [F]**

$$\begin{aligned} & \int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^6 + kx^7}{(a + bx^2 + cx^4)^2} dx \\ &= \int \frac{kx^7 + jx^6 + ix^5 + hx^4 + gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^2} dx \end{aligned}$$

[In] integrate((k\*x^7+j\*x^6+i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x,  
algorithm="maxima")

[Out] 
$$\begin{aligned} & -1/2*(a*b*c^2*e - 2*a^2*c^2*g + a^2*b*c*i - (b*c^3*d - 2*a*c^3*f + a*b*c^2* \\ & h - (a*b^2*c - 2*a^2*c^2)*j)*x^3 + (2*a*c^3*e - a*b*c^2*g + (a*b^2*c - 2*a^ \\ & 2*c^2)*i - (a*b^3 - 3*a^2*b*c)*k)*x^2 - (a^2*b^2 - 2*a^3*c)*k + (a*b*c^2*f \\ & - 2*a^2*c^2*h + a^2*b*c*j - (b^2*c^2 - 2*a*c^3)*d)*x)/(a^2*b^2*c^2 - 4*a^3* \\ & c^3 + (a*b^2*c^3 - 4*a^2*c^4)*x^4 + (a*b^3*c^2 - 4*a^2*b*c^3)*x^2) - 1/2*in \\ & tegrate(-(2*(a*b^2 - 4*a^2*c)*k*x^3 + a*b*c*f - 2*a^2*c*h + a^2*b*j + (b*c^ \\ & 2*d - 2*a*c^2*f + a*b*c*h + (a*b^2 - 6*a^2*c)*j)*x^2 + (b^2*c - 6*a*c^2)*d \\ & - 2*(2*a*c^2*e - a*b*c*g + 2*a^2*c*i - a^2*b*k)*x)/(c*x^4 + b*x^2 + a), x)/ \\ & (a*b^2*c - 4*a^2*c^2) \end{aligned}$$



**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 16214 vs. 2(594) = 1188.

Time = 3.25 (sec) , antiderivative size = 16214, normalized size of antiderivative = 25.14

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^6 + kx^7}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

[In] integrate((k\*x^7+j\*x^6+i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^2,x,  
algorithm="giac")

[Out] 1/4\*k\*log(abs(c\*x^4 + b\*x^2 + a))/c^2 + 1/16\*((a^2\*b^4\*c^3 - 8\*a^3\*b^2\*c^4 + 16\*a^4\*c^5)^2\*(2\*b^3\*c^4 - 8\*a\*b\*c^5 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^3\*c^2 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b\*c^3 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b^2\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*b\*c^4 - 2\*(b^2 - 4\*a\*c)\*b\*c^4)\*d - 2\*(a^2\*b^4\*c^3 - 8\*a^3\*b^2\*c^4 + 16\*a^4\*c^5)^2\*(2\*a\*b^2\*c^4 - 8\*a^2\*c^5 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^2\*c^2 + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*c^3 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b\*c^3 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*c^4 - 2\*(b^2 - 4\*a\*c)\*a\*c^4)\*f + (a^2\*b^4\*c^3 - 8\*a^3\*b^2\*c^4 + 16\*a^4\*c^5)^2\*(2\*a\*b^3\*c^3 - 8\*a^2\*b\*c^4 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^3\*c + 4\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*b\*c^2 + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^2\*c^2 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b\*c^3 - 2\*(b^2 - 4\*a\*c)\*a\*b\*c^3)\*h + (a^2\*b^4\*c^3 - 8\*a^3\*b^2\*c^4 + 16\*a^4\*c^5)^2\*(2\*a\*b^4\*c^2 - 20\*a^2\*b^2\*c^3 + 48\*a^3\*c^4 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^4 + 10\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*b^2\*c + 2\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^3\*c - 24\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^3\*c^2 - 12\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*b\*c^2 - sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a\*b^2\*c^2 + 6\*sqrt(2)\*sqrt(b^2 - 4\*a\*c)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*c^3 - 2\*(b^2 - 4\*a\*c)\*a\*b^2\*c^2 + 12\*(b^2 - 4\*a\*c)\*a^2\*c^3)\*j + 2\*(sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*b^8\*c^5 - 18\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^3\*b^6\*c^6 - 2\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*b^7\*c^6 - 2\*a^2\*b^8\*c^6 + 120\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^4\*b^4\*c^7 + 28\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^3\*b^5\*c^7 + sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^2\*b^6\*c^7 + 36\*a^3\*b^6\*c^7 - 352\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^5\*b^2\*c^8 - 128\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^4\*b^3\*c^8 - 14\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^3\*b^4\*c^8 - 240\*a^4\*b^4\*c^8 + 384\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^6\*c^9 + 192\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^5\*b\*c^9 + 64\*sqrt(2)\*sqrt(b\*c + sqrt(b^2 - 4\*a\*c)\*c)\*a^4\*b^2\*c^9 + 70







$$\begin{aligned}
& b^2 - 4ac) * c) * a^2 * b * c^2 - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a * b^2 * c^2 + 6 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^2 * c^3 - 2 * (b^2 - 4ac) * a * b^2 * c^2 + 12 * (b^2 - 4ac) * a^2 * c^3) * j - \\
& 2 * (\sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^2 * b^8 * c^5 - 18 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^3 * b^6 * c^6 - 2 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^2 * b^7 * c^6 + 2 * a^2 * b^8 * c^6 + 120 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^4 * c^7 + 28 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^3 * b^5 * c^7 \\
& + \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^2 * b^6 * c^7 - 36 * a^3 * b^6 * c^7 - 35 * 2 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * b^2 * c^8 - 128 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^3 * c^8 - 14 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^3 * b^4 * c^8 + 240 * a^4 * b^4 * c^8 + 384 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^6 * c^9 + 192 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * b * c^9 + 6 \\
& 4 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^2 * c^9 - 704 * a^5 * b^2 * c^9 - 9 * 6 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * c^{10} + 768 * a^6 * c^{10} - 2 * (b^2 - 4ac) * a^2 * b^6 * c^6 + 28 * (b^2 - 4ac) * a^3 * b^4 * c^7 - 128 * (b^2 - 4ac) * a^4 * b^2 * c^8 + 192 * (b^2 - 4ac) * a^5 * c^9) * d * \text{abs}(a^2 * b^4 * c^3 - 8 * a^3 * b^2 * c^4 + 1 \\
& 6 * a^4 * c^5) - 2 * (\sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^3 * b^7 * c^5 - 12 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^5 * c^6 - 2 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^3 * b^6 * c^6 + 2 * a^3 * b^7 * c^6 + 48 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * b^3 * c^7 + 16 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^4 * c^7 + \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^3 * b^5 * c^7 - 24 * a^4 * b^5 * c^7 - 64 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^6 * b * c^8 - 32 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * b^2 * c^8 - 8 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^3 * c^8 + 96 * a^5 * b^3 * c^8 + 16 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * b * c^9 - 128 * a^6 * b * c^9 - 2 * (b^2 - 4ac) * a^3 * b^5 * c^6 + 16 * (b^2 - 4ac) * a^4 * b^3 * c^7 - 32 * (b^2 - 4ac) * a^5 * b * c^8) * f * \text{abs}(a^2 * b^4 * c^3 - 8 * a^3 * b^2 * c^4 + 16 * a^4 * c^5) + 4 * (\sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^6 * c^5 - 12 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * b^4 * c^6 - 2 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^5 * c^6 + 2 * a^4 * b^6 * c^6 + 48 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^6 * b^2 * c^7 + 16 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * b^3 * c^7 + \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^4 * c^7 - 24 * a^5 * b^4 * c^7 - 64 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^7 * c^8 - 32 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^6 * b * c^8 - 8 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * b^2 * c^8 + 96 * a^6 * b^2 * c^8 + 16 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^6 * c^9 - 128 * a^7 * c^9 - 2 * (b^2 - 4ac) * a^4 * b^4 * c^6 + 16 * (b^2 - 4ac) * a^5 * b^2 * c^7 - 32 * (b^2 - 4ac) * a^6 * c^8) * h * \text{abs}(a^2 * b^4 * c^3 - 8 * a^3 * b^2 * c^4 + 16 * a^4 * c^5) - 2 * (\sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^7 * c^4 - 12 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * b^5 * c^5 - 2 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^6 * c^5 + 2 * a^4 * b^7 * c^5 + 48 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^6 * b^3 * c^6 + 16 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * b^4 * c^6 + \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^4 * b^5 * c^6 - 24 * a^5 * b^5 * c^6 - 64 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^7 * b * c^7 - 32 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^6 * b^2 * c^7 - 8 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^5 * b^3 * c^7 + 96 * a^6 * b^3 * c^7 + 16 * \sqrt{2} * \sqrt{b * c - \sqrt{b^2 - 4ac}} * c) * a^6 * b * c^8 - 128 * a^7 * b * c^8 - 2 * (b^2 - 4ac) *
\end{aligned}$$

$$\begin{aligned}
& c) * a^4 * b^5 * c^5 + 16 * (b^2 - 4 * a * c) * a^5 * b^3 * c^6 - 32 * (b^2 - 4 * a * c) * a^6 * b * c^7) \\
& * j * \text{abs}(a^2 * b^4 * c^3 - 8 * a^3 * b^2 * c^4 + 16 * a^4 * c^5) + (2 * a^4 * b^{11} * c^{10} - 56 * a^5 * b^9 * c^{11} + 576 * a^6 * b^7 * c^{12} - 2816 * a^7 * b^5 * c^{13} + 6656 * a^8 * b^3 * c^{14} - 614 \\
& 4 * a^9 * b * c^{15} - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^4 * b^{11} * c^8 + 28 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^5 * b^9 * c^9 + 2 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^4 * b^{10} * c^9 - 288 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^6 * b^7 * c^{10} - 48 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^5 * b^8 * c^{10} - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^4 * b^9 * c^{10} + 1408 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^7 * b^5 * c^{11} + 384 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^6 * b^6 * c^{11} + 24 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^5 * b^7 * c^{11} - 3328 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^8 * b^3 * c^{12} - 1280 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^7 * b^4 * c^{12} - 192 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^6 * b^5 * c^{12} + 3072 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^9 * b * c^{13} + 1536 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^8 * b^2 * c^{13} + 640 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^7 * b^3 * c^{13} - 768 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^8 * b * c^{14} - 2 * (b^2 - 4 * a * c) * a^4 * b^9 * c^{10} + 48 * (b^2 - 4 * a * c) * a^5 * b^7 * c^{11} - 384 * (b^2 - 4 * a * c) * a^6 * b^5 * c^{12} + 1280 * (b^2 - 4 * a * c) * a^7 * b^3 * c^{13} - 1536 * (b^2 - 4 * a * c) * a^8 * b * c^{14}) * d + 4 * (2 * a^5 * b^{10} * c^{10} - 32 * a^6 * b^8 * c^{11} + 192 * a^7 * b^6 * c^{12} - 512 * a^8 * b^4 * c^{13} + 512 * a^9 * b^2 * c^{14} - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^5 * b^{10} * c^8 + 16 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^6 * b^8 * c^9 + 2 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^5 * b^9 * c^9 - 96 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^7 * b^6 * c^{10} - 24 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^6 * b^7 * c^{10} - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^5 * b^8 * c^{10} + 256 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^8 * b^4 * c^{11} + 96 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^7 * b^5 * c^{11} + 12 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^6 * b^6 * c^{11} - 256 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^9 * b^2 * c^{12} - 128 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^8 * b^3 * c^{12} - 48 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^7 * b^4 * c^{12} + 64 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^8 * b^2 * c^{13} - 2 * (b^2 - 4 * a * c) * a^5 * b^8 * c^{10} + 24 * (b^2 - 4 * a * c) * a^6 * b^6 * c^{11} - 96 * (b^2 - 4 * a * c) * a^7 * b^4 * c^{12} + 128 * (b^2 - 4 * a * c) * a^8 * b^2 * c^{13}) * f - (2 * a^5 * b^{11} * c^9 - 24 * a^6 * b^9 * c^{10} + 64 * a^7 * b^7 * c^{11} + 256 * a^8 * b^5 * c^{12} - 1536 * a^9 * b^3 * c^{13} + 2048 * a^{10} * b * c^{14} - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^5 * b^{11} * c^7 + 12 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^6 * b^9 * c^8 + 2 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^5 * b^{10} * c^8 - 32 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^7 * b^7 * c^9 - 16 * \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c) * a^6 * b^8 * c^9 - \sqrt{2} * \sqrt{b^2 - 4 * a * c} * \sqrt{b * c - \sqrt{b^2 - 4 * a * c}} * c)
\end{aligned}$$

$$\begin{aligned}
& a^5 b^9 c^9 - 128 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} c \\
& ) a^8 b^5 c^{10} + 8 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} c \\
& ) a^6 b^7 c^{10} + 768 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^9 b^3 c^{11} + 256 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^8 b^4 c^{11} - 1024 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^{10} b c^{12} - 512 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^9 b^2 c^{12} - 128 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^8 b^3 c^{12} + 256 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^9 b^4 c^{13} - 2(b^2 - 4ac) a^5 b^9 c^9 + 16(b^2 - 4ac) a^6 b^7 c^{10} \\
& - 256(b^2 - 4ac) a^8 b^3 c^{12} + 512(b^2 - 4ac) a^9 b^4 c^{13} \\
& ) h - (2a^5 b^{12} c^8 - 48a^6 b^{10} c^9 + 448a^7 b^8 c^{10} - 2048a^8 b^6 c^{11} \\
& + 4608a^9 b^4 c^{12} - 4096a^{10} b^2 c^{13} - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^5 b^{12} c^6 + 24 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^6 b^{10} c^7 + 2 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^5 b^{11} c^7 - 224 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^7 b^8 c^8 - 40 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^6 b^9 c^8 - \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^5 b^{10} c^8 + 1024 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^8 b^6 c^9 + 288 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^7 b^7 c^9 + 20 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^6 b^8 c^9 - 2304 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^9 b^4 c^{10} - 896 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^8 b^5 c^{10} - 144 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^7 b^6 c^{10} + 2048 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^{10} b^2 c^{11} + 1024 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^9 b^3 c^{11} + 448 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^8 b^4 c^{11} - 512 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}} \\
& c) a^9 b^2 c^{12} - 2(b^2 - 4ac) a^5 b^{10} c^8 + 40(b^2 - 4ac) a^6 b^8 c^9 \\
& - 288(b^2 - 4ac) a^7 b^6 c^{10} + 896(b^2 - 4ac) a^8 b^4 c^{11} - 1024(b^2 - 4ac) a^9 b^2 c^{12} \\
& ) j) \arctan(2\sqrt{1/2} x / \sqrt{(a^2 b^5 c^3 - 8a^3 b^3 c^4 + 16a^4 b c^5 - \sqrt{(a^2 b^5 c^3 - 8a^3 b^3 c^4 + 16a^4 b c^5)^2 - 4(a^3 b^4 c^3 - 8a^4 b^2 c^4 + 16a^5 c^5)(a^2 b^4 c^4 - 8a^3 b^2 c^5 + 16a^4 c^6)}) / (a^2 b^4 c^4 - 8a^3 b^2 c^5 + 16a^4 c^6)}) / ((a^4 b^8 c^5 - 16a^5 b^6 c^6 - 2a^4 b^7 c^6 + 96a^6 b^4 c^7 + 24a^5 b^5 c^7 + a^4 b^6 c^7 - 256a^7 b^2 c^8 - 96a^6 b^3 c^8 - 12a^5 b^4 c^8 + 256a^8 c^9 + 128a^7 b c^9 + 48a^6 b^2 c^9 - 64a^7 c^{10})) \operatorname{abs}(a^2 b^4 c^3 - 8a^3 b^2 c^4 + 16a^4 c^5) \operatorname{abs}(c)) - 1/16(4(b^3 c^3 - 4ab c^4 - 2b^2 c^4 + b c^5 + (b^2 c^3 - 4ac^4 - 2b c^4 + c^5) \sqrt{b^2 - 4ac})) e \operatorname{abs}(a^2 b^4 c^3 - 8a^3 b^2 c^4 + 16a^4 c^5) - 2(b^4 c^2 - 4ab^2 c^3 - 2b^3 c^3 + b^2 c^4 + (b^3 c^2 - 4ab c^3 - 2b^2 c^3 + b c^4) \sqrt{b^2 - 4ac})) g \operatorname{abs}(a^2 b^4 c^3 - 8a^3 b^2 c^4 + 16a^4 c^5) + 4(ab^3 c^2 - 4a^2 b c^3 - 2ab^2 c^3 + ab c^4 + (ab^2 c^2 - 4a^2 c^3 - 2ab c^3 + a c^4) \sqrt{b^2 - 4ac})) i \operatorname{abs}(a^2 b^4 c^3 - 8a^3 b^2 c^4 + 16a^4 c^5) + (b^6 - 10ab^4 c - 2b^5 c + 24a^2 b^2 c^2 + 12ab^3 c^2 + b^4 c^2 - 6ab^2 c^3 + (b^5 - 10ab^3 c - 2b^4 c
\end{aligned}$$

$$\begin{aligned}
& c + 24a^2b^2c^2 + 12ab^2c^2 + b^3c^2 - 6a^2b^2c^3) \sqrt{b^2 - 4ac}) * k \\
& * \text{abs}(a^2b^4c^3 - 8a^3b^2c^4 + 16a^4c^5) - 4*(a^2b^7c^6 - 12a^3b^5c^7 - 2a^2b^6c^7 + 48a^4b^3c^8 + 16a^3b^4c^8 + a^2b^5c^8 - 64a^5b^2c^9 - 32a^4b^2c^9 - 8a^3b^3c^9 + 16a^4b^2c^9 - (a^2b^6c^6 - 8a^3b^4c^7 - 2a^2b^5c^7 + 16a^4b^2c^8 + 8a^3b^3c^8 + a^2b^4c^8 - 4a^3b^2c^9) \sqrt{b^2 - 4ac})) * e + 2*(a^2b^8c^5 - 12a^3b^6c^6 - 2a^2b^7c^6 + 48a^4b^4c^7 + 16a^3b^5c^7 + a^2b^6c^7 - 64a^5b^2c^8 - 32a^4b^3c^8 - 8a^3b^4c^8 + 16a^4b^2c^9 + (a^2b^7c^5 - 8a^3b^5c^6 - 2a^2b^6c^6 + 16a^4b^3c^7 + 8a^3b^4c^7 + a^2b^5c^7 - 4a^3b^3c^8) \sqrt{b^2 - 4ac})) * g - 4*(a^3b^7c^5 - 12a^4b^5c^6 - 2a^3b^6c^6 + 48a^5b^3c^7 + 16a^4b^4c^7 + a^3b^5c^7 - 64a^6b^2c^8 - 32a^5b^2c^8 - 8a^4b^3c^8 + 16a^5b^2c^9 - (a^3b^6c^5 - 8a^4b^4c^6 - 2a^3b^5c^6 + 16a^5b^2c^7 + 8a^4b^3c^7 + a^3b^4c^7 - 4a^4b^2c^8) \sqrt{b^2 - 4ac})) * i - (a^2b^{10}c^3 - 18a^3b^8c^4 - 2a^2b^9c^4 + 120a^4b^6c^5 + 28a^3b^7c^5 + a^2b^8c^5 - 352a^5b^4c^6 - 128a^4b^5c^6 - 14a^3b^6c^6 + 384a^6b^2c^7 + 192a^5b^3c^7 + 64a^4b^4c^7 - 96a^5b^2c^8 - (a^2b^9c^3 - 14a^3b^7c^4 - 2a^2b^8c^4 + 64a^4b^5c^5 + 20a^3b^6c^5 + a^2b^7c^5 - 96a^5b^3c^6 - 48a^4b^4c^6 - 10a^3b^5c^6 + 24a^4b^3c^7) \sqrt{b^2 - 4ac})) * k) * \log(x^2 + 1/2*(a^2b^5c^3 - 8a^3b^3c^4 + 16a^4b^2c^5 + \sqrt{(a^2b^5c^3 - 8a^3b^3c^4 + 16a^4b^2c^5)^2 - 4*(a^3b^4c^3 - 8a^4b^2c^4 + 16a^5c^5)*(a^2b^4c^4 - 8a^3b^2c^5 + 16a^4c^6)})) / ((a^2b^4c^4 - 8a^3b^2c^5 + 16a^4c^6)) / ((ab^4c - 8a^2b^2c^2 - 2ab^3c^2 + 16a^3c^3 + 8a^2b^2c^3 + ab^2c^3 - 4a^2c^4) * c^2 * \text{abs}(a^2b^4c^3 - 8a^3b^2c^4 + 16a^4c^5)) - 1/16*(4*(b^3c^3 - 4ab^2c^4 - 2b^2c^4 + bc^5 + (b^2c^3 - 4ac^4 - 2b^2c^4 + c^5) \sqrt{b^2 - 4ac})) * e * \text{abs}(a^2b^4c^3 - 8a^3b^2c^4 + 16a^4c^5) - 2*(b^4c^2 - 4ab^2c^3 - 2b^3c^3 + b^2c^4 - (b^3c^2 - 4ab^2c^3 - 2b^2c^3 + bc^4) \sqrt{b^2 - 4ac})) * g * \text{abs}(a^2b^4c^3 - 8a^3b^2c^4 + 16a^4c^5) + 4*(ab^3c^2 - 4a^2b^2c^3 - 2ab^2c^3 + ab^2c^4 - (ab^2c^2 - 4a^2c^3 - 2ab^2c^3 + ac^4) \sqrt{b^2 - 4ac})) * i * \text{abs}(a^2b^4c^3 - 8a^3b^2c^4 + 16a^4c^5) + (b^6 - 10ab^4c - 2b^5c + 24a^2b^2c^2 + 12ab^3c^2 + b^4c^2 - 6a^2b^2c^3 - (b^5 - 10ab^3c - 2b^4c + 24a^2b^2c^2 + 12ab^3c^2 + b^4c^2 - 6a^2b^2c^3) \sqrt{b^2 - 4ac})) * k * \text{abs}(a^2b^4c^3 - 8a^3b^2c^4 + 16a^4c^5) + 4*(a^2b^7c^6 - 12a^3b^5c^7 - 2a^2b^6c^7 + 48a^4b^3c^8 + 16a^3b^4c^8 + a^2b^5c^8 - 64a^5b^2c^9 - 32a^4b^2c^9 - 8a^3b^3c^9 + 16a^4b^2c^9 + (a^2b^6c^6 - 8a^3b^4c^7 - 2a^2b^5c^7 + 16a^4b^2c^8 + 8a^3b^3c^8 + a^2b^4c^8 - 4a^3b^2c^9) \sqrt{b^2 - 4ac})) * e - 2*(a^2b^8c^5 - 12a^3b^6c^6 - 2a^2b^7c^6 + 48a^4b^4c^7 + 16a^3b^5c^7 + a^2b^6c^7 - 64a^5b^2c^8 - 32a^4b^3c^8 - 8a^3b^4c^8 + 16a^4b^2c^9 - (a^2b^7c^5 - 8a^3b^5c^6 - 2a^2b^6c^6 + 16a^4b^3c^7 + 8a^3b^4c^7 + a^2b^5c^7 - 4a^3b^3c^8) \sqrt{b^2 - 4ac})) * g + 4*(a^3b^7c^5 - 12a^4b^5c^6 - 2a^3b^6c^6 + 48a^5b^3c^7 + 16a^4b^4c^7 + a^3b^5c^7 - 64a^6b^2c^8 - 32a^5b^2c^8 - 8a^4b^3c^8 + 16a^5b^2c^9 - (a^3b^6c^5 - 8a^4b^4c^6 - 2a^3b^5c^6 + 16a^5b^2c^7 + 8a^4b^3c^7 + a^3b^4c^7 - 4a^4
\end{aligned}$$



$$4*b^2*c^8)*\sqrt{b^2 - 4*a*c})*i + (a^2*b^{10}*c^3 - 18*a^3*b^8*c^4 - 2*a^2*b^9*c^4 + 120*a^4*b^6*c^5 + 28*a^3*b^7*c^5 + a^2*b^8*c^5 - 352*a^5*b^4*c^6 - 128*a^4*b^5*c^6 - 14*a^3*b^6*c^6 + 384*a^6*b^2*c^7 + 192*a^5*b^3*c^7 + 64*a^4*b^4*c^7 - 96*a^5*b^2*c^8 - (a^2*b^9*c^3 - 14*a^3*b^7*c^4 - 2*a^2*b^8*c^4 + 64*a^4*b^5*c^5 + 20*a^3*b^6*c^5 + a^2*b^7*c^5 - 96*a^5*b^3*c^6 - 48*a^4*b^4*c^6 - 10*a^3*b^5*c^6 + 24*a^4*b^3*c^7)*\sqrt{b^2 - 4*a*c}))*k)*\log(x^2 + 1/2*(a^2*b^5*c^3 - 8*a^3*b^3*c^4 + 16*a^4*b*c^5 - \sqrt{(a^2*b^5*c^3 - 8*a^3*b^3*c^4 + 16*a^4*b*c^5)^2} - 4*(a^3*b^4*c^3 - 8*a^4*b^2*c^4 + 16*a^5*c^5)*(a^2*b^4*c^4 - 8*a^3*b^2*c^5 + 16*a^4*c^6)))/(a^2*b^4*c^4 - 8*a^3*b^2*c^5 + 16*a^4*c^6))/((a*b^4*c - 8*a^2*b^2*c^2 - 2*a*b^3*c^2 + 16*a^3*c^3 + 8*a^2*b*c^3 + a*b^2*c^3 - 4*a^2*c^4)*c^2*\text{abs}(a^2*b^4*c^3 - 8*a^3*b^2*c^4 + 16*a^4*c^5)) - 1/2*(a*b*c^2*e - 2*a^2*c^2*g + a^2*b*c*i - a^2*b^2*k + 2*a^3*c*k - (b*c^3*d - 2*a*c^3*f + a*b*c^2*h - a*b^2*c*j + 2*a^2*c^2*j)*x^3 + (2*a*c^3*e - a*b*c^2*g + a*b^2*c*i - 2*a^2*c^2*i - a*b^3*k + 3*a^2*b*c*k)*x^2 - (b^2*c^2*d - 2*a*c^3*d - a*b*c^2*f + 2*a^2*c^2*h - a^2*b*c*j)*x)/((c*x^4 + b*x^2 + a)*(b^2 - 4*a*c)*a*c^2)$$

## Mupad [B] (verification not implemented)

Time = 13.37 (sec) , antiderivative size = 53538, normalized size of antiderivative = 83.00

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^6 + kx^7}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

[In] int((d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5 + j\*x^6 + k\*x^7)/(a + b\*x^2 + c\*x^4)^2, x)

[Out] ((b\*c^2\*e - 2\*a\*c^2\*g - a\*b^2\*k + 2\*a^2\*c\*k + a\*b\*c\*i)/(2\*c^2\*(4\*a\*c - b^2)) + (x^2\*(2\*c^3\*e - b^3\*k - b\*c^2\*g - 2\*a\*c^2\*i + b^2\*c\*i + 3\*a\*b\*c\*k))/(2\*c^2\*(4\*a\*c - b^2)) + (x\*(2\*a\*c^2\*d - b^2\*c\*d - 2\*a^2\*c\*h + a^2\*b\*j + a\*b\*c\*f))/(2\*a\*c\*(4\*a\*c - b^2)) - (x^3\*(b\*c^2\*d - 2\*a\*c^2\*f - a\*b^2\*j + 2\*a^2\*c\*j + a\*b\*c\*h))/(2\*a\*c\*(4\*a\*c - b^2)))/(a + b\*x^2 + c\*x^4) + symsum(log(root(1572864\*a^8\*b^2\*c^9\*z^4 - 983040\*a^7\*b^4\*c^8\*z^4 + 327680\*a^6\*b^6\*c^7\*z^4 - 61440\*a^5\*b^8\*c^6\*z^4 + 6144\*a^4\*b^10\*c^5\*z^4 - 256\*a^3\*b^12\*c^4\*z^4 - 1048576\*a^9\*c^10\*z^4 - 1572864\*a^8\*b^2\*c^7\*k\*z^3 + 983040\*a^7\*b^4\*c^6\*k\*z^3 - 327680\*a^6\*b^6\*c^5\*k\*z^3 + 61440\*a^5\*b^8\*c^4\*k\*z^3 - 6144\*a^4\*b^10\*c^3\*k\*z^3 + 256\*a^3\*b^12\*c^2\*k\*z^3 + 1048576\*a^9\*c^8\*k\*z^3 + 98304\*a^8\*b\*c^6\*i\*k\*z^2 + 98304\*a^7\*b\*c^7\*e\*k\*z^2 + 57344\*a^7\*b\*c^7\*f\*j\*z^2 + 32768\*a^7\*b\*c^7\*g\*i\*z^2 + 57344\*a^6\*b\*c^8\*d\*h\*z^2 + 32768\*a^6\*b\*c^8\*e\*g\*z^2 - 32\*a\*b^10\*c^4\*d\*f\*z^2 - 90112\*a^7\*b^3\*c^5\*i\*k\*z^2 + 30720\*a^6\*b^5\*c^4\*i\*k\*z^2 - 4608\*a^5\*b^7\*c^3\*i\*k\*z^2 + 256\*a^4\*b^9\*c^2\*i\*k\*z^2 - 49152\*a^7\*b^2\*c^6\*g\*k\*z^2 + 45056\*a^6\*b^4\*c^5\*g\*k\*z^2 + 24576\*a^7\*b^2\*c^6\*h\*j\*z^2 - 15360\*a^5\*b^6\*c^4\*g\*k\*z^2 - 3072\*a^5\*b^6\*c^4\*h\*j\*z^2 + 2304\*a^4\*b^8\*c^3\*g\*k\*z^2 + 2048\*a^6\*b^4\*c^5\*h\*j\*z^2 + 576\*a^4\*b^8\*c^3\*h\*j\*z^2 - 128\*a^3\*b^10\*c^2\*g\*k\*z^2 - 32\*a^3\*b^10\*c^2\*h\*j\*z^2 - 90112\*a^6\*b^3\*c^6\*e\*k\*z^2 - 49152\*a^6\*b^3\*c^6\*f\*j\*z^2 + 30720\*

$$\begin{aligned}
& a^5b^5c^5e^kz^2 - 24576a^6b^3c^6g^iiz^2 + 15360a^5b^5c^5f^jz^2 \\
& + 6144a^5b^5c^5g^iiz^2 - 4608a^4b^7c^4e^kz^2 - 2048a^4b^7c^4f^jz^2 - 512a^4b^7c^4g^iiz^2 + 256a^3b^9c^3e^kz^2 + 96a^3b^9c^3 \\
& *f^jz^2 + 131072a^6b^2c^7d^jz^2 + 49152a^6b^2c^7e^iiz^2 - 43008a^5b^4c^6d^jz^2 - 12288a^5b^4c^6e^iiz^2 + 6144a^5b^4c^6f^hiz^2 + \\
& 6144a^4b^6c^5d^jz^2 - 2048a^4b^6c^5f^hiz^2 + 1024a^4b^6c^5e^iiz^2 - 320a^3b^8c^4d^jz^2 + 192a^3b^8c^4f^hiz^2 - 49152a^5b^3c^7 \\
& *d^hiz^2 - 24576a^5b^3c^7e^giz^2 + 15360a^4b^5c^6d^hiz^2 + 6144a^4b^5c^6e^giz^2 - 2048a^3b^7c^5d^hiz^2 - 512a^3b^7c^5e^giz^2 + 96 \\
& *a^2b^9c^4d^hiz^2 + 24576a^5b^2c^8d^fz^2 - 3072a^3b^6c^6d^fz^2 + 2048a^4b^4c^7d^fz^2 + 576a^2b^8c^5d^fz^2 + 1536a^4b^10c^k^2 \\
& *z^2 + 61440a^8b^c^6j^2z^2 - 16a^3b^11c^j^2z^2 + 12288a^7b^c^7h^2z^2 + 12288a^6b^c^8f^2z^2 + 61440a^5b^c^9d^2z^2 + 432a^b^9c^5d^2z^2 \\
& - 49152a^8c^7h^jz^2 - 147456a^7c^8d^jz^2 - 65536a^7c^8e^iiz^2 - 16384a^7c^8f^hiz^2 - 49152a^6c^9d^fz^2 + 516096a^8b^2c^5k^2z^2 \\
& - 288768a^7b^4c^4k^2z^2 + 88576a^6b^6c^3k^2z^2 - 15744a^5b^8c^2k^2z^2 - 61440a^7b^3c^5j^2z^2 + 24064a^6b^5c^4j^2z^2 - \\
& 4608a^5b^7c^3j^2z^2 + 432a^4b^9c^2j^2z^2 + 24576a^7b^2c^6i^2z^2 - 6144a^6b^4c^5i^2z^2 + 512a^5b^6c^4i^2z^2 - 8192a^6b^3c^6 \\
& *h^2z^2 + 1536a^5b^5c^5h^2z^2 - 16a^3b^9c^3h^2z^2 - 8192a^6b^2c^7g^2z^2 + 6144a^5b^4c^6g^2z^2 - 1536a^4b^6c^5g^2z^2 + 128a^3b^8c^4g^2z^2 \\
& - 8192a^5b^3c^7f^2z^2 + 1536a^4b^5c^6f^2z^2 - 16a^2b^9c^4f^2z^2 + 24576a^5b^2c^8e^2z^2 - 6144a^4b^4c^7e^2z^2 + 512a^3b^6c^6e^2z^2 - 61440a^4b^3c^8d^2z^2 \\
& + 24064a^3b^5c^7d^2z^2 - 4608a^2b^7c^6d^2z^2 - 393216a^9c^6k^2z^2 - 64a^3b^12k^2z^2 - 32768a^8c^7i^2z^2 - 32768a^6c^9e^2z^2 - 16b^11c^4d^2z^2 \\
& - 16384a^7b^c^5g^iikz - 10240a^7b^c^5f^jkkz + 4096a^7b^c^5h^iiz^2 * jz - 47104a^6b^c^6d^hkkz - 16384a^6b^c^6e^gkz + 6144a^6b^c^6f^gjjz \\
& + 4096a^6b^c^6e^hjjz + 32a^b^10c^2d^fkkz - 6144a^5b^c^7d^ghiz - 4096a^5b^c^7d^fiaz - 32a^b^8c^4d^ffgz - 4096a^4b^c^8d^efz \\
& + 64a^b^7c^5d^efz - 18432a^7b^2c^4h^jkkz + 4608a^6b^4c^3h^jkkz - 384a^5b^6c^2h^jkkz + 12288a^6b^3c^4g^iikz + 7680a^6b^3c^4f^jkkz \\
& - 3072a^6b^3c^4h^iiz^2 * jz - 3072a^5b^5c^3g^iikz - 1920a^5b^5c^3f^jkkz + 768a^5b^5c^3h^iiz^2 * jz + 256a^4b^7c^2g^iikz + 16 \\
& 0a^4b^7c^2f^jkkz - 64a^4b^7c^2h^iiz^2 * jz - 65536a^6b^2c^5d^jkkz - 24576a^6b^2c^5e^iikz + 21504a^5b^4c^4d^jkkz + 9216a^6b^2c^5f^iiz^2 * jz \\
& + 6144a^5b^4c^4e^iikz - 3072a^5b^4c^4f^hkkz - 3072a^4b^6c^3d^jkkz - 2304a^5b^4c^4f^iiz^2 * jz - 2048a^6b^2c^5g^hjjz + 1536a^5b^4c^4g^hjjz \\
& + 1024a^4b^6c^3f^hkkz - 512a^4b^6c^3e^iikz - 384a^4b^6c^3g^hjjz + 192a^4b^6c^3f^iiz^2 * jz + 160a^3b^8c^2d^jkkz - 96a^3b^8c^2f^hkkz \\
& + 32a^3b^8c^2g^hjjz + 41472a^5b^3c^5d^hkkz - 13440a^4b^5c^4d^hkkz + 12288a^5b^3c^5e^gkz - 4608a^5b^3c^5f^gjjz - 3072a^5b^3c^5e^hjjz \\
& - 3072a^4b^5c^4e^gkz + 1888a^3b^7c^3d^hkkz + 1152a^4b^5c^4f^gjjz + 768a^4b^5c^4e^hjjz + 256a^3b^7c^3e^gkz - 96a^3b^7c^3f^gjjz - 96a^2b^9c^2d^hkkz - 6
\end{aligned}$$

$$\begin{aligned}
& 4a^3b^7c^3e^h*j^z + 9216a^5b^2c^6e^f*j^z - 9216a^5b^2c^6d^h*i^z \\
& - 6656a^4b^4c^5d^f*k^z - 6144a^5b^2c^6d^f*k^z + 3456a^3b^6c^4d^f*k^z - 2304a^4b^4c^5e^f*j^z + 2304a^4b^4c^5d^h*i^z - 576a^2b^8c^3d^f*k^z + 192a^3b^6c^4d^h*i^z + 4608a^4b^3c^6d^g*h^z + 3072a^4b^3c^6d^f*i^z - 1152a^3b^5c^5d^g*h^z - 768a^3b^5c^5d^f*i^z + 96a^2b^7c^4d^g*h^z + 64a^2b^7c^4d^f*i^z - 9216a^4b^2c^7d^e*h^z + 2304a^3b^4c^6d^e*h^z + 2048a^4b^2c^7d^f*g^z - 1536a^3b^4c^6d^f*g^z + 384a^2b^6c^5d^f*g^z - 192a^2b^6c^5d^e*h^z + 3072a^3b^3c^7d^e*f^z - 768a^2b^5c^6d^e*f^z - 3072a^8b^c^4*j^2*k^z + 48a^5b^7c*j^2*k^z - 49152a^8b^c^4*i*k^2*z + 2304a^5b^7c*i*k^2*z - 9216a^7b^c^5*h^2*k^z - 32a^4b^8c*i*j^2*z - 1152a^4b^8c*g*k^2*z + 9216a^7b^c^5*g*j^2*z - 3072a^6b^c^6*f^2*k^z + 16a^3b^9c*g*j^2*z - 49152a^7b^c^5*e*k^2*z - 128a^3b^9c*e*k^2*z - 58368a^5b^c^7*d^2*k^z - 1024a^6b^c^6*g*h^2*z - 432a^b^9c^3*d^2*k^z + 1024a^5b^c^7*f^2*g^z + 32a^b^8c^4*d^2*i^z - 9216a^4b^c^8*d^2*g^z + 336a^b^7c^5*d^2*g^z - 672a^b^6c^6*d^2*e^z + 24576a^8c^5*h*j*k^z + 73728a^7c^6*d*j*k^z + 32768a^7c^6*e*i*k^z - 12288a^7c^6*f*i*j^z + 8192a^7c^6*f*h*k^z + 24576a^6c^7*d^f*k^z - 12288a^6c^7*e^f*j^z + 12288a^6c^7d^h*i^z + 12288a^5c^8d^e*h^z + 2304a^7b^3c^3*j^2*k^z - 576a^6b^5c^2*j^2*k^z + 45056a^7b^3c^3*i*k^2*z - 15360a^6b^5c^2*i*k^2*z - 12288a^7b^2c^4*i^2*k^z + 3072a^6b^4c^3*i^2*k^z - 256a^5b^6c^2*i^2*k^z + 15872a^7b^2c^4*i*j^2*z + 6912a^6b^3c^4*h^2*k^z - 4992a^6b^4c^3*i*j^2*z - 1728a^5b^5c^3h^2*k^z + 672a^5b^6c^2*i*j^2*z + 144a^4b^7c^2h^2*k^z + 24576a^7b^2c^4g*k^2*z - 22528a^6b^4c^3g*k^2*z + 7680a^5b^6c^2g*k^2*z + 4096a^6b^2c^5g^2*k^z - 3072a^5b^4c^4g^2*k^z + 768a^4b^6c^3g^2*k^z - 64a^3b^8c^2g^2*k^z - 7936a^6b^3c^4g*j^2*z + 2496a^5b^5c^3g*j^2*z - 1536a^6b^2c^5h^2*i^z + 1280a^5b^3c^5f^2*k^z + 384a^5b^4c^4h^2*i^z - 336a^4b^7c^2g*j^2*z + 192a^4b^5c^4f^2*k^z - 144a^3b^7c^3f^2*k^z - 32a^4b^6c^3h^2*i^z + 16a^2b^9c^2f^2*k^z + 45056a^6b^3c^4e*k^2*z - 15360a^5b^5c^3e*k^2*z - 12288a^5b^2c^6e^2*k^z + 3072a^4b^4c^5e^2*k^z + 2304a^4b^7c^2e*k^2*z - 256a^3b^6c^4e^2*k^z + 59136a^4b^3c^6d^2*k^z - 23488a^3b^5c^5d^2*k^z + 15872a^6b^2c^5e*j^2*z - 4992a^5b^4c^4e*j^2*z + 4560a^2b^7c^4d^2*k^z + 1536a^5b^2c^6f^2*i^z + 768a^5b^3c^5g*h^2*z + 672a^4b^6c^3e*j^2*z - 384a^4b^4c^5f^2*i^z - 192a^4b^5c^4g*h^2*z - 32a^3b^8c^2e*j^2*z + 32a^3b^6c^4f^2*i^z + 16a^3b^7c^3g*h^2*z - 15872a^4b^2c^7d^2*i^z + 4992a^3b^4c^6d^2*i^z - 1536a^5b^2c^6e^h^2*z - 768a^4b^3c^6f^2g^z - 672a^2b^6c^5d^2*i^z + 384a^4b^4c^5e^h^2*z + 192a^3b^5c^5f^2g^z - 32a^3b^6c^4e^h^2*z - 16a^2b^7c^4f^2g^z + 7936a^3b^3c^7d^2g^z - 2496a^2b^5c^6d^2g^z + 1536a^4b^2c^7e^f^2*z - 384a^3b^4c^6e^f^2*z + 32a^2b^6c^5e^f^2*z - 15872a^3b^2c^8d^2e^z + 4992a^2b^4c^7d^2e^z - 61440a^8b^2c^3k^3*z + 21504a^7b^4c^2k^3*z + 16384a^8c^5i^2k^z - 18432a^8c^5i*j^2*z - 128a^4b^9i*k^2*z + 2048a^7c^6h^2i^z + 64a^3b^10g*k^2*z + 16384a^6c^7e^2k^z + 16b^11c^2d^2k^z - 18432a^7c^6e*j^2*z - 2048a^6c^7f^2i^z + 18432a^5c^8d^
\end{aligned}$$

$2*i*z - 3328*a^6*b^6*c*k^3*z + 2048*a^6*c^7*e*h^2*z - 16*b^9*c^4*d^2*g*z -$   
 $2048*a^5*c^8*e*f^2*z + 32*b^8*c^5*d^2*e*z + 18432*a^4*c^9*d^2*e*z + 65536*a$   
 $^9*c^4*k^3*z + 192*a^5*b^8*k^3*z - 3328*a^7*b*c^3*h*i*j*k - 6912*a^6*b*c^4*$   
 $d*i*j*k - 3328*a^6*b*c^4*e*h*j*k - 1536*a^6*b*c^4*f*g*j*k - 768*a^6*b*c^4*g$   
 $*h*i*j - 768*a^6*b*c^4*f*h*i*k - 6912*a^5*b*c^5*d*e*j*k - 2304*a^5*b*c^5*d*$   
 $g*i*j - 1792*a^5*b*c^5*e*f*i*j + 1536*a^5*b*c^5*d*g*h*k - 1280*a^5*b*c^5*d*$   
 $f*i*k - 768*a^5*b*c^5*e*g*h*j - 768*a^5*b*c^5*e*f*h*k - 256*a^5*b*c^5*f*g*h$   
 $*i + 16*a*b^8*c^2*d*f*g*k - 4*a*b^8*c^2*d*f*h*j - 2304*a^4*b*c^6*d*e*g*j -$   
 $1792*a^4*b*c^6*d*e*h*i - 1280*a^4*b*c^6*d*e*f*k - 768*a^4*b*c^6*d*f*g*i - 2$   
 $56*a^4*b*c^6*e*f*g*h - 32*a*b^7*c^3*d*e*f*k - 768*a^3*b*c^7*d*e*f*g + 32*a*$   
 $b^5*c^5*d*e*f*g + 576*a^6*b^3*c^2*h*i*j*k + 1664*a^6*b^2*c^3*g*h*j*k + 384*$   
 $a^6*b^2*c^3*f*i*j*k - 288*a^5*b^4*c^2*g*h*j*k - 160*a^5*b^4*c^2*f*i*j*k + 2$   
 $112*a^5*b^3*c^3*d*i*j*k + 576*a^5*b^3*c^3*e*h*j*k - 448*a^5*b^3*c^3*f*h*i*k$   
 $- 192*a^5*b^3*c^3*g*h*i*j - 192*a^5*b^3*c^3*f*g*j*k - 160*a^4*b^5*c^2*d*i*$   
 $j*k + 96*a^4*b^5*c^2*f*h*i*k + 80*a^4*b^5*c^2*f*g*j*k + 32*a^4*b^5*c^2*g*h*$   
 $i*j + 4992*a^5*b^2*c^4*d*h*i*k - 4608*a^5*b^2*c^4*e*g*i*k + 3456*a^5*b^2*c^$   
 $4*d*g*j*k - 1312*a^4*b^4*c^3*d*h*i*k - 1056*a^4*b^4*c^3*d*g*j*k + 896*a^5*b$   
 $^2*c^4*f*g*i*j + 768*a^4*b^4*c^3*e*g*i*k + 384*a^5*b^2*c^4*f*g*h*k + 384*a^$   
 $5*b^2*c^4*e*h*i*j + 384*a^5*b^2*c^4*e*f*j*k + 224*a^4*b^4*c^3*f*g*h*k - 160$   
 $*a^4*b^4*c^3*e*f*j*k - 96*a^4*b^4*c^3*f*g*i*j + 96*a^3*b^6*c^2*d*h*i*k + 80$   
 $*a^3*b^6*c^2*d*g*j*k - 64*a^4*b^4*c^3*e*h*i*j - 48*a^3*b^6*c^2*f*g*h*k - 24$   
 $96*a^4*b^3*c^4*d*g*h*k + 2112*a^4*b^3*c^4*d*e*j*k - 960*a^4*b^3*c^4*d*f*i*k$   
 $+ 656*a^3*b^5*c^3*d*g*h*k - 448*a^4*b^3*c^4*e*f*h*k + 384*a^3*b^5*c^3*d*f*$   
 $i*k + 320*a^4*b^3*c^4*d*g*i*j - 192*a^4*b^3*c^4*f*g*h*i - 192*a^4*b^3*c^4*e$   
 $*g*h*j + 192*a^4*b^3*c^4*e*f*i*j - 160*a^3*b^5*c^3*d*e*j*k + 96*a^3*b^5*c^3$   
 $*e*f*h*k - 48*a^2*b^7*c^2*d*g*h*k + 32*a^3*b^5*c^3*e*g*h*j - 32*a^2*b^7*c^2$   
 $*d*f*i*k + 4992*a^4*b^2*c^5*d*e*h*k - 3584*a^4*b^2*c^5*d*f*h*j - 1312*a^3*b$   
 $^4*c^4*d*e*h*k + 896*a^4*b^2*c^5*e*f*g*j + 896*a^4*b^2*c^5*d*g*h*i + 640*a^$   
 $4*b^2*c^5*d*f*g*k - 640*a^4*b^2*c^5*d*e*i*j + 600*a^3*b^4*c^4*d*f*h*j + 480$   
 $*a^3*b^4*c^4*d*f*g*k + 384*a^4*b^2*c^5*e*f*h*i - 192*a^2*b^6*c^3*d*f*g*k -$   
 $96*a^3*b^4*c^4*e*f*g*j - 96*a^3*b^4*c^4*d*g*h*i + 96*a^2*b^6*c^3*d*e*h*k +$   
 $12*a^2*b^6*c^3*d*f*h*j - 960*a^3*b^3*c^5*d*e*f*k + 384*a^2*b^5*c^4*d*e*f*k$   
 $+ 320*a^3*b^3*c^5*d*e*g*j - 192*a^3*b^3*c^5*e*f*g*h - 192*a^3*b^3*c^5*d*f*g$   
 $*i + 192*a^3*b^3*c^5*d*e*h*i + 32*a^2*b^5*c^4*d*f*g*i + 896*a^3*b^2*c^6*d*e$   
 $*g*h + 384*a^3*b^2*c^6*d*e*f*i - 96*a^2*b^4*c^5*d*e*g*h - 64*a^2*b^4*c^5*d*$   
 $e*f*i - 192*a^2*b^3*c^6*d*e*f*g + 48*a^6*b^4*c*i*j^2*k - 1424*a^6*b^4*c*h*j$   
 $*k^2 - 2304*a^7*b*c^3*g*j^2*k - 24*a^5*b^5*c*g*j^2*k + 2048*a^7*b*c^3*g*i*k$   
 $^2 - 1024*a^7*b*c^3*f*j*k^2 - 768*a^5*b^5*c*g*i*k^2 + 408*a^5*b^5*c*f*j*k^2$   
 $+ 256*a^6*b*c^4*g*h^2*k + 16*a^4*b^6*c*g*i*j^2 + 4608*a^6*b*c^4*e*i^2*k +$   
 $4608*a^5*b*c^5*e^2*i*k - 896*a^6*b*c^4*f*i^2*j + 768*a^4*b^6*c*d*j*k^2 - 25$   
 $6*a^4*b^6*c*f*h*k^2 - 128*a^4*b^6*c*e*i*k^2 + 2208*a^6*b*c^4*f*h*j^2 - 1920$   
 $*a^6*b*c^4*e*i*j^2 + 800*a^5*b*c^5*f^2*h*j - 256*a^5*b*c^5*f^2*g*k - 16*a*b$   
 $^8*c^2*d^2*i*k + 6*a^3*b^7*c*f*h*j^2 + 8192*a^6*b*c^4*d*h*k^2 + 2048*a^6*b*$   
 $c^4*e*g*k^2 - 472*a^3*b^7*c*d*h*k^2 + 64*a^3*b^7*c*e*g*k^2 + 4896*a^4*b*c^6$   
 $*d^2*h*j + 2304*a^4*b*c^6*d^2*g*k + 1824*a^5*b*c^5*d*h^2*j - 384*a^5*b*c^5*$

$$\begin{aligned}
& e^h^2 * i - 168 * a * b^7 * c^3 * d^2 * g * k + 42 * a * b^7 * c^3 * d^2 * h * j + 6 * a^2 * b^8 * c * d * h * j^2 \\
& + 1536 * a^5 * b * c^5 * e * g * i^2 + 1536 * a^4 * b * c^6 * e^2 * g * i - 896 * a^5 * b * c^5 * d * h * i^2 \\
& - 896 * a^4 * b * c^6 * e^2 * f * j + 144 * a^2 * b^8 * c * d * f * k^2 + 4896 * a^5 * b * c^5 * d * f * j^2 + \\
& + 1824 * a^4 * b * c^6 * d * f^2 * j - 384 * a^4 * b * c^6 * e * f^2 * i + 336 * a * b^6 * c^4 * d^2 * e * k - 1 \\
& 56 * a * b^6 * c^4 * d^2 * f * j + 16 * a * b^6 * c^4 * d^2 * g * i + 12 * a * b^7 * c^3 * d * f^2 * j + 2208 * a \\
& ^3 * b * c^7 * d^2 * f * h - 1920 * a^3 * b * c^7 * d^2 * e * i + 800 * a^4 * b * c^6 * d * f * h^2 - 102 * a * b \\
& ^5 * c^5 * d^2 * f * h - 32 * a * b^5 * c^5 * d^2 * e * i + 12 * a * b^6 * c^4 * d * f^2 * h - 2 * a * b^7 * c^3 * \\
& d * f * h^2 - 896 * a^3 * b * c^7 * d * e^2 * h - 8 * a * b^6 * c^4 * d * f * g^2 - 240 * a * b^4 * c^6 * d^2 * e \\
& * g - 32 * a * b^4 * c^6 * d * e^2 * f + 3072 * a^7 * c^4 * f * i * j * k + 3072 * a^6 * c^5 * e * f * j * k - 3 \\
& 072 * a^6 * c^5 * d * h * i * k + 1536 * a^6 * c^5 * e * h * i * j + 4608 * a^5 * c^6 * d * e * i * j - 3072 * a^ \\
& 5 * c^6 * d * e * h * k - 1152 * a^5 * c^6 * d * f * h * j + 512 * a^5 * c^6 * e * f * h * i + 1536 * a^4 * c^7 * d \\
& * e * f * i - 2 * a * b^9 * c * d * f * j^2 - 1088 * a^7 * b^2 * c^2 * i * j^2 * k + 4800 * a^7 * b^2 * c^2 * h * \\
& j * k^2 + 960 * a^6 * b^2 * c^3 * h^2 * i * k + 544 * a^6 * b^3 * c^2 * g * j^2 * k - 144 * a^5 * b^4 * c^2 \\
& * h^2 * i * k - 2304 * a^6 * b^2 * c^3 * g * i^2 * k + 1920 * a^6 * b^3 * c^2 * g * i * k^2 + 1152 * a^5 * b \\
& ^3 * c^3 * g^2 * i * k - 864 * a^6 * b^3 * c^2 * f * j * k^2 + 384 * a^5 * b^4 * c^2 * g * i^2 * k + 192 * a^ \\
& 6 * b^2 * c^3 * h * i^2 * j - 192 * a^4 * b^5 * c^2 * g^2 * i * k - 32 * a^5 * b^4 * c^2 * h * i^2 * j - 1088 \\
& * a^6 * b^2 * c^3 * e * j^2 * k + 960 * a^6 * b^2 * c^3 * g * i * j^2 - 480 * a^5 * b^3 * c^3 * g * h^2 * k - \\
& 240 * a^5 * b^4 * c^2 * g * i * j^2 + 192 * a^5 * b^2 * c^4 * f^2 * i * k + 72 * a^4 * b^5 * c^2 * g * h^2 * k \\
& + 48 * a^5 * b^4 * c^2 * e * j^2 * k + 48 * a^4 * b^4 * c^3 * f^2 * i * k - 16 * a^3 * b^6 * c^2 * f^2 * i * k \\
& + 13376 * a^6 * b^2 * c^3 * d * j * k^2 - 5136 * a^5 * b^4 * c^2 * d * j * k^2 - 3840 * a^6 * b^2 * c^3 * e \\
& * i * k^2 + 1536 * a^5 * b^4 * c^2 * e * i * k^2 - 768 * a^5 * b^3 * c^3 * e * i^2 * k - 768 * a^4 * b^3 * c \\
& ^4 * e^2 * i * k + 624 * a^5 * b^4 * c^2 * f * h * k^2 + 576 * a^6 * b^2 * c^3 * f * h * k^2 + 192 * a^5 * b^ \\
& 2 * c^4 * g^2 * h * j + 96 * a^5 * b^3 * c^3 * f * i^2 * j + 48 * a^4 * b^4 * c^3 * g^2 * h * j - 8 * a^3 * b^6 \\
& * c^2 * g^2 * h * j + 6848 * a^4 * b^2 * c^5 * d^2 * i * k - 2448 * a^3 * b^4 * c^4 * d^2 * i * k + 960 * a^ \\
& 5 * b^2 * c^4 * e * h^2 * k - 864 * a^5 * b^2 * c^4 * f * h^2 * j + 480 * a^5 * b^3 * c^3 * e * i * j^2 + 336 \\
& * a^4 * b^3 * c^4 * f^2 * h * j + 336 * a^2 * b^6 * c^3 * d^2 * i * k + 192 * a^5 * b^2 * c^4 * g * h^2 * i + \\
& 144 * a^5 * b^3 * c^3 * f * h * j^2 - 144 * a^4 * b^4 * c^3 * e * h^2 * k - 102 * a^4 * b^5 * c^2 * f * h * j^2 \\
& - 96 * a^4 * b^3 * c^4 * f^2 * g * k - 32 * a^4 * b^5 * c^2 * e * i * j^2 - 30 * a^3 * b^5 * c^3 * f^2 * h * j \\
& - 24 * a^3 * b^5 * c^3 * f^2 * g * k + 16 * a^4 * b^4 * c^3 * g * h^2 * i - 12 * a^4 * b^4 * c^3 * f * h^2 * j \\
& + 12 * a^3 * b^6 * c^2 * f * h^2 * j + 8 * a^2 * b^7 * c^2 * f^2 * g * k - 2 * a^2 * b^7 * c^2 * f^2 * h * j - \\
& 9312 * a^5 * b^3 * c^3 * d * h * k^2 + 3288 * a^4 * b^5 * c^2 * d * h * k^2 - 2304 * a^4 * b^2 * c^5 * e^2 \\
& * g * k + 1920 * a^5 * b^3 * c^3 * e * g * k^2 + 1152 * a^4 * b^3 * c^4 * e * g^2 * k - 768 * a^4 * b^5 * c^ \\
& 2 * e * g * k^2 + 384 * a^3 * b^4 * c^4 * e^2 * g * k - 320 * a^5 * b^2 * c^4 * d * i^2 * j - 224 * a^4 * b^3 \\
& * c^4 * f * g^2 * j + 192 * a^5 * b^2 * c^4 * f * h * i^2 + 192 * a^4 * b^2 * c^5 * e^2 * h * j - 192 * a^3 * \\
& b^5 * c^3 * e * g^2 * k - 32 * a^3 * b^4 * c^4 * e^2 * h * j + 24 * a^3 * b^5 * c^3 * f * g^2 * j - 3552 * a^ \\
& 5 * b^2 * c^4 * d * h * j^2 - 3424 * a^3 * b^3 * c^5 * d^2 * g * k + 1332 * a^4 * b^4 * c^3 * d * h * j^2 + 1 \\
& 224 * a^2 * b^5 * c^4 * d^2 * g * k + 960 * a^5 * b^2 * c^4 * e * g * j^2 - 496 * a^3 * b^3 * c^5 * d^2 * h * j \\
& + 432 * a^4 * b^3 * c^4 * d * h^2 * j - 240 * a^4 * b^4 * c^3 * e * g * j^2 - 222 * a^2 * b^5 * c^4 * d^2 * \\
& h * j + 192 * a^4 * b^2 * c^5 * f^2 * g * i + 192 * a^4 * b^2 * c^5 * e * f^2 * k - 174 * a^3 * b^5 * c^3 * d \\
& * h^2 * j - 156 * a^3 * b^6 * c^2 * d * h * j^2 + 48 * a^3 * b^4 * c^4 * e * f^2 * k - 32 * a^4 * b^3 * c^4 * \\
& e * h^2 * i + 16 * a^3 * b^6 * c^2 * e * g * j^2 + 16 * a^3 * b^4 * c^4 * f^2 * g * i - 16 * a^2 * b^6 * c^3 * \\
& e * f^2 * k + 12 * a^2 * b^7 * c^2 * d * h^2 * j + 1728 * a^5 * b^2 * c^4 * d * f * k^2 + 1392 * a^4 * b^4 * \\
& c^3 * d * f * k^2 - 840 * a^3 * b^6 * c^2 * d * f * k^2 - 768 * a^4 * b^2 * c^5 * e * g^2 * i + 576 * a^4 * b \\
& ^2 * c^5 * d * g^2 * j + 96 * a^4 * b^3 * c^4 * d * h * i^2 + 96 * a^3 * b^3 * c^5 * e^2 * f * j - 80 * a^3 * b \\
& ^4 * c^4 * d * g^2 * j + 64 * a^4 * b^2 * c^5 * f * g^2 * h + 48 * a^3 * b^4 * c^4 * f * g^2 * h + 6848 * a^3
\end{aligned}$$

$$\begin{aligned}
& *b^2*c^6*d^2*e*k - 3552*a^3*b^2*c^6*d^2*f*j - 2448*a^2*b^4*c^5*d^2*e*k + 13 \\
& 32*a^2*b^4*c^5*d^2*f*j + 960*a^3*b^2*c^6*d^2*g*i - 496*a^4*b^3*c^4*d*f*j^2 \\
& + 432*a^3*b^3*c^5*d*f^2*j - 240*a^2*b^4*c^5*d^2*g*i - 222*a^3*b^5*c^3*d*f*j \\
& ^2 + 192*a^4*b^2*c^5*e*g*h^2 - 174*a^2*b^5*c^4*d*f^2*j + 42*a^2*b^7*c^2*d*f \\
& *j^2 - 32*a^3*b^3*c^5*e*f^2*i + 16*a^3*b^4*c^4*e*g*h^2 - 320*a^3*b^2*c^6*d* \\
& e^2*j - 224*a^3*b^3*c^5*d*g^2*h + 192*a^4*b^2*c^5*d*f*i^2 + 192*a^3*b^2*c^6 \\
& *e^2*f*h - 32*a^3*b^4*c^4*d*f*i^2 + 24*a^2*b^5*c^4*d*g^2*h - 864*a^3*b^2*c^ \\
& 6*d*f^2*h + 480*a^2*b^3*c^6*d^2*e*i + 336*a^3*b^3*c^5*d*f*h^2 + 192*a^3*b^2 \\
& *c^6*e*f^2*g + 144*a^2*b^3*c^6*d^2*f*h - 30*a^2*b^5*c^4*d*f*h^2 + 16*a^2*b^ \\
& 4*c^5*e*f^2*g - 12*a^2*b^4*c^5*d*f^2*h + 192*a^3*b^2*c^6*d*f*g^2 + 96*a^2*b \\
& ^3*c^6*d*e^2*h + 48*a^2*b^4*c^5*d*f*g^2 + 960*a^2*b^2*c^7*d^2*e*g + 192*a^2 \\
& *b^2*c^7*d*e^2*f - 3072*a^8*b*c^2*j^2*k^2 + 1104*a^7*b^3*c*j^2*k^2 + 768*a^ \\
& 6*b^4*c*i^2*k^2 - 256*a^6*b^3*c^2*i^3*k + 1536*a^7*b*c^3*h^2*k^2 - 960*a^7* \\
& b*c^3*i^2*j^2 + 444*a^5*b^5*c*h^2*k^2 - 16*a^5*b^5*c*i^2*j^2 - 3072*a^7*b^2 \\
& *c^2*g*k^3 - 496*a^6*b^3*c^2*h*j^3 + 192*a^4*b^6*c*g^2*k^2 - 192*a^4*b^4*c^ \\
& 3*g^3*k + 144*a^5*b^3*c^3*h^3*j + 32*a^3*b^6*c^2*g^3*k - 18*a^4*b^5*c^2*h^3 \\
& *j - 9*a^4*b^6*c*h^2*j^2 - 192*a^6*b*c^4*h^2*i^2 + 36*a^3*b^7*c*f^2*k^2 - 4 \\
& *a^3*b^7*c*g^2*j^2 - 2176*a^6*b^3*c^2*e*k^3 - 256*a^3*b^3*c^5*e^3*k - 192*a \\
& ^6*b^2*c^3*f*j^3 - 192*a^4*b^2*c^5*f^3*j + 132*a^5*b^4*c^2*f*j^3 + 128*a^4* \\
& b^3*c^4*g^3*i - 28*a^3*b^4*c^4*f^3*j + 6*a^2*b^6*c^3*f^3*j + 10752*a^5*b*c^ \\
& 5*d^2*k^2 - 960*a^5*b*c^5*e^2*j^2 - 192*a^5*b*c^5*f^2*i^2 - 1680*a^5*b^3*c^ \\
& 3*d*j^3 - 1680*a^2*b^3*c^6*d^3*j + 222*a^4*b^5*c^2*d*j^3 + 80*a^4*b^3*c^4*f \\
& *h^3 + 80*a^3*b^3*c^5*f^3*h + 30*a*b^8*c^2*d^2*j^2 + 6*a^3*b^5*c^3*f*h^3 + \\
& 6*a^2*b^5*c^4*f^3*h - 960*a^4*b*c^6*d^2*i^2 - 192*a^4*b*c^6*e^2*h^2 - 192*a \\
& ^4*b^2*c^5*d*h^3 - 192*a^2*b^2*c^7*d^3*h + 128*a^3*b^3*c^5*e*g^3 - 28*a^3*b \\
& ^4*c^4*d*h^3 + 12*a*b^6*c^4*d^2*h^2 + 6*a^2*b^6*c^3*d*h^3 - 192*a^3*b*c^7*e \\
& ^2*f^2 + 60*a*b^5*c^5*d^2*g^2 + 198*a*b^4*c^6*d^2*f^2 + 144*a^2*b^3*c^6*d*f \\
& ^3 - 960*a^2*b*c^8*d^2*e^2 + 240*a*b^3*c^7*d^2*e^2 + 4608*a^8*c^3*i*j^2*k - \\
& 3072*a^8*c^3*h*j*k^2 - 512*a^7*c^4*h^2*i*k + 120*a^5*b^6*h*j*k^2 + 768*a^7 \\
& *c^4*h*i^2*j + 4608*a^7*c^4*e*j^2*k + 512*a^6*c^5*f^2*i*k + 64*a^4*b^7*g*i* \\
& k^2 - 40*a^4*b^7*f*j*k^2 - 9216*a^7*c^4*d*j*k^2 - 4096*a^7*c^4*e*i*k^2 - 10 \\
& 24*a^7*c^4*f*h*k^2 - 4608*a^5*c^6*d^2*i*k - 512*a^6*c^5*e*h^2*k - 192*a^6*c \\
& ^5*f*h^2*j - 40*a^3*b^8*d*j*k^2 + 24*a^3*b^8*f*h*k^2 + 2304*a^6*c^5*d*i^2*j \\
& + 768*a^5*c^6*e^2*h*j + 256*a^6*c^5*f*h*i^2 + 8*b^9*c^2*d^2*g*k - 2*b^9*c^ \\
& 2*d^2*h*j + 6144*a^8*b*c^2*i*k^3 - 2176*a^7*b^3*c*i*k^3 - 1728*a^6*c^5*d*h* \\
& j^2 + 1536*a^7*b*c^3*i^3*k + 512*a^5*c^6*e*f^2*k + 24*a^2*b^9*d*h*k^2 - 307 \\
& 2*a^6*c^5*d*f*k^2 - 16*b^8*c^3*d^2*e*k + 6*b^8*c^3*d^2*f*j - 4608*a^4*c^7*d \\
& ^2*e*k + 2016*a^7*b*c^3*h*j^3 - 1728*a^4*c^7*d^2*f*j + 1088*a^6*b^4*c*g*k^3 \\
& + 224*a^6*b*c^4*h^3*j + 30*a^5*b^5*c*h*j^3 + 2304*a^4*c^7*d*e^2*j + 768*a^ \\
& 5*c^6*d*f*i^2 + 256*a^4*c^7*e^2*f*h + 6*b^7*c^4*d^2*f*h + 6144*a^7*b*c^3*e* \\
& k^3 + 1536*a^4*b*c^6*e^3*k + 512*a^6*b*c^4*g*i^3 + 192*a^5*b^5*c*e*k^3 - 19 \\
& 2*a^4*c^7*d*f^2*h - 10*a^4*b^6*c*f*j^3 + 108*a*b^9*c*d^2*k^2 + 16*b^6*c^5*d \\
& ^2*e*g + 4320*a^6*b*c^4*d*j^3 + 4320*a^3*b*c^7*d^3*j + 222*a*b^5*c^5*d^3*j \\
& + 96*a^5*b*c^5*f*h^3 + 96*a^4*b*c^6*f^3*h - 10*a^3*b^7*c*d*j^3 + 768*a^3*c^ \\
& 8*d*e^2*f + 512*a^3*b*c^7*e^3*g + 132*a*b^4*c^6*d^3*h + 2016*a^2*b*c^8*d^3*
\end{aligned}$$

$$\begin{aligned}
& f - 496*a*b^3*c^7*d^3*f + 224*a^3*b*c^7*d*f^3 - 18*a*b^5*c^5*d*f^3 - 1920*a \\
& ^7*b^2*c^2*i^2*k^2 - 1648*a^6*b^3*c^2*h^2*k^2 + 240*a^6*b^3*c^2*i^2*j^2 - 9 \\
& 60*a^6*b^2*c^3*h^2*j^2 - 512*a^6*b^2*c^3*g^2*k^2 - 480*a^5*b^4*c^2*g^2*k^2 \\
& + 198*a^5*b^4*c^2*h^2*j^2 - 240*a^5*b^3*c^3*g^2*j^2 - 240*a^5*b^3*c^3*f^2*k \\
& ^2 + 60*a^4*b^5*c^2*g^2*j^2 - 36*a^4*b^5*c^2*f^2*k^2 - 16*a^5*b^3*c^3*h^2*i \\
& ^2 - 1920*a^5*b^2*c^4*e^2*k^2 + 768*a^4*b^4*c^3*e^2*k^2 - 464*a^5*b^2*c^4*f \\
& ^2*j^2 - 384*a^5*b^2*c^4*g^2*i^2 - 64*a^3*b^6*c^2*e^2*k^2 + 42*a^4*b^4*c^3* \\
& f^2*j^2 + 12*a^3*b^6*c^2*f^2*j^2 - 13104*a^4*b^3*c^4*d^2*k^2 + 5628*a^3*b^5 \\
& *c^3*d^2*k^2 - 1128*a^2*b^7*c^2*d^2*k^2 + 240*a^4*b^3*c^4*e^2*j^2 - 48*a^4* \\
& b^3*c^4*g^2*h^2 - 16*a^4*b^3*c^4*f^2*i^2 - 16*a^3*b^5*c^3*e^2*j^2 - 4*a^3*b \\
& ^5*c^3*g^2*h^2 - 2880*a^4*b^2*c^5*d^2*j^2 + 1750*a^3*b^4*c^4*d^2*j^2 - 345* \\
& a^2*b^6*c^3*d^2*j^2 - 192*a^4*b^2*c^5*f^2*h^2 - 42*a^3*b^4*c^4*f^2*h^2 + 24 \\
& 0*a^3*b^3*c^5*d^2*i^2 - 48*a^3*b^3*c^5*f^2*g^2 - 16*a^3*b^3*c^5*e^2*h^2 - 1 \\
& 6*a^2*b^5*c^4*d^2*i^2 - 4*a^2*b^5*c^4*f^2*g^2 - 464*a^3*b^2*c^6*d^2*h^2 - 3 \\
& 84*a^3*b^2*c^6*e^2*g^2 + 42*a^2*b^4*c^5*d^2*h^2 - 240*a^2*b^3*c^6*d^2*g^2 - \\
& 16*a^2*b^3*c^6*e^2*f^2 - 960*a^2*b^2*c^7*d^2*f^2 - 8*a*b^10*d*f*k^2 - a^2* \\
& b^8*c*f^2*j^2 - 2048*a^8*c^3*i^2*k^2 - 100*a^6*b^5*j^2*k^2 - 64*a^5*b^6*i^2 \\
& *k^2 - 288*a^7*c^4*h^2*j^2 - 36*a^4*b^7*h^2*k^2 - 16*a^3*b^8*g^2*k^2 - 2048 \\
& *a^6*c^5*e^2*k^2 - 864*a^6*c^5*f^2*j^2 - 4*a^2*b^9*f^2*k^2 - 2592*a^5*c^6*d \\
& ^2*j^2 - 1536*a^5*c^6*e^2*i^2 - 32*a^5*c^6*f^2*h^2 - 864*a^4*c^7*d^2*h^2 + \\
& 360*a^7*b^2*c^2*j^4 - 4*b^7*c^4*d^2*g^2 - 9*b^6*c^5*d^2*f^2 - 288*a^3*c^8*d \\
& ^2*f^2 - 24*a^5*b^2*c^4*h^4 - 16*b^5*c^6*d^2*e^2 - 9*a^4*b^4*c^3*h^4 - 16*a \\
& ^3*b^4*c^4*g^4 - 24*a^3*b^2*c^6*f^4 - 9*a^2*b^4*c^5*f^4 - a^2*b^6*c^3*f^2*h \\
& ^2 + 192*a^6*b^5*i*k^3 - 96*a^5*b^6*g*k^3 - 1728*a^7*c^4*f*j^3 - 192*a^5*c^ \\
& 6*f^3*j - 10*b^7*c^4*d^3*j - 1024*a^6*c^5*e*i^3 - 1024*a^4*c^7*e^3*i + 1536 \\
& *a^8*b^2*c*k^4 - 10*b^6*c^5*d^3*h - 1728*a^3*c^8*d^3*h - 192*a^5*c^6*d*h^3 \\
& - 25*a^6*b^4*c*j^4 + 30*b^5*c^6*d^3*f + 360*a*b^2*c^8*d^4 - 4*b^11*d^2*k^2 \\
& - 4096*a^9*c^2*k^4 - 1296*a^8*c^3*j^4 - 144*a^7*b^4*k^4 - 256*a^7*c^4*i^4 - \\
& 16*a^6*c^5*h^4 - 16*a^4*c^7*f^4 - 256*a^3*c^8*e^4 - 25*b^4*c^7*d^4 - 1296* \\
& a^2*c^9*d^4 - b^8*c^3*d^2*h^2 - b^10*c*d^2*j^2, z, n)*((3072*a^5*c^6*d*k - \\
& 512*a^4*c^7*e*f - 1536*a^5*c^6*e*j - 512*a^5*c^6*f*i + 1024*a^6*c^5*h*k - 1 \\
& 536*a^6*c^5*i*j + 32*a*b^5*c^5*d*e + 1024*a^3*b*c^7*d*e - 16*a*b^6*c^4*d*g \\
& + 1024*a^4*b*c^6*d*i + 512*a^4*b*c^6*e*h + 256*a^4*b*c^6*f*g + 16*a*b^8*c^2 \\
& *d*k + 256*a^5*b*c^5*f*k + 768*a^5*b*c^5*g*j + 512*a^5*b*c^5*h*i + 1792*a^6 \\
& *b*c^4*j*k - 384*a^2*b^3*c^6*d*e + 192*a^2*b^4*c^5*d*g + 32*a^2*b^4*c^5*e*f \\
& - 512*a^3*b^2*c^6*d*g + 32*a^2*b^5*c^4*d*i - 16*a^2*b^5*c^4*f*g - 384*a^3* \\
& b^3*c^5*d*i - 128*a^3*b^3*c^5*e*h - 288*a^2*b^6*c^3*d*k + 1792*a^3*b^4*c^4* \\
& d*k - 32*a^3*b^4*c^4*e*j + 32*a^3*b^4*c^4*f*i + 64*a^3*b^4*c^4*g*h - 4352*a \\
& ^4*b^2*c^5*d*k + 512*a^4*b^2*c^5*e*j - 256*a^4*b^2*c^5*g*h + 16*a^2*b^7*c^2 \\
& *f*k - 144*a^3*b^5*c^3*f*k + 16*a^3*b^5*c^3*g*j + 256*a^4*b^3*c^4*f*k - 256 \\
& *a^4*b^3*c^4*g*j - 128*a^4*b^3*c^4*h*i - 48*a^3*b^6*c^2*h*k + 512*a^4*b^4*c \\
& ^3*h*k - 32*a^4*b^4*c^3*i*j - 1536*a^5*b^2*c^4*h*k + 512*a^5*b^2*c^4*i*j + \\
& 80*a^4*b^5*c^2*j*k - 768*a^5*b^3*c^3*j*k)/(8*(64*a^5*c^5 - a^2*b^6*c^2 + 12 \\
& *a^3*b^4*c^3 - 48*a^4*b^2*c^4)) - \text{root}(1572864*a^8*b^2*c^9*z^4 - 983040*a^7 \\
& *b^4*c^8*z^4 + 327680*a^6*b^6*c^7*z^4 - 61440*a^5*b^8*c^6*z^4 + 6144*a^4*b^
\end{aligned}$$

$$\begin{aligned}
& 10*c^5*z^4 - 256*a^3*b^12*c^4*z^4 - 1048576*a^9*c^10*z^4 - 1572864*a^8*b^2*c^7*k*z^3 + 983040*a^7*b^4*c^6*k*z^3 - 327680*a^6*b^6*c^5*k*z^3 + 61440*a^5*b^8*c^4*k*z^3 - 6144*a^4*b^10*c^3*k*z^3 + 256*a^3*b^12*c^2*k*z^3 + 1048576*a^9*c^8*k*z^3 + 98304*a^8*b*c^6*i*k*z^2 + 98304*a^7*b*c^7*e*k*z^2 + 57344*a^7*b*c^7*f*j*z^2 + 32768*a^7*b*c^7*g*i*z^2 + 57344*a^6*b*c^8*d*h*z^2 + 32768*a^6*b*c^8*e*g*z^2 - 32*a*b^10*c^4*d*f*z^2 - 90112*a^7*b^3*c^5*i*k*z^2 + 30720*a^6*b^5*c^4*i*k*z^2 - 4608*a^5*b^7*c^3*i*k*z^2 + 256*a^4*b^9*c^2*i*k*z^2 - 49152*a^7*b^2*c^6*g*k*z^2 + 45056*a^6*b^4*c^5*g*k*z^2 + 24576*a^7*b^2*c^6*h*j*z^2 - 15360*a^5*b^6*c^4*g*k*z^2 - 3072*a^5*b^6*c^4*h*j*z^2 + 2304*a^4*b^8*c^3*g*k*z^2 + 2048*a^6*b^4*c^5*h*j*z^2 + 576*a^4*b^8*c^3*h*j*z^2 - 128*a^3*b^10*c^2*g*k*z^2 - 32*a^3*b^10*c^2*h*j*z^2 - 90112*a^6*b^3*c^6*e*k*z^2 - 49152*a^6*b^3*c^6*f*j*z^2 + 30720*a^5*b^5*c^5*e*k*z^2 - 24576*a^6*b^3*c^6*g*i*z^2 + 15360*a^5*b^5*c^5*f*j*z^2 + 6144*a^5*b^5*c^5*g*i*z^2 - 4608*a^4*b^7*c^4*e*k*z^2 - 2048*a^4*b^7*c^4*f*j*z^2 - 512*a^4*b^7*c^4*g*i*z^2 + 256*a^3*b^9*c^3*e*k*z^2 + 96*a^3*b^9*c^3*f*j*z^2 + 131072*a^6*b^2*c^7*d*j*z^2 + 49152*a^6*b^2*c^7*e*i*z^2 - 43008*a^5*b^4*c^6*d*j*z^2 - 12288*a^5*b^4*c^6*e*i*z^2 + 6144*a^5*b^4*c^6*f*h*z^2 + 6144*a^4*b^6*c^5*d*j*z^2 - 2048*a^4*b^6*c^5*f*h*z^2 + 1024*a^4*b^6*c^5*e*i*z^2 - 320*a^3*b^8*c^4*d*j*z^2 + 192*a^3*b^8*c^4*f*h*z^2 - 49152*a^5*b^3*c^7*d*h*z^2 - 24576*a^5*b^3*c^7*e*g*z^2 + 15360*a^4*b^5*c^6*d*h*z^2 + 6144*a^4*b^5*c^6*e*g*z^2 - 2048*a^3*b^7*c^5*d*h*z^2 - 512*a^3*b^7*c^5*e*g*z^2 + 96*a^2*b^9*c^4*d*h*z^2 + 24576*a^5*b^2*c^8*d*f*z^2 - 3072*a^3*b^6*c^6*d*f*z^2 + 2048*a^4*b^4*c^7*d*f*z^2 + 576*a^2*b^8*c^5*d*f*z^2 + 1536*a^4*b^10*c*k^2*z^2 + 61440*a^8*b*c^6*j^2*z^2 - 16*a^3*b^11*c*j^2*z^2 + 12288*a^7*b*c^7*h^2*z^2 + 12288*a^6*b*c^8*f^2*z^2 + 61440*a^5*b*c^9*d^2*z^2 + 432*a*b^9*c^5*d^2*z^2 - 49152*a^8*c^7*h*j*z^2 - 147456*a^7*c^8*d*j*z^2 - 65536*a^7*c^8*e*i*z^2 - 16384*a^7*c^8*f*h*z^2 - 49152*a^6*c^9*d*f*z^2 + 516096*a^8*b^2*c^5*k^2*z^2 - 288768*a^7*b^4*c^4*k^2*z^2 + 88576*a^6*b^6*c^3*k^2*z^2 - 15744*a^5*b^8*c^2*k^2*z^2 - 61440*a^7*b^3*c^5*j^2*z^2 + 24064*a^6*b^5*c^4*j^2*z^2 - 4608*a^5*b^7*c^3*j^2*z^2 + 432*a^4*b^9*c^2*j^2*z^2 + 24576*a^7*b^2*c^6*i^2*z^2 - 6144*a^6*b^4*c^5*i^2*z^2 + 512*a^5*b^6*c^4*i^2*z^2 - 8192*a^6*b^3*c^6*h^2*z^2 + 1536*a^5*b^5*c^5*h^2*z^2 - 16*a^3*b^9*c^3*h^2*z^2 - 8192*a^6*b^2*c^7*g^2*z^2 + 6144*a^5*b^4*c^6*g^2*z^2 - 1536*a^4*b^6*c^5*g^2*z^2 + 128*a^3*b^8*c^4*g^2*z^2 - 8192*a^5*b^3*c^7*f^2*z^2 + 1536*a^4*b^5*c^6*f^2*z^2 - 16*a^2*b^9*c^4*f^2*z^2 + 24576*a^5*b^2*c^8*e^2*z^2 - 6144*a^4*b^4*c^7*e^2*z^2 + 512*a^3*b^6*c^6*e^2*z^2 - 61440*a^4*b^3*c^8*d^2*z^2 + 24064*a^3*b^5*c^7*d^2*z^2 - 4608*a^2*b^7*c^6*d^2*z^2 - 393216*a^9*c^6*k^2*z^2 - 64*a^3*b^12*k^2*z^2 - 32768*a^8*c^7*i^2*z^2 - 32768*a^6*c^9*e^2*z^2 - 16*b^11*c^4*d^2*z^2 - 16384*a^7*b*c^5*g*i*k*z - 10240*a^7*b*c^5*f*j*k*z + 4096*a^7*b*c^5*h*i*j*z - 47104*a^6*b*c^6*d*h*k*z - 16384*a^6*b*c^6*e*g*k*z + 6144*a^6*b*c^6*f*g*j*z + 4096*a^6*b*c^6*e*h*j*z + 32*a*b^10*c^2*d*f*k*z - 6144*a^5*b*c^7*d*g*h*z - 4096*a^5*b*c^7*d*f*i*z - 32*a*b^8*c^4*d*f*g*z - 4096*a^4*b*c^8*d*e*f*z + 64*a*b^7*c^5*d*e*f*z - 18432*a^7*b^2*c^4*h*j*k*z + 4608*a^6*b^4*c^3*h*j*k*z - 384*a^5*b^6*c^2*h*j*k*z + 12288*a^6*b^3*c^4*g*i*k*z + 7680*a^6*b^3*c^4*f*j*k*z - 3072*a^6*b^3*c^4*h*i*j*z - 3072*a^5*b^5*c^3*g*i*k*z - 1920*a^5*b^5*c^3*f*j*k*z + 768*a^5*b^5*c^
\end{aligned}$$



$3h^*i^*j^*z + 256a^4b^7c^2g^*i^*k^*z + 160a^4b^7c^2f^*j^*k^*z - 64a^4b^7c^2h^*i^*j^*z - 65536a^6b^2c^5d^*j^*k^*z - 24576a^6b^2c^5e^*i^*k^*z + 21504a^5b^4c^4d^*j^*k^*z + 9216a^6b^2c^5f^*i^*j^*z + 6144a^5b^4c^4e^*i^*k^*z - 3072a^5b^4c^4f^*h^*k^*z - 3072a^4b^6c^3d^*j^*k^*z - 2304a^5b^4c^4f^*i^*j^*z - 2048a^6b^2c^5g^*h^*j^*z + 1536a^5b^4c^4g^*h^*j^*z + 1024a^4b^6c^3f^*h^*k^*z - 512a^4b^6c^3e^*i^*k^*z - 384a^4b^6c^3g^*h^*j^*z + 192a^4b^6c^3f^*i^*j^*z + 160a^3b^8c^2d^*j^*k^*z - 96a^3b^8c^2f^*h^*k^*z + 32a^3b^8c^2g^*h^*j^*z + 41472a^5b^3c^5d^*h^*k^*z - 13440a^4b^5c^4d^*h^*k^*z + 12288a^5b^3c^5e^*g^*k^*z - 4608a^5b^3c^5f^*g^*j^*z - 3072a^5b^3c^5e^*h^*j^*z - 3072a^4b^5c^4e^*g^*k^*z + 1888a^3b^7c^3d^*h^*k^*z + 1152a^4b^5c^4f^*g^*j^*z + 768a^4b^5c^4e^*h^*j^*z + 256a^3b^7c^3e^*g^*k^*z - 96a^3b^7c^3f^*g^*j^*z - 96a^2b^9c^2d^*h^*k^*z - 64a^3b^7c^3e^*h^*j^*z + 9216a^5b^2c^6e^*f^*j^*z - 9216a^5b^2c^6d^*h^*i^*z - 6656a^4b^4c^5d^*f^*k^*z - 6144a^5b^2c^6d^*f^*k^*z + 3456a^3b^6c^4d^*f^*k^*z - 2304a^4b^4c^5e^*f^*j^*z + 2304a^4b^4c^5d^*h^*i^*z - 576a^2b^8c^3d^*f^*k^*z + 192a^3b^6c^4e^*f^*j^*z - 192a^3b^6c^4d^*h^*i^*z + 4608a^4b^3c^6d^*g^*h^*z + 3072a^4b^3c^6d^*f^*i^*z - 1152a^3b^5c^5d^*g^*h^*z - 768a^3b^5c^5d^*f^*i^*z + 96a^2b^7c^4d^*g^*h^*z + 64a^2b^7c^4d^*f^*i^*z - 9216a^4b^2c^7d^*e^*h^*z + 2304a^3b^4c^6d^*e^*h^*z + 2048a^4b^2c^7d^*f^*g^*z - 1536a^3b^4c^6d^*f^*g^*z + 384a^2b^6c^5d^*f^*g^*z - 192a^2b^6c^5d^*e^*h^*z + 3072a^3b^3c^7d^*e^*f^*z - 768a^2b^5c^6d^*e^*f^*z - 3072a^8b^*c^4j^2k^*z + 48a^5b^7c^*j^2k^*z - 49152a^8b^*c^4i^*k^2z + 2304a^5b^7c^*i^*k^2z - 9216a^7b^*c^5h^2k^*z - 32a^4b^8c^*i^*j^2z - 1152a^4b^8c^*g^*k^2z + 9216a^7b^*c^5g^*j^2z - 3072a^6b^*c^6f^2k^*z + 16a^3b^9c^*g^*j^2z - 49152a^7b^*c^5e^*k^2z - 128a^3b^9c^*e^*k^2z - 58368a^5b^*c^7d^2k^*z - 1024a^6b^*c^6g^*h^2z - 432a^*b^9c^3d^2k^*z + 1024a^5b^*c^7f^2g^*z + 32a^*b^8c^4d^2i^*z - 9216a^4b^*c^8d^2g^*z + 336a^*b^7c^5d^2g^*z - 672a^*b^6c^6d^2e^*z + 24576a^8c^5h^*j^*k^*z + 73728a^7c^6d^*j^*k^*z + 32768a^7c^6e^*i^*k^*z - 12288a^7c^6f^*i^*j^*z + 8192a^7c^6f^*h^*k^*z + 24576a^6c^7d^*f^*k^*z - 12288a^6c^7e^*f^*j^*z + 12288a^6c^7d^*h^*i^*z + 12288a^5c^8d^*e^*h^*z + 2304a^7b^3c^3j^2k^*z - 576a^6b^5c^2j^2k^*z + 45056a^7b^3c^3i^*k^2z - 15360a^6b^5c^2i^*k^2z - 12288a^7b^2c^4i^2k^*z + 3072a^6b^4c^3i^2k^*z - 256a^5b^6c^2i^2k^*z + 15872a^7b^2c^4i^*j^2z + 6912a^6b^3c^4h^2k^*z - 4992a^6b^4c^3i^*j^2z - 1728a^5b^5c^3h^2k^*z + 672a^5b^6c^2i^*j^2z + 144a^4b^7c^2h^2k^*z + 24576a^7b^2c^4g^*k^2z - 22528a^6b^4c^3g^*k^2z + 7680a^5b^6c^2g^*k^2z + 4096a^6b^2c^5g^2k^*z - 3072a^5b^4c^4g^2k^*z + 768a^4b^6c^3g^2k^*z - 64a^3b^8c^2g^2k^*z - 7936a^6b^3c^4g^*j^2z + 2496a^5b^5c^3g^*j^2z - 1536a^6b^2c^5h^2i^*z + 1280a^5b^3c^5f^2k^*z + 384a^5b^4c^4h^2i^*z - 336a^4b^7c^2g^*j^2z + 192a^4b^5c^4f^2k^*z - 144a^3b^7c^3f^2k^*z - 32a^4b^6c^3h^2i^*z + 16a^2b^9c^2f^2k^*z + 45056a^6b^3c^4e^*k^2z - 15360a^5b^5c^3e^*k^2z - 12288a^5b^2c^6e^2k^*z + 3072a^4b^4c^5e^2k^*z + 2304a^4b^7c^2e^*k^2z - 256a^3b^6c^4e^2k^*z + 59136a^4b^3c^6d^2k^*z - 23488a^3b^5c^5d^2k^*z + 15872a^6b^2c^5e^*j^2z - 4992a^5b^4c^4e^*j^2z + 4560a^2b^7c^4d^2k^*z + 1536a^5b^2c^6f^2i^*z + 768a^5b^3c^$

$$\begin{aligned}
& ^5*g*h^2*z + 672*a^4*b^6*c^3*e*j^2*z - 384*a^4*b^4*c^5*f^2*i*z - 192*a^4*b^5*c^4*g*h^2*z - 32*a^3*b^8*c^2*e*j^2*z + 32*a^3*b^6*c^4*f^2*i*z + 16*a^3*b^7*c^3*g*h^2*z - 15872*a^4*b^2*c^7*d^2*i*z + 4992*a^3*b^4*c^6*d^2*i*z - 1536*a^5*b^2*c^6*e*h^2*z - 768*a^4*b^3*c^6*f^2*g*z - 672*a^2*b^6*c^5*d^2*i*z + 384*a^4*b^4*c^5*e*h^2*z + 192*a^3*b^5*c^5*f^2*g*z - 32*a^3*b^6*c^4*e*h^2*z - 16*a^2*b^7*c^4*f^2*g*z + 7936*a^3*b^3*c^7*d^2*g*z - 2496*a^2*b^5*c^6*d^2*g*z + 1536*a^4*b^2*c^7*e*f^2*z - 384*a^3*b^4*c^6*e*f^2*z + 32*a^2*b^6*c^5*e*f^2*z - 15872*a^3*b^2*c^8*d^2*e*z + 4992*a^2*b^4*c^7*d^2*e*z - 61440*a^8*b^2*c^3*k^3*z + 21504*a^7*b^4*c^2*k^3*z + 16384*a^8*c^5*i^2*k*z - 18432*a^8*c^5*i*j^2*z - 128*a^4*b^9*i*k^2*z + 2048*a^7*c^6*h^2*i*z + 64*a^3*b^10*g*k^2*z + 16384*a^6*c^7*e^2*k*z + 16*b^11*c^2*d^2*k*z - 18432*a^7*c^6*e*j^2*z - 2048*a^6*c^7*f^2*i*z + 18432*a^5*c^8*d^2*i*z - 3328*a^6*b^6*c*k^3*z + 2048*a^6*c^7*e*h^2*z - 16*b^9*c^4*d^2*g*z - 2048*a^5*c^8*e*f^2*z + 32*b^8*c^5*d^2*e*z + 18432*a^4*c^9*d^2*e*z + 65536*a^9*c^4*k^3*z + 192*a^5*b^8*k^3*z - 3328*a^7*b*c^3*h*i*j*k - 6912*a^6*b*c^4*d*i*j*k - 3328*a^6*b*c^4*e*h*j*k - 1536*a^6*b*c^4*f*g*j*k - 768*a^6*b*c^4*g*h*i*j - 768*a^6*b*c^4*f*h*i*k - 6912*a^5*b*c^5*d*e*j*k - 2304*a^5*b*c^5*d*g*i*j - 1792*a^5*b*c^5*e*f*i*j + 1536*a^5*b*c^5*d*g*h*k - 1280*a^5*b*c^5*d*f*i*k - 768*a^5*b*c^5*e*g*h*j - 768*a^5*b*c^5*e*f*h*k - 256*a^5*b*c^5*f*g*h*i + 16*a*b^8*c^2*d*f*g*k - 4*a*b^8*c^2*d*f*h*j - 2304*a^4*b*c^6*d*e*g*j - 1792*a^4*b*c^6*d*e*h*i - 1280*a^4*b*c^6*d*e*f*k - 768*a^4*b*c^6*d*f*g*i - 256*a^4*b*c^6*e*f*g*h - 32*a*b^7*c^3*d*e*f*k - 768*a^3*b*c^7*d*e*f*g + 32*a*b^5*c^5*d*e*f*g + 576*a^6*b^3*c^2*h*i*j*k + 1664*a^6*b^2*c^3*g*h*j*k + 384*a^6*b^2*c^3*f*i*j*k - 288*a^5*b^4*c^2*g*h*j*k - 160*a^5*b^4*c^2*f*i*j*k + 2112*a^5*b^3*c^3*d*i*j*k + 576*a^5*b^3*c^3*e*h*j*k - 448*a^5*b^3*c^3*f*h*i*k - 192*a^5*b^3*c^3*g*h*i*j - 192*a^5*b^3*c^3*f*g*j*k - 160*a^4*b^5*c^2*d*i*j*k + 96*a^4*b^5*c^2*f*h*i*k + 80*a^4*b^5*c^2*f*g*j*k + 32*a^4*b^5*c^2*g*h*i*j + 4992*a^5*b^2*c^4*d*h*i*k - 4608*a^5*b^2*c^4*e*g*i*k + 3456*a^5*b^2*c^4*d*g*j*k - 1312*a^4*b^4*c^3*d*h*i*k - 1056*a^4*b^4*c^3*d*g*j*k + 896*a^5*b^2*c^4*f*g*i*j + 768*a^4*b^4*c^3*e*g*i*k + 384*a^5*b^2*c^4*f*g*h*k + 384*a^5*b^2*c^4*e*h*i*j + 384*a^5*b^2*c^4*e*f*j*k + 224*a^4*b^4*c^3*f*g*h*k - 160*a^4*b^4*c^3*e*f*j*k - 96*a^4*b^4*c^3*f*g*i*j + 96*a^3*b^6*c^2*d*h*i*k + 80*a^3*b^6*c^2*d*g*j*k - 64*a^4*b^4*c^3*e*h*i*j - 48*a^3*b^6*c^2*f*g*h*k - 2496*a^4*b^3*c^4*d*g*h*k + 2112*a^4*b^3*c^4*d*e*j*k - 960*a^4*b^3*c^4*d*f*i*k + 656*a^3*b^5*c^3*d*g*h*k - 448*a^4*b^3*c^4*e*f*h*k + 384*a^3*b^5*c^3*d*f*i*k + 320*a^4*b^3*c^4*d*g*i*j - 192*a^4*b^3*c^4*f*g*h*i - 192*a^4*b^3*c^4*e*g*h*j + 192*a^4*b^3*c^4*e*f*i*j - 160*a^3*b^5*c^3*d*e*j*k + 96*a^3*b^5*c^3*e*f*h*k - 48*a^2*b^7*c^2*d*g*h*k + 32*a^3*b^5*c^3*e*g*h*j - 32*a^2*b^7*c^2*d*f*i*k + 4992*a^4*b^2*c^5*d*e*h*k - 3584*a^4*b^2*c^5*d*f*h*j - 1312*a^3*b^4*c^4*d*e*h*k + 896*a^4*b^2*c^5*e*f*g*j + 896*a^4*b^2*c^5*d*g*h*i + 640*a^4*b^2*c^5*d*f*g*k - 640*a^4*b^2*c^5*d*e*i*j + 600*a^3*b^4*c^4*d*f*h*j + 480*a^3*b^4*c^4*d*f*g*k + 384*a^4*b^2*c^5*e*f*h*i - 192*a^2*b^6*c^3*d*f*g*k - 96*a^3*b^4*c^4*e*f*g*j - 96*a^3*b^4*c^4*d*g*h*i + 96*a^2*b^6*c^3*d*e*h*k + 12*a^2*b^6*c^3*d*f*h*j - 960*a^3*b^3*c^5*d*e*f*k + 384*a^2*b^5*c^4*d*e*f*k + 320*a^3*b^3*c^5*d*e*g*j - 192*a^3*b^3*c^5*e*f*g*h - 192*a^3*b^3*c^5*d*f*g*i + 192*a^3*b^3*c^5*d*e*h*i + 32*a
\end{aligned}$$

$$\begin{aligned}
&^2b^5c^4d^*fg^*i + 896a^3b^2c^6d^*e^*g^*h + 384a^3b^2c^6d^*e^*f^*i - 96 \\
&a^2b^4c^5d^*e^*g^*h - 64a^2b^4c^5d^*e^*f^*i - 192a^2b^3c^6d^*e^*f^*g + 4 \\
&8a^6b^4c^*i^*j^2k - 1424a^6b^4c^*h^*j^*k^2 - 2304a^7b^*c^3g^*j^2k - 24* \\
&a^5b^5c^*g^*j^2k + 2048a^7b^*c^3g^*i^*k^2 - 1024a^7b^*c^3f^*j^*k^2 - 768a^ \\
&^5b^5c^*g^*i^*k^2 + 408a^5b^5c^*f^*j^*k^2 + 256a^6b^*c^4g^*h^2k + 16a^4b^ \\
&^6c^*g^*i^*j^2 + 4608a^6b^*c^4e^*i^2k + 4608a^5b^*c^5e^2i^*k - 896a^6b^* \\
&c^4f^*i^2j + 768a^4b^6c^*d^*j^*k^2 - 256a^4b^6c^*f^*h^*k^2 - 128a^4b^6c^ \\
&*e^*i^*k^2 + 2208a^6b^*c^4f^*h^*j^2 - 1920a^6b^*c^4e^*i^*j^2 + 800a^5b^*c^5 \\
&f^2h^*j - 256a^5b^*c^5f^2g^*k - 16a^*b^8c^2d^2i^*k + 6a^3b^7c^*f^*h^*j^ \\
&2 + 8192a^6b^*c^4d^*h^*k^2 + 2048a^6b^*c^4e^*g^*k^2 - 472a^3b^7c^*d^*h^*k^2 \\
&+ 64a^3b^7c^*e^*g^*k^2 + 4896a^4b^*c^6d^2h^*j + 2304a^4b^*c^6d^2g^*k + \\
&1824a^5b^*c^5d^*h^2j - 384a^5b^*c^5e^*h^2i - 168a^*b^7c^3d^2g^*k + 4 \\
&2a^*b^7c^3d^2h^*j + 6a^2b^8c^*d^*h^*j^2 + 1536a^5b^*c^5e^*g^*i^2 + 1536a^ \\
&^4b^*c^6e^2g^*i - 896a^5b^*c^5d^*h^*i^2 - 896a^4b^*c^6e^2f^*j + 144a^2* \\
&b^8c^*d^*f^*k^2 + 4896a^5b^*c^5d^*f^*j^2 + 1824a^4b^*c^6d^*f^2j - 384a^4b^ \\
&*c^6e^*f^2i + 336a^*b^6c^4d^2e^*k - 156a^*b^6c^4d^2f^*j + 16a^*b^6c^4 \\
&*d^2g^*i + 12a^*b^7c^3d^*f^2j + 2208a^3b^*c^7d^2f^*h - 1920a^3b^*c^7d^ \\
&^2e^*i + 800a^4b^*c^6d^*f^*h^2 - 102a^*b^5c^5d^2f^*h - 32a^*b^5c^5d^2e^ \\
&*i + 12a^*b^6c^4d^*f^2h - 2a^*b^7c^3d^*f^*h^2 - 896a^3b^*c^7d^*e^2h - 8 \\
&*a^*b^6c^4d^*f^*g^2 - 240a^*b^4c^6d^2e^*g - 32a^*b^4c^6d^*e^2f + 3072a^ \\
&7c^4f^*i^*j^*k + 3072a^6c^5e^*f^*j^*k - 3072a^6c^5d^*h^*i^*k + 1536a^6c^5 \\
&e^*h^*i^*j + 4608a^5c^6d^*e^*i^*j - 3072a^5c^6d^*e^*h^*k - 1152a^5c^6d^*f^*h^ \\
&j + 512a^5c^6e^*f^*h^*i + 1536a^4c^7d^*e^*f^*i - 2a^*b^9c^*d^*f^*j^2 - 1088a^ \\
&^7b^2c^2i^*j^2k + 4800a^7b^2c^2h^*j^*k^2 + 960a^6b^2c^3h^2i^*k + 5 \\
&44a^6b^3c^2g^*j^2k - 144a^5b^4c^2h^2i^*k - 2304a^6b^2c^3g^*i^2k \\
&+ 1920a^6b^3c^2g^*i^*k^2 + 1152a^5b^3c^3g^2i^*k - 864a^6b^3c^2f^* \\
&j^*k^2 + 384a^5b^4c^2g^*i^2k + 192a^6b^2c^3h^*i^2j - 192a^4b^5c^2 \\
&*g^2i^*k - 32a^5b^4c^2h^*i^2j - 1088a^6b^2c^3e^*j^2k + 960a^6b^2c^ \\
&c^3g^*i^*j^2 - 480a^5b^3c^3g^*h^2k - 240a^5b^4c^2g^*i^*j^2 + 192a^5b^ \\
&^2c^4f^2i^*k + 72a^4b^5c^2g^*h^2k + 48a^5b^4c^2e^*j^2k + 48a^4b^ \\
&^4c^3f^2i^*k - 16a^3b^6c^2f^2i^*k + 13376a^6b^2c^3d^*j^*k^2 - 5136* \\
&a^5b^4c^2d^*j^*k^2 - 3840a^6b^2c^3e^*i^*k^2 + 1536a^5b^4c^2e^*i^*k^2 - \\
&768a^5b^3c^3e^*i^2k - 768a^4b^3c^4e^2i^*k + 624a^5b^4c^2f^*h^*k^ \\
&2 + 576a^6b^2c^3f^*h^*k^2 + 192a^5b^2c^4g^2h^*j + 96a^5b^3c^3f^*i^ \\
&2j + 48a^4b^4c^3g^2h^*j - 8a^3b^6c^2g^2h^*j + 6848a^4b^2c^5d^2 \\
&*i^*k - 2448a^3b^4c^4d^2i^*k + 960a^5b^2c^4e^*h^2k - 864a^5b^2c^4 \\
&*f^*h^2j + 480a^5b^3c^3e^*i^*j^2 + 336a^4b^3c^4f^2h^*j + 336a^2b^6c^ \\
&c^3d^2i^*k + 192a^5b^2c^4g^*h^2i + 144a^5b^3c^3f^*h^*j^2 - 144a^4b^ \\
&^4c^3e^*h^2k - 102a^4b^5c^2f^*h^*j^2 - 96a^4b^3c^4f^2g^*k - 32a^4* \\
&b^5c^2e^*i^*j^2 - 30a^3b^5c^3f^2h^*j - 24a^3b^5c^3f^2g^*k + 16a^4* \\
&b^4c^3g^*h^2i - 12a^4b^4c^3f^*h^2j + 12a^3b^6c^2f^*h^2j + 8a^2b^ \\
&^7c^2f^2g^*k - 2a^2b^7c^2f^2h^*j - 9312a^5b^3c^3d^*h^*k^2 + 3288a^ \\
&4b^5c^2d^*h^*k^2 - 2304a^4b^2c^5e^2g^*k + 1920a^5b^3c^3e^*g^*k^2 + 1 \\
&152a^4b^3c^4e^*g^2k - 768a^4b^5c^2e^*g^*k^2 + 384a^3b^4c^4e^2g^*k \\
&- 320a^5b^2c^4d^*i^2j - 224a^4b^3c^4f^*g^2j + 192a^5b^2c^4f^*h^*
\end{aligned}$$

$$\begin{aligned}
& i^2 + 192a^4b^2c^5e^2h^*j - 192a^3b^5c^3e^*g^2k - 32a^3b^4c^4e^2h^*j + 24a^3b^5c^3f^*g^2j - 3552a^5b^2c^4d^*h^*j^2 - 3424a^3b^3c^5d^2g^*k + 1332a^4b^4c^3d^*h^*j^2 + 1224a^2b^5c^4d^2g^*k + 960a^5b^2c^4e^*g^*j^2 - 496a^3b^3c^5d^2h^*j + 432a^4b^3c^4d^*h^2j - 240a^4b^4c^3e^*g^*j^2 - 222a^2b^5c^4d^2h^*j + 192a^4b^2c^5f^2g^*i + 192a^4b^2c^5e^*f^2k - 174a^3b^5c^3d^*h^2j - 156a^3b^6c^2d^*h^*j^2 + 48a^3b^4c^4e^*f^2k - 32a^4b^3c^4e^*h^2i + 16a^3b^6c^2e^*g^*j^2 + 16a^3b^4c^4f^2g^*i - 16a^2b^6c^3e^*f^2k + 12a^2b^7c^2d^*h^2j + 1728a^5b^2c^4d^*f^*k^2 + 1392a^4b^4c^3d^*f^*k^2 - 840a^3b^6c^2d^*f^*k^2 - 768a^4b^2c^5e^*g^2i + 576a^4b^2c^5d^*g^2j + 96a^4b^3c^4d^*h^*i^2 + 96a^3b^3c^5e^2f^*j - 80a^3b^4c^4d^*g^2j + 64a^4b^2c^5f^*g^2h + 48a^3b^4c^4f^*g^2h + 6848a^3b^2c^6d^2e^*k - 3552a^3b^2c^6d^2f^*j - 2448a^2b^4c^5d^2e^*k + 1332a^2b^4c^5d^2f^*j + 960a^3b^2c^6d^2g^*i - 496a^4b^3c^4d^*f^*j^2 + 432a^3b^3c^5d^*f^2j - 240a^2b^4c^5d^2g^*i - 222a^3b^5c^3d^*f^*j^2 + 192a^4b^2c^5e^*g^*h^2 - 174a^2b^5c^4d^*f^2j + 42a^2b^7c^2d^*f^*j^2 - 32a^3b^3c^5e^*f^2i + 16a^3b^4c^4e^*g^*h^2 - 320a^3b^2c^6d^e^2j - 224a^3b^3c^5d^*g^2h + 192a^4b^2c^5d^*f^*i^2 + 192a^3b^2c^6e^2f^*h - 32a^3b^4c^4d^*f^*i^2 + 24a^2b^5c^4d^*g^2h - 864a^3b^2c^6d^*f^2h + 480a^2b^3c^6d^2e^*i + 336a^3b^3c^5d^*f^*h^2 + 192a^3b^2c^6e^*f^2g + 144a^2b^3c^6d^2f^*h - 30a^2b^5c^4d^*f^*h^2 + 16a^2b^4c^5e^*f^2g - 12a^2b^4c^5d^*f^2h + 192a^3b^2c^6d^*f^*g^2 + 96a^2b^3c^6d^e^2h + 48a^2b^4c^5d^*f^*g^2 + 960a^2b^2c^7d^2e^*g + 192a^2b^2c^7d^e^2f - 3072a^8b^*c^2j^2k^2 + 1104a^7b^3c^*j^2k^2 + 768a^6b^4c^*i^2k^2 - 256a^6b^3c^2i^3k + 1536a^7b^*c^3h^2k^2 - 960a^7b^*c^3i^2j^2 + 444a^5b^5c^*h^2k^2 - 16a^5b^5c^*i^2j^2 - 3072a^7b^2c^2g^*k^3 - 496a^6b^3c^2h^*j^3 + 192a^4b^6c^*g^2k^2 - 192a^4b^4c^3g^3k + 144a^5b^3c^3h^3j + 32a^3b^6c^2g^3k - 18a^4b^5c^2h^3j - 9a^4b^6c^*h^2j^2 - 192a^6b^*c^4h^2i^2 + 36a^3b^7c^*f^2k^2 - 4a^3b^7c^*g^2j^2 - 2176a^6b^3c^2e^*k^3 - 256a^3b^3c^5e^3k - 192a^6b^2c^3f^*j^3 - 192a^4b^2c^5f^3j + 132a^5b^4c^2f^*j^3 + 128a^4b^3c^4g^3i - 28a^3b^4c^4f^3j + 6a^2b^6c^3f^3j + 10752a^5b^*c^5d^2k^2 - 960a^5b^*c^5e^2j^2 - 192a^5b^*c^5f^2i^2 - 1680a^5b^3c^3d^*j^3 - 1680a^2b^3c^6d^3j + 222a^4b^5c^2d^*j^3 + 80a^4b^3c^4f^*h^3 + 80a^3b^3c^5f^3h + 30a^*b^8c^2d^2j^2 + 6a^3b^5c^3f^*h^3 + 6a^2b^5c^4f^3h - 960a^4b^*c^6d^2i^2 - 192a^4b^*c^6e^2h^2 - 192a^4b^2c^5d^*h^3 - 192a^2b^2c^7d^3h + 128a^3b^3c^5e^*g^3 - 28a^3b^4c^4d^*h^3 + 12a^*b^6c^4d^2h^2 + 6a^2b^6c^3d^*h^3 - 192a^3b^*c^7e^2f^2 + 60a^*b^5c^5d^2g^2 + 198a^*b^4c^6d^2f^2 + 144a^2b^3c^6d^*f^3 - 960a^2b^*c^8d^2e^2 + 240a^*b^3c^7d^2e^2 + 4608a^8c^3i^*j^2k - 3072a^8c^3h^*j^*k^2 - 512a^7c^4h^2i^*k + 120a^5b^6h^*j^*k^2 + 768a^7c^4h^*i^2j + 4608a^7c^4e^*j^2k + 512a^6c^5f^2i^*k + 64a^4b^7g^*i^*k^2 - 40a^4b^7f^*j^*k^2 - 9216a^7c^4d^*j^*k^2 - 4096a^7c^4e^*i^*k^2 - 1024a^7c^4f^*h^*k^2 - 4608a^5c^6d^2i^*k - 512a^6c^5e^*h^2k - 192a^6c^5f^*h^2j - 40a^3b^8d^*j^*k^2 + 24a^3b^8f^*h^*k^2 + 2304a^6c^5d^*i^2j + 768a^5c^6e^2h^*j + 256a^6c^
\end{aligned}$$

$$\begin{aligned}
& 5*f*h*i^2 + 8*b^9*c^2*d^2*g*k - 2*b^9*c^2*d^2*h*j + 6144*a^8*b*c^2*i*k^3 - \\
& 2176*a^7*b^3*c*i*k^3 - 1728*a^6*c^5*d*h*j^2 + 1536*a^7*b*c^3*i^3*k + 512*a^5*c^6*e*f^2*k + 24*a^2*b^9*d*h*k^2 - 3072*a^6*c^5*d*f*k^2 - 16*b^8*c^3*d^2* \\
& e*k + 6*b^8*c^3*d^2*f*j - 4608*a^4*c^7*d^2*e*k + 2016*a^7*b*c^3*h*j^3 - 1728*a^4*c^7*d^2*f*j + 1088*a^6*b^4*c*g*k^3 + 224*a^6*b*c^4*h^3*j + 30*a^5*b^5 \\
& *c*h*j^3 + 2304*a^4*c^7*d*e^2*j + 768*a^5*c^6*d*f*i^2 + 256*a^4*c^7*e^2*f*h + 6*b^7*c^4*d^2*f*h + 6144*a^7*b*c^3*e*k^3 + 1536*a^4*b*c^6*e^3*k + 512*a^6 \\
& *b*c^4*g*i^3 + 192*a^5*b^5*c*e*k^3 - 192*a^4*c^7*d*f^2*h - 10*a^4*b^6*c*f*j^3 + 108*a*b^9*c*d^2*k^2 + 16*b^6*c^5*d^2*e*g + 4320*a^6*b*c^4*d*j^3 + 4320 \\
& *a^3*b*c^7*d^3*j + 222*a*b^5*c^5*d^3*j + 96*a^5*b*c^5*f*h^3 + 96*a^4*b*c^6*f^3*h - 10*a^3*b^7*c*d*j^3 + 768*a^3*c^8*d*e^2*f + 512*a^3*b*c^7*e^3*g + 1 \\
& 32*a*b^4*c^6*d^3*h + 2016*a^2*b*c^8*d^3*f - 496*a*b^3*c^7*d^3*f + 224*a^3*b*c^7*d*f^3 - 18*a*b^5*c^5*d*f^3 - 1920*a^7*b^2*c^2*i^2*k^2 - 1648*a^6*b^3*c^2 \\
& *h^2*k^2 + 240*a^6*b^3*c^2*i^2*j^2 - 960*a^6*b^2*c^3*h^2*j^2 - 512*a^6*b^2*c^3*g^2*k^2 - 480*a^5*b^4*c^2*g^2*k^2 + 198*a^5*b^4*c^2*h^2*j^2 - 240*a^5 \\
& *b^3*c^3*g^2*j^2 - 240*a^5*b^3*c^3*f^2*k^2 + 60*a^4*b^5*c^2*g^2*j^2 - 36*a^4*b^5*c^2*f^2*k^2 - 16*a^5*b^3*c^3*h^2*i^2 - 1920*a^5*b^2*c^4*e^2*k^2 + 768 \\
& *a^4*b^4*c^3*e^2*k^2 - 464*a^5*b^2*c^4*f^2*j^2 - 384*a^5*b^2*c^4*g^2*i^2 - 64*a^3*b^6*c^2*e^2*k^2 + 42*a^4*b^4*c^3*f^2*j^2 + 12*a^3*b^6*c^2*f^2*j^2 - \\
& 13104*a^4*b^3*c^4*d^2*k^2 + 5628*a^3*b^5*c^3*d^2*k^2 - 1128*a^2*b^7*c^2*d^2*k^2 + 240*a^4*b^3*c^4*e^2*j^2 - 48*a^4*b^3*c^4*g^2*h^2 - 16*a^4*b^3*c^4*f^2 \\
& *i^2 - 16*a^3*b^5*c^3*e^2*j^2 - 4*a^3*b^5*c^3*g^2*h^2 - 2880*a^4*b^2*c^5*d^2*j^2 + 1750*a^3*b^4*c^4*d^2*j^2 - 345*a^2*b^6*c^3*d^2*j^2 - 192*a^4*b^2*c^5 \\
& *f^2*h^2 - 42*a^3*b^4*c^4*f^2*h^2 + 240*a^3*b^3*c^5*d^2*i^2 - 48*a^3*b^3*c^5*f^2*g^2 - 16*a^3*b^3*c^5*e^2*h^2 - 16*a^2*b^5*c^4*d^2*i^2 - 4*a^2*b^5*c^4 \\
& *f^2*g^2 - 464*a^3*b^2*c^6*d^2*h^2 - 384*a^3*b^2*c^6*e^2*g^2 + 42*a^2*b^4*c^5*d^2*h^2 - 240*a^2*b^3*c^6*d^2*g^2 - 16*a^2*b^3*c^6*e^2*f^2 - 960*a^2*b^2 \\
& *c^7*d^2*f^2 - 8*a*b^10*d*f*k^2 - a^2*b^8*c*f^2*j^2 - 2048*a^8*c^3*i^2*k^2 - 100*a^6*b^5*j^2*k^2 - 64*a^5*b^6*i^2*k^2 - 288*a^7*c^4*h^2*j^2 - 36*a^4 \\
& *b^7*h^2*k^2 - 16*a^3*b^8*g^2*k^2 - 2048*a^6*c^5*e^2*k^2 - 864*a^6*c^5*f^2*j^2 - 4*a^2*b^9*f^2*k^2 - 2592*a^5*c^6*d^2*j^2 - 1536*a^5*c^6*e^2*i^2 - 32*a^5 \\
& *c^6*f^2*h^2 - 864*a^4*c^7*d^2*h^2 + 360*a^7*b^2*c^2*j^4 - 4*b^7*c^4*d^2*g^2 - 9*b^6*c^5*d^2*f^2 - 288*a^3*c^8*d^2*f^2 - 24*a^5*b^2*c^4*h^4 - 16*b^5 \\
& *c^6*d^2*e^2 - 9*a^4*b^4*c^3*h^4 - 16*a^3*b^4*c^4*g^4 - 24*a^3*b^2*c^6*f^4 - 9*a^2*b^4*c^5*f^4 - a^2*b^6*c^3*f^2*h^2 + 192*a^6*b^5*i*k^3 - 96*a^5*b^6 \\
& *g*k^3 - 1728*a^7*c^4*f*j^3 - 192*a^5*c^6*f^3*j - 10*b^7*c^4*d^3*j - 1024*a^6*c^5*e*i^3 - 1024*a^4*c^7*e^3*i + 1536*a^8*b^2*c*k^4 - 10*b^6*c^5*d^3*h - \\
& 1728*a^3*c^8*d^3*h - 192*a^5*c^6*d*h^3 - 25*a^6*b^4*c*j^4 + 30*b^5*c^6*d^3*f + 360*a*b^2*c^8*d^4 - 4*b^11*d^2*k^2 - 4096*a^9*c^2*k^4 - 1296*a^8*c^3*j^4 \\
& - 144*a^7*b^4*k^4 - 256*a^7*c^4*i^4 - 16*a^6*c^5*h^4 - 16*a^4*c^7*f^4 - 256*a^3*c^8*e^4 - 25*b^4*c^7*d^4 - 1296*a^2*c^9*d^4 - b^8*c^3*d^2*h^2 - b^10 \\
& *c*d^2*j^2, z, n)*((6144*a^5*c^8*d + 2048*a^6*c^7*h - 288*a^2*b^6*c^5*d + 1920*a^3*b^4*c^6*d - 5632*a^4*b^2*c^7*d + 16*a^2*b^7*c^4*f - 192*a^3*b^5*c^5 \\
& *f + 768*a^4*b^3*c^6*f - 32*a^3*b^6*c^4*h + 384*a^4*b^4*c^5*h - 1536*a^5*b^2*c^6*h + 16*a^3*b^7*c^3*j - 192*a^4*b^5*c^4*j + 768*a^5*b^3*c^5*j + 16*a*
\end{aligned}$$

$$\begin{aligned}
& b^8c^4d - 1024a^5b^7c^7f - 1024a^6b^7c^6j) / (8(64a^5c^5 - a^2b^6c^2 + 12a^3b^4c^3 - 48a^4b^2c^4)) + (x(32a^2b^6c^5e - 2048a^6c^7i - 2048a^5c^8e - 384a^3b^4c^6e + 1536a^4b^2c^7e - 16a^2b^7c^4g + 192a^3b^5c^5g - 768a^4b^3c^6g + 32a^3b^6c^4i - 384a^4b^4c^5i + 1536a^5b^2c^6i + 32a^2b^9c^2k - 528a^3b^7c^3k + 3264a^4b^5c^4k - 8960a^5b^3c^5k + 1024a^5b^7c^7g + 9216a^6b^7c^6k) / (4(64a^5c^5 - a^2b^6c^2 + 12a^3b^4c^3 - 48a^4b^2c^4)) - (\text{root}(1572864a^8b^2c^9z^4 - 983040a^7b^4c^8z^4 + 327680a^6b^6c^7z^4 - 61440a^5b^8c^6z^4 + 6144a^4b^10c^5z^4 - 256a^3b^12c^4z^4 - 1048576a^9c^10z^4 - 1572864a^8b^2c^7kz^3 + 983040a^7b^4c^6kz^3 - 327680a^6b^6c^5kz^3 + 61440a^5b^8c^4kz^3 - 6144a^4b^10c^3kz^3 + 256a^3b^12c^2kz^3 + 1048576a^9c^8kz^3 + 98304a^8b^7c^6ikz^2 + 98304a^7b^5c^7ekz^2 + 57344a^7b^7c^7fjz^2 + 32768a^7b^7c^7gi^2 + 57344a^6b^7c^8d^2hz^2 + 32768a^6b^7c^8eg^2z^2 - 32a^4b^10c^4df^2z^2 - 90112a^7b^3c^5ikz^2 + 30720a^6b^5c^4ikz^2 - 4608a^5b^7c^3ikz^2 + 256a^4b^9c^2ikz^2 - 49152a^7b^2c^6gkz^2 + 45056a^6b^4c^5gkz^2 + 24576a^7b^2c^6h^2jz^2 - 15360a^5b^6c^4gkz^2 - 3072a^5b^6c^4h^2jz^2 + 2304a^4b^8c^3gkz^2 + 2048a^6b^4c^5h^2jz^2 + 576a^4b^8c^3h^2jz^2 - 128a^3b^10c^2gkz^2 - 32a^3b^10c^2h^2jz^2 - 90112a^6b^3c^6ekz^2 - 49152a^6b^3c^6f^2jz^2 + 30720a^5b^5c^5ekz^2 - 24576a^6b^3c^6giz^2 + 15360a^5b^5c^5f^2jz^2 + 6144a^5b^5c^5giz^2 - 4608a^4b^7c^4ekz^2 - 2048a^4b^7c^4f^2jz^2 - 512a^4b^7c^4giz^2 + 256a^3b^9c^3ekz^2 + 96a^3b^9c^3f^2jz^2 + 131072a^6b^2c^7d^2jz^2 + 49152a^6b^2c^7eiz^2 - 43008a^5b^4c^6d^2jz^2 - 12288a^5b^4c^6eiz^2 + 6144a^5b^4c^6f^2hz^2 + 6144a^4b^6c^5d^2jz^2 - 2048a^4b^6c^5f^2hz^2 + 1024a^4b^6c^5eiz^2 - 320a^3b^8c^4d^2jz^2 + 192a^3b^8c^4f^2hz^2 - 49152a^5b^3c^7d^2hz^2 - 24576a^5b^3c^7eg^2z^2 + 15360a^4b^5c^6d^2hz^2 + 6144a^4b^5c^6eg^2z^2 - 2048a^3b^7c^5d^2hz^2 - 512a^3b^7c^5eg^2z^2 + 96a^2b^9c^4d^2hz^2 + 24576a^5b^2c^8d^2fz^2 - 3072a^3b^6c^6d^2fz^2 + 2048a^4b^4c^7d^2fz^2 + 576a^2b^8c^5d^2fz^2 + 1536a^4b^10c^k^2z^2 + 61440a^8b^6c^6j^2z^2 - 16a^3b^11c^j^2z^2 + 12288a^7b^6c^7h^2z^2 + 12288a^6b^7c^8f^2z^2 + 61440a^5b^8c^9d^2z^2 + 432a^6b^9c^5d^2z^2 - 49152a^8c^7h^2jz^2 - 147456a^7c^8d^2jz^2 - 65536a^7c^8eiz^2 - 16384a^7c^8f^2hz^2 - 49152a^6c^9d^2fz^2 + 516096a^8b^2c^5k^2z^2 - 288768a^7b^4c^4k^2z^2 + 88576a^6b^6c^3k^2z^2 - 15744a^5b^8c^2k^2z^2 - 61440a^7b^3c^5j^2z^2 + 24064a^6b^5c^4j^2z^2 - 4608a^5b^7c^3j^2z^2 + 432a^4b^9c^2j^2z^2 + 24576a^7b^2c^6i^2z^2 - 6144a^6b^4c^5i^2z^2 + 512a^5b^6c^4i^2z^2 - 8192a^6b^3c^6h^2z^2 + 1536a^5b^5c^5h^2z^2 - 16a^3b^9c^3h^2z^2 - 8192a^6b^2c^7g^2z^2 + 6144a^5b^4c^6g^2z^2 - 1536a^4b^6c^5g^2z^2 + 128a^3b^8c^4g^2z^2 - 8192a^5b^3c^7f^2z^2 + 1536a^4b^5c^6f^2z^2 - 16a^2b^9c^4f^2z^2 + 24576a^5b^2c^8e^2z^2 - 6144a^4b^4c^7e^2z^2 + 512a^3b^6c^6e^2z^2 - 61440a^4b^3c^8d^2z^2 + 24064a^3b^5c^7d^2z^2 - 4608a^2b^7c^6d^2z^2 - 393216a^9c^6k^2z^2 - 64a^3b^12
\end{aligned}$$

$$\begin{aligned}
& *k^2z^2 - 32768a^8c^7i^2z^2 - 32768a^6c^9e^2z^2 - 16b^{11}c^4d^2z^2 - 16384a^7b^5c^5g^i*kz - 10240a^7b^5c^5f^j*kz + 4096a^7b^5c^5h^i*jz - 47104a^6b^5c^6d^h*kz - 16384a^6b^5c^6e^g*kz + 6144a^6b^5c^6f^g*jz + 4096a^6b^5c^6e^h*jz + 32a^6b^{10}c^2d^f*kz - 6144a^5b^5c^7d^g*hz - 4096a^5b^5c^7d^f*i^z - 32a^6b^8c^4d^f*g^z - 4096a^4b^5c^8d^e*f^z + 64a^6b^7c^5d^e*f^z - 18432a^7b^2c^4h^j*kz + 4608a^6b^4c^3h^j*kz - 384a^5b^6c^2h^j*kz + 12288a^6b^3c^4g^i*kz + 7680a^6b^3c^4f^j*kz - 3072a^6b^3c^4h^i*jz - 3072a^5b^5c^3g^i*kz - 1920a^5b^5c^3f^j*kz + 768a^5b^5c^3h^i*jz + 256a^4b^7c^2g^i*kz + 160a^4b^7c^2f^j*kz - 64a^4b^7c^2h^i*jz - 65536a^6b^2c^5d^j*kz - 24576a^6b^2c^5e^i*kz + 21504a^5b^4c^4d^j*kz + 9216a^6b^2c^5f^i*jz + 6144a^5b^4c^4e^i*kz - 3072a^5b^4c^4f^h*kz - 3072a^4b^6c^3d^j*kz - 2304a^5b^4c^4f^i*jz - 2048a^6b^2c^5g^h*jz + 1536a^5b^4c^4g^h*jz + 1024a^4b^6c^3f^h*kz - 512a^4b^6c^3e^i*kz - 384a^4b^6c^3g^h*jz + 192a^4b^6c^3f^i*jz + 160a^3b^8c^2d^j*kz - 96a^3b^8c^2f^h*kz + 32a^3b^8c^2g^h*jz + 41472a^5b^3c^5d^h*kz - 13440a^4b^5c^4d^h*kz + 12288a^5b^3c^5e^g*kz - 4608a^5b^3c^5f^g*jz - 3072a^5b^3c^5e^h*jz - 3072a^4b^5c^4e^g*kz + 1888a^3b^7c^3d^h*kz + 1152a^4b^5c^4f^g*jz + 768a^4b^5c^4e^h*jz + 256a^3b^7c^3e^g*kz - 96a^3b^7c^3f^g*jz - 96a^2b^9c^2d^h*kz - 64a^3b^7c^3e^h*jz + 9216a^5b^2c^6e^f*jz - 9216a^5b^2c^6d^h*i^z - 6656a^4b^4c^5d^f*kz - 6144a^5b^2c^6d^f*kz + 3456a^3b^6c^4d^f*kz - 2304a^4b^4c^5e^f*jz + 2304a^4b^4c^5d^h*i^z - 576a^2b^8c^3d^f*kz + 192a^3b^6c^4e^f*jz - 192a^3b^6c^4d^h*i^z + 4608a^4b^3c^6d^g^h^z + 3072a^4b^3c^6d^f*i^z - 1152a^3b^5c^5d^g^h^z - 768a^3b^5c^5d^f*i^z + 96a^2b^7c^4d^g^h^z + 64a^2b^7c^4d^f*i^z - 9216a^4b^2c^7d^e^h^z + 2304a^3b^4c^6d^e^h^z + 2048a^4b^2c^7d^f^g^z - 1536a^3b^4c^6d^f^g^z + 384a^2b^6c^5d^f^g^z - 192a^2b^6c^5d^e^h^z + 3072a^3b^3c^7d^e^f^z - 768a^2b^5c^6d^e^f^z - 3072a^8b^c^4j^2*kz + 48a^5b^7c^j^2*kz - 49152a^8b^c^4i^k^2z + 2304a^5b^7c^i^k^2z - 9216a^7b^c^5h^2*kz - 32a^4b^8c^i^j^2z - 1152a^4b^8c^g^k^2z + 9216a^7b^c^5g^j^2z - 3072a^6b^c^6f^2*kz + 16a^3b^9c^g^j^2z - 49152a^7b^c^5e^k^2z - 128a^3b^9c^e^k^2z - 58368a^5b^c^7d^2*kz - 1024a^6b^c^6g^h^2z - 432a^6b^9c^3d^2*kz + 1024a^5b^c^7f^2*g^z + 32a^6b^8c^4d^2i^z - 9216a^4b^c^8d^2*g^z + 336a^6b^7c^5d^2*g^z - 672a^6b^c^6d^2e^z + 24576a^8c^5h^j*kz + 73728a^7c^6d^j*kz + 32768a^7c^6e^i*kz - 12288a^7c^6f^i*jz + 8192a^7c^6f^h*kz + 24576a^6c^7d^f*kz - 12288a^6c^7e^f*jz + 12288a^6c^7d^h*i^z + 12288a^5c^8d^e^h^z + 2304a^7b^3c^3j^2*kz - 576a^6b^5c^2j^2*kz + 45056a^7b^3c^3i^k^2z - 15360a^6b^5c^2i^k^2z - 12288a^7b^2c^4i^2*kz + 3072a^6b^4c^3i^2*kz - 256a^5b^6c^2i^2*kz + 15872a^7b^2c^4i^j^2z + 6912a^6b^3c^4h^2*kz - 4992a^6b^4c^3i^j^2z - 1728a^5b^5c^3h^2*kz + 672a^5b^6c^2i^j^2z + 144a^4b^7c^2h^2*kz + 24576a^7b^2c^4g^k^2z - 22528a^6b^4c^3g^k^2z + 7680a^5b^6c^2g^k^2z + 4096a^6b^2c^5g^2*kz - 3072a^5b^4c^4g^2*kz + 768a^4b^6c^3g^2
\end{aligned}$$

$$\begin{aligned}
& *k*z - 64*a^3*b^8*c^2*g^2*k*z - 7936*a^6*b^3*c^4*g*j^2*z + 2496*a^5*b^5*c^3 \\
& *g*j^2*z - 1536*a^6*b^2*c^5*h^2*i*z + 1280*a^5*b^3*c^5*f^2*k*z + 384*a^5*b^4 \\
& c^4*h^2*i*z - 336*a^4*b^7*c^2*g*j^2*z + 192*a^4*b^5*c^4*f^2*k*z - 144*a^3 \\
& *b^7*c^3*f^2*k*z - 32*a^4*b^6*c^3*h^2*i*z + 16*a^2*b^9*c^2*f^2*k*z + 45056* \\
& a^6*b^3*c^4*e*k^2*z - 15360*a^5*b^5*c^3*e*k^2*z - 12288*a^5*b^2*c^6*e^2*k*z \\
& + 3072*a^4*b^4*c^5*e^2*k*z + 2304*a^4*b^7*c^2*e*k^2*z - 256*a^3*b^6*c^4*e^ \\
& 2*k*z + 59136*a^4*b^3*c^6*d^2*k*z - 23488*a^3*b^5*c^5*d^2*k*z + 15872*a^6*b \\
& ^2*c^5*e*j^2*z - 4992*a^5*b^4*c^4*e*j^2*z + 4560*a^2*b^7*c^4*d^2*k*z + 1536 \\
& *a^5*b^2*c^6*f^2*i*z + 768*a^5*b^3*c^5*g*h^2*z + 672*a^4*b^6*c^3*e*j^2*z - \\
& 384*a^4*b^4*c^5*f^2*i*z - 192*a^4*b^5*c^4*g*h^2*z - 32*a^3*b^8*c^2*e*j^2*z \\
& + 32*a^3*b^6*c^4*f^2*i*z + 16*a^3*b^7*c^3*g*h^2*z - 15872*a^4*b^2*c^7*d^2*i \\
& *z + 4992*a^3*b^4*c^6*d^2*i*z - 1536*a^5*b^2*c^6*e*h^2*z - 768*a^4*b^3*c^6* \\
& f^2*g*z - 672*a^2*b^6*c^5*d^2*i*z + 384*a^4*b^4*c^5*e*h^2*z + 192*a^3*b^5*c \\
& ^5*f^2*g*z - 32*a^3*b^6*c^4*e*h^2*z - 16*a^2*b^7*c^4*f^2*g*z + 7936*a^3*b^3 \\
& *c^7*d^2*g*z - 2496*a^2*b^5*c^6*d^2*g*z + 1536*a^4*b^2*c^7*e*f^2*z - 384*a^ \\
& 3*b^4*c^6*e*f^2*z + 32*a^2*b^6*c^5*e*f^2*z - 15872*a^3*b^2*c^8*d^2*e*z + 49 \\
& 92*a^2*b^4*c^7*d^2*e*z - 61440*a^8*b^2*c^3*k^3*z + 21504*a^7*b^4*c^2*k^3*z \\
& + 16384*a^8*c^5*i^2*k*z - 18432*a^8*c^5*i*j^2*z - 128*a^4*b^9*i*k^2*z + 204 \\
& 8*a^7*c^6*h^2*i*z + 64*a^3*b^10*g*k^2*z + 16384*a^6*c^7*e^2*k*z + 16*b^11*c \\
& ^2*d^2*k*z - 18432*a^7*c^6*e*j^2*z - 2048*a^6*c^7*f^2*i*z + 18432*a^5*c^8*d \\
& ^2*i*z - 3328*a^6*b^6*c*k^3*z + 2048*a^6*c^7*e*h^2*z - 16*b^9*c^4*d^2*g*z - \\
& 2048*a^5*c^8*e*f^2*z + 32*b^8*c^5*d^2*e*z + 18432*a^4*c^9*d^2*e*z + 65536* \\
& a^9*c^4*k^3*z + 192*a^5*b^8*k^3*z - 3328*a^7*b*c^3*h*i*j*k - 6912*a^6*b*c^4 \\
& *d*i*j*k - 3328*a^6*b*c^4*e*h*j*k - 1536*a^6*b*c^4*f*g*j*k - 768*a^6*b*c^4* \\
& g*h*i*j - 768*a^6*b*c^4*f*h*i*k - 6912*a^5*b*c^5*d*e*j*k - 2304*a^5*b*c^5*d \\
& *g*i*j - 1792*a^5*b*c^5*e*f*i*j + 1536*a^5*b*c^5*d*g*h*k - 1280*a^5*b*c^5*d \\
& *f*i*k - 768*a^5*b*c^5*e*g*h*j - 768*a^5*b*c^5*e*f*h*k - 256*a^5*b*c^5*f*g* \\
& h*i + 16*a*b^8*c^2*d*f*g*k - 4*a*b^8*c^2*d*f*h*j - 2304*a^4*b*c^6*d*e*g*j - \\
& 1792*a^4*b*c^6*d*e*h*i - 1280*a^4*b*c^6*d*e*f*k - 768*a^4*b*c^6*d*f*g*i - \\
& 256*a^4*b*c^6*e*f*g*h - 32*a*b^7*c^3*d*e*f*k - 768*a^3*b*c^7*d*e*f*g + 32*a \\
& *b^5*c^5*d*e*f*g + 576*a^6*b^3*c^2*h*i*j*k + 1664*a^6*b^2*c^3*g*h*j*k + 384 \\
& *a^6*b^2*c^3*f*i*j*k - 288*a^5*b^4*c^2*g*h*j*k - 160*a^5*b^4*c^2*f*i*j*k + \\
& 2112*a^5*b^3*c^3*d*i*j*k + 576*a^5*b^3*c^3*e*h*j*k - 448*a^5*b^3*c^3*f*h*i* \\
& k - 192*a^5*b^3*c^3*g*h*i*j - 192*a^5*b^3*c^3*f*g*j*k - 160*a^4*b^5*c^2*d*i \\
& *j*k + 96*a^4*b^5*c^2*f*h*i*k + 80*a^4*b^5*c^2*f*g*j*k + 32*a^4*b^5*c^2*g*h \\
& *i*j + 4992*a^5*b^2*c^4*d*h*i*k - 4608*a^5*b^2*c^4*e*g*i*k + 3456*a^5*b^2*c \\
& ^4*d*g*j*k - 1312*a^4*b^4*c^3*d*h*i*k - 1056*a^4*b^4*c^3*d*g*j*k + 896*a^5* \\
& b^2*c^4*f*g*i*j + 768*a^4*b^4*c^3*e*g*i*k + 384*a^5*b^2*c^4*f*g*h*k + 384*a \\
& ^5*b^2*c^4*e*h*i*j + 384*a^5*b^2*c^4*e*f*j*k + 224*a^4*b^4*c^3*f*g*h*k - 16 \\
& 0*a^4*b^4*c^3*e*f*j*k - 96*a^4*b^4*c^3*f*g*i*j + 96*a^3*b^6*c^2*d*h*i*k + 8 \\
& 0*a^3*b^6*c^2*d*g*j*k - 64*a^4*b^4*c^3*e*h*i*j - 48*a^3*b^6*c^2*f*g*h*k - 2 \\
& 496*a^4*b^3*c^4*d*g*h*k + 2112*a^4*b^3*c^4*d*e*j*k - 960*a^4*b^3*c^4*d*f*i* \\
& k + 656*a^3*b^5*c^3*d*g*h*k - 448*a^4*b^3*c^4*e*f*h*k + 384*a^3*b^5*c^3*d*f \\
& *i*k + 320*a^4*b^3*c^4*d*g*i*j - 192*a^4*b^3*c^4*f*g*h*i - 192*a^4*b^3*c^4* \\
& e*g*h*j + 192*a^4*b^3*c^4*e*f*i*j - 160*a^3*b^5*c^3*d*e*j*k + 96*a^3*b^5*c^
\end{aligned}$$



$$\begin{aligned}
& 3*e*f*h*k - 48*a^2*b^7*c^2*d*g*h*k + 32*a^3*b^5*c^3*e*g*h*j - 32*a^2*b^7*c^2*d*f*i*k + 4992*a^4*b^2*c^5*d*e*h*k - 3584*a^4*b^2*c^5*d*f*h*j - 1312*a^3*b^4*c^4*d*e*h*k + 896*a^4*b^2*c^5*e*f*g*j + 896*a^4*b^2*c^5*d*g*h*i + 640*a^4*b^2*c^5*d*f*g*k - 640*a^4*b^2*c^5*d*e*i*j + 600*a^3*b^4*c^4*d*f*h*j + 480*a^3*b^4*c^4*d*f*g*k + 384*a^4*b^2*c^5*e*f*h*i - 192*a^2*b^6*c^3*d*f*g*k - 96*a^3*b^4*c^4*e*f*g*j - 96*a^3*b^4*c^4*d*g*h*i + 96*a^2*b^6*c^3*d*e*h*k + 12*a^2*b^6*c^3*d*f*h*j - 960*a^3*b^3*c^5*d*e*f*k + 384*a^2*b^5*c^4*d*e*f*k + 320*a^3*b^3*c^5*d*e*g*j - 192*a^3*b^3*c^5*e*f*g*h - 192*a^3*b^3*c^5*d*f*g*i + 192*a^3*b^3*c^5*d*e*h*i + 32*a^2*b^5*c^4*d*f*g*i + 896*a^3*b^2*c^6*d*e*g*h + 384*a^3*b^2*c^6*d*e*f*i - 96*a^2*b^4*c^5*d*e*g*h - 64*a^2*b^4*c^5*d*e*f*i - 192*a^2*b^3*c^6*d*e*f*g + 48*a^6*b^4*c*i*j^2*k - 1424*a^6*b^4*c*h*j*k^2 - 2304*a^7*b*c^3*g*j^2*k - 24*a^5*b^5*c*g*j^2*k + 2048*a^7*b*c^3*g*i*k^2 - 1024*a^7*b*c^3*f*j*k^2 - 768*a^5*b^5*c*g*i*k^2 + 408*a^5*b^5*c*f*j*k^2 + 256*a^6*b*c^4*g*h^2*k + 16*a^4*b^6*c*g*i*j^2 + 4608*a^6*b*c^4*e*i^2*k + 4608*a^5*b*c^5*e^2*i*k - 896*a^6*b*c^4*f*i^2*j + 768*a^4*b^6*c*d*j*k^2 - 256*a^4*b^6*c*f*h*k^2 - 128*a^4*b^6*c*e*i*k^2 + 2208*a^6*b*c^4*f*h*j^2 - 1920*a^6*b*c^4*e*i*j^2 + 800*a^5*b*c^5*f^2*h*j - 256*a^5*b*c^5*f^2*g*k - 16*a^8*b^2*c^2*d^2*i*k + 6*a^3*b^7*c*f*h*j^2 + 8192*a^6*b*c^4*d*h*k^2 + 2048*a^6*b*c^4*e*g*k^2 - 472*a^3*b^7*c*d*h*k^2 + 64*a^3*b^7*c*e*g*k^2 + 4896*a^4*b*c^6*d^2*h*j + 2304*a^4*b*c^6*d^2*g*k + 1824*a^5*b*c^5*d*h^2*j - 384*a^5*b*c^5*e*h^2*i - 168*a*b^7*c^3*d^2*g*k + 42*a*b^7*c^3*d^2*h*j + 6*a^2*b^8*c*d*h*j^2 + 1536*a^5*b*c^5*e*g*i^2 + 1536*a^4*b*c^6*e^2*g*i - 896*a^5*b*c^5*d*h*i^2 - 896*a^4*b*c^6*e^2*f*j + 144*a^2*b^8*c*d*f*k^2 + 4896*a^5*b*c^5*d*f*j^2 + 1824*a^4*b*c^6*d*f^2*j - 384*a^4*b*c^6*e*f^2*i + 336*a*b^6*c^4*d^2*e*k - 156*a*b^6*c^4*d^2*f*j + 16*a*b^6*c^4*d^2*g*i + 12*a*b^7*c^3*d*f^2*j + 2208*a^3*b*c^7*d^2*f*h - 1920*a^3*b*c^7*d^2*e*i + 800*a^4*b*c^6*d*f*h^2 - 102*a*b^5*c^5*d^2*f*h - 32*a*b^5*c^5*d^2*e*i + 12*a*b^6*c^4*d*f^2*h - 2*a*b^7*c^3*d*f*h^2 - 896*a^3*b*c^7*d*e^2*h - 8*a*b^6*c^4*d*f*g^2 - 240*a*b^4*c^6*d^2*e*g - 32*a*b^4*c^6*d*e^2*f + 3072*a^7*c^4*f*i*j*k + 3072*a^6*c^5*e*f*j*k - 3072*a^6*c^5*d*h*i*k + 1536*a^6*c^5*e*h*i*j + 4608*a^5*c^6*d*e*i*j - 3072*a^5*c^6*d*e*h*k - 1152*a^5*c^6*d*f*h*j + 512*a^5*c^6*e*f*h*i + 1536*a^4*c^7*d*e*f*i - 2*a*b^9*c*d*f*j^2 - 1088*a^7*b^2*c^2*i*j^2*k + 4800*a^7*b^2*c^2*h*j*k^2 + 960*a^6*b^2*c^3*h^2*i*k + 544*a^6*b^3*c^2*g*j^2*k - 144*a^5*b^4*c^2*h^2*i*k - 2304*a^6*b^2*c^3*g*i^2*k + 1920*a^6*b^3*c^2*g*i*k^2 + 1152*a^5*b^3*c^3*g^2*i*k - 864*a^6*b^3*c^2*f*j*k^2 + 384*a^5*b^4*c^2*g*i^2*k + 192*a^6*b^2*c^3*h*i^2*j - 192*a^4*b^5*c^2*g^2*i*k - 32*a^5*b^4*c^2*h*i^2*j - 1088*a^6*b^2*c^3*e*j^2*k + 960*a^6*b^2*c^3*g*i*j^2 - 480*a^5*b^3*c^3*g*h^2*k - 240*a^5*b^4*c^2*g*i*j^2 + 192*a^5*b^2*c^4*f^2*i*k + 72*a^4*b^5*c^2*g*h^2*k + 48*a^5*b^4*c^2*e*j^2*k + 48*a^4*b^4*c^3*f^2*i*k - 16*a^3*b^6*c^2*f^2*i*k + 13376*a^6*b^2*c^3*d*j*k^2 - 5136*a^5*b^4*c^2*d*j*k^2 - 3840*a^6*b^2*c^3*e*i*k^2 + 1536*a^5*b^4*c^2*e*i*k^2 - 768*a^5*b^3*c^3*e*i^2*k - 768*a^4*b^3*c^4*e^2*i*k + 624*a^5*b^4*c^2*f*h*k^2 + 576*a^6*b^2*c^3*f*h*k^2 + 192*a^5*b^2*c^4*g^2*h*j + 96*a^5*b^3*c^3*f*i^2*j + 48*a^4*b^4*c^3*g^2*h*j - 8*a^3*b^6*c^2*g^2*h*j + 6848*a^4*b^2*c^5*d^2*i*k - 2448*a^3*b^4*c^4*d^2*i*k + 960*a^5*b^2*c^4*e*h^2*k - 864*a^5*b^2*c^4*f*h^2*j + 480*a^5*b^3*c^3*e*i*j^2 + 33
\end{aligned}$$

$$\begin{aligned}
& 6a^4b^3c^4f^2h^*j + 336a^2b^6c^3d^2i^*k + 192a^5b^2c^4g^*h^2i + \\
& 144a^5b^3c^3f^*h^*j^2 - 144a^4b^4c^3e^*h^2k - 102a^4b^5c^2f^*h^*j^2 - \\
& 96a^4b^3c^4f^2g^*k - 32a^4b^5c^2e^*i^*j^2 - 30a^3b^5c^3f^2h^* \\
& j - 24a^3b^5c^3f^2g^*k + 16a^4b^4c^3g^*h^2i - 12a^4b^4c^3f^*h^2j + \\
& 12a^3b^6c^2f^*h^2j + 8a^2b^7c^2f^2g^*k - 2a^2b^7c^2f^2h^*j - \\
& 9312a^5b^3c^3d^*h^*k^2 + 3288a^4b^5c^2d^*h^*k^2 - 2304a^4b^2c^5e^ \\
& 2g^*k + 1920a^5b^3c^3e^*g^*k^2 + 1152a^4b^3c^4e^*g^2k - 768a^4b^5c^ \\
& 2e^*g^*k^2 + 384a^3b^4c^4e^2g^*k - 320a^5b^2c^4d^*i^2j - 224a^4b^ \\
& 3c^4f^*g^2j + 192a^5b^2c^4f^*h^*i^2 + 192a^4b^2c^5e^2h^*j - 192a^3 \\
& b^5c^3e^*g^2k - 32a^3b^4c^4e^2h^*j + 24a^3b^5c^3f^*g^2j - 3552a^ \\
& 5b^2c^4d^*h^*j^2 - 3424a^3b^3c^5d^2g^*k + 1332a^4b^4c^3d^*h^*j^2 + \\
& 1224a^2b^5c^4d^2g^*k + 960a^5b^2c^4e^*g^*j^2 - 496a^3b^3c^5d^2h^* \\
& j + 432a^4b^3c^4d^*h^2j - 240a^4b^4c^3e^*g^*j^2 - 222a^2b^5c^4d^2 \\
& h^*j + 192a^4b^2c^5f^2g^*i + 192a^4b^2c^5e^*f^2k - 174a^3b^5c^3d^ \\
& h^2j - 156a^3b^6c^2d^*h^*j^2 + 48a^3b^4c^4e^*f^2k - 32a^4b^3c^4 \\
& e^*h^2i + 16a^3b^6c^2e^*g^*j^2 + 16a^3b^4c^4f^2g^*i - 16a^2b^6c^3 \\
& e^*f^2k + 12a^2b^7c^2d^*h^2j + 1728a^5b^2c^4d^*f^*k^2 + 1392a^4b^4 \\
& c^3d^*f^*k^2 - 840a^3b^6c^2d^*f^*k^2 - 768a^4b^2c^5e^*g^2i + 576a^4b^ \\
& 2c^5d^*g^2j + 96a^4b^3c^4d^*h^*i^2 + 96a^3b^3c^5e^2f^*j - 80a^3b^ \\
& 4c^4d^*g^2j + 64a^4b^2c^5f^*g^2h + 48a^3b^4c^4f^*g^2h + 6848a^ \\
& 3b^2c^6d^2e^*k - 3552a^3b^2c^6d^2f^*j - 2448a^2b^4c^5d^2e^*k + 1 \\
& 332a^2b^4c^5d^2f^*j + 960a^3b^2c^6d^2g^*i - 496a^4b^3c^4d^*f^*j^2 \\
& + 432a^3b^3c^5d^*f^2j - 240a^2b^4c^5d^2g^*i - 222a^3b^5c^3d^*f^* \\
& j^2 + 192a^4b^2c^5e^*g^*h^2 - 174a^2b^5c^4d^*f^2j + 42a^2b^7c^2d^* \\
& f^*j^2 - 32a^3b^3c^5e^*f^2i + 16a^3b^4c^4e^*g^*h^2 - 320a^3b^2c^6d^ \\
& e^2j - 224a^3b^3c^5d^*g^2h + 192a^4b^2c^5d^*f^*i^2 + 192a^3b^2c^ \\
& 6e^2f^*h - 32a^3b^4c^4d^*f^*i^2 + 24a^2b^5c^4d^*g^2h - 864a^3b^2c^ \\
& 6d^*f^2h + 480a^2b^3c^6d^2e^*i + 336a^3b^3c^5d^*f^*h^2 + 192a^3b^ \\
& 2c^6e^*f^2g + 144a^2b^3c^6d^2f^*h - 30a^2b^5c^4d^*f^*h^2 + 16a^2b^ \\
& 4c^5e^*f^2g - 12a^2b^4c^5d^*f^2h + 192a^3b^2c^6d^*f^*g^2 + 96a^2b^ \\
& 3c^6d^*e^2h + 48a^2b^4c^5d^*f^*g^2 + 960a^2b^2c^7d^2e^*g + 192a^ \\
& 2b^2c^7d^*e^2f - 3072a^8b^*c^2j^2k^2 + 1104a^7b^3c^*j^2k^2 + 768a^ \\
& 6b^4c^*i^2k^2 - 256a^6b^3c^2i^3k + 1536a^7b^*c^3h^2k^2 - 960a^7 \\
& b^*c^3i^2j^2 + 444a^5b^5c^*h^2k^2 - 16a^5b^5c^*i^2j^2 - 3072a^7b^ \\
& 2c^2g^*k^3 - 496a^6b^3c^2h^*j^3 + 192a^4b^6c^*g^2k^2 - 192a^4b^4c^ \\
& 3g^3k + 144a^5b^3c^3h^3j + 32a^3b^6c^2g^3k - 18a^4b^5c^2h^ \\
& 3j - 9a^4b^6c^*h^2j^2 - 192a^6b^*c^4h^2i^2 + 36a^3b^7c^*f^2k^2 - \\
& 4a^3b^7c^*g^2j^2 - 2176a^6b^3c^2e^*k^3 - 256a^3b^3c^5e^3k - 192a^ \\
& 6b^2c^3f^*j^3 - 192a^4b^2c^5f^3j + 132a^5b^4c^2f^*j^3 + 128a^4 \\
& b^3c^4g^3i - 28a^3b^4c^4f^3j + 6a^2b^6c^3f^3j + 10752a^5b^*c^ \\
& 5d^2k^2 - 960a^5b^*c^5e^2j^2 - 192a^5b^*c^5f^2i^2 - 1680a^5b^3c^ \\
& 3d^*j^3 - 1680a^2b^3c^6d^3j + 222a^4b^5c^2d^*j^3 + 80a^4b^3c^4f^ \\
& h^3 + 80a^3b^3c^5f^3h + 30a^*b^8c^2d^2j^2 + 6a^3b^5c^3f^*h^3 + \\
& 6a^2b^5c^4f^3h - 960a^4b^*c^6d^2i^2 - 192a^4b^*c^6e^2h^2 - 192a^ \\
& 4b^2c^5d^*h^3 - 192a^2b^2c^7d^3h + 128a^3b^3c^5e^*g^3 - 28a^3*
\end{aligned}$$

$$\begin{aligned}
& b^4c^4d^3h^3 + 12a^2b^6c^4d^2h^2 + 6a^2b^6c^3d^3h^3 - 192a^3b^3c^7e^2f^2 + 60a^2b^5c^5d^2g^2 + 198a^2b^4c^6d^2f^2 + 144a^2b^3c^6d^2f^3 - 960a^2b^3c^8d^2e^2 + 240a^2b^3c^7d^2e^2 + 4608a^8c^3i^2j^2k - 3072a^8c^3h^2j^2k^2 - 512a^7c^4h^2i^2k + 120a^5b^6h^2j^2k^2 + 768a^7c^4h^2i^2j + 4608a^7c^4e^2j^2k + 512a^6c^5f^2i^2k + 64a^4b^7g^2i^2k^2 - 40a^4b^7f^2j^2k^2 - 9216a^7c^4d^2j^2k^2 - 4096a^7c^4e^2i^2k^2 - 1024a^7c^4f^2h^2k^2 - 4608a^5c^6d^2i^2k - 512a^6c^5e^2h^2k - 192a^6c^5f^2h^2j - 40a^3b^8d^2j^2k^2 + 24a^3b^8f^2h^2k^2 + 2304a^6c^5d^2i^2j + 768a^5c^6e^2h^2j + 256a^6c^5f^2h^2i^2 + 8b^9c^2d^2g^2k - 2b^9c^2d^2h^2j + 6144a^8b^3c^2i^2k^3 - 2176a^7b^3c^2i^2k^3 - 1728a^6c^5d^2h^2j^2 + 1536a^7b^3c^3i^2k^3 + 512a^5c^6e^2f^2k + 24a^2b^9d^2h^2k^2 - 3072a^6c^5d^2f^2k^2 - 16b^8c^3d^2e^2k + 6b^8c^3d^2f^2j - 4608a^4c^7d^2e^2k + 2016a^7b^3c^3h^2j^3 - 1728a^4c^7d^2f^2j + 1088a^6b^4c^2g^2k^3 + 224a^6b^3c^4h^3j + 30a^5b^5c^2h^2j^3 + 2304a^4c^7d^2e^2j + 768a^5c^6d^2f^2i^2 + 256a^4c^7e^2f^2h + 6b^7c^4d^2f^2h + 6144a^7b^3c^3e^2k^3 + 1536a^4b^3c^6e^2k^3 + 512a^6b^3c^4g^2i^3 + 192a^5b^5c^2e^2k^3 - 192a^4c^7d^2f^2h - 10a^4b^6c^2f^2j^3 + 108a^2b^9c^2d^2k^2 + 16b^6c^5d^2e^2g + 4320a^6b^3c^4d^2j^3 + 4320a^3b^3c^7d^3j + 222a^2b^5c^5d^3j + 96a^5b^3c^5f^2h^3 + 96a^4b^3c^6f^3h - 10a^3b^7c^2d^2j^3 + 768a^3c^8d^2e^2f + 512a^3b^3c^7e^3g + 132a^2b^4c^6d^3h + 2016a^2b^3c^8d^3f - 496a^2b^3c^7d^3f + 224a^3b^3c^7d^2f^3 - 18a^2b^5c^5d^2f^3 - 1920a^7b^2c^2i^2k^2 - 1648a^6b^3c^2h^2k^2 + 240a^6b^3c^2i^2j^2 - 960a^6b^2c^3h^2j^2 - 512a^6b^2c^3g^2k^2 - 480a^5b^4c^2g^2k^2 + 198a^5b^4c^2h^2j^2 - 240a^5b^3c^3g^2j^2 - 240a^5b^3c^3f^2k^2 + 60a^4b^5c^2g^2j^2 - 36a^4b^5c^2f^2k^2 - 16a^5b^3c^3h^2i^2 - 1920a^5b^2c^4e^2k^2 + 768a^4b^4c^3e^2k^2 - 464a^5b^2c^4f^2j^2 - 384a^5b^2c^4g^2i^2 - 64a^3b^6c^2e^2k^2 + 42a^4b^4c^3f^2j^2 + 12a^3b^6c^2f^2j^2 - 13104a^4b^3c^4d^2k^2 + 5628a^3b^5c^3d^2k^2 - 1128a^2b^7c^2d^2k^2 + 240a^4b^3c^4e^2j^2 - 48a^4b^3c^4g^2h^2 - 16a^4b^3c^4f^2i^2 - 16a^3b^5c^3e^2j^2 - 4a^3b^5c^3g^2h^2 - 2880a^4b^2c^5d^2j^2 + 1750a^3b^4c^4d^2j^2 - 345a^2b^6c^3d^2j^2 - 192a^4b^2c^5f^2h^2 - 42a^3b^4c^4f^2h^2 + 240a^3b^3c^5d^2i^2 - 48a^3b^3c^5f^2g^2 - 16a^3b^3c^5e^2h^2 - 16a^2b^5c^4d^2i^2 - 4a^2b^5c^4f^2g^2 - 464a^3b^2c^6d^2h^2 - 384a^3b^2c^6e^2g^2 + 42a^2b^4c^5d^2h^2 - 240a^2b^3c^6d^2g^2 - 16a^2b^3c^6e^2f^2 - 960a^2b^2c^7d^2f^2 - 8a^2b^10d^2f^2k^2 - a^2b^8c^2f^2j^2 - 2048a^8c^3i^2k^2 - 100a^6b^5j^2k^2 - 64a^5b^6i^2k^2 - 288a^7c^4h^2j^2 - 36a^4b^7h^2k^2 - 16a^3b^8g^2k^2 - 2048a^6c^5e^2k^2 - 864a^6c^5f^2j^2 - 4a^2b^9f^2k^2 - 2592a^5c^6d^2j^2 - 1536a^5c^6e^2i^2 - 32a^5c^6f^2h^2 - 864a^4c^7d^2h^2 + 360a^7b^2c^2j^4 - 4b^7c^4d^2g^2 - 9b^6c^5d^2f^2 - 288a^3c^8d^2f^2 - 24a^5b^2c^4h^4 - 16b^5c^6d^2e^2 - 9a^4b^4c^3h^4 - 16a^3b^4c^4g^4 - 24a^3b^2c^6f^4 - 9a^2b^4c^5f^4 - a^2b^6c^3f^2h^2 + 192a^6b^5i^2k^3 - 96a^5b^6g^2k^3 - 1728a^7c^4f^2j^3 - 192a^5c^6f^3j - 10b^7c^4d^3j - 1024a^6c^5e^2i^3 - 1024a^4c^7e^3i + 153
\end{aligned}$$

$$\begin{aligned}
& 6a^8b^2c^k^4 - 10b^6c^5d^3h - 1728a^3c^8d^3h - 192a^5c^6d^3h^3 \\
& - 25a^6b^4c^j^4 + 30b^5c^6d^3f + 360a^2b^2c^8d^4 - 4b^{11}d^2k^2 \\
& - 4096a^9c^2k^4 - 1296a^8c^3j^4 - 144a^7b^4k^4 - 256a^7c^4i^4 \\
& - 16a^6c^5h^4 - 16a^4c^7f^4 - 256a^3c^8e^4 - 25b^4c^7d^4 - 1296 \\
& a^2c^9d^4 - b^8c^3d^2h^2 - b^{10}cd^2j^2, z, n) * x * (8192a^6b^2c^8 + \\
& 32a^2b^9c^4 - 512a^3b^7c^5 + 3072a^4b^5c^6 - 8192a^5b^3c^7) / (4 \\
& * (64a^5c^5 - a^2b^6c^2 + 12a^3b^4c^3 - 48a^4b^2c^4)) + (x * (2b^6 \\
& c^5d^2 - 576a^3c^8d^2 + 64a^4c^7f^2 - 64a^5c^6h^2 + 8a^2b^9k^2 \\
& + 576a^6c^5j^2 - 36a^2b^4c^6d^2 + 128a^3b^3c^7e^2 + 128a^5b^2c^5 \\
& i^2 + 2a^2b^8c^j^2 - 136a^3b^7c^k^2 + 3072a^6b^2c^4k^2 + 256a^2b^2 \\
& c^7d^2 - 32a^2b^3c^6e^2 + 20a^2b^4c^5f^2 - 96a^3b^2c^6f^2 - \\
& 8a^2b^5c^4g^2 + 32a^3b^3c^5g^2 + 2a^2b^6c^3h^2 - 4a^3b^4c^4 \\
& h^2 - 32a^4b^3c^4i^2 - 40a^3b^6c^2j^2 + 276a^4b^4c^3j^2 - 736a^5 \\
& b^2c^4j^2 + 888a^4b^5c^2k^2 - 2656a^5b^3c^3k^2 - 384a^4c^7d \\
& * h - 1024a^5c^6e^k + 384a^5c^6f^j - 1024a^6c^5i^k + 4a^2b^5c^5d \\
& * f + 320a^3b^2c^7d^*f + 576a^4b^2c^6d^*j + 256a^4b^2c^6e^*i + 64a^4b^2c^6 \\
& f^*h + 512a^5b^2c^5g^*k + 64a^5b^2c^5h^*j - 96a^2b^3c^6d^*f + 8a^2b^4 \\
& c^5d^*h + 32a^2b^4c^5e^*g + 64a^3b^2c^6d^*h - 128a^3b^2c^6e^*g \\
& + 20a^2b^5c^4d^*j - 12a^2b^5c^4f^*h - 224a^3b^3c^5d^*j - 64a^3b^3 \\
& c^5e^*i + 32a^3b^3c^5f^*h - 12a^2b^6c^3f^*j - 32a^3b^4c^4e^*k + \\
& 152a^3b^4c^4f^*j + 32a^3b^4c^4g^*i + 384a^4b^2c^5e^*k - 512a^4b^2 \\
& c^5f^*j - 128a^4b^2c^5g^*i + 4a^2b^7c^2h^*j + 16a^3b^5c^3g^*k - \\
& 44a^3b^5c^3h^*j - 192a^4b^3c^4g^*k + 96a^4b^3c^4h^*j - 32a^4b^4c^3 \\
& i^*k + 384a^5b^2c^4i^*k) / (4 * (64a^5c^5 - a^2b^6c^2 + 12a^3b^4c^3 \\
& - 48a^4b^2c^4)) - (5b^3c^6d^3 + 8a^3c^6f^3 + 216a^6c^3j^3 - \\
& 96a^2c^7d^2e^2 + 72a^2c^7d^2f - 4a^4b^2c^4h^3 - 3b^4c^5d^2f + \\
& 5a^4b^4c^j^3 - 32a^3c^6e^2h - 96a^4c^5d^2i^2 + b^5c^4d^2h + 216 \\
& a^3c^6d^2j + 8a^4c^5f^2h^2 + 384a^5c^4d^2k^2 + b^6c^3d^2j + 4a^2 \\
& b^7f^2k^2 + 72a^4c^5f^2j + 216a^5c^4f^2j^2 - 32a^5c^4h^2i^2 - 12 \\
& a^3b^6h^2k^2 + 24a^5c^4h^2j + 128a^6c^3h^2k^2 + 20a^4b^5j^2k^2 + 6 \\
& a^2b^2c^5f^3 - 3a^3b^3c^3h^3 - 66a^5b^2c^2j^3 - 36a^2b^3c^7d^3 \\
& + 4a^2b^8d^2k^2 + a^2b^7c^d^j^2 - 192a^3c^6d^2e^i + 48a^3c^6d^2f^h + 14 \\
& 4a^4c^5d^2h^j - 128a^4c^5e^2f^k - 64a^4c^5e^2h^i - 384a^5c^4e^2j^k \\
& - 128a^5c^4f^2i^k - 384a^6c^3i^2j^k + 16a^2b^2c^6d^2e^2 + 18a^2b^2c^6 \\
& d^2f + 3a^2b^3c^5d^2f^2 - 60a^2b^2c^6d^2f^2 + 4a^2b^4c^4d^2g^2 + 16a^2 \\
& b^2c^6e^2f - a^2b^3c^5d^2h + a^2b^5c^3d^2h^2 - 60a^2b^2c^6d^2h - 28 \\
& a^3b^2c^5d^2h^2 - 10a^2b^4c^4d^2j - 28a^3b^2c^5f^2h - 396a^4b^2c^4 \\
& d^2j^2 - 72a^2b^6c^d^2k^2 + 16a^3b^2c^5e^2j + 16a^4b^2c^4f^2i^2 + a^2b^6 \\
& c^2f^2j^2 - 36a^3b^5c^2f^2k^2 + 128a^5b^2c^3f^2k^2 - 3a^3b^5c^2h^2j^2 \\
& - 204a^5b^2c^3h^2j^2 + 128a^4b^4c^2h^2k^2 + 16a^5b^2c^3i^2j^2 - 204a^5b^2 \\
& b^3c^2j^2k^2 + 512a^6b^2c^2j^2k^2 - 24a^2b^2c^5d^2g^2 - 9a^2b^3c^4d^2 \\
& h^2 + 4a^2b^3c^4f^2g^2 + 16a^3b^2c^4d^2i^2 - 6a^2b^2c^5d^2j^2 - 5a^2 \\
& b^3c^4f^2h^2 + a^2b^4c^3f^2h^2 - 21a^2b^5c^2d^2j^2 + 18a^3b^2c^4 \\
& f^2h^2 + 155a^3b^3c^3d^2j^2 - 8a^3b^2c^4g^2h^2 + 436a^3b^4c^2d^2 \\
& k^2 - 952a^4b^2c^3d^2k^2 - 5a^2b^4c^3f^2j^2 + 26a^3b^2c^4f^2j^2 -
\end{aligned}$$

$$\begin{aligned}
& 12a^3b^4c^2f^*j^2 + 2a^4b^2c^3f^*j^2 + 4a^3b^3c^3g^2j + 52a^4b^3c^2f^*k^2 - 6a^3b^4c^2h^2j + 42a^4b^2c^3h^2j + 51a^4b^3c^2h^*j^2 - 360a^5b^2c^2h^*k^2 - 16a^3b^3c^5d^*e^*g + 96a^2b^3c^6d^*e^*g - 4a^3b^4c^4d^*f^*h + 16a^3b^5c^3d^*e^*k - 4a^3b^5c^3d^*f^*j + 544a^3b^3c^5d^*e^*k - 312a^3b^3c^5d^*f^*j + 96a^3b^3c^5d^*g^*i + 32a^3b^3c^5e^*f^*i + 32a^3b^3c^5e^*g^*h - 8a^3b^6c^2d^*g^*k + 2a^3b^6c^2d^*h^*j + 544a^4b^3c^4d^*i^*k + 224a^4b^3c^4e^*h^*k + 32a^4b^3c^4e^*i^*j + 64a^4b^3c^4f^*g^*k - 152a^4b^3c^4f^*h^*j + 32a^4b^3c^4g^*h^*i + 192a^5b^3c^3g^*j^*k + 224a^5b^3c^3h^*i^*k + 32a^2b^2c^5d^*e^*i + 52a^2b^2c^5d^*f^*h - 16a^2b^2c^5e^*f^*g - 192a^2b^3c^4d^*e^*k + 70a^2b^3c^4d^*f^*j - 16a^2b^3c^4d^*g^*i + 96a^2b^4c^3d^*g^*k - 30a^2b^4c^3d^*h^*j + 16a^2b^4c^3e^*f^*k - 272a^3b^2c^4d^*g^*k + 100a^3b^2c^4d^*h^*j - 48a^3b^2c^4e^*f^*k - 16a^3b^2c^4e^*g^*j - 16a^3b^2c^4f^*g^*i + 16a^2b^5c^2d^*i^*k - 8a^2b^5c^2f^*g^*k + 2a^2b^5c^2f^*h^*j - 192a^3b^3c^3d^*i^*k - 48a^3b^3c^3e^*h^*k + 24a^3b^3c^3f^*g^*k + 6a^3b^3c^3f^*h^*j + 16a^3b^4c^2f^*i^*k + 24a^3b^4c^2g^*h^*k + 80a^4b^2c^3e^*j^*k - 48a^4b^2c^3f^*i^*k - 112a^4b^2c^3g^*h^*k - 16a^4b^2c^3g^*i^*j - 40a^4b^3c^2g^*j^*k - 48a^4b^3c^2h^*i^*k + 80a^5b^2c^2i^*j^*k)/(8*(64a^5c^5 - a^2b^6c^2 + 12a^3b^4c^3 - 48a^4b^2c^4)) + (x*(32a^2c^7e^3 + 32a^5c^4i^3 - 12a^4b^5k^3 - 2b^3c^6d^2e + b^4c^5d^2g + 124a^5b^3c^k^3 - 320a^6b^3c^2k^3 + 96a^3c^6e^2i + 96a^4c^5e^i^2 + 144a^3c^6d^2k + 128a^5c^4e^k^2 - b^6c^3d^2k - 4a^2b^7g^k^2 - 16a^4c^5f^2k + 8a^3b^6i^k^2 + 16a^5c^4h^2k + 128a^6c^3i^k^2 - 144a^6c^3j^2k - 4a^2b^3c^4g^3 + 24a^3b^3c^7d^2e - 48a^2c^7d^*e^*f - 144a^3c^6d^*e^*j - 48a^3c^6d^*f^*i - 16a^3c^6e^*f^*h + 96a^4c^5d^*h^*k - 144a^4c^5d^*i^*j - 48a^4c^5e^*h^*j - 16a^4c^5f^*h^*i - 96a^5c^4f^*j^*k - 48a^5c^4h^*i^*j - 12a^3b^2c^6d^2g + 16a^2b^3c^6e^*f^2 - 48a^2b^3c^6e^2g - 2a^3b^3c^5d^2i + 24a^2b^3c^6d^2i + 8a^3b^3c^5e^*h^2 + 18a^3b^4c^4d^2k + 16a^3b^3c^5f^2i + 96a^4b^3c^4e^*j^2 + 8a^2b^6c^*e^*k^2 - 176a^3b^3c^5e^2k - 48a^4b^3c^4g^*i^2 - a^2b^6c^*g^*j^2 + 8a^4b^3c^4h^2i + 44a^3b^5c^*g^*k^2 - 64a^5b^3c^3g^*k^2 + 2a^3b^5c^*i^*j^2 + 96a^5b^3c^3i^*j^2 - 88a^4b^4c^*i^*k^2 - 176a^5b^3c^3i^2k - 3a^4b^4c^*j^2k + 24a^2b^2c^5e^*g^2 - 8a^2b^2c^5f^2g + 2a^2b^3c^4e^*h^2 - 100a^2b^2c^5d^2k - a^2b^4c^3g^*h^2 + 2a^2b^5c^2e^*j^2 - 4a^3b^2c^4g^*h^2 - 28a^3b^3c^3e^*j^2 + 32a^2b^3c^4e^2k + 24a^3b^2c^4g^2i - 88a^3b^4c^2e^*k^2 + 216a^4b^2c^3e^*k^2 - a^2b^4c^3f^2k + 2a^3b^3c^3h^2i + 14a^3b^4c^2g^*j^2 - 48a^4b^2c^3g^*j^2 + 8a^2b^5c^2g^2k - 44a^3b^3c^3g^2k - 108a^4b^3c^2g^*k^2 - 12a^4b^2c^3h^2k - 28a^4b^3c^2i^*j^2 + 32a^4b^3c^2i^2k + 216a^5b^2c^2i^k^2 + 40a^5b^2c^2j^2k - 4a^3b^2c^6d^*e^*f + 2a^3b^3c^5d^*f^*g + 32a^2b^3c^6d^*e^*h + 24a^2b^3c^6d^*f^*g - 2a^3b^5c^3d^*f^*k - 8a^3b^3c^5d^*f^*k + 72a^3b^3c^5d^*g^*j + 32a^3b^3c^5d^*h^*i + 80a^3b^3c^5e^*f^*j - 96a^3b^3c^5e^*g^*i + 8a^3b^3c^5f^*g^*h + 72a^4b^3c^4d^*j^*k - 352a^4b^3c^4e^*i^*k + 8a^4b^3c^4f^*h^*k + 80a^4b^3c^4f^*i^*j + 24a^4b^3c^4g^*h^*j + 56a^5b^3c^3h^*j^*k + 20a^2b^2c^5d^*e^*j - 4a^2b^2c^5d^*f^*i - 16a^2b^2c^5d^*g^*h - 12a^2b^2c^5e^*f^*h + 18a^2b^3c^4d^*f^*k -
\end{aligned}$$

$$\begin{aligned}
& 10a^2b^3c^4d^*g^*j - 12a^2b^3c^4e^*f^*j + 6a^2b^3c^4f^*g^*h + 6a^2b^4c^3d^*h^*k - 32a^2b^4c^3e^*g^*k + 4a^2b^4c^3e^*h^*j + 6a^2b^4c^3f^*g^*j - 64a^3b^2c^4d^*h^*k + 20a^3b^2c^4d^*i^*j + 176a^3b^2c^4e^*g^*k - 20a^3b^2c^4e^*h^*j - 40a^3b^2c^4f^*g^*j - 12a^3b^2c^4f^*h^*i - 2a^2b^5c^2g^*h^*j - 10a^3b^3c^3d^*j^*k + 64a^3b^3c^3e^*i^*k + 6a^3b^3c^3f^*h^*k - 12a^3b^3c^3f^*i^*j + 10a^3b^3c^3g^*h^*j - 32a^3b^4c^2g^*i^*k + 4a^3b^4c^2h^*i^*j + 8a^4b^2c^3f^*j^*k + 176a^4b^2c^3g^*i^*k - 20a^4b^2c^3h^*i^*j - 6a^4b^3c^2h^*j^*k)/(4*(64a^5c^5 - a^2b^6c^2 + 12a^3b^4c^3 - 48a^4b^2c^4))\text{root}(1572864a^8b^2c^9z^4 - 983040a^7b^4c^8z^4 + 327680a^6b^6c^7z^4 - 61440a^5b^8c^6z^4 + 6144a^4b^10c^5z^4 - 256a^3b^12c^4z^4 - 1048576a^9c^10z^4 - 1572864a^8b^2c^7kz^3 + 983040a^7b^4c^6kz^3 - 327680a^6b^6c^5kz^3 + 61440a^5b^8c^4kz^3 - 6144a^4b^10c^3kz^3 + 256a^3b^12c^2kz^3 + 1048576a^9c^8kz^3 + 98304a^8b^6c^6i^*kz^2 + 98304a^7b^6c^7e^*kz^2 + 57344a^7b^6c^7f^*jz^2 + 32768a^7b^6c^7g^*iz^2 + 57344a^6b^6c^8d^*h^*z^2 + 32768a^6b^6c^8e^*gz^2 - 32a^6b^10c^4d^*f^*z^2 - 90112a^7b^3c^5i^*kz^2 + 30720a^6b^5c^4i^*kz^2 - 4608a^5b^7c^3i^*kz^2 + 256a^4b^9c^2i^*kz^2 - 49152a^7b^2c^6g^*kz^2 + 45056a^6b^4c^5g^*kz^2 + 24576a^7b^2c^6h^*jz^2 - 15360a^5b^6c^4g^*kz^2 - 3072a^5b^6c^4h^*jz^2 + 2304a^4b^8c^3g^*kz^2 + 2048a^6b^4c^5h^*jz^2 + 576a^4b^8c^3h^*jz^2 - 128a^3b^10c^2g^*kz^2 - 32a^3b^10c^2h^*jz^2 - 90112a^6b^3c^6e^*kz^2 - 49152a^6b^3c^6f^*jz^2 + 30720a^5b^5c^5e^*kz^2 - 24576a^6b^3c^6g^*iz^2 + 15360a^5b^5c^5f^*jz^2 + 6144a^5b^5c^5g^*iz^2 - 4608a^4b^7c^4e^*kz^2 - 2048a^4b^7c^4f^*jz^2 - 512a^4b^7c^4g^*iz^2 + 256a^3b^9c^3e^*kz^2 + 96a^3b^9c^3f^*jz^2 + 131072a^6b^2c^7d^*jz^2 + 49152a^6b^2c^7e^*iz^2 - 43008a^5b^4c^6d^*jz^2 - 12288a^5b^4c^6e^*iz^2 + 6144a^5b^4c^6f^*h^*z^2 + 6144a^4b^6c^5d^*jz^2 - 2048a^4b^6c^5f^*h^*z^2 + 1024a^4b^6c^5e^*iz^2 - 320a^3b^8c^4d^*jz^2 + 192a^3b^8c^4f^*h^*z^2 - 49152a^5b^3c^7d^*h^*z^2 - 24576a^5b^3c^7e^*gz^2 + 15360a^4b^5c^6d^*h^*z^2 + 6144a^4b^5c^6e^*gz^2 - 2048a^3b^7c^5d^*h^*z^2 - 512a^3b^7c^5e^*gz^2 + 96a^2b^9c^4d^*h^*z^2 + 24576a^5b^2c^8d^*f^*z^2 - 3072a^3b^6c^6d^*f^*z^2 + 2048a^4b^4c^7d^*f^*z^2 + 576a^2b^8c^5d^*f^*z^2 + 1536a^4b^10c^6k^2z^2 + 61440a^8b^6c^6j^2z^2 - 16a^3b^11c^5j^2z^2 + 12288a^7b^6c^7h^2z^2 + 12288a^6b^6c^8f^2z^2 + 61440a^5b^6c^9d^2z^2 + 432a^6b^9c^5d^2z^2 - 49152a^8c^7h^*jz^2 - 147456a^7c^8d^*jz^2 - 65536a^7c^8e^*iz^2 - 16384a^7c^8f^*h^*z^2 - 49152a^6c^9d^*f^*z^2 + 516096a^8b^2c^5k^2z^2 - 288768a^7b^4c^4k^2z^2 + 88576a^6b^6c^3k^2z^2 - 15744a^5b^8c^2k^2z^2 - 61440a^7b^3c^5j^2z^2 + 24064a^6b^5c^4j^2z^2 - 4608a^5b^7c^3j^2z^2 + 432a^4b^9c^2j^2z^2 + 24576a^7b^2c^6i^2z^2 - 6144a^6b^4c^5i^2z^2 + 512a^5b^6c^4i^2z^2 - 8192a^6b^3c^6h^2z^2 + 1536a^5b^5c^5h^2z^2 - 16a^3b^9c^3h^2z^2 - 8192a^6b^2c^7g^2z^2 + 6144a^5b^4c^6g^2z^2 - 1536a^4b^6c^5g^2z^2 + 128a^3b^8c^4g^2z^2 - 8192a^5b^3c^7f^2z^2 + 1536a^4b^5c^6f^2z^2 - 16a^2b^9c^4f^2z^2 + 24576a^5b^2c^8e^2z^2 - 6144a^4b^4c^7e^2z^2 + 512a^3b^6c^6e^2z^2 - 61440
\end{aligned}$$

$$\begin{aligned}
& a^4 b^3 c^8 d^2 z^2 + 24064 a^3 b^5 c^7 d^2 z^2 - 4608 a^2 b^7 c^6 d^2 z^2 \\
& - 393216 a^9 c^6 k^2 z^2 - 64 a^3 b^{12} k^2 z^2 - 32768 a^8 c^7 i^2 z^2 - 3 \\
& 2768 a^6 c^9 e^2 z^2 - 16 b^{11} c^4 d^2 z^2 - 16384 a^7 b^5 g^i k^k z - 1024 \\
& 0 a^7 b^5 f^j k^k z + 4096 a^7 b^5 h^i j^k z - 47104 a^6 b^5 c^6 d^h k^k z - 16 \\
& 384 a^6 b^5 c^6 e^g k^k z + 6144 a^6 b^5 c^6 f^g j^k z + 4096 a^6 b^5 c^6 e^h j^k z + 3 \\
& 2 a^b^{10} c^2 d^f k^k z - 6144 a^5 b^5 c^7 d^g h^k z - 4096 a^5 b^5 c^7 d^f i^k z - 32 \\
& a^b^8 c^4 d^f g^k z - 4096 a^4 b^5 c^8 d^e f^k z + 64 a^b^7 c^5 d^e f^k z - 18432 a^7 \\
& b^2 c^4 h^j k^k z + 4608 a^6 b^4 c^3 h^j k^k z - 384 a^5 b^6 c^2 h^j k^k z + \\
& 12288 a^6 b^3 c^4 g^i k^k z + 7680 a^6 b^3 c^4 f^j k^k z - 3072 a^6 b^3 c^4 h^i \\
& j^k z - 3072 a^5 b^5 c^3 g^i k^k z - 1920 a^5 b^5 c^3 f^j k^k z + 768 a^5 b^5 c^3 \\
& h^i j^k z + 256 a^4 b^7 c^2 g^i k^k z + 160 a^4 b^7 c^2 f^j k^k z - 64 a^4 b^7 c^2 \\
& h^i j^k z - 65536 a^6 b^2 c^5 d^j k^k z - 24576 a^6 b^2 c^5 e^i k^k z + 21504 \\
& a^5 b^4 c^4 d^j k^k z + 9216 a^6 b^2 c^5 f^i j^k z + 6144 a^5 b^4 c^4 e^i k^k z \\
& - 3072 a^5 b^4 c^4 f^h k^k z - 3072 a^4 b^6 c^3 d^j k^k z - 2304 a^5 b^4 c^4 f^i \\
& j^k z - 2048 a^6 b^2 c^5 g^h j^k z + 1536 a^5 b^4 c^4 g^h j^k z + 1024 a^4 b^6 c^3 \\
& f^h k^k z - 512 a^4 b^6 c^3 e^i k^k z - 384 a^4 b^6 c^3 g^h j^k z + 192 a^4 b^6 \\
& c^3 f^i j^k z + 160 a^3 b^8 c^2 d^j k^k z - 96 a^3 b^8 c^2 f^h k^k z + 32 a^3 b^8 \\
& c^2 g^h j^k z + 41472 a^5 b^3 c^5 d^h k^k z - 13440 a^4 b^5 c^4 d^h k^k z + 1 \\
& 2288 a^5 b^3 c^5 e^g k^k z - 4608 a^5 b^3 c^5 f^g j^k z - 3072 a^5 b^3 c^5 e^h \\
& j^k z - 3072 a^4 b^5 c^4 e^g k^k z + 1888 a^3 b^7 c^3 d^h k^k z + 1152 a^4 b^5 c^4 \\
& f^g j^k z + 768 a^4 b^5 c^4 e^h j^k z + 256 a^3 b^7 c^3 e^g k^k z - 96 a^3 b^7 c^3 \\
& f^g j^k z - 96 a^2 b^9 c^2 d^h k^k z - 64 a^3 b^7 c^3 e^h j^k z + 9216 a^5 b^2 \\
& c^6 e^f j^k z - 9216 a^5 b^2 c^6 d^h i^k z - 6656 a^4 b^4 c^5 d^f k^k z - 6144 a^5 \\
& b^2 c^6 d^f k^k z + 3456 a^3 b^6 c^4 d^d f^k^k z - 2304 a^4 b^4 c^5 e^f j^k z + \\
& 2304 a^4 b^4 c^5 d^h i^k z - 576 a^2 b^8 c^3 d^d f^k^k z + 192 a^3 b^6 c^4 e^f j^k \\
& z - 192 a^3 b^6 c^4 d^h i^k z + 4608 a^4 b^3 c^6 d^g h^k z + 3072 a^4 b^3 c^6 \\
& d^f i^k z - 1152 a^3 b^5 c^5 d^g h^k z - 768 a^3 b^5 c^5 d^f i^k z + 96 a^2 b^7 c^4 \\
& d^g h^k z + 64 a^2 b^7 c^4 d^f i^k z - 9216 a^4 b^2 c^7 d^e h^k z + 2304 a^3 b^4 \\
& c^6 d^e h^k z + 2048 a^4 b^2 c^7 d^d f^g^k z - 1536 a^3 b^4 c^6 d^d f^g^k z + 384 a^2 \\
& b^6 c^5 d^d f^g^k z - 192 a^2 b^6 c^5 d^e h^k z + 3072 a^3 b^3 c^7 d^e f^k z - \\
& 768 a^2 b^5 c^6 d^e f^k z - 3072 a^8 b^5 c^4 j^2 k^k z + 48 a^5 b^7 c^j^2 k^k z - 4 \\
& 9152 a^8 b^5 c^4 i^k^2 z + 2304 a^5 b^7 c^i^k^2 z - 9216 a^7 b^5 c^h^2 k^k z - \\
& 32 a^4 b^8 c^i^j^2 z - 1152 a^4 b^8 c^g^k^2 z + 9216 a^7 b^5 c^g^j^2 z - 30 \\
& 72 a^6 b^5 c^6 f^2 k^k z + 16 a^3 b^9 c^g^j^2 z - 49152 a^7 b^5 c^e^k^2 z - 128 \\
& a^3 b^9 c^e^k^2 z - 58368 a^5 b^5 c^7 d^2 k^k z - 1024 a^6 b^5 c^6 g^h^2 z - 432 \\
& a^b^9 c^3 d^2 k^k z + 1024 a^5 b^5 c^7 f^2 g^k z + 32 a^b^8 c^4 d^2 i^k z - 9216 a^4 \\
& b^5 c^8 d^2 g^k z + 336 a^b^7 c^5 d^2 g^k z - 672 a^b^6 c^6 d^2 e^k z + 24576 a^8 \\
& c^5 h^j k^k z + 73728 a^7 c^6 d^j k^k z + 32768 a^7 c^6 e^i k^k z - 12288 a^7 c^6 \\
& f^i j^k z + 8192 a^7 c^6 f^h k^k z + 24576 a^6 c^7 d^f k^k z - 12288 a^6 c^7 e^ \\
& f^j^k z + 12288 a^6 c^7 d^h i^k z + 12288 a^5 c^8 d^e h^k z + 2304 a^7 b^3 c^3 j^ \\
& ^2 k^k z - 576 a^6 b^5 c^2 j^2 k^k z + 45056 a^7 b^3 c^3 i^k^2 z - 15360 a^6 b^5 \\
& c^2 i^k^2 z - 12288 a^7 b^2 c^4 i^2 k^k z + 3072 a^6 b^4 c^3 i^2 k^k z - 256 a^5 \\
& b^6 c^2 i^2 k^k z + 15872 a^7 b^2 c^4 i^j^2 z + 6912 a^6 b^3 c^4 h^2 k^k z - \\
& 4992 a^6 b^4 c^3 i^j^2 z - 1728 a^5 b^5 c^3 h^2 k^k z + 672 a^5 b^6 c^2 i^j^ \\
& ^2 z + 144 a^4 b^7 c^2 h^2 k^k z + 24576 a^7 b^2 c^4 g^k^2 z - 22528 a^6 b^4
\end{aligned}$$

$c^3g^k^2z + 7680a^5b^6c^2g^k^2z + 4096a^6b^2c^5g^2k^2z - 3072a^5b^4c^4g^2k^2z + 768a^4b^6c^3g^2k^2z - 64a^3b^8c^2g^2k^2z - 7936a^6b^3c^4g^j^2z + 2496a^5b^5c^3g^j^2z - 1536a^6b^2c^5h^2i^2z + 1280a^5b^3c^5f^2k^2z + 384a^5b^4c^4h^2i^2z - 336a^4b^7c^2g^j^2z + 192a^4b^5c^4f^2k^2z - 144a^3b^7c^3f^2k^2z - 32a^4b^6c^3h^2i^2z + 16a^2b^9c^2f^2k^2z + 45056a^6b^3c^4e^k^2z - 15360a^5b^5c^3e^k^2z - 12288a^5b^2c^6e^2k^2z + 3072a^4b^4c^5e^2k^2z + 2304a^4b^7c^2e^k^2z - 256a^3b^6c^4e^2k^2z + 59136a^4b^3c^6d^2k^2z - 23488a^3b^5c^5d^2k^2z + 15872a^6b^2c^5e^e^j^2z - 4992a^5b^4c^4e^j^2z + 4560a^2b^7c^4d^2k^2z + 1536a^5b^2c^6f^2i^2z + 768a^5b^3c^5g^h^2z + 672a^4b^6c^3e^j^2z - 384a^4b^4c^5f^2i^2z - 192a^4b^5c^4g^h^2z - 32a^3b^8c^2e^j^2z + 32a^3b^6c^4f^2i^2z + 16a^3b^7c^3g^h^2z - 15872a^4b^2c^7d^2i^2z + 4992a^3b^4c^6d^2i^2z - 1536a^5b^2c^6e^h^2z - 768a^4b^3c^6f^2g^2z - 672a^2b^6c^5d^2i^2z + 384a^4b^4c^5e^h^2z + 192a^3b^5c^5f^2g^2z - 32a^3b^6c^4e^h^2z - 16a^2b^7c^4f^2g^2z + 7936a^3b^3c^7d^2g^2z - 2496a^2b^5c^6d^2g^2z + 1536a^4b^2c^7e^f^2z - 384a^3b^4c^6e^f^2z + 32a^2b^6c^5e^f^2z - 15872a^3b^2c^8d^2e^z + 4992a^2b^4c^7d^2e^z - 61440a^8b^2c^3k^3z + 21504a^7b^4c^2k^3z + 16384a^8c^5i^2k^2z - 18432a^8c^5i^j^2z - 128a^4b^9i^k^2z + 2048a^7c^6h^2i^2z + 64a^3b^10g^k^2z + 16384a^6c^7e^2k^2z + 16b^11c^2d^2k^2z - 18432a^7c^6e^j^2z - 2048a^6c^7f^2i^2z + 18432a^5c^8d^2i^2z - 3328a^6b^6c^k^3z + 2048a^6c^7e^h^2z - 16b^9c^4d^2g^2z - 2048a^5c^8e^f^2z + 32b^8c^5d^2e^z + 18432a^4c^9d^2e^z + 65536a^9c^4k^3z + 192a^5b^8k^3z - 3328a^7b^c^3h^i^j^k - 6912a^6b^c^4d^i^j^k - 3328a^6b^c^4e^h^j^k - 1536a^6b^c^4f^g^j^k - 768a^6b^c^4g^h^i^j - 768a^6b^c^4f^h^i^k - 6912a^5b^c^5d^e^j^k - 2304a^5b^c^5d^g^i^j - 1792a^5b^c^5e^f^i^j + 1536a^5b^c^5d^g^h^k - 1280a^5b^c^5d^f^i^k - 768a^5b^c^5e^g^h^j - 768a^5b^c^5e^f^h^k - 256a^5b^c^5f^g^h^i + 16a^ab^8c^2d^f^g^k - 4a^ab^8c^2d^f^h^j - 2304a^4b^c^6d^e^g^j - 1792a^4b^c^6d^e^h^i - 1280a^4b^c^6d^e^f^k - 768a^4b^c^6d^f^g^i - 256a^4b^c^6e^f^g^h - 32a^ab^7c^3d^e^f^k - 768a^3b^c^7d^e^f^g + 32a^ab^5c^5d^e^f^g + 576a^6b^3c^2h^i^j^k + 1664a^6b^2c^3g^h^j^k + 384a^6b^2c^3f^i^j^k - 288a^5b^4c^2g^h^j^k - 160a^5b^4c^2f^i^j^k + 2112a^5b^3c^3d^i^j^k + 576a^5b^3c^3e^h^j^k - 448a^5b^3c^3f^h^i^k - 192a^5b^3c^3g^h^i^j - 192a^5b^3c^3f^g^j^k - 160a^4b^5c^2d^i^j^k + 96a^4b^5c^2f^h^i^k + 80a^4b^5c^2f^g^j^k + 32a^4b^5c^2g^h^i^j + 4992a^5b^2c^4d^h^i^k - 4608a^5b^2c^4e^g^i^k + 3456a^5b^2c^4d^g^j^k - 1312a^4b^4c^3d^h^i^k - 1056a^4b^4c^3d^g^j^k + 896a^5b^2c^4f^g^i^j + 768a^4b^4c^3e^g^i^k + 384a^5b^2c^4f^g^h^k + 384a^5b^2c^4e^h^i^j + 384a^5b^2c^4e^f^j^k + 224a^4b^4c^3f^g^h^k - 160a^4b^4c^3e^f^j^k - 96a^4b^4c^3f^g^i^j + 96a^3b^6c^2d^h^i^k + 80a^3b^6c^2d^g^j^k - 64a^4b^4c^3e^h^i^j - 48a^3b^6c^2f^g^h^k - 2496a^4b^3c^4d^g^h^k + 2112a^4b^3c^4d^e^j^k - 960a^4b^3c^4d^f^i^k + 656a^3b^5c^3d^g^h^k - 448a^4b^3c^4e^f^h^k + 384a^3b^5c^3d^f^i^k + 320a^4b^3c^4d^g^i^j - 192$



$$\begin{aligned}
& a^4 b^3 c^4 f g h i - 192 a^4 b^3 c^4 e g h j + 192 a^4 b^3 c^4 e f i j - \\
& 160 a^3 b^5 c^3 d e j k + 96 a^3 b^5 c^3 e f h k - 48 a^2 b^7 c^2 d g h k + \\
& 32 a^3 b^5 c^3 e g h j - 32 a^2 b^7 c^2 d f i k + 4992 a^4 b^2 c^5 d e h k \\
& - 3584 a^4 b^2 c^5 d f h j - 1312 a^3 b^4 c^4 d e h k + 896 a^4 b^2 c^5 e e \\
& f g j + 896 a^4 b^2 c^5 d g h i + 640 a^4 b^2 c^5 d f g k - 640 a^4 b^2 c^5 \\
& d e i j + 600 a^3 b^4 c^4 d f h j + 480 a^3 b^4 c^4 d f g k + 384 a^4 b^2 c^5 \\
& e f h i - 192 a^2 b^6 c^3 d f g k - 96 a^3 b^4 c^4 e f g j - 96 a^3 b^4 \\
& c^4 d g h i + 96 a^2 b^6 c^3 d e h k + 12 a^2 b^6 c^3 d f h j - 960 a^3 b^ \\
& 3 c^5 d e f k + 384 a^2 b^5 c^4 d e f k + 320 a^3 b^3 c^5 d e g j - 192 a^3 \\
& b^3 c^5 e f g h - 192 a^3 b^3 c^5 d f g i + 192 a^3 b^3 c^5 d e h i + 32 a \\
& ^2 b^5 c^4 d f g i + 896 a^3 b^2 c^6 d e g h + 384 a^3 b^2 c^6 d e f i - 96 \\
& a^2 b^4 c^5 d e g h - 64 a^2 b^4 c^5 d e f i - 192 a^2 b^3 c^6 d e f g + 4 \\
& 8 a^6 b^4 c^3 i j^2 k - 1424 a^6 b^4 c^3 h j k^2 - 2304 a^7 b^3 c^3 g j^2 k - 24 a \\
& ^5 b^5 c^3 g j^2 k + 2048 a^7 b^3 c^3 g i k^2 - 1024 a^7 b^3 c^3 f j k^2 - 768 a \\
& ^5 b^5 c^3 g i k^2 + 408 a^5 b^5 c^3 f j k^2 + 256 a^6 b^3 c^4 g h^2 k + 16 a^4 b \\
& ^6 c^3 g i j^2 + 4608 a^6 b^3 c^4 e i^2 k + 4608 a^5 b^3 c^5 e^2 i k - 896 a^6 b^3 \\
& c^4 f i^2 j + 768 a^4 b^6 c^3 d j k^2 - 256 a^4 b^6 c^3 f h k^2 - 128 a^4 b^6 c^3 \\
& e i k^2 + 2208 a^6 b^3 c^4 f h j^2 - 1920 a^6 b^3 c^4 e i j^2 + 800 a^5 b^3 c^5 \\
& f^2 h j - 256 a^5 b^3 c^5 f^2 g k - 16 a^4 b^8 c^2 d^2 i k + 6 a^3 b^7 c^3 f h j^2 \\
& + 8192 a^6 b^3 c^4 d h k^2 + 2048 a^6 b^3 c^4 e g k^2 - 472 a^3 b^7 c^3 d h k^2 \\
& + 64 a^3 b^7 c^3 e g k^2 + 4896 a^4 b^3 c^6 d^2 h j + 2304 a^4 b^3 c^6 d^2 g k + \\
& 1824 a^5 b^3 c^5 d h^2 j - 384 a^5 b^3 c^5 e h^2 i - 168 a^4 b^7 c^3 d^2 g k + 4 \\
& 2 a^4 b^7 c^3 d^2 h j + 6 a^2 b^8 c^3 d h j^2 + 1536 a^5 b^3 c^5 e g i^2 + 1536 a^4 \\
& b^3 c^6 e^2 g i - 896 a^5 b^3 c^5 d h i^2 - 896 a^4 b^3 c^6 e^2 f j + 144 a^2 b^8 \\
& c^3 d f k^2 + 4896 a^5 b^3 c^5 d f j^2 + 1824 a^4 b^3 c^6 d f^2 j - 384 a^4 b^3 \\
& c^6 e f^2 i + 336 a^4 b^6 c^4 d^2 e k - 156 a^4 b^6 c^4 d^2 f j + 16 a^4 b^6 c^4 \\
& d^2 g i + 12 a^4 b^7 c^3 d f^2 j + 2208 a^3 b^3 c^7 d^2 f h - 1920 a^3 b^3 c^7 d^2 \\
& e i + 800 a^4 b^3 c^6 d f h^2 - 102 a^4 b^5 c^5 d^2 f h - 32 a^4 b^5 c^5 d^2 e \\
& i + 12 a^4 b^6 c^4 d f^2 h - 2 a^4 b^7 c^3 d f h^2 - 896 a^3 b^3 c^7 d e^2 h - 8 \\
& a^4 b^6 c^4 d f g^2 - 240 a^4 b^4 c^6 d^2 e g - 32 a^4 b^4 c^6 d e^2 f + 3072 a^7 \\
& c^4 f i j k + 3072 a^6 c^5 e f j k - 3072 a^6 c^5 d h i k + 1536 a^6 c^5 e \\
& h i j + 4608 a^5 c^6 d e i j - 3072 a^5 c^6 d e h k - 1152 a^5 c^6 d f h j \\
& + 512 a^5 c^6 e f h i + 1536 a^4 c^7 d e f i - 2 a^4 b^9 c^3 d f j^2 - 1088 a^7 \\
& b^2 c^2 i j^2 k + 4800 a^7 b^2 c^2 h j k^2 + 960 a^6 b^2 c^3 h^2 i k + 5 \\
& 44 a^6 b^3 c^2 g j^2 k - 144 a^5 b^4 c^2 h^2 i k - 2304 a^6 b^2 c^3 g i^2 k \\
& + 1920 a^6 b^3 c^2 g i k^2 + 1152 a^5 b^3 c^3 g^2 i k - 864 a^6 b^3 c^2 f j \\
& k^2 + 384 a^5 b^4 c^2 g i^2 k + 192 a^6 b^2 c^3 h i^2 j - 192 a^4 b^5 c^2 \\
& g^2 i k - 32 a^5 b^4 c^2 h i^2 j - 1088 a^6 b^2 c^3 e j^2 k + 960 a^6 b^2 c^3 \\
& g i j^2 - 480 a^5 b^3 c^3 g h^2 k - 240 a^5 b^4 c^2 g i j^2 + 192 a^5 b^ \\
& ^2 c^4 f^2 i k + 72 a^4 b^5 c^2 g h^2 k + 48 a^5 b^4 c^2 e j^2 k + 48 a^4 b^ \\
& ^4 c^3 f^2 i k - 16 a^3 b^6 c^2 f^2 i k + 13376 a^6 b^2 c^3 d j k^2 - 5136 a^5 \\
& b^4 c^2 d j k^2 - 3840 a^6 b^2 c^3 e i k^2 + 1536 a^5 b^4 c^2 e i k^2 - \\
& 768 a^5 b^3 c^3 e i^2 k - 768 a^4 b^3 c^4 e^2 i k + 624 a^5 b^4 c^2 f h k^2 \\
& + 576 a^6 b^2 c^3 f h k^2 + 192 a^5 b^2 c^4 g^2 h j + 96 a^5 b^3 c^3 f i^2 \\
& j + 48 a^4 b^4 c^3 g^2 h j - 8 a^3 b^6 c^2 g^2 h j + 6848 a^4 b^2 c^5 d^2
\end{aligned}$$

$$\begin{aligned}
& *i*k - 2448*a^3*b^4*c^4*d^2*i*k + 960*a^5*b^2*c^4*e*h^2*k - 864*a^5*b^2*c^4 \\
& *f*h^2*j + 480*a^5*b^3*c^3*e*i*j^2 + 336*a^4*b^3*c^4*f^2*h*j + 336*a^2*b^6* \\
& c^3*d^2*i*k + 192*a^5*b^2*c^4*g*h^2*i + 144*a^5*b^3*c^3*f*h*j^2 - 144*a^4*b \\
& ^4*c^3*e*h^2*k - 102*a^4*b^5*c^2*f*h*j^2 - 96*a^4*b^3*c^4*f^2*g*k - 32*a^4* \\
& b^5*c^2*e*i*j^2 - 30*a^3*b^5*c^3*f^2*h*j - 24*a^3*b^5*c^3*f^2*g*k + 16*a^4* \\
& b^4*c^3*g*h^2*i - 12*a^4*b^4*c^3*f*h^2*j + 12*a^3*b^6*c^2*f*h^2*j + 8*a^2*b \\
& ^7*c^2*f^2*g*k - 2*a^2*b^7*c^2*f^2*h*j - 9312*a^5*b^3*c^3*d*h*k^2 + 3288*a^ \\
& 4*b^5*c^2*d*h*k^2 - 2304*a^4*b^2*c^5*e^2*g*k + 1920*a^5*b^3*c^3*e*g*k^2 + 1 \\
& 152*a^4*b^3*c^4*e*g^2*k - 768*a^4*b^5*c^2*e*g*k^2 + 384*a^3*b^4*c^4*e^2*g*k \\
& - 320*a^5*b^2*c^4*d*i^2*j - 224*a^4*b^3*c^4*f*g^2*j + 192*a^5*b^2*c^4*f*h* \\
& i^2 + 192*a^4*b^2*c^5*e^2*h*j - 192*a^3*b^5*c^3*e*g^2*k - 32*a^3*b^4*c^4*e^ \\
& 2*h*j + 24*a^3*b^5*c^3*f*g^2*j - 3552*a^5*b^2*c^4*d*h*j^2 - 3424*a^3*b^3*c^ \\
& 5*d^2*g*k + 1332*a^4*b^4*c^3*d*h*j^2 + 1224*a^2*b^5*c^4*d^2*g*k + 960*a^5*b \\
& ^2*c^4*e*g*j^2 - 496*a^3*b^3*c^5*d^2*h*j + 432*a^4*b^3*c^4*d*h^2*j - 240*a^ \\
& 4*b^4*c^3*e*g*j^2 - 222*a^2*b^5*c^4*d^2*h*j + 192*a^4*b^2*c^5*f^2*g*i + 192 \\
& *a^4*b^2*c^5*e*f^2*k - 174*a^3*b^5*c^3*d*h^2*j - 156*a^3*b^6*c^2*d*h*j^2 + \\
& 48*a^3*b^4*c^4*e*f^2*k - 32*a^4*b^3*c^4*e*h^2*i + 16*a^3*b^6*c^2*e*g*j^2 + \\
& 16*a^3*b^4*c^4*f^2*g*i - 16*a^2*b^6*c^3*e*f^2*k + 12*a^2*b^7*c^2*d*h^2*j + \\
& 1728*a^5*b^2*c^4*d*f*k^2 + 1392*a^4*b^4*c^3*d*f*k^2 - 840*a^3*b^6*c^2*d*f*k \\
& ^2 - 768*a^4*b^2*c^5*e*g^2*i + 576*a^4*b^2*c^5*d*g^2*j + 96*a^4*b^3*c^4*d*h \\
& *i^2 + 96*a^3*b^3*c^5*e^2*f*j - 80*a^3*b^4*c^4*d*g^2*j + 64*a^4*b^2*c^5*f*g \\
& ^2*h + 48*a^3*b^4*c^4*f*g^2*h + 6848*a^3*b^2*c^6*d^2*e*k - 3552*a^3*b^2*c^6 \\
& *d^2*f*j - 2448*a^2*b^4*c^5*d^2*e*k + 1332*a^2*b^4*c^5*d^2*f*j + 960*a^3*b^ \\
& 2*c^6*d^2*g*i - 496*a^4*b^3*c^4*d*f*j^2 + 432*a^3*b^3*c^5*d*f^2*j - 240*a^2 \\
& *b^4*c^5*d^2*g*i - 222*a^3*b^5*c^3*d*f*j^2 + 192*a^4*b^2*c^5*e*g*h^2 - 174* \\
& a^2*b^5*c^4*d*f^2*j + 42*a^2*b^7*c^2*d*f*j^2 - 32*a^3*b^3*c^5*e*f^2*i + 16* \\
& a^3*b^4*c^4*e*g*h^2 - 320*a^3*b^2*c^6*d*e^2*j - 224*a^3*b^3*c^5*d*g^2*h + 1 \\
& 92*a^4*b^2*c^5*d*f*i^2 + 192*a^3*b^2*c^6*e^2*f*h - 32*a^3*b^4*c^4*d*f*i^2 + \\
& 24*a^2*b^5*c^4*d*g^2*h - 864*a^3*b^2*c^6*d*f^2*h + 480*a^2*b^3*c^6*d^2*e*i \\
& + 336*a^3*b^3*c^5*d*f*h^2 + 192*a^3*b^2*c^6*e*f^2*g + 144*a^2*b^3*c^6*d^2* \\
& f*h - 30*a^2*b^5*c^4*d*f*h^2 + 16*a^2*b^4*c^5*e*f^2*g - 12*a^2*b^4*c^5*d*f^ \\
& 2*h + 192*a^3*b^2*c^6*d*f*g^2 + 96*a^2*b^3*c^6*d*e^2*h + 48*a^2*b^4*c^5*d*f \\
& *g^2 + 960*a^2*b^2*c^7*d^2*e*g + 192*a^2*b^2*c^7*d*e^2*f - 3072*a^8*b*c^2*j \\
& ^2*k^2 + 1104*a^7*b^3*c*j^2*k^2 + 768*a^6*b^4*c*i^2*k^2 - 256*a^6*b^3*c^2*i \\
& ^3*k + 1536*a^7*b*c^3*h^2*k^2 - 960*a^7*b*c^3*i^2*j^2 + 444*a^5*b^5*c*h^2*k \\
& ^2 - 16*a^5*b^5*c*i^2*j^2 - 3072*a^7*b^2*c^2*g*k^3 - 496*a^6*b^3*c^2*h*j^3 \\
& + 192*a^4*b^6*c*g^2*k^2 - 192*a^4*b^4*c^3*g^3*k + 144*a^5*b^3*c^3*h^3*j + 3 \\
& 2*a^3*b^6*c^2*g^3*k - 18*a^4*b^5*c^2*h^3*j - 9*a^4*b^6*c*h^2*j^2 - 192*a^6* \\
& b*c^4*h^2*i^2 + 36*a^3*b^7*c*f^2*k^2 - 4*a^3*b^7*c*g^2*j^2 - 2176*a^6*b^3*c \\
& ^2*e*k^3 - 256*a^3*b^3*c^5*e^3*k - 192*a^6*b^2*c^3*f*j^3 - 192*a^4*b^2*c^5* \\
& f^3*j + 132*a^5*b^4*c^2*f*j^3 + 128*a^4*b^3*c^4*g^3*i - 28*a^3*b^4*c^4*f^3* \\
& j + 6*a^2*b^6*c^3*f^3*j + 10752*a^5*b*c^5*d^2*k^2 - 960*a^5*b*c^5*e^2*j^2 - \\
& 192*a^5*b*c^5*f^2*i^2 - 1680*a^5*b^3*c^3*d*j^3 - 1680*a^2*b^3*c^6*d^3*j + \\
& 222*a^4*b^5*c^2*d*j^3 + 80*a^4*b^3*c^4*f*h^3 + 80*a^3*b^3*c^5*f^3*h + 30*a* \\
& b^8*c^2*d^2*j^2 + 6*a^3*b^5*c^3*f*h^3 + 6*a^2*b^5*c^4*f^3*h - 960*a^4*b*c^6
\end{aligned}$$

$$\begin{aligned}
& d^2i^2 - 192a^4b^3c^6e^2h^2 - 192a^4b^2c^5d^2h^3 - 192a^2b^2c^7d^3h + 128a^3b^3c^5e^2g^3 - 28a^3b^4c^4d^2h^3 + 12a^2b^6c^4d^2h^2 \\
& + 6a^2b^6c^3d^2h^3 - 192a^3b^3c^7e^2f^2 + 60a^2b^5c^5d^2g^2 + 198a^2b^4c^6d^2f^2 + 144a^2b^3c^6d^2f^3 - 960a^2b^3c^8d^2e^2 + 240a^2b^3c^7d^2e^2 + 4608a^8c^3i^2j^2k - 3072a^8c^3h^2j^2k^2 - 512a^7c^4 \\
& h^2i^2k + 120a^5b^6h^2j^2k^2 + 768a^7c^4h^2i^2j + 4608a^7c^4e^2j^2k + 512a^6c^5f^2i^2k + 64a^4b^7g^2i^2k^2 - 40a^4b^7f^2j^2k^2 - 9216a^7 \\
& c^4d^2j^2k^2 - 4096a^7c^4e^2i^2k^2 - 1024a^7c^4f^2h^2k^2 - 4608a^5c^6d^2i^2k - 512a^6c^5e^2h^2k - 192a^6c^5f^2h^2j - 40a^3b^8d^2j^2k^2 + 2 \\
& 4a^3b^8f^2h^2k^2 + 2304a^6c^5d^2i^2j + 768a^5c^6e^2h^2j + 256a^6c^5f^2h^2i^2 + 8b^9c^2d^2g^2k - 2b^9c^2d^2h^2j + 6144a^8b^3c^2i^2k^3 - \\
& 2176a^7b^3c^2i^2k^3 - 1728a^6c^5d^2h^2j^2 + 1536a^7b^3c^3i^3k + 512a^5c^6e^2f^2k + 24a^2b^9d^2h^2k^2 - 3072a^6c^5d^2f^2k^2 - 16b^8c^3d^2e^2k + 6b^8c^3d^2f^2j - 4608a^4c^7d^2e^2k + 2016a^7b^3c^3h^2j^3 - 172 \\
& 8a^4c^7d^2f^2j + 1088a^6b^4c^2g^2k^3 + 224a^6b^3c^4h^3j + 30a^5b^5c^2h^2j^3 + 2304a^4c^7d^2e^2j + 768a^5c^6d^2f^2i^2 + 256a^4c^7e^2f^2h^2 \\
& + 6b^7c^4d^2f^2h^2 + 6144a^7b^3c^3e^2k^3 + 1536a^4b^3c^6e^3k + 512a^6b^3c^4g^2i^3 + 192a^5b^5c^2e^2k^3 - 192a^4c^7d^2f^2h^2 - 10a^4b^6c^2f^2j^3 + 108a^2b^9c^2d^2k^2 + 16b^6c^5d^2e^2g + 4320a^6b^3c^4d^2j^3 + 432 \\
& 0a^3b^3c^7d^3j + 222a^2b^5c^5d^3j + 96a^5b^3c^5f^2h^3 + 96a^4b^3c^6f^3h - 10a^3b^7c^2d^2j^3 + 768a^3c^8d^2e^2f + 512a^3b^3c^7e^3g + 1 \\
& 32a^2b^4c^6d^3h + 2016a^2b^3c^8d^3f - 496a^2b^3c^7d^3f + 224a^3b^3c^7d^3f^3 - 18a^2b^5c^5d^2f^3 - 1920a^7b^2c^2i^2k^2 - 1648a^6b^3c^2h^2k^2 + 240a^6b^3c^2i^2j^2 - 960a^6b^2c^3h^2j^2 - 512a^6b^2c^3g^2k^2 - 480a^5b^4c^2g^2k^2 + 198a^5b^4c^2h^2j^2 - 240a^5 \\
& b^3c^3g^2j^2 - 240a^5b^3c^3f^2k^2 + 60a^4b^5c^2g^2j^2 - 36a^4b^5c^2f^2k^2 - 16a^5b^3c^3h^2i^2 - 1920a^5b^2c^4e^2k^2 + 768 \\
& a^4b^4c^3e^2k^2 - 464a^5b^2c^4f^2j^2 - 384a^5b^2c^4g^2i^2 - 64a^3b^6c^2e^2k^2 + 42a^4b^4c^3f^2j^2 + 12a^3b^6c^2f^2j^2 - \\
& 13104a^4b^3c^4d^2k^2 + 5628a^3b^5c^3d^2k^2 - 1128a^2b^7c^2d^2k^2 + 240a^4b^3c^4e^2j^2 - 48a^4b^3c^4g^2h^2 - 16a^4b^3c^4f^2i^2 - 16a^3b^5c^3e^2j^2 - 4a^3b^5c^3g^2h^2 - 2880a^4b^2c^5d^2j^2 + 1750a^3b^4c^4d^2j^2 - 345a^2b^6c^3d^2j^2 - 192a^4b^2c^5f^2h^2 - 42a^3b^4c^4f^2h^2 + 240a^3b^3c^5d^2i^2 - 48a^3b^3c^5f^2g^2 - 16a^3b^3c^5e^2h^2 - 16a^2b^5c^4d^2i^2 - 4a^2b^5c^4f^2g^2 - 464a^3b^2c^6d^2h^2 - 384a^3b^2c^6e^2g^2 + 42a^2b^4c^5d^2h^2 - 240a^2b^3c^6d^2g^2 - 16a^2b^3c^6e^2f^2 - 960a^2b^2c^7d^2f^2 - 8a^2b^10d^2f^2k^2 - a^2b^8c^2f^2j^2 - 2048a^8c^3i^2k^2 - 100a^6b^5j^2k^2 - 64a^5b^6i^2k^2 - 288a^7c^4h^2j^2 - 36a^4b^7h^2k^2 - 16a^3b^8g^2k^2 - 2048a^6c^5e^2k^2 - 864a^6c^5f^2j^2 - 4a^2b^9f^2k^2 - 2592a^5c^6d^2j^2 - 1536a^5c^6e^2i^2 - 32a^5c^6f^2h^2 - 864a^4c^7d^2h^2 + 360a^7b^2c^2j^4 - 4b^7c^4d^2g^2 - 9b^6c^5d^2f^2 - 288a^3c^8d^2f^2 - 24a^5b^2c^4h^4 - 16b^5c^6d^2e^2 - 9a^4b^4c^3h^4 - 16a^3b^4c^4g^4 - 24a^3b^2c^6f^4 - 9a^2b^4c^5f^4 - a^2b^6c^3f^2h^2 + 192a^6b^5i^2k^3 - 96a^5b^6
\end{aligned}$$

$$\begin{aligned}
& *g*k^3 - 1728*a^7*c^4*f*j^3 - 192*a^5*c^6*f^3*j - 10*b^7*c^4*d^3*j - 1024*a \\
& ^6*c^5*e*i^3 - 1024*a^4*c^7*e^3*i + 1536*a^8*b^2*c*k^4 - 10*b^6*c^5*d^3*h - \\
& 1728*a^3*c^8*d^3*h - 192*a^5*c^6*d*h^3 - 25*a^6*b^4*c*j^4 + 30*b^5*c^6*d^3 \\
& *f + 360*a*b^2*c^8*d^4 - 4*b^11*d^2*k^2 - 4096*a^9*c^2*k^4 - 1296*a^8*c^3*j \\
& ^4 - 144*a^7*b^4*k^4 - 256*a^7*c^4*i^4 - 16*a^6*c^5*h^4 - 16*a^4*c^7*f^4 - \\
& 256*a^3*c^8*e^4 - 25*b^4*c^7*d^4 - 1296*a^2*c^9*d^4 - b^8*c^3*d^2*h^2 - b^1 \\
& 0*c*d^2*j^2, z, n), n, 1, 4)
\end{aligned}$$

$$3.59 \quad \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5+jx^8+kx^{11}}{(a+bx^2+cx^4)^3} dx$$

Optimal result	805
Rubi [A] (verified)	806
Mathematica [A] (verified)	813
Maple [C] (verified)	814
Fricas [F(-1)]	815
Sympy [F(-1)]	815
Maxima [F]	815
Giac [B] (verification not implemented)	816
Mupad [B] (verification not implemented)	832

### Optimal result

Integrand size = 50, antiderivative size = 1177

$$\int \frac{d+ex+fx^2+gx^3+hx^4+ix^5+jx^8+kx^{11}}{(a+bx^2+cx^4)^3} dx =$$

$$\frac{x \left( c^2 \left( abf - b^2 \left( d + \frac{a^2 j}{c^2} \right) + 2a \left( cd - ah + \frac{a^2 j}{c} \right) \right) + (2ac^3 f - ab^3 j - bc(c^2 d + ach - 3a^2 j)) x^2 \right)}{4ac^2 (b^2 - 4ac) (a + bx^2 + cx^4)^2}$$

$$- \frac{bc^3 (ce + ai) - ab^4 k + 4a^2 b^2 ck - 2ac^2 (c^2 g + a^2 k) + (2c^5 e + b^2 c^3 i - c^4 (bg + 2ai) - b^5 k + 5ab^3 ck - 5a^2 b^2 k)}{4c^4 (b^2 - 4ac) (a + bx^2 + cx^4)^2}$$

$$+ \frac{x \left( c \left( ab^3 f + 8a^2 bcf + 4a^2 (7c^2 d + ach - 9a^2 j) + b^4 \left( 3d - \frac{2a^2 j}{c^2} \right) - ab^2 \left( 25cd + 7ah - \frac{11a^2 j}{c} \right) \right) + (ab^2 c^2 f + b^3 c^2 i + 2bc^3 (3ce + ai) + 11ab^4 k - \frac{b^6 k}{c} + 32a^3 c^2 k - 3b^2 (c^3 g + 13a^2 ck) + 2(6c^5 e + b^2 c^3 i - c^4 (3bg - 2ai))) \right)}{8a^2 c (b^2 - 4ac)^2 (a + bx^2 + cx^4)}$$

$$+ \frac{\left( ab^2 c^2 f + 20a^2 c^3 f + b^3 (3c^2 d + a^2 j) - 4abc(6c^2 d + 3ach + 4a^2 j) + \frac{ab^3 c^2 f - 52a^2 bc^3 f - 6ab^2 c(5c^2 d - 3ach - 3a^2 j) + b^4 c^2 d - 3a^2 b^2 c^2 j}{\sqrt{b^2 - 4ac}} \right)}{8\sqrt{2} a^2 c^{3/2} (b^2 - 4ac)^2 \sqrt{b - \sqrt{b^2 - 4ac}}}$$

$$+ \frac{\left( ab^2 c^2 f + 20a^2 c^3 f + b^3 (3c^2 d + a^2 j) - 4abc(6c^2 d + 3ach + 4a^2 j) - \frac{ab^3 c^2 f - 52a^2 bc^3 f - 6ab^2 c(5c^2 d - 3ach - 3a^2 j) + b^4 c^2 d - 3a^2 b^2 c^2 j}{\sqrt{b^2 - 4ac}} \right)}{8\sqrt{2} a^2 c^{3/2} (b^2 - 4ac)^2 \sqrt{b + \sqrt{b^2 - 4ac}}}$$

$$- \frac{(12c^5 e + 2b^2 c^3 i - c^4 (6bg - 4ai) - b^5 k + 10ab^3 ck - 30a^2 bc^2 k) \operatorname{arctanh} \left( \frac{b+2cx^2}{\sqrt{b^2-4ac}} \right)}{2c^3 (b^2 - 4ac)^{5/2}}$$

$$+ \frac{k \log(a + bx^2 + cx^4)}{4c^3}$$

[Out]  $-1/4*x*(c^2*(a*b*f-b^2*(d+a^2*j/c^2)+2*a*(c*d-a*h+a^2*j/c))+(2*a*c^3*f-a*b^3*j-b*c*(-3*a^2*j+a*c*h+c^2*d))*x^2)/a/c^2/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^2+1$

$$\begin{aligned}
& /4*(-b*c^3*(a*i+c*e)+a*b^4*k-4*a^2*b^2*c*k+2*a*c^2*(a^2*k+c^2*g)-(2*c^5*e+b \\
& ^2*c^3*i-c^4*(2*a*i+b*g)-b^5*k+5*a*b^3*c*k-5*a^2*b*c^2*k)*x^2)/c^4/(-4*a*c+ \\
& b^2)/(c*x^4+b*x^2+a)^2+1/8*x*(c*(a*b^3*f+8*a^2*b*c*f+4*a^2*(-9*a^2*j+a*c*h+ \\
& 7*c^2*d)+b^4*(3*d-2*a^2*j/c^2)-a*b^2*(25*c*d+7*a*h-11*a^2*j/c))+a*b^2*c^2* \\
& f+20*a^2*c^3*f+b^3*(a^2*j+3*c^2*d)-4*a*b*c*(4*a^2*j+3*a*c*h+6*c^2*d))*x^2)/ \\
& a^2/c/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)+1/4*(b^3*c^2*i+2*b*c^3*(a*i+3*c*e)+11* \\
& a*b^4*k-b^6*k/c+32*a^3*c^2*k-3*b^2*(13*a^2*c*k+c^3*g)+2*(6*c^5*e+b^2*c^3*i- \\
& c^4*(-2*a*i+3*b*g)+2*b^5*k-15*a*b^3*c*k+25*a^2*b*c^2*k)*x^2)/c^3/(-4*a*c+b^ \\
& 2)^2/(c*x^4+b*x^2+a)-1/2*(12*c^5*e+2*b^2*c^3*i-c^4*(-4*a*i+6*b*g)-b^5*k+10* \\
& a*b^3*c*k-30*a^2*b*c^2*k)*\operatorname{arctanh}((2*c*x^2+b)/(-4*a*c+b^2)^{(1/2)})/c^3/(-4*a \\
& *c+b^2)^{(5/2)}+1/4*k*\ln(c*x^4+b*x^2+a)/c^3+1/16*\operatorname{arctan}(x*2^{(1/2)}*c^{(1/2)})/(b- \\
& (-4*a*c+b^2)^{(1/2)})^{(1/2)}*(a*b^2*c^2*f+20*a^2*c^3*f+b^3*(a^2*j+3*c^2*d)-4* \\
& a*b*c*(4*a^2*j+3*a*c*h+6*c^2*d)+(a*b^3*c^2*f-52*a^2*b*c^3*f-6*a*b^2*c*(-3*a \\
& ^2*j-3*a*c*h+5*c^2*d)+b^4*(-a^2*j+3*c^2*d)+8*a^2*c^2*(5*a^2*j+3*a*c*h+21*c^ \\
& 2*d))/(-4*a*c+b^2)^{(1/2)})/a^2/c^{(3/2)}/(-4*a*c+b^2)^2*2^{(1/2)}/(b-(-4*a*c+b^2 \\
& )^{(1/2)})^{(1/2)}+1/16*\operatorname{arctan}(x*2^{(1/2)}*c^{(1/2)})/(b+(-4*a*c+b^2)^{(1/2)})^{(1/2)}* \\
& (a*b^2*c^2*f+20*a^2*c^3*f+b^3*(a^2*j+3*c^2*d)-4*a*b*c*(4*a^2*j+3*a*c*h+6*c^ \\
& 2*d)+(-a*b^3*c^2*f+52*a^2*b*c^3*f+6*a*b^2*c*(-3*a^2*j-3*a*c*h+5*c^2*d)-b^4* \\
& (-a^2*j+3*c^2*d)-8*a^2*c^2*(5*a^2*j+3*a*c*h+21*c^2*d))/(-4*a*c+b^2)^{(1/2)})/ \\
& a^2/c^{(3/2)}/(-4*a*c+b^2)^2*2^{(1/2)}/(b+(-4*a*c+b^2)^{(1/2)})^{(1/2)}
\end{aligned}$$

## Rubi [A] (verified)

Time = 5.12 (sec) , antiderivative size = 1179, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.200$ , Rules

used = {1687, 1692, 1180, 211, 1677, 1674, 648, 632, 212, 642}

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^8 + kx^{11}}{(a + bx^2 + cx^4)^3} dx =$$

$$\frac{x \left( \left( - \left( \left( \frac{ja^2}{c^2} + d \right) b^2 \right) + afb + 2a \left( \frac{ja^2}{c} - ha + cd \right) \right) c^2 + (-ajb^3 - c(-3ja^2 + cha + c^2d)b + 2ac^3f) x^2 \right)}{4ac^2 (b^2 - 4ac) (cx^4 + bx^2 + a)^2}$$

$$+ \frac{\left( \left( \frac{ja^2}{c} + 3cd \right) b^3 + acfb^2 - 4a(4ja^2 + 3cha + 6c^2d)b + 20a^2c^2f + \frac{(3c^2d - a^2j)b^4 + ac^2fb^3 - 6ac(-3ja^2 - 3cha + 5c^2d)}{c\sqrt{b^2 - 4ac}} \right)}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2 \sqrt{b - \sqrt{b^2 - 4ac}}}$$

$$+ \frac{\left( \left( \frac{ja^2}{c} + 3cd \right) b^3 + acfb^2 - 4a(4ja^2 + 3cha + 6c^2d)b + 20a^2c^2f - \frac{(3c^2d - a^2j)b^4 + ac^2fb^3 - 6ac(-3ja^2 - 3cha + 5c^2d)}{c\sqrt{b^2 - 4ac}} \right)}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2 \sqrt{b + \sqrt{b^2 - 4ac}}}$$

$$- \frac{(-kb^5 + 10ackb^3 + 2c^3ib^2 - 30a^2c^2kb + 12c^5e - c^4(6bg - 4ai)) \operatorname{arctanh}\left(\frac{2cx^2 + b}{\sqrt{b^2 - 4ac}}\right)}{2c^3 (b^2 - 4ac)^{5/2}}$$

$$+ \frac{k \log(cx^4 + bx^2 + a)}{4c^3}$$

$$+ \frac{x \left( (ja^2 + 3c^2d)b^3 + ac^2fb^2 - 4ac(4ja^2 + 3cha + 6c^2d)b + 20a^2c^3f \right) x^2 + c \left( \left( 3d - \frac{2a^2j}{c^2} \right) b^4 + afb^3 - a \right)}{8a^2c (b^2 - 4ac)^2 (cx^4 + bx^2 + a)}$$

$$+ \frac{-\frac{kb^6}{c} + 11akb^4 + c^2ib^3 - 3(gc^3 + 13a^2kc)b^2 + 2c^3(3ce + ai)b + 2(2kb^5 - 15ackb^3 + c^3ib^2 + 25a^2c^2kb + 2ac^2e - c^4(bg + 2ai))x^2 - 2ac^2e}{4c^3 (b^2 - 4ac)^2 (cx^4 + bx^2 + a)}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5 + j\*x^8 + k\*x^11)/(a + b\*x^2 + c\*x^4)^3, x]

[Out]  $-1/4*(x*(c^2*(a*b*f - b^2*(d + (a^2*j)/c^2) + 2*a*(c*d - a*h + (a^2*j)/c)) + (2*a*c^3*f - a*b^3*j - b*c*(c^2*d + a*c*h - 3*a^2*j))*x^2)/(a*c^2*(b^2 - 4*a*c)*(a + b*x^2 + c*x^4)^2 - (b*c^3*(c*e + a*i) - a*b^4*k + 4*a^2*b^2*c*k - 2*a*c^2*(c^2*g + a^2*k) + (2*c^5*e + b^2*c^3*i - c^4*(b*g + 2*a*i) - b^5*k + 5*a*b^3*c*k - 5*a^2*b*c^2*k)*x^2)/(4*c^4*(b^2 - 4*a*c)*(a + b*x^2 + c*x^4)^2) + (x*(c*(a*b^3*f + 8*a^2*b*c*f + 4*a^2*(7*c^2*d + a*c*h - 9*a^2*j) + b^4*(3*d - (2*a^2*j)/c^2) - a*b^2*(25*c*d + 7*a*h - (11*a^2*j)/c)) + (a*b^2*c^2*f + 20*a^2*c^3*f + b^3*(3*c^2*d + a^2*j) - 4*a*b*c*(6*c^2*d + 3*a*c*h + 4*a^2*j))*x^2)/(8*a^2*c*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4) + (b^3*c^2*i + 2*b*c^3*(3*c*e + a*i) + 11*a*b^4*k - (b^6*k)/c + 32*a^3*c^2*k - 3*b^2*(c^3*g + 13*a^2*c*k) + 2*(6*c^5*e + b^2*c^3*i - c^4*(3*b*g - 2*a*i) + 2*b^5*k - 15*a*b^3*c*k + 25*a^2*b*c^2*k)*x^2)/(4*c^3*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4) + ((a*b^2*c*f + 20*a^2*c^2*f - 4*a*b*(6*c^2*d + 3*a*c*h + 4*a^2*j) + b^3*(3*c*d + (a^2*j)/c) + (a*b^3*c^2*f - 52*a^2*b*c^3*f - 6*a*b^2*c*(5*c^2*d - 3*a*c*h - 3*a^2*j) + b^4*(3*c^2*d - a^2*j) + 8*a^2*c^2*(21*c^2*d + 3*a*c*h + 5*a^2*j))/(c*sqrt[b^2 - 4*a*c]))*ArcTan[(sqrt[2]*sqrt[c]*x)/sqrt[b^2 - 4*a*c]]$

```

rt[b - Sqrt[b^2 - 4*a*c]])/(8*Sqrt[2]*a^2*Sqrt[c]*(b^2 - 4*a*c)^2*Sqrt[b -
  Sqrt[b^2 - 4*a*c]]) + ((a*b^2*c*f + 20*a^2*c^2*f - 4*a*b*(6*c^2*d + 3*a*c*
h + 4*a^2*j) + b^3*(3*c*d + (a^2*j)/c) - (a*b^3*c^2*f - 52*a^2*b*c^3*f - 6*
a*b^2*c*(5*c^2*d - 3*a*c*h - 3*a^2*j) + b^4*(3*c^2*d - a^2*j) + 8*a^2*c^2*(
21*c^2*d + 3*a*c*h + 5*a^2*j))/(c*Sqrt[b^2 - 4*a*c]))*ArcTan[(Sqrt[2]*Sqrt[
c]*x)/Sqrt[b + Sqrt[b^2 - 4*a*c]]]/(8*Sqrt[2]*a^2*Sqrt[c]*(b^2 - 4*a*c)^2*
Sqrt[b + Sqrt[b^2 - 4*a*c]]) - ((12*c^5*e + 2*b^2*c^3*i - c^4*(6*b*g - 4*a*
i) - b^5*k + 10*a*b^3*c*k - 30*a^2*b*c^2*k)*ArcTanh[(b + 2*c*x^2)/Sqrt[b^2
- 4*a*c]])/(2*c^3*(b^2 - 4*a*c)^(5/2)) + (k*Log[a + b*x^2 + c*x^4]/(4*c^3)

```

#### Rule 211

```

Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] := Simp[(Rt[a/b, 2]/a)*ArcTan[x/Rt[
a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

```

#### Rule 212

```

Int[((a_) + (b_.)*(x_)^2)^(-1), x_Symbol] := Simp[(1/(Rt[a, 2]*Rt[-b, 2]))*
ArcTanh[Rt[-b, 2]*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (Gt
Q[a, 0] || LtQ[b, 0])

```

#### Rule 632

```

Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] := Dist[-2, Subst[In
t[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]

```

#### Rule 642

```

Int[((d_) + (e_.)*(x_))/((a_.) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] := S
imp[d*(Log[RemoveContent[a + b*x + c*x^2, x])/b], x] /; FreeQ[{a, b, c, d,
e}, x] && EqQ[2*c*d - b*e, 0]

```

#### Rule 648

```

Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] := D
ist[(2*c*d - b*e)/(2*c), Int[1/(a + b*x + c*x^2), x], x] + Dist[e/(2*c), In
t[(b + 2*c*x)/(a + b*x + c*x^2), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ
[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && !NiceSqrtQ[b^2 - 4*a*c]

```

#### Rule 1180

```

Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]

```



Rule 1674

```
Int[(Pq_)*((a_) + (b_)*(x_) + (c_)*(x_)^2)^(p_), x_Symbol] := With[{Q =
PolynomialQuotient[Pq, a + b*x + c*x^2, x], f = Coeff[PolynomialRemainder[P
q, a + b*x + c*x^2, x], x, 0], g = Coeff[PolynomialRemainder[Pq, a + b*x +
c*x^2, x], x, 1]}, Simp[(b*f - 2*a*g + (2*c*f - b*g)*x)*((a + b*x + c*x^2)^
(p + 1)/((p + 1)*(b^2 - 4*a*c))), x] + Dist[1/((p + 1)*(b^2 - 4*a*c)), Int[
(a + b*x + c*x^2)^(p + 1)*ExpandToSum[(p + 1)*(b^2 - 4*a*c)*Q - (2*p + 3)*(
2*c*f - b*g), x], x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && NeQ[b^2
- 4*a*c, 0] && LtQ[p, -1]
```

Rule 1677

```
Int[(Pq_)*(x_)^(m_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] :
> Dist[1/2, Subst[Int[x^((m - 1)/2)*SubstFor[x^2, Pq, x]*(a + b*x + c*x^2)^
p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x^2] && IntegerQ[
(m - 1)/2]
```

Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

Rule 1692

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := With[{d =
Coeff[PolynomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 0], e = Coeff[Poly
nomialRemainder[Pq, a + b*x^2 + c*x^4, x], x, 2]}, Simp[x*(a + b*x^2 + c*x^
4)^(p + 1)*((a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)/(2*a*(p + 1)*(b
^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[(a + b*x^2 + c*
x^4)^(p + 1)*ExpandToSum[2*a*(p + 1)*(b^2 - 4*a*c)*PolynomialQuotient[Pq, a
+ b*x^2 + c*x^4, x] + b^2*d*(2*p + 3) - 2*a*c*d*(4*p + 5) - a*b*e + c*(4*p
+ 7)*(b*d - 2*a*e)*x^2, x], x], x]] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x^
2] && Expon[Pq, x^2] > 1 && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1]
```

Rubi steps

$$\text{integral} = \int \frac{d + fx^2 + hx^4 + jx^8}{(a + bx^2 + cx^4)^3} dx + \int \frac{x(e + gx^2 + ix^4 + kx^{10})}{(a + bx^2 + cx^4)^3} dx$$

$$\begin{aligned}
&= \frac{x \left( c^2 \left( abf - b^2 \left( d + \frac{a^2 j}{c^2} \right) + 2a \left( cd - ah + \frac{a^2 j}{c} \right) \right) + (2ac^3 f - ab^3 j - bc(c^2 d + ach - 3a^2 j)) x^2 \right)}{4ac^2 (b^2 - 4ac) (a + bx^2 + cx^4)^2} \\
&+ \frac{1}{2} \text{Subst} \left( \int \frac{e + gx + ix^2 + kx^5}{(a + bx + cx^2)^3} dx, x, x^2 \right) \\
&= \frac{\int \frac{-abf - b^2 \left( 3d - \frac{a^2 j}{c^2} \right) + 2a \left( 7cd + ah - \frac{a^2 j}{c} \right) + \frac{(10ac^3 f - ab^3 j - bc(5c^2 d + 5ach + a^2 j)) x^2}{c^2} + 4a \left( 4a - \frac{b^2}{c} \right) j x^4}{(a + bx^2 + cx^4)^2} dx}{4a (b^2 - 4ac)} \\
&= \frac{x \left( c^2 \left( abf - b^2 \left( d + \frac{a^2 j}{c^2} \right) + 2a \left( cd - ah + \frac{a^2 j}{c} \right) \right) + (2ac^3 f - ab^3 j - bc(c^2 d + ach - 3a^2 j)) x^2 \right)}{4ac^2 (b^2 - 4ac) (a + bx^2 + cx^4)^2} \\
&= \frac{bc^3 (ce + ai) - ab^4 k + 4a^2 b^2 ck - 2ac^2 (c^2 g + a^2 k) + (2c^5 e + b^2 c^3 i - c^4 (bg + 2ai) - b^5 k + 5ab^3 ck)}{4c^4 (b^2 - 4ac) (a + bx^2 + cx^4)^2} \\
&+ \frac{x \left( c \left( ab^3 f + 8a^2 bcf + 4a^2 (7c^2 d + ach - 9a^2 j) + b^4 \left( 3d - \frac{2a^2 j}{c^2} \right) - ab^2 \left( 25cd + 7ah - \frac{11a^2 j}{c} \right) \right) + (2ac^3 f - ab^3 j - bc(c^2 d + ach - 3a^2 j)) x^2 \right)}{8a^2 c (b^2 - 4ac)^2 (a + bx^2 + cx^4)^2} \\
&+ \frac{\int \frac{3b^4 d + ab^3 f - 16a^2 bcf + 4a^2 (21c^2 d + 3ach + 5a^2 j) - ab^2 \left( 27cd - 3ah - \frac{a^2 j}{c} \right) + \frac{(ab^2 c^2 f + 20a^2 c^3 f + b^3 (3c^2 d + a^2 j) - 4abc(6c^2 d + 3ach + 4a^2 j))}{c}}{a + bx^2 + cx^4} dx}{8a^2 (b^2 - 4ac)^2} \\
&= \frac{\text{Subst} \left( \int \frac{6ce - 3bg + 2ai + \frac{b^2 i}{c} - \frac{b^5 k}{c^4} + \frac{3ab^3 k}{c^3} + \frac{a^2 bk}{c^2} - \frac{2(b^4 - 5ab^2 c + 4a^2 c^2) kx}{c^3} + \frac{2b(b^2 - 4ac) kx^2}{c^2} + 2 \left( 4a - \frac{b^2}{c} \right) kx^3}{(a + bx + cx^2)^2} dx, x, x^2 \right)}{4 (b^2 - 4ac)}
\end{aligned}$$

$$\begin{aligned}
&= \frac{x\left(c^2\left(abf - b^2\left(d + \frac{a^2j}{c^2}\right) + 2a\left(cd - ah + \frac{a^2j}{c}\right)\right) + (2ac^3f - ab^3j - bc(c^2d + ach - 3a^2j))x^2\right)}{4ac^2(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&- \frac{bc^3(ce + ai) - ab^4k + 4a^2b^2ck - 2ac^2(c^2g + a^2k) + (2c^5e + b^2c^3i - c^4(bg + 2ai) - b^5k + 5ab^3ck)}{4c^4(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{x\left(c\left(ab^3f + 8a^2bcf + 4a^2(7c^2d + ach - 9a^2j) + b^4\left(3d - \frac{2a^2j}{c^2}\right) - ab^2\left(25cd + 7ah - \frac{11a^2j}{c}\right)\right) + b^3c^2i + 2bc^3(3ce + ai) + 11ab^4k - \frac{b^6k}{c} + 32a^3c^2k - 3b^2(c^3g + 13a^2ck) + 2(6c^5e + b^2c^3i - c^4(3bg + 2ai) - b^5k + 5ab^3ck)}{8a^2c(b^2 - 4ac)^2(a + bx^2 + cx^4)}\right)}{4c^3(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{\text{Subst}\left(\int \frac{2(6c^2e - 3bcg + b^2i + 2aci + \frac{ab^3k}{c^2} - \frac{7a^2bk}{c}) + \frac{2(b^2 - 4ac)^2kx}{c^2}}{a + bx + cx^2} dx, x, x^2\right)}{4(b^2 - 4ac)^2} \\
&+ \frac{\left(ab^2cf + 20a^2c^2f - 4ab(6c^2d + 3ach + 4a^2j) + b^3\left(3cd + \frac{a^2j}{c}\right) - \frac{ab^3c^2f - 52a^2bc^3f - 6ab^2c(5c^2d - 3ach - 3a^2j) - b^5k + 5ab^3ck}{16a^2(b^2 - 4ac)^2}\right)}{16a^2(b^2 - 4ac)^2} \\
&+ \frac{\left(ab^2cf + 20a^2c^2f - 4ab(6c^2d + 3ach + 4a^2j) + b^3\left(3cd + \frac{a^2j}{c}\right) + \frac{ab^3c^2f - 52a^2bc^3f - 6ab^2c(5c^2d - 3ach - 3a^2j) - b^5k + 5ab^3ck}{16a^2(b^2 - 4ac)^2}\right)}{16a^2(b^2 - 4ac)^2} \\
&= \frac{x\left(c^2\left(abf - b^2\left(d + \frac{a^2j}{c^2}\right) + 2a\left(cd - ah + \frac{a^2j}{c}\right)\right) + (2ac^3f - ab^3j - bc(c^2d + ach - 3a^2j))x^2\right)}{4ac^2(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&- \frac{bc^3(ce + ai) - ab^4k + 4a^2b^2ck - 2ac^2(c^2g + a^2k) + (2c^5e + b^2c^3i - c^4(bg + 2ai) - b^5k + 5ab^3ck)}{4c^4(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{x\left(c\left(ab^3f + 8a^2bcf + 4a^2(7c^2d + ach - 9a^2j) + b^4\left(3d - \frac{2a^2j}{c^2}\right) - ab^2\left(25cd + 7ah - \frac{11a^2j}{c}\right)\right) + b^3c^2i + 2bc^3(3ce + ai) + 11ab^4k - \frac{b^6k}{c} + 32a^3c^2k - 3b^2(c^3g + 13a^2ck) + 2(6c^5e + b^2c^3i - c^4(3bg + 2ai) - b^5k + 5ab^3ck)}{8a^2c(b^2 - 4ac)^2(a + bx^2 + cx^4)}\right)}{4c^3(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{\left(ab^2cf + 20a^2c^2f - 4ab(6c^2d + 3ach + 4a^2j) + b^3\left(3cd + \frac{a^2j}{c}\right) + \frac{ab^3c^2f - 52a^2bc^3f - 6ab^2c(5c^2d - 3ach - 3a^2j) - b^5k + 5ab^3ck}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&+ \frac{\left(ab^2cf + 20a^2c^2f - 4ab(6c^2d + 3ach + 4a^2j) + b^3\left(3cd + \frac{a^2j}{c}\right) - \frac{ab^3c^2f - 52a^2bc^3f - 6ab^2c(5c^2d - 3ach - 3a^2j) - b^5k + 5ab^3ck}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&+ \frac{k\text{Subst}\left(\int \frac{b + 2cx}{a + bx + cx^2} dx, x, x^2\right)}{4c^3} \\
&+ \frac{(12c^5e + 2b^2c^3i - c^4(6bg - 4ai) - b^5k + 10ab^3ck - 30a^2bc^2k)\text{Subst}\left(\int \frac{1}{a + bx + cx^2} dx, x, x^2\right)}{4c^3(b^2 - 4ac)^2}
\end{aligned}$$

$$\begin{aligned}
&= \frac{x\left(c^2\left(abf - b^2\left(d + \frac{a^2j}{c^2}\right) + 2a\left(cd - ah + \frac{a^2j}{c}\right)\right) + (2ac^3f - ab^3j - bc(c^2d + ach - 3a^2j))x^2\right)}{4ac^2(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&- \frac{bc^3(ce + ai) - ab^4k + 4a^2b^2ck - 2ac^2(c^2g + a^2k) + (2c^5e + b^2c^3i - c^4(bg + 2ai) - b^5k + 5ab^3ck)}{4c^4(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{x\left(c\left(ab^3f + 8a^2bcf + 4a^2(7c^2d + ach - 9a^2j) + b^4\left(3d - \frac{2a^2j}{c^2}\right) - ab^2\left(25cd + 7ah - \frac{11a^2j}{c}\right)\right) + (2ac^3f - ab^3j - bc(c^2d + ach - 3a^2j))x^2\right)}{8a^2c(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{b^3c^2i + 2bc^3(3ce + ai) + 11ab^4k - \frac{b^6k}{c} + 32a^3c^2k - 3b^2(c^3g + 13a^2ck) + 2(6c^5e + b^2c^3i - c^4(3bg - 2ai) - b^5k + 5ab^3ck)}{4c^3(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{\left(ab^2cf + 20a^2c^2f - 4ab(6c^2d + 3ach + 4a^2j) + b^3\left(3cd + \frac{a^2j}{c}\right) + \frac{ab^3c^2f - 52a^2bc^3f - 6ab^2c(5c^2d - 3ach - 3a^2j)}{cv}\right)}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&+ \frac{\left(ab^2cf + 20a^2c^2f - 4ab(6c^2d + 3ach + 4a^2j) + b^3\left(3cd + \frac{a^2j}{c}\right) - \frac{ab^3c^2f - 52a^2bc^3f - 6ab^2c(5c^2d - 3ach - 3a^2j)}{cv}\right)}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&+ \frac{k \log(a + bx^2 + cx^4)}{4c^3} \\
&- \frac{(12c^5e + 2b^2c^3i - c^4(6bg - 4ai) - b^5k + 10ab^3ck - 30a^2bc^2k) \text{Subst}\left(\int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2\right)}{2c^3(b^2 - 4ac)^2} \\
&= \frac{x\left(c^2\left(abf - b^2\left(d + \frac{a^2j}{c^2}\right) + 2a\left(cd - ah + \frac{a^2j}{c}\right)\right) + (2ac^3f - ab^3j - bc(c^2d + ach - 3a^2j))x^2\right)}{4ac^2(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&- \frac{bc^3(ce + ai) - ab^4k + 4a^2b^2ck - 2ac^2(c^2g + a^2k) + (2c^5e + b^2c^3i - c^4(bg + 2ai) - b^5k + 5ab^3ck)}{4c^4(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&+ \frac{x\left(c\left(ab^3f + 8a^2bcf + 4a^2(7c^2d + ach - 9a^2j) + b^4\left(3d - \frac{2a^2j}{c^2}\right) - ab^2\left(25cd + 7ah - \frac{11a^2j}{c}\right)\right) + (2ac^3f - ab^3j - bc(c^2d + ach - 3a^2j))x^2\right)}{8a^2c(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{b^3c^2i + 2bc^3(3ce + ai) + 11ab^4k - \frac{b^6k}{c} + 32a^3c^2k - 3b^2(c^3g + 13a^2ck) + 2(6c^5e + b^2c^3i - c^4(3bg - 2ai) - b^5k + 5ab^3ck)}{4c^3(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&+ \frac{\left(ab^2cf + 20a^2c^2f - 4ab(6c^2d + 3ach + 4a^2j) + b^3\left(3cd + \frac{a^2j}{c}\right) + \frac{ab^3c^2f - 52a^2bc^3f - 6ab^2c(5c^2d - 3ach - 3a^2j)}{cv}\right)}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b - \sqrt{b^2 - 4ac}}} \\
&+ \frac{\left(ab^2cf + 20a^2c^2f - 4ab(6c^2d + 3ach + 4a^2j) + b^3\left(3cd + \frac{a^2j}{c}\right) - \frac{ab^3c^2f - 52a^2bc^3f - 6ab^2c(5c^2d - 3ach - 3a^2j)}{cv}\right)}{8\sqrt{2}a^2\sqrt{c}(b^2 - 4ac)^2\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&- \frac{(12c^5e + 2b^2c^3i - c^4(6bg - 4ai) - b^5k + 10ab^3ck - 30a^2bc^2k) \tanh^{-1}\left(\frac{b + 2cx^2}{\sqrt{b^2 - 4ac}}\right)}{2c^3(b^2 - 4ac)^{5/2}} \\
&+ \frac{k \log(a + bx^2 + cx^4)}{4c^3}
\end{aligned}$$



$$\begin{aligned}
& - 16a^3bc\sqrt{b^2 - 4ac}j) \operatorname{ArcTan}[(\sqrt{2}\sqrt{c}x)/\sqrt{b - \sqrt{b^2 - 4ac}}]] / (8\sqrt{2}a^2c^{3/2}(b^2 - 4ac)^{5/2}\sqrt{b - \sqrt{b^2 - 4ac}}) + ((-3b^4c^2d + 30ab^2c^3d - 168a^2c^4d + 3b^3c^2\sqrt{b^2 - 4ac}d - 24abc^3\sqrt{b^2 - 4ac}d - ab^3c^2f + 52a^2b^2c^3f + ab^2c^2\sqrt{b^2 - 4ac}f + 20a^2c^3\sqrt{b^2 - 4ac}f - 18a^2b^2c^2h - 24a^3c^3h - 12a^2b^2c^2\sqrt{b^2 - 4ac}h + a^2b^4j - 18a^3b^2c^2j - 40a^4c^2j + a^2b^3\sqrt{b^2 - 4ac}j - 16a^3bc\sqrt{b^2 - 4ac}j) \operatorname{ArcTan}[(\sqrt{2}\sqrt{c}x)/\sqrt{b + \sqrt{b^2 - 4ac}}]] / (8\sqrt{2}a^2c^{3/2}(b^2 - 4ac)^{5/2}\sqrt{b + \sqrt{b^2 - 4ac}}) + ((12c^5e - 6b^4c^4g + 2b^2c^3i + 4ac^4i - b^5k + 10ab^3c^2k - 30a^2b^2c^2k + b^4\sqrt{b^2 - 4ac}k - 8ab^2c\sqrt{b^2 - 4ac}k + 16a^2c^2\sqrt{b^2 - 4ac}k) \operatorname{Log}[-b + \sqrt{b^2 - 4ac} - 2cx^2]) / (4c^3(b^2 - 4ac)^{5/2}) + ((-12c^5e + 6b^4c^4g - 2b^2c^3i - 4ac^4i + b^5k - 10ab^3c^2k + 30a^2b^2c^2k + b^4\sqrt{b^2 - 4ac}k - 8ab^2c\sqrt{b^2 - 4ac}k + 16a^2c^2\sqrt{b^2 - 4ac}k) \operatorname{Log}[b + \sqrt{b^2 - 4ac} + 2cx^2]) / (4c^3(b^2 - 4ac)^{5/2})
\end{aligned}$$

### Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 1.14 (sec) , antiderivative size = 1182, normalized size of antiderivative = 1.00

method	result	size
risch	Expression too large to display	1182
default	Expression too large to display	2058

[In] `int((k*x^11+j*x^8+i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x,method=_RETURNVERBOSE)`

[Out]  $(-1/8*(16a^3bcj - a^2b^3j + 12a^2b^2c^2h - 20a^2c^3f - ab^2c^2f + 24a^2b^2c^3d - 3b^3c^2d)/a^2/(16a^2c^2 - 8a^2b^2c + b^4)*x^7 + 1/2*(25a^2b^2c^2k - 15ab^3c^2k + 2ac^4i + 2b^5k + b^2c^3i - 3b^4g + 6c^5e)/c^2/(16a^2c^2 - 8a^2b^2c + b^4)*x^6 - 1/8/a^2*(36a^4c^2j + 5a^3b^2c^2j - 4a^3c^3h + a^2b^4j + 19a^2b^2c^2h - 28a^2b^2c^3f - 28a^2c^4d - 2ab^3c^2f + 49ab^2c^3d - 6b^4c^2d)/(16a^2c^2 - 8a^2b^2c + b^4)/cx^5 + 1/4*(32a^3c^3k + 11a^2b^2c^2k - 19ab^4c^2k + 6ab^3c^4i + 3b^6k + 3b^3c^3i - 9b^2c^4g + 18b^5e)/(16a^2c^2 - 8a^2b^2c + b^4)/c^3x^4 - 1/8/c*(28a^4b^2c^2j + 2a^3b^3j + 16a^3b^2c^2h - 36a^3c^3f + 5a^2b^3c^3h - 5a^2b^2c^2f + 4a^2b^2c^3d - ab^4c^2f + 20ab^3c^2d - 3b^5c^2d)/a^2/(16a^2c^2 - 8a^2b^2c + b^4)*x^3 + 1/2/c^3*(31a^3b^2c^2k - 22a^2b^3c^2k - 2a^2c^4i + 3ab^5k + 5ab^2c^3i - 5ab^4g + 10ac^5e - b^3c^3g + 2b^2c^4e)/(16a^2c^2 - 8a^2b^2c + b^4)*x^2 - 1/8*(20a^4c^2j + a^3b^2j + 12a^3c^2h + 3a^2b^2c^2h - 16a^2b^2c^2f - 44a^2c^3d + ab^3c^2f + 37ab^2c^2d - 5b^4c^2d)/c/(16a^2c^2 - 8a^2b^2c + b^4)/ax + 1/4*(24a^4c^2k - 21a^3b^2c^2k + 3a^2b^4k + 6a^2b^2c^3i - 8a^2c^4g - ab^2c^3g + 10$

```
*a*b*c^4*e-b^3*c^3*e)/(16*a^2*c^2-8*a*b^2*c+b^4)/c^3)/(c*x^4+b*x^2+a)^2+1/16/c*sum((8/c*k*_R^3-1/a^2*(16*a^3*b*c*j-a^2*b^3*j+12*a^2*b*c^2*h-20*a^2*c^3*f-a*b^2*c^2*f+24*a*b*c^3*d-3*b^3*c^2*d)/(16*a^2*c^2-8*a*b^2*c+b^4)*_R^2-8/c*(7*a^2*b*c*k-a*b^3*k-2*a*c^3*i-b^2*c^2*i+3*b*c^3*g-6*c^4*e)/(16*a^2*c^2-8*a*b^2*c+b^4)*_R+1/a^2*(20*a^4*c*j+a^3*b^2*j+12*a^3*c^2*h+3*a^2*b^2*c*h-16*a^2*b*c^2*f+84*a^2*c^3*d+a*b^3*c*f-27*a*b^2*c^2*d+3*b^4*c*d)/(16*a^2*c^2-8*a*b^2*c+b^4))/(2*_R^3*c+_R*b)*ln(x-_R),_R=RootOf(_Z^4*c+_Z^2*b+a))
```

### Fricas [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^8 + kx^{11}}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

```
[In] integrate((k*x^11+j*x^8+i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x,algorithm="fricas")
```

```
[Out] Timed out
```

### Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^8 + kx^{11}}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

```
[In] integrate((k*x**11+j*x**8+i*x**5+h*x**4+g*x**3+f*x**2+e*x+d)/(c*x**4+b*x**2+a)**3,x)
```

```
[Out] Timed out
```

### Maxima [F]

$$\begin{aligned} & \int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^8 + kx^{11}}{(a + bx^2 + cx^4)^3} dx \\ &= \int \frac{kx^{11} + jx^8 + ix^5 + hx^4 + gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^3} dx \end{aligned}$$

```
[In] integrate((k*x^11+j*x^8+i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^3,x,algorithm="maxima")
```

```
[Out] 1/8*(12*a^4*b*c^3*i - (12*a^2*b*c^5*h - 3*(b^3*c^5 - 8*a*b*c^6)*d - (a*b^2*c^5 + 20*a^2*c^6)*f - (a^2*b^3*c^3 - 16*a^3*b*c^4)*j)*x^7 + 4*(6*a^2*c^6*e
```





$$\begin{aligned}
& c^5) * d + (a^4 * b^8 * c^5 - 16 * a^5 * b^6 * c^6 + 96 * a^6 * b^4 * c^7 - 256 * a^7 * b^2 * c^8 + \\
& 256 * a^8 * c^9)^2 * (2 * a * b^4 * c^4 + 32 * a^2 * b^2 * c^5 - 160 * a^3 * c^6 - \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a * b^4 * c^2 - 16 * \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^2 * b^2 * c^3 + 2 * \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^3 * c^4 + 40 * \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^2 * b * c^4 - \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a * b^2 * c^4 - 20 * \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^2 * c^5 - 2 * (b^2 - 4 * a * c) * a * b^2 * c^4 - 40 * (b^2 - 4 * a * c) * a^2 * c^5) * f - 12 * (a^4 * b^8 * c^5 - 16 * a^5 * b^6 * c^6 + 96 * a^6 * b^4 * c^7 - 2 \\
& 56 * a^7 * b^2 * c^8 + 256 * a^8 * c^9)^2 * (2 * a^2 * b^3 * c^4 - 8 * a^3 * b * c^5 - \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^2 * b^3 * c^2 + 4 * \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^3 * b * c^3 + 2 * \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^2 * b^2 * c^3 - \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^2 * b * c^4 - 2 * (b^2 - 4 * a * c) * a^2 * b * c^4) * h + (a^4 * b^8 * c^5 - 16 * a^5 * b^6 * c^6 + 96 * a^6 * b^4 * c^7 - 256 * a^7 * b^2 * c^8 + 2 \\
& 56 * a^8 * c^9)^2 * (2 * a^2 * b^5 * c^2 - 40 * a^3 * b^3 * c^3 + 128 * a^4 * b * c^4 - \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^2 * b^5 + 20 * \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^3 * b^3 * c + 2 * \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^2 * b^4 * c - 64 * \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^4 * b * c^2 - 32 * \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^3 * b^2 * c^2 - \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^2 * b^3 * c^2 + 16 * \sqrt{2} * \sqrt{b^2 - 4 * a * c}) * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^3 * b * c^3 - 2 * (b^2 - 4 * a * c) * a^2 * b^3 * c^2 + \\
& 32 * (b^2 - 4 * a * c) * a^3 * b * c^3) * j + 6 * (\sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^4 * b^14 * c^7 - 29 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^5 * b^12 * c^8 - 2 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^4 * b^13 * c^8 - 2 * a^4 * b^14 * c^8 + 368 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^6 * b^10 * c^9 + 50 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^5 * b^11 * c^9 + \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^4 * b^12 * c^9 + 58 * a^5 * b^12 * c^9 - 2640 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^7 * b^8 * c^10 - 536 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^6 * b^9 * c^10 - 25 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^5 * b^10 * c^10 - 736 * a^6 * b^10 * c^10 + 11520 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^8 * b^6 * c^11 + 3136 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^7 * b^7 * c^11 + 268 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^6 * b^8 * c^11 + 5280 * a^7 * b^8 * c^11 - 30464 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^9 * b^4 * c^12 - 10496 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^8 * b^5 * c^12 - 1568 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^7 * b^6 * c^12 - 23040 * a^8 * b^6 * c^12 + 45056 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^10 * b^2 * c^13 + 18944 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^9 * b^3 * c^13 + 5248 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^8 * b^4 * c^13 + 6092 \\
& 8 * a^9 * b^4 * c^13 - 28672 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^11 * c^14 - 14336 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^10 * b * c^14 - 9472 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^9 * b^2 * c^14 - 90112 * a^10 * b^2 * c^14 + 7168 * \sqrt{2} * \sqrt{b * c + \sqrt{b^2 - 4 * a * c}} * a^10 * c^15 + 57344 * a^11 * c^15 + 2 * (b^2 - 4 * a * c) * a^4 * b^12 * c^8 - 50 * (b^2 - 4 * a * c) * a^5 * b^10 * c^9 + 536 * (b^2 - 4 * a * c) * a^
\end{aligned}$$

$$\begin{aligned}
& 6*b^8*c^{10} - 3136*(b^2 - 4*a*c)*a^7*b^6*c^{11} + 10496*(b^2 - 4*a*c)*a^8*b^4*c^{12} - 18944*(b^2 - 4*a*c)*a^9*b^2*c^{13} + 14336*(b^2 - 4*a*c)*a^{10}*c^{14}) * \\
& \text{abs}(a^4*b^8*c^5 - 16*a^5*b^6*c^6 + 96*a^6*b^4*c^7 - 256*a^7*b^2*c^8 + 256*a^8*c^9) + 2*(\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^5*b^{13}*c^7 - 36*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^6*b^{11}*c^8 - 2*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^5*b^{12}*c^8 - 2*a^5*b^{13}*c^8 + 480*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^9*c^9 + 64*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^6*b^{10}*c^9 + \text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^5*b^{11}*c^9 + 72*a^6*b^{11}*c^9 - 3200*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^8*b^7*c^{10} - 704*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^8*c^{10} - 32*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^6*b^9*c^{10} - 960*a^7*b^9*c^{10} + 11520*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^9*b^5*c^{11} + 3584*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^8*b^6*c^{11} + 352*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^7*c^{11} + 6400*a^8*b^7*c^{11} - 21504*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^{10}*b^3*c^{12} - 8704*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^9*b^4*c^{12} - 1792*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^8*b^5*c^{12} - 23040*a^9*b^5*c^{12} + 16384*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^{11}*b*c^{13} + 8192*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^{10}*b^2*c^{13} + 4352*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^9*b^3*c^{13} + 43008*a^{10}*b^3*c^{13} - 4096*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^{10}*b*c^{14} - 32768*a^{11}*b*c^{14} + 2*(b^2 - 4*a*c)*a^5*b^{11}*c^8 - 64*(b^2 - 4*a*c)*a^6*b^9*c^9 + 704*(b^2 - 4*a*c)*a^7*b^7*c^{10} - 3584*(b^2 - 4*a*c)*a^8*b^5*c^{11} + 8704*(b^2 - 4*a*c)*a^9*b^3*c^{12} - 8192*(b^2 - 4*a*c)*a^{10}*b*c^{13}) * \text{f*abs}(a^4*b^8*c^5 - 16*a^5*b^6*c^6 + 96*a^6*b^4*c^7 - 256*a^7*b^2*c^8 + 256*a^8*c^9) + 6*(\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^6*b^{12}*c^7 - 16*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^{10}*c^8 - 2*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^6*b^{11}*c^8 - 2*a^6*b^{12}*c^8 + 80*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^8*b^8*c^9 + 24*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^9*c^9 + \text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^6*b^{10}*c^9 + 32*a^7*b^{10}*c^9 - 64*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^8*b^7*c^{10} - 12*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^8*c^{10} - 160*a^8*b^8*c^{10} - 1280*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^{10}*b^4*c^{11} - 256*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^9*b^5*c^{11} + 32*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^8*b^6*c^{11} + 4096*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^{11}*b^2*c^{12} + 1536*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^{10}*b^3*c^{12} + 128*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^9*b^4*c^{12} + 2560*a^{10}*b^4*c^{12} - 4096*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^{12}*c^{13} - 2048*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^{11}*b*c^{13} - 768*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^{10}*b^2*c^{13} - 8192*a^{11}*b^2*c^{13} + 1024*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^{11}*c^{14} + 8192*a^{12}*c^{14} + 2*(b^2 - 4*a*c)*a^6*b^{10}*c^8 - 24*(b^2 - 4*a*c)*a^7*b^8*c^9 + 64*(b^2 - 4*a*c)*a^8*b^6*c^{10} + 256*(b^2 - 4*a*c)*a^9*b^4*c^{11} - 1536*(b^2 - 4*a*c)*a^{10}*b^2*c^{12} + 2048*(b^2 - 4*a*c)*a^{11}*c^{13}) * \text{h*abs}(a^4*b^8*c^5 - 16*a^5*b^6*c^6 + 96*a^6*b^4*c^7 - 256*a^7*b^2*c^8 + 256*a^8*c^9) + 2*(\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^{12}*c^6 - 2*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^7*b^{11}*c^7 - 2*a^7*b^{12}*c^7 - 240*\text{sqrt}(2)*\text{sqrt}(b*c + s
\end{aligned}$$

$$\begin{aligned}
& \text{qrt}(b^2 - 4ac) * a^9 * b^8 * c^8 - 8 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) \\
& * a^8 * b^9 * c^8 + \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^7 * b^{10} * c^8 + 2560 * \\
& \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^{10} * b^6 * c^9 + 448 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) \\
& * c) * a^9 * b^7 * c^9 + 4 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^8 * b^8 * c^9 + 480 * a^9 * b^8 * c^9 - 11520 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) \\
& * c) * a^{11} * b^4 * c^{10} - 3328 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^{10} * b^5 * c^{10} - 224 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^9 * b^6 * c^{10} - 5120 * a^{10} * b^6 * c^{10} + 24576 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^{12} * b^2 * c^{11} \\
& + 9728 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^{11} * b^3 * c^{11} + 1664 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^{10} * b^4 * c^{11} + 23040 * a^{11} * b^4 * c^{11} - 20480 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^{13} * c^{12} - 10240 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^{12} * b * c^{12} - 4864 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^{11} * b^2 * c^{12} - 49152 * a^{12} * b^2 * c^{12} + 5120 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * c) * a^{12} * c^{13} + 40960 * a^{13} * c^{13} + 2 * (b^2 - 4ac) * a^7 * b^{10} * c^7 + 8 * (b^2 - 4ac) * a^8 * b^8 * c^8 - 448 * (b^2 - 4ac) * a^9 * b^6 * c^9 + 3328 * (b^2 - 4ac) * a^{10} * b^4 * c^{10} - 9728 * (b^2 - 4ac) * a^{11} * b^2 * c^{11} + 10240 * (b^2 - 4ac) * a^{12} * c^{12}) * j * \text{abs}(a^4 * b^8 * c^5 - 16 * a^5 * b^6 * c^6 + 96 * a^6 * b^4 * c^7 - 256 * a^7 * b^2 * c^8 + 256 * a^8 * c^9) + 3 * (2 * a^8 * b^{21} * c^{14} - 84 * a^9 * b^{19} * c^{15} + 1648 * a^{10} * b^{17} * c^{16} - 19712 * a^{11} * b^{15} * c^{17} + 157696 * a^{12} * b^{13} * c^{18} - 874496 * a^{13} * b^{11} * c^{19} + 3383296 * a^{14} * b^9 * c^{20} - 8978432 * a^{15} * b^7 * c^{21} + 15597568 * a^{16} * b^5 * c^{22} - 15990784 * a^{17} * b^3 * c^{23} + 7340032 * a^{18} * b * c^{24} - \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^8 * b^{21} * c^{12} + 42 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^9 * b^{19} * c^{13} + 2 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^8 * b^{20} * c^{13} - 824 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{10} * b^{17} * c^{14} - 76 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^9 * b^{18} * c^{14} - \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^8 * b^{19} * c^{14} + 9856 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{11} * b^{15} * c^{15} + 1344 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{10} * b^{16} * c^{15} + 38 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^9 * b^{17} * c^{15} - 78848 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{12} * b^{13} * c^{16} - 14336 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{11} * b^{14} * c^{16} - 672 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{10} * b^{15} * c^{16} + 437248 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{13} * b^{11} * c^{17} + 100352 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{12} * b^{12} * c^{17} + 7168 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{11} * b^{13} * c^{17} - 1691648 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{14} * b^9 * c^{18} - 473088 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{13} * b^{10} * c^{18} - 50176 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{12} * b^{11} * c^{18} + 4489216 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{15} * b^7 * c^{19} + 1490944 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{14} * b^8 * c^{19} + 236544 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{13} * b^9 * c^{19} - 7798784 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^{16} * b^5 * c^{20} - 3014656 * \text{sqrt}(2) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * \text{qrt}(b^2 - 4ac) * c) * a^
\end{aligned}$$



$$\begin{aligned}
& - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{16}*b^4*c^{21} - 851968*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{17}*b^2*c^{22} - 2*(b^2 - 4*a*c)*a^9*b^{18}*c^{14} + 160*(b^2 - 4*a*c)*a^{10}*b^{16}*c^{15} - 3584*(b^2 - 4*a*c)*a^{11}*b^{14}*c^{16} + 39424*(b^2 - 4*a*c)*a^{12}*b^{12}*c^{17} - 250880*(b^2 - 4*a*c)*a^{13}*b^{10}*c^{18} + 974848*(b^2 - 4*a*c)*a^{14}*b^8*c^{19} - 2293760*(b^2 - 4*a*c)*a^{15}*b^6*c^{20} + 3014656*(b^2 - 4*a*c)*a^{16}*b^4*c^{21} - 1703936*(b^2 - 4*a*c)*a^{17}*b^2*c^{22})*f + 6*(6*a^{10}*b^{19}*c^{14} - 184*a^{11}*b^{17}*c^{15} + 2432*a^{12}*b^{15}*c^{16} - 17920*a^{13}*b^{13}*c^{17} + 78848*a^{14}*b^{11}*c^{18} - 200704*a^{15}*b^9*c^{19} + 229376*a^{16}*b^7*c^{20} + 131072*a^{17}*b^5*c^{21} - 655360*a^{18}*b^3*c^{22} + 524288*a^{19}*b*c^{23} - 3*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{10}*b^{19}*c^{12} + 92*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{11}*b^{17}*c^{13} + 6*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{10}*b^{18}*c^{13} - 1216*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{12}*b^{15}*c^{14} - 160*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{11}*b^{16}*c^{14} - 3*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{10}*b^{17}*c^{14} + 8960*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{13}*b^{13}*c^{15} + 1792*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{12}*b^{14}*c^{15} + 80*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{11}*b^{15}*c^{15} - 39424*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{14}*b^{11}*c^{16} - 10752*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{13}*b^{12}*c^{16} - 896*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{12}*b^{13}*c^{16} + 100352*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{15}*b^9*c^{17} + 35840*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{14}*b^{10}*c^{17} + 5376*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{13}*b^{11}*c^{17} - 114688*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{16}*b^7*c^{18} - 57344*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{15}*b^8*c^{18} - 17920*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{14}*b^9*c^{18} - 65536*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{17}*b^5*c^{19} + 28672*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{15}*b^7*c^{19} + 327680*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{18}*b^3*c^{20} + 131072*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{17}*b^4*c^{20} - 262144*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{19}*b*c^{21} - 131072*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{18}*b^2*c^{21} - 65536*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{17}*b^3*c^{21} + 65536*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{18}*b*c^{22} - 6*(b^2 - 4*a*c)*a^{10}*b^{17}*c^{14} + 160*(b^2 - 4*a*c)*a^{11}*b^{15}*c^{15} - 1792*(b^2 - 4*a*c)*a^{12}*b^{13}*c^{16} + 10752*(b^2 - 4*a*c)*a^{13}*b^{11}*c^{17} - 35840*(b^2 - 4*a*c)*a^{14}*b^9*c^{18} + 57344*(b^2 - 4*a*c)*a^{15}*b^7*c^{19} - 131072*(b^2 - 4*a*c)*a^{17}*b^3*c^{21} + 131072*(b^2 - 4*a*c)*a^{18}*b*c^{22})*h - (2*a^{10}*b^{21}*c^{12} - 100*a^{11}*b^{19}*c^{13} + 1968*a^{12}*b^{17}*c^{14} - 20736*a^{13}*b^{15}*c^{15} + 129024*a^{14}*b^{13}*c^{16} - 473088*a^{15}*b^{11}*c^{17} + 860160*a^{16}*b^9*c^{18} + 196608*a^{17}*b^7*c^{19} - 4325376*a^{18}*b^5*c^{20} + 8126464*a^{19}*b^3*c^{21} - 5242880*a^{20}*b*c^{22} - \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c)*c)*a^{10}*b^{21}*c^{10}
\end{aligned}$$

$$\begin{aligned}
& + 50\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{11} + 2\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{10}b^{20} \\
& c^{11} - 984\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{12}b^{17}c^{12} - 92\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{11} \\
& 1b^{18}c^{12} - \sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{10}b^{19}c^{12} + 10368\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{13}a^{13}b^{15}c^{13} + 1600\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{12}b^{16}c^{13} + 46\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{11}b^{17}c^{13} - 64512\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{14}b^{13}c^{14} - 14336\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{13}b^{14}c^{14} - 800\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{12}b^{15}c^{14} + 236544\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{15}b^{11}c^{15} + 71680\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{14}b^{12}c^{15} + 7168\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{13}b^{13}c^{15} - 430080\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{16}b^9c^{16} - 186368\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{15}b^{10}c^{16} - 35840\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{14}b^{11}c^{16} - 98304\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{17}b^7c^{17} + 114688\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{16}b^8c^{17} + 93184\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{15}b^9c^{17} + 2162688\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{18}b^5c^{18} + 655360\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{17}b^6c^{18} - 57344\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{16}b^7c^{18} - 4063232\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{19}b^3c^{19} - 1703936\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{18}b^4c^{19} - 327680\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{17}b^5c^{19} + 2621440\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{20}b^2c^{20} + 1310720\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{19}b^2c^{20} + 851968\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}}c^{18}b^3c^{20} - 655360\sqrt{2}\sqrt{b^2 - 4ac}\sqrt{bc + \sqrt{b^2 - 4ac}} \\
& c^{21}b^1c^{21} - 2(b^2 - 4ac)a^{10}b^{19}c^{12} + 92(b^2 - 4ac)a^{11}b^{17}c^{13} - 1600(b^2 - 4ac)a^{12}b^{15}c^{14} + 14336(b^2 - 4ac)a^{13}b^{13}c^{15} - 716 \\
& 80(b^2 - 4ac)a^{14}b^{11}c^{16} + 186368(b^2 - 4ac)a^{15}b^9c^{17} - 114688(b^2 - 4ac)a^{16}b^7c^{18} - 655360(b^2 - 4ac)a^{17}b^5c^{19} + 17039 \\
& 36(b^2 - 4ac)a^{18}b^3c^{20} - 1310720(b^2 - 4ac)a^{19}b^1c^{21}) * j) * \arctan(2\sqrt{1/2} * x / \sqrt{(a^4b^9c^5 - 16a^5b^7c^6 + 96a^6b^5c^7 - 256a^7b^3c^8 + 256a^8b^1c^9 + \sqrt{(a^4b^9c^5 - 16a^5b^7c^6 + 96a^6b^5c^7 - 256a^7b^3c^8 + 256a^8b^1c^9)^2 - 4(a^5b^8c^5 - 16a^6b^6c^6 + 96a^7b^4c^7 - 256a^8b^2c^8 + 256a^9c^9)(a^4b^8c^6 - 16a^5b^6c^7 + 96a^6b^4c^8 - 256a^7b^2c^9 + 256a^8c^{10})}) / (a^4b^8c^6 - 16a^5b^6c^7 + 96a^6b^4c^8 - 256a^7b^2c^9 + 256a^8c^{10})}) / ((a^7b^{14}c^7 - 28a^8b^{12}c^8 - 2a^7b^{13}c^8 + 336a^9b^{10}c^9 + 48a^8b^{11}c^9 + a^7b^{12}c^9 - 2240a^{10}b^8c^{10} - 480a^9b^9c^{10} - 24a^8b^{10}c^{10}
\end{aligned}$$



$$\begin{aligned}
&rt(2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*b^{10}*c^{10} + 736*a^6*b^{10}*c^{10} + 1 \\
&1520*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^6*c^{11} + 3136*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^7*b^7*c^{11} + 268*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^6*b^8*c^{11} - 5280*a^7*b^8*c^{11} - 30464*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9*b^4*c^{12} - 10496*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^5*c^{12} - 1568*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^7*b^6*c^{12} + 23040*a^8*b^6*c^{12} + 45056*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{10}*b^2*c^{13} + 18944*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9*b^3*c^{13} + 5248*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^4*c^{13} - 60928*a^9*b^4*c^{13} - 28672*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{11}*c^{14} - 14336*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{10}*b*c^{14} - 9472*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9*b^2*c^{14} + 90112*a^{10}*b^2*c^{14} + 7168*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{10}*c^{15} - 57344*a^{11}*c^{15} - 2*(b^2 - 4*a*c)*a^4*b^{12}*c^8 + 50*(b^2 - 4*a*c)*a^5*b^{10}*c^9 - 536*(b^2 - 4*a*c)*a^6*b^8*c^{10} + 3136*(b^2 - 4*a*c)*a^7*b^6*c^{11} - 10496*(b^2 - 4*a*c)*a^8*b^4*c^{12} + 18944*(b^2 - 4*a*c)*a^9*b^2*c^{13} - 14336*(b^2 - 4*a*c)*a^{10}*c^{14})*d*abs(a^4*b^8*c^5 - 16*a^5*b^6*c^6 + 96*a^6*b^4*c^7 - 256*a^7*b^2*c^8 + 256*a^8*c^9) - 2*(\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*b^{13}*c^7 - 36*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^6*b^{11}*c^8 - 2*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*b^{12}*c^8 + 2*a^5*b^{13}*c^8 + 480*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^7*b^9*c^9 + 64*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^6*b^{10}*c^9 + \sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^5*b^{11}*c^9 - 72*a^6*b^{11}*c^9 - 3200*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^7*c^{10} - 704*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^7*b^8*c^{10} - 32*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^6*b^9*c^{10} + 960*a^7*b^9*c^{10} + 11520*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9*b^5*c^{11} + 3584*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^6*c^{11} + 352*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^7*b^7*c^{11} - 6400*a^8*b^7*c^{11} - 21504*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{10}*b^3*c^{12} - 8704*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9*b^4*c^{12} - 1792*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^5*c^{12} + 23040*a^9*b^5*c^{12} + 16384*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{11}*b*c^{13} + 8192*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{10}*b^2*c^{13} + 4352*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9*b^3*c^{13} - 43008*a^{10}*b^3*c^{13} - 4096*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{10}*b*c^{14} + 32768*a^{11}*b*c^{14} - 2*(b^2 - 4*a*c)*a^5*b^{11}*c^8 + 64*(b^2 - 4*a*c)*a^6*b^9*c^9 - 704*(b^2 - 4*a*c)*a^7*b^7*c^{10} + 3584*(b^2 - 4*a*c)*a^8*b^5*c^{11} - 8704*(b^2 - 4*a*c)*a^9*b^3*c^{12} + 8192*(b^2 - 4*a*c)*a^{10}*b*c^{13})*f*abs(a^4*b^8*c^5 - 16*a^5*b^6*c^6 + 96*a^6*b^4*c^7 - 256*a^7*b^2*c^8 + 256*a^8*c^9) - 6*(\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^6*b^{12}*c^7 - 16*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^7*b^{10}*c^8 - 2*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^6*b^{11}*c^8 + 2*a^6*b^{12}*c^8 + 80*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^8*c^9 + 24*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^7*b^9*c^9 + \sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^6*b^{10}*c^9 - 32*a^7*b^{10}*c^9 - 64*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^7*c^{10} - 12*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^7*b^8*c^{10} + 160*a^8*b^8*c^{10} - 1280*\sqrt{2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^
\end{aligned}$$



$$\begin{aligned}
& 10*b^4*c^{11} - 256*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9*b^5*c^{11} + 32 \\
& *\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^6*c^{11} + 4096*\sqrt{2}*\sqrt{b \\
& *c - \sqrt{b^2 - 4*a*c}}*c)*a^{11}*b^2*c^{12} + 1536*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 \\
& - 4*a*c}}*c)*a^{10}*b^3*c^{12} + 128*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9 \\
& *b^4*c^{12} - 2560*a^{10}*b^4*c^{12} - 4096*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}* \\
& c)*a^{12}*c^{13} - 2048*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{11}*b*c^{13} - 7 \\
& 68*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{10}*b^2*c^{13} + 8192*a^{11}*b^2*c^{13} \\
& + 1024*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{11}*c^{14} - 8192*a^{12}*c^{14} \\
& - 2*(b^2 - 4*a*c)*a^6*b^{10}*c^8 + 24*(b^2 - 4*a*c)*a^7*b^8*c^9 - 64*(b^2 - \\
& 4*a*c)*a^8*b^6*c^{10} - 256*(b^2 - 4*a*c)*a^9*b^4*c^{11} + 1536*(b^2 - 4*a*c)* \\
& a^{10}*b^2*c^{12} - 2048*(b^2 - 4*a*c)*a^{11}*c^{13})*h*abs(a^4*b^8*c^5 - 16*a^5*b^ \\
& 6*c^6 + 96*a^6*b^4*c^7 - 256*a^7*b^2*c^8 + 256*a^8*c^9) - 2*(\sqrt{2}*\sqrt{b \\
& *c - \sqrt{b^2 - 4*a*c}}*c)*a^7*b^{12}*c^6 - 2*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4* \\
& a*c}}*c)*a^7*b^{11}*c^7 + 2*a^7*b^{12}*c^7 - 240*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4 \\
& *a*c}}*c)*a^9*b^8*c^8 - 8*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^9*c^ \\
& 8 + \sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^7*b^{10}*c^8 + 2560*\sqrt{2}*\sqrt{ \\
& t(b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{10}*b^6*c^9 + 448*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 \\
& - 4*a*c}}*c)*a^9*b^7*c^9 + 4*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^ \\
& 8*c^9 - 480*a^9*b^8*c^9 - 11520*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^1 \\
& 1*b^4*c^{10} - 3328*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{10}*b^5*c^{10} - 2 \\
& 24*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9*b^6*c^{10} + 5120*a^{10}*b^6*c^{10} \\
& 0 + 24576*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{12}*b^2*c^{11} + 9728*\sqrt{ \\
& (2)*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{11}*b^3*c^{11} + 1664*\sqrt{2}*\sqrt{b*c - \\
& \sqrt{b^2 - 4*a*c}}*c)*a^{10}*b^4*c^{11} - 23040*a^{11}*b^4*c^{11} - 20480*\sqrt{2}*\sqrt{ \\
& rt(b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{13}*c^{12} - 10240*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 \\
& - 4*a*c}}*c)*a^{12}*b*c^{12} - 4864*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^ \\
& 11*b^2*c^{12} + 49152*a^{12}*b^2*c^{12} + 5120*\sqrt{2}*\sqrt{b*c - \sqrt{b^2 - 4*a* \\
& c}}*c)*a^{12}*c^{13} - 40960*a^{13}*c^{13} - 2*(b^2 - 4*a*c)*a^7*b^{10}*c^7 - 8*(b^2 - \\
& 4*a*c)*a^8*b^8*c^8 + 448*(b^2 - 4*a*c)*a^9*b^6*c^9 - 3328*(b^2 - 4*a*c)*a^ \\
& 10*b^4*c^{10} + 9728*(b^2 - 4*a*c)*a^{11}*b^2*c^{11} - 10240*(b^2 - 4*a*c)*a^{12}* \\
& ^{12})*j*abs(a^4*b^8*c^5 - 16*a^5*b^6*c^6 + 96*a^6*b^4*c^7 - 256*a^7*b^2*c^8 \\
& + 256*a^8*c^9) + 3*(2*a^8*b^{21}*c^{14} - 84*a^9*b^{19}*c^{15} + 1648*a^{10}*b^{17}*c^{1 \\
& 6} - 19712*a^{11}*b^{15}*c^{17} + 157696*a^{12}*b^{13}*c^{18} - 874496*a^{13}*b^{11}*c^{19} + \\
& 3383296*a^{14}*b^9*c^{20} - 8978432*a^{15}*b^7*c^{21} + 15597568*a^{16}*b^5*c^{22} - 15 \\
& 990784*a^{17}*b^3*c^{23} + 7340032*a^{18}*b*c^{24} - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{ \\
& (b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^{21}*c^{12} + 42*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{ \\
& rt(b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9*b^{19}*c^{13} + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{ \\
& rt(b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^{20}*c^{13} - 824*\sqrt{2}*\sqrt{b^2 - 4*a*c} \\
& )*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{10}*b^{17}*c^{14} - 76*\sqrt{2}*\sqrt{b^2 - 4* \\
& a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9*b^{18}*c^{14} - \sqrt{2}*\sqrt{b^2 - 4*a \\
& *c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^8*b^{19}*c^{14} + 9856*\sqrt{2}*\sqrt{b^2 - \\
& 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{11}*b^{15}*c^{15} + 1344*\sqrt{2}*\sqrt{ \\
& (b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{10}*b^{16}*c^{15} + 38*\sqrt{2}*\sqrt{ \\
& rt(b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^9*b^{17}*c^{15} - 78848*\sqrt{ \\
& (2)*\sqrt{b^2 - 4*a*c})*\sqrt{b*c - \sqrt{b^2 - 4*a*c}}*c)*a^{12}*b^{13}*c^{16} - 14336
\end{aligned}$$

$$\begin{aligned}
& * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{11} b^{14} c^{16} - \\
& 672 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{10} b^{15} c^{16} + 437248 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{13} b^{11} c^{17} + 100352 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{12} b^{12} c^{17} + 7168 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{11} b^{13} c^{17} - 1691648 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{14} b^9 c^{18} - 473088 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{13} b^{10} c^{18} - 50176 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{12} b^{11} c^{18} + 4489216 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{15} b^7 c^{19} + 1490944 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{14} b^8 c^{19} + 236544 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{13} b^9 c^{19} - 7798784 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{16} b^5 c^{20} - 3014656 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{15} b^6 c^{20} - 745472 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{14} b^7 c^{20} + 7995392 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{17} b^3 c^{21} + 3538944 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{16} b^4 c^{21} + 1507328 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{15} b^5 c^{21} - 3670016 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{18} b^2 c^{22} - 1835008 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{17} b^2 c^{22} - 1769472 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{16} b^3 c^{22} + 917504 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{17} b^3 c^{23} - 2 * (b^2 - 4ac) a^8 b^{19} c^{14} + 76 * (b^2 - 4ac) a^9 b^{17} c^{15} - 1344 * (b^2 - 4ac) a^{10} b^{15} c^{16} + 14336 * (b^2 - 4ac) a^{11} b^{13} c^{17} - 100352 * (b^2 - 4ac) a^{12} b^{11} c^{18} + 473088 * (b^2 - 4ac) a^{13} b^9 c^{19} - 1490944 * (b^2 - 4ac) a^{14} b^7 c^{20} + 3014656 * (b^2 - 4ac) a^{15} b^5 c^{21} - 3538944 * (b^2 - 4ac) a^{16} b^3 c^{22} + 1835008 * (b^2 - 4ac) a^{17} b^2 c^{23} * d + (2a^9 b^{20} c^{14} - 168a^{10} b^{18} c^{15} + 4224a^{11} b^{16} c^{16} - 53760a^{12} b^{14} c^{17} + 408576a^{13} b^{12} c^{18} - 1978368a^{14} b^{10} c^{19} + 6193152a^{15} b^8 c^{20} - 12189696a^{16} b^6 c^{21} + 13762560a^{17} b^4 c^{22} - 6815744a^{18} b^2 c^{23} - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^9 b^{20} c^{12} + 84 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{10} b^{18} c^{13} + 2 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^9 b^{19} c^{13} - 2112 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{11} b^{16} c^{14} - 160 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{10} b^{17} c^{14} - \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^9 b^{18} c^{14} + 26880 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{12} b^{14} c^{15} + 3584 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{11} b^{15} c^{15} + 80 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{10} b^{16} c^{15} - 204288 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{13} b^{12} c^{16} - 39424 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{12} b^{13} c^{16} - 1792 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{11} b^{14} c^{16} + 989184 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} * a^{14} b^{10} c^{17} + 250880 * \sqrt{2} * \sqrt{b^2 - 4ac} * \sqrt{bc - \sqrt{b^2 - 4ac}} *
\end{aligned}$$



$$\begin{aligned}
& - 4*a*c)*c)*a^{18}*b^3*c^{20} + 131072*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{17}*b^4*c^{20} - 262144*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{19}*b*c^{21} - 131072*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{18}*b^2*c^{21} - 65536*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{17}*b^3*c^{21} + 65536*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{18}*b*c^{22} - 6*(b^2 - 4*a*c)*a^{10}*b^{17}*c^{14} + 160*(b^2 - 4*a*c)*a^{11}*b^{15}*c^{15} - 1792*(b^2 - 4*a*c)*a^{12}*b^{13}*c^{16} + 10752*(b^2 - 4*a*c)*a^{13}*b^{11}*c^{17} - 35840*(b^2 - 4*a*c)*a^{14}*b^9*c^{18} + 57344*(b^2 - 4*a*c)*a^{15}*b^7*c^{19} - 131072*(b^2 - 4*a*c)*a^{17}*b^3*c^{21} + 131072*(b^2 - 4*a*c)*a^{18}*b*c^{22})*h - (2*a^{10}*b^{21}*c^{12} - 100*a^{11}*b^{19}*c^{13} + 1968*a^{12}*b^{17}*c^{14} - 20736*a^{13}*b^{15}*c^{15} + 129024*a^{14}*b^{13}*c^{16} - 473088*a^{15}*b^{11}*c^{17} + 860160*a^{16}*b^9*c^{18} + 196608*a^{17}*b^7*c^{19} - 4325376*a^{18}*b^5*c^{20} + 8126464*a^{19}*b^3*c^{21} - 5242880*a^{20}*b*c^{22} - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{10}*b^{21}*c^{10} + 50*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{11}*b^{19}*c^{11} + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{10}*b^{20}*c^{11} - 984*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{12}*b^{17}*c^{12} - 92*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{11}*b^{18}*c^{12} - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{10}*b^{19}*c^{12} + 10368*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{13}*b^{15}*c^{13} + 1600*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{12}*b^{16}*c^{13} + 46*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{11}*b^{17}*c^{13} - 64512*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{14}*b^{13}*c^{14} - 14336*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{13}*b^{14}*c^{14} - 800*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{12}*b^{15}*c^{14} + 236544*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{15}*b^{11}*c^{15} + 71680*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{14}*b^{12}*c^{15} + 7168*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{13}*b^{13}*c^{15} - 430080*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{16}*b^9*c^{16} - 186368*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{15}*b^{10}*c^{16} - 35840*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{14}*b^{11}*c^{16} - 98304*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{17}*b^7*c^{17} + 114688*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{16}*b^8*c^{17} + 93184*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{15}*b^9*c^{17} + 2162688*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{18}*b^5*c^{18} + 655360*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{17}*b^6*c^{18} - 57344*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{16}*b^7*c^{18} - 4063232*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{19}*b^3*c^{19} - 1703936*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{18}*b^4*c^{19} - 327680*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{17}*b^5*c^{19} + 2621440*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{20}*b*c^{20} + 1310720*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{19}*b^2*c^{20} + 851968*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c - \sqrt{b^2 - 4*a*c})*c)*a^{18}*b^3*c^{20} - 655360*s
\end{aligned}$$

$$\begin{aligned}
& \text{qrt}(2) * \text{sqrt}(b^2 - 4*a*c) * \text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c) * c) * a^{19} * b * c^{21} - 2 * (b \\
& ^2 - 4*a*c) * a^{10} * b^{19} * c^{12} + 92 * (b^2 - 4*a*c) * a^{11} * b^{17} * c^{13} - 1600 * (b^2 - \\
& 4*a*c) * a^{12} * b^{15} * c^{14} + 14336 * (b^2 - 4*a*c) * a^{13} * b^{13} * c^{15} - 71680 * (b^2 - 4 \\
& *a*c) * a^{14} * b^{11} * c^{16} + 186368 * (b^2 - 4*a*c) * a^{15} * b^9 * c^{17} - 114688 * (b^2 - 4 \\
& *a*c) * a^{16} * b^7 * c^{18} - 655360 * (b^2 - 4*a*c) * a^{17} * b^5 * c^{19} + 1703936 * (b^2 - 4 \\
& *a*c) * a^{18} * b^3 * c^{20} - 1310720 * (b^2 - 4*a*c) * a^{19} * b * c^{21}) * j) * \arctan(2 * \text{sqrt}(1 \\
& / 2) * x / \text{sqrt}((a^4 * b^9 * c^5 - 16 * a^5 * b^7 * c^6 + 96 * a^6 * b^5 * c^7 - 256 * a^7 * b^3 * c^8 \\
& + 256 * a^8 * b * c^9 - \text{sqrt}((a^4 * b^9 * c^5 - 16 * a^5 * b^7 * c^6 + 96 * a^6 * b^5 * c^7 - 25 \\
& 6 * a^7 * b^3 * c^8 + 256 * a^8 * b * c^9)^2 - 4 * (a^5 * b^8 * c^5 - 16 * a^6 * b^6 * c^6 + 96 * a^7 \\
& * b^4 * c^7 - 256 * a^8 * b^2 * c^8 + 256 * a^9 * c^9)) * (a^4 * b^8 * c^6 - 16 * a^5 * b^6 * c^7 + 9 \\
& 6 * a^6 * b^4 * c^8 - 256 * a^7 * b^2 * c^9 + 256 * a^8 * c^{10}))) / (a^4 * b^8 * c^6 - 16 * a^5 * b^6 \\
& * c^7 + 96 * a^6 * b^4 * c^8 - 256 * a^7 * b^2 * c^9 + 256 * a^8 * c^{10}))) / ((a^7 * b^{14} * c^7 - \\
& 28 * a^8 * b^{12} * c^8 - 2 * a^7 * b^{13} * c^8 + 336 * a^9 * b^{10} * c^9 + 48 * a^8 * b^{11} * c^9 + a^7 \\
& * b^{12} * c^9 - 2240 * a^{10} * b^8 * c^{10} - 480 * a^9 * b^9 * c^{10} - 24 * a^8 * b^{10} * c^{10} + 8960 \\
& * a^{11} * b^6 * c^{11} + 2560 * a^{10} * b^7 * c^{11} + 240 * a^9 * b^8 * c^{11} - 21504 * a^{12} * b^4 * c^{11} \\
& 2 - 7680 * a^{11} * b^5 * c^{12} - 1280 * a^{10} * b^6 * c^{12} + 28672 * a^{13} * b^2 * c^{13} + 12288 * a \\
& ^{12} * b^3 * c^{13} + 3840 * a^{11} * b^4 * c^{13} - 16384 * a^{14} * c^{14} - 8192 * a^{13} * b * c^{14} - 61 \\
& 44 * a^{12} * b^2 * c^{14} + 4096 * a^{13} * c^{15}) * \text{abs}(a^4 * b^8 * c^5 - 16 * a^5 * b^6 * c^6 + 96 * a^ \\
& 6 * b^4 * c^7 - 256 * a^7 * b^2 * c^8 + 256 * a^8 * c^9) * \text{abs}(c) + 1/4 * k * \log(\text{abs}(c * x^4 + \\
& b * x^2 + a)) / c^3 + 1/16 * (12 * (b^3 * c^5 - 4 * a * b * c^6 - 2 * b^2 * c^6 + b * c^7 - (b^2 * \\
& c^5 - 4 * a * c^6 - 2 * b * c^6 + c^7) * \text{sqrt}(b^2 - 4 * a * c)) * e * \text{abs}(a^4 * b^8 * c^5 - 16 * a^ \\
& 5 * b^6 * c^6 + 96 * a^6 * b^4 * c^7 - 256 * a^7 * b^2 * c^8 + 256 * a^8 * c^9) - 6 * (b^4 * c^4 - \\
& 4 * a * b^2 * c^5 - 2 * b^3 * c^5 + b^2 * c^6 + (b^3 * c^4 - 4 * a * b * c^5 - 2 * b^2 * c^5 + b * c^ \\
& 6) * \text{sqrt}(b^2 - 4 * a * c)) * g * \text{abs}(a^4 * b^8 * c^5 - 16 * a^5 * b^6 * c^6 + 96 * a^6 * b^4 * c^7 - \\
& 256 * a^7 * b^2 * c^8 + 256 * a^8 * c^9) + 2 * (b^5 * c^3 - 2 * a * b^3 * c^4 - 2 * b^4 * c^4 - 8 * \\
& a^2 * b * c^5 - 4 * a * b^2 * c^5 + b^3 * c^5 + 2 * a * b * c^6 + (b^4 * c^3 - 2 * a * b^2 * c^4 - 2 * \\
& b^3 * c^4 - 8 * a^2 * c^5 - 4 * a * b * c^5 + b^2 * c^5 + 2 * a * c^6) * \text{sqrt}(b^2 - 4 * a * c)) * i * a \\
& \text{bs}(a^4 * b^8 * c^5 - 16 * a^5 * b^6 * c^6 + 96 * a^6 * b^4 * c^7 - 256 * a^7 * b^2 * c^8 + 256 * a^ \\
& 8 * c^9) - (b^8 - 14 * a * b^6 * c - 2 * b^7 * c + 70 * a^2 * b^4 * c^2 + 20 * a * b^5 * c^2 + b^6 * \\
& c^2 - 120 * a^3 * b^2 * c^3 - 60 * a^2 * b^3 * c^3 - 10 * a * b^4 * c^3 + 30 * a^2 * b^2 * c^4 - (b \\
& ^7 - 14 * a * b^5 * c - 2 * b^6 * c + 70 * a^2 * b^3 * c^2 + 20 * a * b^4 * c^2 + b^5 * c^2 - 120 * a \\
& ^3 * b * c^3 - 60 * a^2 * b^2 * c^3 - 10 * a * b^3 * c^3 + 30 * a^2 * b * c^4) * \text{sqrt}(b^2 - 4 * a * c)) \\
& * k * \text{abs}(a^4 * b^8 * c^5 - 16 * a^5 * b^6 * c^6 + 96 * a^6 * b^4 * c^7 - 256 * a^7 * b^2 * c^8 + 25 \\
& 6 * a^8 * c^9) + 12 * (a^4 * b^{11} * c^{10} - 20 * a^5 * b^9 * c^{11} - 2 * a^4 * b^{10} * c^{11} + 160 * a^ \\
& 6 * b^7 * c^{12} + 32 * a^5 * b^8 * c^{12} + a^4 * b^9 * c^{12} - 640 * a^7 * b^5 * c^{13} - 192 * a^6 * b^ \\
& 6 * c^{13} - 16 * a^5 * b^7 * c^{13} + 1280 * a^8 * b^3 * c^{14} + 512 * a^7 * b^4 * c^{14} + 96 * a^6 * b^ \\
& 5 * c^{14} - 1024 * a^9 * b * c^{15} - 512 * a^8 * b^2 * c^{15} - 256 * a^7 * b^3 * c^{15} + 256 * a^8 * b * \\
& c^{16} + (a^4 * b^{10} * c^{10} - 16 * a^5 * b^8 * c^{11} - 2 * a^4 * b^9 * c^{11} + 96 * a^6 * b^6 * c^{12} \\
& + 24 * a^5 * b^7 * c^{12} + a^4 * b^8 * c^{12} - 256 * a^7 * b^4 * c^{13} - 96 * a^6 * b^5 * c^{13} - 12 * \\
& a^5 * b^6 * c^{13} + 256 * a^8 * b^2 * c^{14} + 128 * a^7 * b^3 * c^{14} + 48 * a^6 * b^4 * c^{14} - 64 * a \\
& ^7 * b^2 * c^{15}) * \text{sqrt}(b^2 - 4 * a * c)) * e - 6 * (a^4 * b^{12} * c^9 - 20 * a^5 * b^{10} * c^{10} - 2 * \\
& a^4 * b^{11} * c^{10} + 160 * a^6 * b^8 * c^{11} + 32 * a^5 * b^9 * c^{11} + a^4 * b^{10} * c^{11} - 640 * a^ \\
& 7 * b^6 * c^{12} - 192 * a^6 * b^7 * c^{12} - 16 * a^5 * b^8 * c^{12} + 1280 * a^8 * b^4 * c^{13} + 512 * a \\
& ^7 * b^5 * c^{13} + 96 * a^6 * b^6 * c^{13} - 1024 * a^9 * b^2 * c^{14} - 512 * a^8 * b^3 * c^{14} - 256 * \\
& a^7 * b^4 * c^{14} + 256 * a^8 * b^2 * c^{15} + (a^4 * b^{11} * c^9 - 16 * a^5 * b^9 * c^{10} - 2 * a^4 * b
\end{aligned}$$

$$\begin{aligned}
& ^{10}c^{10} + 96a^6b^7c^{11} + 24a^5b^8c^{11} + a^4b^9c^{11} - 256a^7b^5c^{12} - 96a^6b^6c^{12} - 12a^5b^7c^{12} + 256a^8b^3c^{13} + 128a^7b^4c^{13} \\
& + 48a^6b^5c^{13} - 64a^7b^3c^{14})\sqrt{b^2 - 4ac}) * g + 2(a^4b^{13}c^8 - 18a^5b^{11}c^9 - 2a^4b^{12}c^9 + 120a^6b^9c^{10} + 28a^5b^{10}c^{10} \\
& + a^4b^{11}c^{10} - 320a^7b^7c^{11} - 128a^6b^8c^{11} - 14a^5b^9c^{11} + 128a^7b^6c^{12} + 64a^6b^7c^{12} + 1536a^9b^3c^{13} + 512a^8b^4c^{13} \\
& - 64a^7b^5c^{13} - 2048a^{10}b^2c^{14} - 1024a^9b^2c^{14} - 256a^8b^3c^{14} + 512a^9b^2c^{15} + (a^4b^{12}c^8 - 14a^5b^{10}c^9 - 2a^4b^{11}c^9 + 64a^6b^8c^{10} \\
& + 20a^5b^9c^{10} + a^4b^{10}c^{10} - 64a^7b^6c^{11} - 48a^6b^7c^{11} - 10a^5b^8c^{11} - 256a^8b^4c^{12} - 64a^7b^5c^{12} + 24a^6b^6c^{12} + 512a^9b^2c^{13} \\
& + 256a^8b^3c^{13} + 32a^7b^4c^{13} - 128a^8b^2c^{14})\sqrt{b^2 - 4ac}) * i - (a^4b^{16}c^5 - 30a^5b^{14}c^6 - 2a^4b^{15}c^6 + 390a^6b^{12}c^7 \\
& + 52a^5b^{13}c^7 + a^4b^{14}c^7 - 2840a^7b^{10}c^8 - 572a^6b^{11}c^8 - 26a^5b^{12}c^8 + 12480a^8b^8c^9 + 3392a^7b^9c^9 + 286a^6b^{10}c^9 \\
& - 33024a^9b^6c^{10} - 11392a^8b^7c^{10} - 1696a^7b^8c^{10} + 48640a^{10}b^4c^{11} + 20480a^9b^5c^{11} + 5696a^8b^6c^{11} - 30720a^{11}b^2c^{12} \\
& - 15360a^{10}b^3c^{12} - 10240a^9b^4c^{12} + 7680a^{10}b^2c^{13} + (a^4b^{15}c^5 - 26a^5b^{13}c^6 - 2a^4b^{14}c^6 + 286a^6b^{11}c^7 + 44a^5b^{12}c^7 \\
& + a^4b^{13}c^7 - 1696a^7b^9c^8 - 396a^6b^{10}c^8 - 22a^5b^{11}c^8 + 5696a^8b^7c^9 + 1808a^7b^8c^9 + 198a^6b^9c^9 - 10240a^9b^5c^{10} \\
& - 4160a^8b^6c^{10} - 904a^7b^7c^{10} + 7680a^{10}b^3c^{11} + 3840a^9b^4c^{11} + 2080a^8b^5c^{11} - 1920a^9b^3c^{12})\sqrt{b^2 - 4ac}) * k) * \log(x^2 + 1/2(a^4b^9c^5 \\
& - 16a^5b^7c^6 + 96a^6b^5c^7 - 256a^7b^3c^8 + 256a^8b^2c^9 + \sqrt{(a^4b^9c^5 - 16a^5b^7c^6 + 96a^6b^5c^7 - 256a^7b^3c^8 + 256a^8b^2c^9)^2} \\
& - 4(a^5b^8c^5 - 16a^6b^6c^6 + 96a^7b^4c^7 - 256a^8b^2c^8 + 256a^9c^9)(a^4b^8c^6 - 16a^5b^6c^7 + 96a^6b^4c^8 - 256a^7b^2c^9 + 256a^8c^{10}))) / (a^4b^8c^6 \\
& - 16a^5b^6c^7 + 96a^6b^4c^8 - 256a^7b^2c^9 + 256a^8c^{10}) / ((a^6b^2c^2 - 12a^2b^4c^3 - 2ab^5c^3 + 48a^3b^2c^4 + 16a^2b^3c^4 + ab^4c^4 \\
& - 64a^4c^5 - 32a^3b^2c^5 - 8a^2b^2c^5 + 16a^3c^6) * c^2 * \text{abs}(a^4b^8c^5 - 16a^5b^6c^6 + 96a^6b^4c^7 - 256a^7b^2c^8 + 256a^8c^9)) + 1/16 * (12 * (b^3c^5 \\
& - 4ab^2c^6 - 2b^2c^6 + bc^7 - (b^2c^5 - 4a^2c^6 - 2b^2c^6 + c^7) * \sqrt{b^2 - 4ac}) * e * \text{abs}(a^4b^8c^5 - 16a^5b^6c^6 + 96a^6b^4c^7 - 256a^7b^2c^8 \\
& + 256a^8c^9) - 6 * (b^4c^4 - 4ab^2c^5 - 2b^3c^5 + b^2c^6 - (b^3c^4 - 4ab^2c^5 - 2b^2c^5 + bc^6) * \sqrt{b^2 - 4ac})) * g * \text{abs}(a^4b^8c^5 \\
& - 16a^5b^6c^6 + 96a^6b^4c^7 - 256a^7b^2c^8 + 256a^8c^9) + 2 * (b^5c^3 - 2ab^3c^4 - 2b^4c^4 - 8a^2b^2c^5 - 4ab^2c^5 + b^3c^5 + 2ab^2c^6 \\
& - (b^4c^3 - 2ab^2c^4 - 2b^3c^4 - 8a^2c^5 - 4ab^2c^5 + b^2c^5 + 2ac^6) * \sqrt{b^2 - 4ac}) * i * \text{abs}(a^4b^8c^5 - 16a^5b^6c^6 + 96a^6b^4c^7 - 256a^7b^2c^8 \\
& + 256a^8c^9) - (b^8 - 14ab^6c - 2b^7c + 70a^2b^4c^2 + 20ab^5c^2 + b^6c^2 - 120a^3b^2c^3 - 60a^2b^3c^3 - 10ab^4c^3 + 30a^2b^2c^4 - (b^7 - 14ab^5c \\
& - 2b^6c + 70a^2b^3c^2 + 20ab^4c^2 + b^5c^2 - 120a^3b^2c^3 - 60a^2b^2c^3 - 10ab^3c^3 + 30a^2b^2c^4) * \sqrt{b^2 - 4ac}) * k * \text{abs}(a^4b^8c^5 - 16a^5b^6c^6 \\
& + 96a^6b^4c^7 - 256a^7b^2c^8 + 256a^8c^9)
\end{aligned}$$

$$\begin{aligned}
& - 12*(a^4*b^{11}*c^{10} - 20*a^5*b^9*c^{11} - 2*a^4*b^{10}*c^{11} + 160*a^6*b^7*c^{12} \\
& + 32*a^5*b^8*c^{12} + a^4*b^9*c^{12} - 640*a^7*b^5*c^{13} - 192*a^6*b^6*c^{13} - 16 \\
& *a^5*b^7*c^{13} + 1280*a^8*b^3*c^{14} + 512*a^7*b^4*c^{14} + 96*a^6*b^5*c^{14} - 10 \\
& 24*a^9*b*c^{15} - 512*a^8*b^2*c^{15} - 256*a^7*b^3*c^{15} + 256*a^8*b*c^{16} - (a^4 \\
& *b^{10}*c^{10} - 16*a^5*b^8*c^{11} - 2*a^4*b^9*c^{11} + 96*a^6*b^6*c^{12} + 24*a^5*b^ \\
& 7*c^{12} + a^4*b^8*c^{12} - 256*a^7*b^4*c^{13} - 96*a^6*b^5*c^{13} - 12*a^5*b^6*c^1 \\
& 3 + 256*a^8*b^2*c^{14} + 128*a^7*b^3*c^{14} + 48*a^6*b^4*c^{14} - 64*a^7*b^2*c^{15} \\
& )*\text{sqrt}(b^2 - 4*a*c))*e + 6*(a^4*b^{12}*c^9 - 20*a^5*b^{10}*c^{10} - 2*a^4*b^{11}*c^ \\
& 10 + 160*a^6*b^8*c^{11} + 32*a^5*b^9*c^{11} + a^4*b^{10}*c^{11} - 640*a^7*b^6*c^{12} \\
& - 192*a^6*b^7*c^{12} - 16*a^5*b^8*c^{12} + 1280*a^8*b^4*c^{13} + 512*a^7*b^5*c^{13} \\
& + 96*a^6*b^6*c^{13} - 1024*a^9*b^2*c^{14} - 512*a^8*b^3*c^{14} - 256*a^7*b^4*c^1 \\
& 4 + 256*a^8*b^2*c^{15} + (a^4*b^{11}*c^9 - 16*a^5*b^9*c^{10} - 2*a^4*b^{10}*c^{10} + \\
& 96*a^6*b^7*c^{11} + 24*a^5*b^8*c^{11} + a^4*b^9*c^{11} - 256*a^7*b^5*c^{12} - 96*a^ \\
& 6*b^6*c^{12} - 12*a^5*b^7*c^{12} + 256*a^8*b^3*c^{13} + 128*a^7*b^4*c^{13} + 48*a^6 \\
& *b^5*c^{13} - 64*a^7*b^3*c^{14})*\text{sqrt}(b^2 - 4*a*c))*g - 2*(a^4*b^{13}*c^8 - 18*a^ \\
& 5*b^{11}*c^9 - 2*a^4*b^{12}*c^9 + 120*a^6*b^9*c^{10} + 28*a^5*b^{10}*c^{10} + a^4*b^1 \\
& 1*c^{10} - 320*a^7*b^7*c^{11} - 128*a^6*b^8*c^{11} - 14*a^5*b^9*c^{11} + 128*a^7*b^ \\
& 6*c^{12} + 64*a^6*b^7*c^{12} + 1536*a^9*b^3*c^{13} + 512*a^8*b^4*c^{13} - 64*a^7*b^ \\
& 5*c^{13} - 2048*a^{10}*b*c^{14} - 1024*a^9*b^2*c^{14} - 256*a^8*b^3*c^{14} + 512*a^9* \\
& b*c^{15} + (a^4*b^{12}*c^8 - 14*a^5*b^{10}*c^9 - 2*a^4*b^{11}*c^9 + 64*a^6*b^8*c^{10} \\
& + 20*a^5*b^9*c^{10} + a^4*b^{10}*c^{10} - 64*a^7*b^6*c^{11} - 48*a^6*b^7*c^{11} - 10 \\
& *a^5*b^8*c^{11} - 256*a^8*b^4*c^{12} - 64*a^7*b^5*c^{12} + 24*a^6*b^6*c^{12} + 512* \\
& a^9*b^2*c^{13} + 256*a^8*b^3*c^{13} + 32*a^7*b^4*c^{13} - 128*a^8*b^2*c^{14})*\text{sqrt}( \\
& b^2 - 4*a*c))*i + (a^4*b^{16}*c^5 - 30*a^5*b^{14}*c^6 - 2*a^4*b^{15}*c^6 + 390*a^ \\
& 6*b^{12}*c^7 + 52*a^5*b^{13}*c^7 + a^4*b^{14}*c^7 - 2840*a^7*b^{10}*c^8 - 572*a^6*b \\
& ^{11}*c^8 - 26*a^5*b^{12}*c^8 + 12480*a^8*b^8*c^9 + 3392*a^7*b^9*c^9 + 286*a^6* \\
& b^{10}*c^9 - 33024*a^9*b^6*c^{10} - 11392*a^8*b^7*c^{10} - 1696*a^7*b^8*c^{10} + 48 \\
& 640*a^{10}*b^4*c^{11} + 20480*a^9*b^5*c^{11} + 5696*a^8*b^6*c^{11} - 30720*a^{11}*b^2 \\
& *c^{12} - 15360*a^{10}*b^3*c^{12} - 10240*a^9*b^4*c^{12} + 7680*a^{10}*b^2*c^{13} - (a^ \\
& 4*b^{15}*c^5 - 26*a^5*b^{13}*c^6 - 2*a^4*b^{14}*c^6 + 286*a^6*b^{11}*c^7 + 44*a^5*b \\
& ^{12}*c^7 + a^4*b^{13}*c^7 - 1696*a^7*b^9*c^8 - 396*a^6*b^{10}*c^8 - 22*a^5*b^{11}* \\
& c^8 + 5696*a^8*b^7*c^9 + 1808*a^7*b^8*c^9 + 198*a^6*b^9*c^9 - 10240*a^9*b^5 \\
& *c^{10} - 4160*a^8*b^6*c^{10} - 904*a^7*b^7*c^{10} + 7680*a^{10}*b^3*c^{11} + 3840*a^ \\
& 9*b^4*c^{11} + 2080*a^8*b^5*c^{11} - 1920*a^9*b^3*c^{12})*\text{sqrt}(b^2 - 4*a*c))*k)*l \\
& \text{og}(x^2 + 1/2*(a^4*b^9*c^5 - 16*a^5*b^7*c^6 + 96*a^6*b^5*c^7 - 256*a^7*b^3*c \\
& ^8 + 256*a^8*b*c^9 - \text{sqrt}((a^4*b^9*c^5 - 16*a^5*b^7*c^6 + 96*a^6*b^5*c^7 - \\
& 256*a^7*b^3*c^8 + 256*a^8*b*c^9)^2 - 4*(a^5*b^8*c^5 - 16*a^6*b^6*c^6 + 96*a \\
& ^7*b^4*c^7 - 256*a^8*b^2*c^8 + 256*a^9*c^9)*(a^4*b^8*c^6 - 16*a^5*b^6*c^7 + \\
& 96*a^6*b^4*c^8 - 256*a^7*b^2*c^9 + 256*a^8*c^{10}))/((a^4*b^8*c^6 - 16*a^5*b \\
& ^6*c^7 + 96*a^6*b^4*c^8 - 256*a^7*b^2*c^9 + 256*a^8*c^{10}))/((a*b^6*c^2 - 12 \\
& *a^2*b^4*c^3 - 2*a*b^5*c^3 + 48*a^3*b^2*c^4 + 16*a^2*b^3*c^4 + a*b^4*c^4 - \\
& 64*a^4*c^5 - 32*a^3*b*c^5 - 8*a^2*b^2*c^5 + 16*a^3*c^6)*c^2*\text{abs}(a^4*b^8*c^5 \\
& - 16*a^5*b^6*c^6 + 96*a^6*b^4*c^7 - 256*a^7*b^2*c^8 + 256*a^8*c^9)) - 1/8* \\
& (2*a^2*b^3*c^3*e - 20*a^3*b*c^4*e + 2*a^3*b^2*c^3*g + 16*a^4*c^4*g - 12*a^4 \\
& *b*c^3*i - 6*a^4*b^4*k + 42*a^5*b^2*c*k - 48*a^6*c^2*k - (3*b^3*c^5*d - 24*
\end{aligned}$$

```

a*b*c^6*d + a*b^2*c^5*f + 20*a^2*c^6*f - 12*a^2*b*c^5*h + a^2*b^3*c^3*j - 1
6*a^3*b*c^4*j)*x^7 - 4*(6*a^2*c^6*e - 3*a^2*b*c^5*g + a^2*b^2*c^4*i + 2*a^3
*c^5*i + 2*a^2*b^5*c*k - 15*a^3*b^3*c^2*k + 25*a^4*b*c^3*k)*x^6 - (6*b^4*c^
4*d - 49*a*b^2*c^5*d + 28*a^2*c^6*d + 2*a*b^3*c^4*f + 28*a^2*b*c^5*f - 19*a
^2*b^2*c^4*h + 4*a^3*c^5*h - a^2*b^4*c^2*j - 5*a^3*b^2*c^3*j - 36*a^4*c^4*j
)*x^5 - 2*(18*a^2*b*c^5*e - 9*a^2*b^2*c^4*g + 3*a^2*b^3*c^3*i + 6*a^3*b*c^4
*i + 3*a^2*b^6*k - 19*a^3*b^4*c*k + 11*a^4*b^2*c^2*k + 32*a^5*c^3*k)*x^4 -
(3*b^5*c^3*d - 20*a*b^3*c^4*d - 4*a^2*b*c^5*d + a*b^4*c^3*f + 5*a^2*b^2*c^4
*f + 36*a^3*c^5*f - 5*a^2*b^3*c^3*h - 16*a^3*b*c^4*h - 2*a^3*b^3*c^2*j - 28
*a^4*b*c^3*j)*x^3 - 4*(2*a^2*b^2*c^4*e + 10*a^3*c^5*e - a^2*b^3*c^3*g - 5*a
^3*b*c^4*g + 5*a^3*b^2*c^3*i - 2*a^4*c^4*i + 3*a^3*b^5*k - 22*a^4*b^3*c*k +
31*a^5*b*c^2*k)*x^2 - (5*a*b^4*c^3*d - 37*a^2*b^2*c^4*d + 44*a^3*c^5*d - a
^2*b^3*c^3*f + 16*a^3*b*c^4*f - 3*a^3*b^2*c^3*h - 12*a^4*c^4*h - a^4*b^2*c^
2*j - 20*a^5*c^3*j)*x)/((c*x^4 + b*x^2 + a)^2*(b^2 - 4*a*c)^2*a^2*c^3)

```

### Mupad [B] (verification not implemented)

Time = 27.14 (sec) , antiderivative size = 97905, normalized size of antiderivative = 83.18

$$\int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5 + jx^8 + kx^{11}}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

```
[In] int((d + e*x + f*x^2 + g*x^3 + h*x^4 + i*x^5 + j*x^8 + k*x^11)/(a + b*x^2 +
c*x^4)^3,x)
```

```
[Out] ((x^7*(3*b^3*c^2*d + 20*a^2*c^3*f + a^2*b^3*j - 24*a*b*c^3*d - 16*a^3*b*c*j
+ a*b^2*c^2*f - 12*a^2*b*c^2*h))/(8*a^2*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) -
(b^3*c^3*e + 8*a^2*c^4*g - 3*a^2*b^4*k - 24*a^4*c^2*k - 10*a*b*c^4*e + a*b^
2*c^3*g - 6*a^2*b*c^3*i + 21*a^3*b^2*c*k)/(4*c^3*(b^4 + 16*a^2*c^2 - 8*a*b^
2*c)) + (x^4*(3*b^6*k - 9*b^2*c^4*g + 3*b^3*c^3*i + 32*a^3*c^3*k + 18*b*c^5
*e + 11*a^2*b^2*c^2*k + 6*a*b*c^4*i - 19*a*b^4*c*k))/(4*c^3*(b^4 + 16*a^2*c
^2 - 8*a*b^2*c)) + (x^2*(2*b^2*c^4*e - b^3*c^3*g - 2*a^2*c^4*i + 10*a*c^5*e
+ 3*a*b^5*k - 5*a*b*c^4*g + 5*a*b^2*c^3*i - 22*a^2*b^3*c*k + 31*a^3*b*c^2*
k))/(2*c^3*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) + (x^6*(6*c^5*e + 2*b^5*k + b^2*
c^3*i - 3*b*c^4*g + 2*a*c^4*i - 15*a*b^3*c*k + 25*a^2*b*c^2*k))/(2*c^2*(b^4
+ 16*a^2*c^2 - 8*a*b^2*c)) - (x^3*(2*a^3*b^3*j - 36*a^3*c^3*f - 3*b^5*c*d
- 5*a^2*b^2*c^2*f - a*b^4*c*f + 28*a^4*b*c*j + 20*a*b^3*c^2*d + 4*a^2*b*c^3
*d + 5*a^2*b^3*c*h + 16*a^3*b*c^2*h))/(8*a^2*c*(b^4 + 16*a^2*c^2 - 8*a*b^2*
c)) + (x^5*(28*a^2*c^4*d + 6*b^4*c^2*d + 4*a^3*c^3*h - a^2*b^4*j - 36*a^4*c
^2*j - 19*a^2*b^2*c^2*h - 49*a*b^2*c^3*d + 2*a*b^3*c^2*f + 28*a^2*b*c^3*f -
5*a^3*b^2*c*j))/(8*a^2*c*(b^4 + 16*a^2*c^2 - 8*a*b^2*c)) - (x*(12*a^3*c^2*
h - 44*a^2*c^3*d + a^3*b^2*j - 5*b^4*c*d + 20*a^4*c*j + a*b^3*c*f + 37*a*b^
2*c^2*d - 16*a^2*b*c^2*f + 3*a^2*b^2*c*h))/(8*a*c*(b^4 + 16*a^2*c^2 - 8*a*b
^2*c)))/(x^4*(2*a*c + b^2) + a^2 + c^2*x^8 + 2*a*b*x^2 + 2*b*c*x^6) + symsu
m(log((10368*a*b^5*c^10*d^3 - 8000*a^5*c^11*f^3 - 567*b^7*c^9*d^3 + 169344*

```



$$\begin{aligned}
& a^3 b^3 c^{12} d^3 + 193536 a^4 c^{12} d^2 e^2 - 141120 a^4 c^{12} d^2 f + 1728 a^6 b^3 c^9 h^3 + 315 b^8 c^8 d^2 f + 6400 a^9 b^3 c^6 j^3 + 27648 a^5 c^{11} e^2 h + 21504 a^6 c^{10} d^2 i^2 - 135 b^9 c^7 d^2 h + 192 a^2 b^{14} d^2 k^2 - 2880 a^6 c^{10} f^2 h^2 + 46080 a^6 c^{10} e^2 j - 1376256 a^9 c^7 d^2 k^2 + 9 b^{11} c^5 d^2 j + 64 a^3 b^{13} f^2 k^2 - 8000 a^8 c^8 f^2 j^2 + 3072 a^7 c^9 h^2 i^2 + 192 a^4 b^{12} h^2 k^2 + 5120 a^8 c^8 i^2 j - 196608 a^{10} c^6 h^2 k^2 + 2240 a^6 b^{10} j^2 k^2 - 327680 a^{11} c^5 j^2 k^2 - 67824 a^2 b^3 c^{11} d^3 + 35 a^2 b^6 c^8 f^3 + 84 a^3 b^4 c^9 f^3 - 12720 a^4 b^2 c^{10} f^3 + 540 a^4 b^5 c^7 h^3 + 4320 a^5 b^3 c^8 h^3 + 35 a^6 b^7 c^3 j^3 - 1176 a^7 b^5 c^4 j^3 + 9456 a^8 b^3 c^5 j^3 + 129024 a^5 c^{11} d^2 e^2 i - 40320 a^5 c^{11} d^2 f^2 h - 67200 a^6 c^{10} d^2 f^2 j + 18432 a^6 c^{10} e^2 h^2 i + 245760 a^7 c^9 e^2 f^2 k + 30720 a^7 c^9 e^2 i^2 j - 9600 a^7 c^9 f^2 h^2 j + 81920 a^8 c^8 f^2 i^2 k - 6237 a^2 b^6 c^9 d^2 f + 210 a^2 b^7 c^8 d^2 f^2 + 116160 a^4 b^3 c^{11} d^2 f^2 - 36864 a^4 b^3 c^{11} e^2 f + 2430 a^2 b^7 c^8 d^2 h + 133056 a^4 b^3 c^{11} d^2 h + 27648 a^5 b^3 c^{10} d^2 h^2 - 324 a^2 b^9 c^6 d^2 j + 193536 a^5 b^3 c^{10} d^2 j + 26880 a^5 b^3 c^{10} f^2 h + 63360 a^7 b^3 c^8 d^2 j^2 - 5568 a^3 b^{12} c^2 d^2 k^2 - 4096 a^6 b^3 c^9 f^2 i^2 + 40000 a^6 b^3 c^9 f^2 j - 2304 a^4 b^{11} c^2 f^2 k^2 - 352256 a^9 b^3 c^6 f^2 k^2 + 8064 a^7 b^3 c^8 h^2 j + 12480 a^8 b^3 c^7 h^2 j^2 - 2112 a^5 b^{10} c^2 h^2 k^2 - 41664 a^7 b^8 c^2 j^2 k^2 + 6912 a^2 b^4 c^{10} d^2 e^2 - 62208 a^3 b^2 c^{11} d^2 e^2 + 42372 a^2 b^4 c^{10} d^2 f - 1764 a^2 b^5 c^9 d^2 f^2 - 96048 a^3 b^2 c^{11} d^2 f^2 - 4608 a^3 b^3 c^{10} d^2 f^2 + 1728 a^2 b^6 c^8 d^2 g^2 + 2304 a^3 b^3 c^{10} e^2 f - 15552 a^3 b^4 c^9 d^2 g^2 + 48384 a^4 b^2 c^{10} d^2 g^2 - 13716 a^2 b^5 c^9 d^2 h + 405 a^2 b^7 c^7 d^2 h^2 + 12096 a^3 b^3 c^{10} d^2 h - 5400 a^3 b^5 c^8 d^2 h^2 + 28944 a^4 b^3 c^9 d^2 h^2 + 192 a^2 b^8 c^6 d^2 i^2 + 576 a^3 b^5 c^8 f^2 g^2 - 960 a^3 b^6 c^7 d^2 i^2 + 6912 a^4 b^2 c^{10} e^2 h - 9216 a^4 b^3 c^9 f^2 g^2 - 768 a^4 b^4 c^8 d^2 i^2 + 14592 a^5 b^2 c^9 d^2 i^2 + 3717 a^2 b^7 c^7 d^2 j - 15 a^2 b^7 c^7 f^2 h + 3 a^2 b^{11} c^3 d^2 j^2 - 15192 a^3 b^5 c^8 d^2 j - 360 a^3 b^5 c^8 f^2 h + 135 a^3 b^6 c^7 f^2 h^2 - 132 a^3 b^9 c^4 d^2 j^2 - 7920 a^4 b^3 c^9 d^2 j + 15696 a^4 b^3 c^9 f^2 h - 5580 a^4 b^4 c^8 f^2 h^2 + 2079 a^4 b^7 c^5 d^2 j^2 - 20592 a^5 b^2 c^9 f^2 h^2 - 14448 a^5 b^5 c^6 d^2 j^2 + 37104 a^6 b^3 c^7 d^2 j^2 + 64 a^3 b^7 c^6 f^2 i^2 + 1728 a^4 b^4 c^8 g^2 h - 768 a^4 b^5 c^7 f^2 i^2 + 70656 a^4 b^{10} c^2 d^2 k^2 + 2304 a^5 b^2 c^9 e^2 j + 6912 a^5 b^2 c^9 g^2 h - 3840 a^5 b^3 c^8 f^2 i^2 - 499008 a^5 b^8 c^3 d^2 k^2 + 2071104 a^6 b^6 c^4 d^2 k^2 - 4853952 a^7 b^4 c^5 d^2 k^2 + 5399808 a^8 b^2 c^6 d^2 k^2 + a^2 b^9 c^5 f^2 j + 20 a^3 b^7 c^6 f^2 j + a^3 b^{10} c^3 f^2 j^2 - 1596 a^4 b^5 c^7 f^2 j - 51 a^4 b^8 c^4 f^2 j^2 + 16736 a^5 b^3 c^8 f^2 j + 875 a^5 b^6 c^5 f^2 j^2 - 2716 a^6 b^4 c^6 f^2 j^2 - 39600 a^7 b^2 c^7 f^2 j^2 + 192 a^4 b^6 c^6 h^2 i^2 + 1536 a^5 b^4 c^7 h^2 i^2 + 576 a^5 b^4 c^7 g^2 j + 28480 a^5 b^9 c^2 f^2 k^2 + 3840 a^6 b^2 c^8 h^2 i^2 + 11520 a^6 b^2 c^8 g^2 j - 164096 a^6 b^7 c^3 f^2 k^2 + 436800 a^7 b^5 c^4 f^2 k^2 - 338944 a^8 b^3 c^5 f^2 k^2 - 81 a^4 b^7 c^5 h^2 j + 3 a^4 b^9 c^3 h^2 j^2 + 720 a^5 b^5 c^6 h^2 j - 78 a^5 b^7 c^4 h^2 j^2 + 17136 a^6 b^3 c^7 h^2 j - 900 a^6 b^5 c^5 h^2 j^2 + 22272 a^7 b^3 c^6 h^2 j^2 + 64 a^5 b^6 c^5 i^2 j + 1536 a^6 b^4 c^6 i^2 j - 960 a^6 b^8 c^2 h^2 k^2 + 5376 a^7 b^2 c^7 i^2 j + 108672 a^7 b^6 c^3 h^2 k^2 - 548160 a^8 b^4 c^4 h^2 k^2 + 922368 a^9 b^2 c^5 h^2 k^2 + 305024 a^8 b^6 c^2 j^2 k^2 - 1042880 a^9 b^4 c^3
\end{aligned}$$

$$\begin{aligned}
& *j*k^2 + 1479936*a^{10}*b^2*c^4*j*k^2 - 193536*a^4*b*c^{11}*d*e*g - 90*a*b^8*c^7*d*f*h + 6*a*b^{10}*c^5*d*f*j - 64512*a^5*b*c^{10}*d*g*i - 24576*a^5*b*c^{10}*e*f*i - 27648*a^5*b*c^{10}*e*g*h - 1778688*a^6*b*c^9*d*e*k + 84096*a^6*b*c^9*d*h*j - 46080*a^6*b*c^9*e*g*j - 9216*a^6*b*c^9*g*h*i - 592896*a^7*b*c^8*d*i*k - 359424*a^7*b*c^8*e*h*k - 122880*a^7*b*c^8*f*g*k - 15360*a^7*b*c^8*g*i*j - 549888*a^8*b*c^7*e*j*k - 119808*a^8*b*c^7*h*i*k - 183296*a^9*b*c^6*i*j*k - 6912*a^2*b^5*c^9*d*e*g + 62208*a^3*b^3*c^{10}*d*e*g + 2304*a^2*b^6*c^8*d*e*i - 270*a^2*b^6*c^8*d*f*h - 16128*a^3*b^4*c^9*d*e*i + 16056*a^3*b^4*c^9*d*f*h - 2304*a^3*b^4*c^9*e*f*g + 23040*a^4*b^2*c^{10}*d*e*i - 127008*a^4*b^2*c^{10}*d*f*h + 36864*a^4*b^2*c^{10}*e*f*g - 1152*a^2*b^7*c^7*d*g*i - 48*a^2*b^8*c^6*d*f*j - 2304*a^2*b^9*c^5*d*e*k + 8064*a^3*b^5*c^8*d*g*i + 768*a^3*b^5*c^8*e*f*i - 2226*a^3*b^6*c^7*d*f*j + 43776*a^3*b^7*c^6*d*e*k - 11520*a^4*b^3*c^9*d*g*i - 10752*a^4*b^3*c^9*e*f*i - 6912*a^4*b^3*c^9*e*g*h + 33384*a^4*b^4*c^8*d*f*j - 340992*a^4*b^5*c^7*d*e*k - 162528*a^5*b^2*c^9*d*f*j + 1241856*a^5*b^3*c^8*d*e*k - 72*a^2*b^9*c^5*d*h*j + 1152*a^2*b^{10}*c^4*d*g*k - 384*a^3*b^6*c^7*f*g*i + 2016*a^3*b^7*c^6*d*h*j - 21888*a^3*b^8*c^5*d*g*k - 768*a^3*b^8*c^5*e*f*k + 2304*a^4*b^4*c^8*e*h*i + 5376*a^4*b^4*c^8*f*g*i - 18648*a^4*b^5*c^7*d*h*j + 170496*a^4*b^6*c^6*d*g*k + 19968*a^4*b^6*c^6*e*f*k + 13824*a^5*b^2*c^9*e*h*i + 12288*a^5*b^2*c^9*f*g*i + 67392*a^5*b^3*c^8*d*h*j - 2304*a^5*b^3*c^8*e*g*j - 620928*a^5*b^4*c^7*d*g*k - 119040*a^5*b^4*c^7*e*f*k + 889344*a^6*b^2*c^8*d*g*k + 172032*a^6*b^2*c^8*e*f*k - 384*a^2*b^{11}*c^3*d*i*k - 24*a^3*b^8*c^5*f*h*j + 6528*a^3*b^9*c^4*d*i*k + 384*a^3*b^9*c^4*f*g*k - 1152*a^4*b^5*c^7*g*h*i + 1050*a^4*b^6*c^6*f*h*j - 42240*a^4*b^7*c^5*d*i*k - 2304*a^4*b^7*c^5*e*h*k - 9984*a^4*b^7*c^5*f*g*k - 6912*a^5*b^3*c^8*g*h*i + 768*a^5*b^4*c^7*e*i*j - 9576*a^5*b^4*c^7*f*h*j + 93312*a^5*b^5*c^6*d*i*k + 2304*a^5*b^5*c^6*e*h*k + 59520*a^5*b^5*c^6*f*g*k + 16896*a^6*b^2*c^8*e*i*j - 57504*a^6*b^2*c^8*f*h*j + 117504*a^6*b^3*c^7*d*i*k + 103680*a^6*b^3*c^7*e*h*k - 86016*a^6*b^3*c^7*f*g*k - 128*a^3*b^{10}*c^3*f*i*k + 3072*a^4*b^8*c^4*f*i*k + 1152*a^4*b^8*c^4*g*h*k - 384*a^5*b^5*c^6*g*i*j - 13184*a^5*b^6*c^5*f*i*k - 1152*a^5*b^6*c^5*g*h*k - 8448*a^6*b^3*c^7*g*i*j - 11008*a^6*b^4*c^6*f*i*k - 51840*a^6*b^4*c^6*g*h*k - 26880*a^6*b^5*c^5*e*j*k + 98304*a^7*b^2*c^7*f*i*k + 179712*a^7*b^2*c^7*g*h*k + 231168*a^7*b^3*c^6*e*j*k - 384*a^4*b^9*c^3*h*i*k - 384*a^5*b^7*c^4*h*i*k + 18048*a^6*b^5*c^5*h*i*k + 13440*a^6*b^6*c^4*g*j*k - 25344*a^7*b^3*c^6*h*i*k - 115584*a^7*b^4*c^5*g*j*k + 274944*a^8*b^2*c^6*g*j*k - 4480*a^6*b^7*c^3*i*j*k + 29568*a^7*b^5*c^4*i*j*k - 14592*a^8*b^3*c^5*i*j*k)/(512*(4096*a^{10}*c^{10} + a^4*b^{12}*c^4 - 24*a^5*b^{10}*c^5 + 240*a^6*b^8*c^6 - 1280*a^7*b^6*c^7 + 3840*a^8*b^4*c^8 - 6144*a^9*b^2*c^9)) + \text{root}(56371445760*a^{11}*b^8*c^{12}*z^4 - 503316480*a^8*b^{14}*c^9*z^4 + 47185920*a^7*b^{16}*c^8*z^4 - 2621440*a^6*b^{18}*c^7*z^4 + 65536*a^5*b^{20}*c^6*z^4 - 171798691840*a^{14}*b^2*c^{15}*z^4 + 193273528320*a^{13}*b^4*c^{14}*z^4 - 128849018880*a^{12}*b^6*c^{13}*z^4 - 16911433728*a^{10}*b^{10}*c^{11}*z^4 + 3523215360*a^9*b^{12}*c^{10}*z^4 + 68719476736*a^{15}*c^{16}*z^4 - 47185920*a^7*b^{16}*c^5*k*z^3 + 2621440*a^6*b^{18}*c^4*k*z^3 - 65536*a^5*b^{20}*c^3*k*z^3 + 171798691840*a^{14}*b^2*c^{12}*k*z^3 - 193273528320*a^{13}*b^4*c^{11}*k*z^3 + 128849018880*a^{12}*b^6*c^{10}*k*z^3 + 16911433728*a^{10}*b^{10}*c^8*k*z^3 - 3523215360*a^9*b^{12}*c^7*k*z^3
\end{aligned}$$

$$\begin{aligned}
&^3 - 56371445760a^{11}b^8c^9kz^3 + 503316480a^8b^{14}c^6kz^3 - 687194 \\
&76736a^{15}c^{13}kz^3 + 1536a^8b^{18}c^6dfz^2 - 2571632640a^9b^5c^{11}d \\
&*jz^2 + 2548039680a^9b^3c^{13}d*hz^2 + 2453667840a^9b^7c^9ekz^2 + \\
&2181038080a^{12}b^3c^{10}ikz^2 - 6492782592a^{10}b^5c^{10}ekz^2 + 1509 \\
&949440a^9b^3c^{13}egz^2 - 1401421824a^8b^5c^{12}d*hz^2 - 1226833920* \\
&a^9b^8c^8gkz^2 - 1321205760a^9b^2c^{14}dfz^2 - 2793406464a^{11}b*c \\
&^{13}d*jz^2 + 9563013120a^{11}b^3c^{11}ekz^2 + 890634240a^8b^7c^{10}d*j \\
&*z^2 - 754974720a^8b^5c^{12}egz^2 - 570425344a^{11}b^5c^9ikz^2 + 73 \\
&2168192a^7b^6c^{12}dfz^2 - 581959680a^{10}b^4c^{11}f*jz^2 - 603979776* \\
&a^{10}b^2c^{13}eiz^2 + 534773760a^{11}b^3c^{11}h*jz^2 - 558366720a^8b^9 \\
&*c^8ekz^2 - 4781506560a^{11}b^4c^{10}gkz^2 - 2013265920a^{13}b*c^{11}i* \\
&kz^2 - 456130560a^9b^4c^{12}f*hz^2 + 384040960a^9b^6c^{10}f*jz^2 - 2 \\
&64241152a^{10}b^7c^8ikz^2 + 390463488a^7b^7c^{11}d*hz^2 + 279183360* \\
&a^8b^{10}c^7gkz^2 + 301989888a^{10}b^3c^{12}g*iz^2 + 222822400a^9b^9* \\
&c^7*ikz^2 - 366280704a^6b^8c^{11}dfz^2 - 330301440a^8b^4c^{13}dfz \\
&^2 + 254017536a^8b^6c^{11}f*hz^2 - 1887436800a^{10}b*c^{14}d*hz^2 + 1887 \\
&43680a^{10}b^2c^{13}f*hz^2 - 185303040a^7b^9c^9d*jz^2 - 117964800a^1 \\
&0b^5c^{10}h*jz^2 - 6039797760a^{12}b*c^{12}ekz^2 - 67502080a^8b^{11}c^6 \\
&*ikz^2 + 121634816a^{11}b^2c^{12}f*jz^2 + 188743680a^7b^7c^{11}egz^2 \\
&- 115671040a^8b^8c^9f*jz^2 + 125829120a^8b^6c^{11}eiz^2 + 1081344 \\
&0a^7b^{13}c^5*ikz^2 + 76677120a^7b^{11}c^7ekz^2 - 38338560a^7b^{12}c \\
&^6gkz^2 - 37355520a^9b^7c^9h*jz^2 - 917504a^6b^{15}c^4*ikz^2 + \\
&32768a^5b^{17}c^3*ikz^2 - 62914560a^8b^7c^{10}g*iz^2 + 23101440a^8b \\
&^9c^8h*jz^2 - 4349952a^7b^{11}c^7h*jz^2 + 2949120a^6b^{14}c^5gkz^ \\
&2 + 337920a^6b^{13}c^6h*jz^2 - 98304a^5b^{16}c^4gkz^2 - 7680a^5b^1 \\
&5c^5h*jz^2 - 61931520a^7b^8c^{10}f*hz^2 + 23592960a^7b^9c^9g*iz^ \\
&2 + 17940480a^7b^{10}c^8f*jz^2 - 47185920a^7b^8c^{10}eiz^2 - 5898240 \\
&a^6b^{13}c^6ekz^2 - 3538944a^6b^{11}c^8g*iz^2 - 1347584a^6b^{12}c^7 \\
&*f*jz^2 + 196608a^5b^{15}c^5ekz^2 + 196608a^5b^{13}c^7g*iz^2 + 3584 \\
&0a^5b^{14}c^6f*jz^2 + 96583680a^5b^{10}c^{10}dfz^2 + 23371776a^6b^{11} \\
&*c^8d*jz^2 - 51609600a^6b^9c^{10}d*hz^2 + 7077888a^6b^{10}c^9eiz^2 \\
&+ 6144000a^6b^{10}c^9f*hz^2 - 1677312a^5b^{13}c^7d*jz^2 - 393216a^5 \\
&b^{12}c^8eiz^2 + 61440a^5b^{12}c^8f*hz^2 + 53760a^4b^{15}c^6d*jz^2 \\
&- 46080a^4b^{14}c^7f*hz^2 + 1536a^3b^{16}c^6f*hz^2 - 23592960a^6b^ \\
&9c^{10}egz^2 + 1179648a^5b^{11}c^9egz^2 + 829440a^4b^{13}c^8d*hz^2 \\
&+ 368640a^5b^{11}c^9d*hz^2 - 105984a^3b^{15}c^7d*hz^2 + 4608a^2b^1 \\
&7c^6d*hz^2 - 15175680a^4b^{12}c^9dfz^2 + 1428480a^3b^{14}c^8dfz^ \\
&2 - 73728a^2b^{16}c^7dfz^2 + 4108320768a^{10}b^3c^{12}d*jz^2 - 1207959 \\
&552a^{10}b*c^{14}egz^2 - 578813952a^{12}b*c^{12}h*jz^2 + 3246391296a^{10}b \\
&^6c^9gkz^2 - 402653184a^{11}b*c^{13}g*iz^2 + 3019898880a^{12}b^2c^{11}g \\
&*kz^2 - 440401920a^{10}b*c^{14}f^2z^2 - 188743680a^{11}b*c^{13}h^2z^2 + 17 \\
&61607680a^{10}c^{15}dfz^2 - 655360a^6b^{18}c^k^2z^2 - 94464a^8b^{17}c^7d \\
&^2z^2 + 6936330240a^8b^3c^{14}d^2z^2 + 2464874496a^6b^7c^{12}d^2z^2 \\
&- 3963617280a^9b*c^{15}d^2z^2 + 58007224320a^{13}b^4c^8k^2z^2 + 149684 \\
&22400a^{11}b^8c^6k^2z^2 + 805306368a^{11}c^{14}eiz^2 - 35966156800a^{12}
\end{aligned}$$

$$\begin{aligned}
& *b^6*c^7*k^2*z^2 + 419430400*a^12*c^13*f*j*z^2 - 1509949440*a^9*b^2*c^14*e^2*z^2 + 251658240*a^11*c^14*f*h*z^2 - 56874762240*a^14*b^2*c^9*k^2*z^2 - 5400428544*a^7*b^5*c^13*d^2*z^2 + 890470400*a^9*b^12*c^4*k^2*z^2 + 754974720*a^8*b^4*c^13*e^2*z^2 - 730054656*a^5*b^9*c^11*d^2*z^2 + 477102080*a^12*b^3*c^10*j^2*z^2 + 477102080*a^9*b^3*c^13*f^2*z^2 - 377487360*a^9*b^4*c^12*g^2*z^2 + 301989888*a^10*b^2*c^13*g^2*z^2 - 174325760*a^11*b^5*c^9*j^2*z^2 - 126156800*a^8*b^14*c^3*k^2*z^2 + 188743680*a^8*b^6*c^11*g^2*z^2 + 141557760*a^10*b^3*c^12*h^2*z^2 - 174325760*a^8*b^5*c^12*f^2*z^2 - 188743680*a^7*b^6*c^12*e^2*z^2 - 4350935040*a^10*b^10*c^5*k^2*z^2 + 146165760*a^4*b^11*c^10*d^2*z^2 - 50331648*a^10*b^4*c^11*i^2*z^2 + 11796480*a^7*b^16*c^2*k^2*z^2 - 33554432*a^11*b^2*c^12*i^2*z^2 + 11206656*a^10*b^7*c^8*j^2*z^2 + 8929280*a^9*b^9*c^7*j^2*z^2 + 20971520*a^9*b^6*c^10*i^2*z^2 - 2600960*a^8*b^11*c^6*j^2*z^2 + 291840*a^7*b^13*c^5*j^2*z^2 - 14080*a^6*b^15*c^4*j^2*z^2 + 256*a^5*b^17*c^3*j^2*z^2 - 47185920*a^7*b^8*c^10*g^2*z^2 - 26542080*a^8*b^7*c^10*h^2*z^2 - 2752512*a^7*b^10*c^8*i^2*z^2 + 2621440*a^8*b^8*c^9*i^2*z^2 + 524288*a^6*b^12*c^7*i^2*z^2 - 32768*a^5*b^14*c^6*i^2*z^2 + 9584640*a^7*b^9*c^9*h^2*z^2 - 2359296*a^9*b^5*c^11*h^2*z^2 - 1290240*a^6*b^11*c^8*h^2*z^2 + 46080*a^5*b^13*c^7*h^2*z^2 + 2304*a^4*b^15*c^6*h^2*z^2 + 5898240*a^6*b^10*c^9*g^2*z^2 - 294912*a^5*b^12*c^8*g^2*z^2 + 11206656*a^7*b^7*c^11*f^2*z^2 + 8929280*a^6*b^9*c^10*f^2*z^2 + 23592960*a^6*b^8*c^11*e^2*z^2 - 2600960*a^5*b^11*c^9*f^2*z^2 + 291840*a^4*b^13*c^8*f^2*z^2 - 14080*a^3*b^15*c^7*f^2*z^2 + 256*a^2*b^17*c^6*f^2*z^2 - 19860480*a^3*b^13*c^9*d^2*z^2 - 1179648*a^5*b^10*c^10*e^2*z^2 + 1771776*a^2*b^15*c^8*d^2*z^2 - 440401920*a^13*b*c^11*j^2*z^2 + 1207959552*a^10*c^15*e^2*z^2 + 134217728*a^12*c^13*i^2*z^2 + 25769803776*a^15*c^10*k^2*z^2 + 16384*a^5*b^20*k^2*z^2 + 2304*b^19*c^6*d^2*z^2 + 165150720*a^9*b*c^12*d*g*j*z + 23592960*a^10*b*c^11*g*h*j*z + 169869312*a^7*b*c^14*d*e*f*z + 99090432*a^8*b*c^13*d*g*h*z - 3145728*a^9*b*c^12*f*h*i*z + 56623104*a^8*b*c^13*d*f*i*z - 1536*a*b^18*c^3*d*f*k*z - 9437184*a^8*b*c^13*e*f*h*z + 1536*a*b^15*c^6*d*f*i*z - 4608*a*b^14*c^7*d*f*g*z + 9216*a*b^13*c^8*d*e*f*z + 2173501440*a^9*b^5*c^8*d*j*k*z - 1987706880*a^9*b^3*c^10*d*h*k*z + 1121255424*a^8*b^5*c^9*d*h*k*z + 861143040*a^8*b^4*c^10*d*f*k*z - 859963392*a^7*b^6*c^9*d*f*k*z - 780779520*a^8*b^7*c^7*d*j*k*z - 754974720*a^9*b^3*c^10*e*g*k*z + 2222456832*a^11*b*c^10*d*j*k*z - 454164480*a^11*b^3*c^8*h*j*k*z + 377487360*a^8*b^5*c^9*e*g*k*z + 290979840*a^10*b^4*c^8*f*j*k*z + 381026304*a^6*b^8*c^8*d*f*k*z + 412876800*a^8*b^2*c^12*d*e*j*z + 301989888*a^10*b^2*c^10*e*i*k*z - 320421888*a^7*b^7*c^8*d*h*k*z + 185794560*a^10*b^5*c^7*h*j*k*z - 192020480*a^9*b^6*c^7*f*j*k*z + 190709760*a^9*b^4*c^9*f*h*k*z - 150994944*a^10*b^3*c^9*g*i*k*z + 168990720*a^7*b^9*c^6*d*j*k*z + 235929600*a^9*b^2*c^11*d*f*k*z - 206438400*a^8*b^3*c^11*d*g*j*z - 206438400*a^7*b^4*c^11*d*e*j*z - 101646336*a^8*b^6*c^8*f*h*k*z - 29245440*a^9*b^7*c^6*h*j*k*z - 60817408*a^11*b^2*c^9*f*j*k*z + 57835520*a^8*b^8*c^6*f*j*k*z + 219414528*a^7*b^2*c^13*d*e*h*z - 70778880*a^10*b^2*c^10*f*h*k*z + 677376*a^7*b^11*c^4*h*j*k*z - 645120*a^8*b^9*c^5*h*j*k*z - 53760*a^6*b^13*c^3*h*j*k*z + 31457280*a^8*b^7*c^7*g*i*k*z - 62914560*a^8*b^6*c^8*e*i*k*z - 94371840*a^7*b^7*c^8*e*g*k*z - 221773824*a^6*b^3*c^13*d*e*f*z + 82575360*a^9*b^2*c^11*d*i*j*z + 11
\end{aligned}$$

$796480a^{10}b^2c^{10}h^i j^z - 11796480a^7b^9c^6g^i k^z - 8970240a^7b^{10}c^5f^j k^z + 103219200a^7b^5c^{10}d^g j^z - 2457600a^8b^6c^8h^i j^z + 1769472a^6b^{11}c^5g^i k^z + 921600a^7b^8c^7h^i j^z + 673792a^6b^{12}c^4f^j k^z - 138240a^6b^{10}c^6h^i j^z - 98304a^5b^{13}c^4g^i k^z - 17920a^5b^{14}c^3f^j k^z + 7680a^5b^{12}c^5h^i j^z - 97136640a^5b^{10}c^7d^f k^z - 29491200a^9b^3c^{10}g^h j^z + 58982400a^9b^2c^{11}e^h j^z + 23592960a^7b^8c^7e^i k^z - 22169088a^6b^{11}c^5d^j k^z + 21381120a^7b^8c^7f^h k^z + 14745600a^8b^5c^9g^h j^z + 42854400a^6b^9c^7d^h k^z - 109707264a^7b^3c^{12}d^g h^z - 3686400a^7b^7c^8g^h j^z - 3538944a^6b^{10}c^6e^i k^z + 1645056a^5b^{13}c^4d^j k^z - 890880a^6b^{10}c^6f^h k^z + 460800a^6b^9c^7g^h j^z - 330240a^5b^{12}c^5f^h k^z + 196608a^5b^{12}c^5e^i k^z - 53760a^4b^{15}c^3d^j k^z + 46080a^4b^{14}c^4f^h k^z - 23040a^5b^{11}c^6g^h j^z - 1536a^3b^{16}c^3f^h k^z - 29491200a^8b^4c^{10}e^h j^z - 17203200a^7b^6c^9d^i j^z + 11796480a^6b^9c^7e^g k^z + 110886912a^6b^4c^{12}d^f g^z + 7372800a^7b^6c^9e^h j^z + 40108032a^8b^2c^{12}d^h i^z + 6451200a^6b^8c^8d^i j^z + 2359296a^8b^3c^{11}f^h i^z - 967680a^5b^{10}c^7d^i j^z - 921600a^6b^8c^8e^h j^z - 829440a^4b^{13}c^5d^h k^z - 589824a^5b^{11}c^6e^g k^z - 491520a^6b^7c^9f^h i^z + 184320a^5b^9c^8f^h i^z + 105984a^3b^{15}c^4d^h k^z + 69120a^5b^{11}c^6d^h k^z + 53760a^4b^{12}c^6d^i j^z + 46080a^5b^{10}c^7e^h j^z - 27648a^4b^{11}c^7f^h i^z - 4608a^2b^{17}c^3d^h k^z + 1536a^3b^{13}c^6f^h i^z - 25804800a^6b^7c^9d^g j^z - 88473600a^6b^4c^{12}d^e h^z + 51609600a^6b^6c^{10}d^e j^z - 84934656a^7b^2c^{13}d^f g^z + 117964800a^5b^5c^{12}d^e f^z + 15160320a^4b^{12}c^6d^f k^z - 45613056a^7b^3c^{12}d^f i^z + 44236800a^6b^5c^{11}d^g h^z - 10321920a^6b^6c^{10}d^h i^z + 7077888a^7b^4c^{11}d^h i^z - 5898240a^7b^4c^{11}f^g h^z + 4718592a^8b^2c^{12}f^g h^z + 3225600a^5b^9c^8d^g j^z + 2949120a^6b^6c^{10}f^g h^z + 2396160a^5b^8c^9d^h i^z - 1428480a^3b^{14}c^5d^f k^z - 737280a^5b^8c^9f^g h^z - 161280a^4b^{11}c^7d^g j^z + 92160a^4b^{10}c^8f^g h^z + 73728a^2b^{16}c^4d^f k^z - 50688a^3b^{12}c^7d^h i^z - 27648a^4b^{10}c^8d^h i^z - 4608a^3b^{12}c^7f^g h^z + 4608a^2b^{14}c^6d^h i^z - 58982400a^5b^6c^{11}d^f g^z + 11796480a^7b^3c^{12}e^f h^z + 8847360a^5b^7c^{10}d^f i^z - 6635520a^5b^7c^{10}d^g h^z - 6451200a^5b^8c^9d^e j^z - 5898240a^6b^5c^{11}e^f h^z - 3809280a^4b^9c^9d^f i^z + 2359296a^6b^5c^{11}d^f i^z + 1474560a^5b^7c^{10}e^f h^z + 681984a^3b^{11}c^8d^f i^z + 322560a^4b^{10}c^8d^e j^z - 276480a^4b^9c^9d^g h^z - 184320a^4b^9c^9e^f h^z + 179712a^3b^{11}c^8d^g h^z - 55296a^2b^{13}c^7d^f i^z - 13824a^2b^{13}c^7d^g h^z + 9216a^3b^{11}c^8e^f h^z + 16220160a^4b^8c^{10}d^f g^z + 13271040a^5b^6c^{11}d^e h^z - 2396160a^3b^{10}c^9d^f g^z + 552960a^4b^8c^{10}d^e h^z - 359424a^3b^{10}c^9d^e h^z + 175104a^2b^{12}c^8d^f g^z + 27648a^2b^{12}c^8d^e h^z - 32440320a^4b^7c^{11}d^e f^z + 4792320a^3b^9c^{10}d^e f^z - 350208a^2b^{11}c^9d^e f^z + 1439170560a^{10}b^3c^{11}d^h k^z - 3361603584a^{10}b^3c^9d^j k^z + 603979776a^{10}b^3c^{11}e^g k^z + 407371776a^{12}b^3c^9h^j k^z + 201326592a^{11}b^3c^{10}g^i k^z + 346816512a^7b^3c^{14}d^2g^z + 129761280a^{11}b^3c^{10}h^2$

$k*z + 121896960*a^{10}*b*c^{11}*f^2*k*z + 458752*a^6*b^{15}*c*i*k^2*z + 19660800*a^{11}*b*c^{10}*g*j^2*z + 49152*a^5*b^{16}*c*g*k^2*z + 7077888*a^9*b*c^{12}*g*h^2*z$   
 $+ 94464*a*b^{17}*c^4*d^2*k*z - 19660800*a^8*b*c^{13}*f^2*g*z - 66816*a*b^{14}*c^7*d^2*i*z + 214272*a*b^{13}*c^8*d^2*g*z - 428544*a*b^{12}*c^9*d^2*e*z + 2390753$   
 $280*a^{11}*b^4*c^7*g*k^2*z - 2411421696*a^6*b^7*c^9*d^2*k*z - 6603079680*a^8*b^3*c^{11}*d^2*k*z + 3715891200*a^9*b*c^{12}*d^2*k*z - 880803840*a^{10}*c^{12}*d*f*k*z - 1623195648*a^{10}*b^6*c^6*g*k^2*z - 402653184*a^{11}*c^{11}*e*i*k*z - 15099$   
 $49440*a^{12}*b^2*c^8*g*k^2*z - 209715200*a^{12}*c^{10}*f*j*k*z - 330301440*a^9*c^{13}*d*e*j*z + 3019898880*a^{12}*b*c^9*e*k^2*z - 125829120*a^{11}*c^{11}*f*h*k*z - 110100480*a^{10}*c^{12}*d*i*j*z - 198180864*a^8*c^{14}*d*e*h*z - 15728640*a^{11}*c^{11}*h*i*j*z - 1226833920*a^9*b^7*c^6*e*k^2*z - 47185920*a^{10}*c^{12}*e*h*j*z - 66060288*a^9*c^{13}*d*h*i*z - 1090519040*a^{12}*b^3*c^7*i*k^2*z + 1022754816*a^6*b^2*c^{14}*d^2*e*z + 5216108544*a^7*b^5*c^{10}*d^2*k*z + 754974720*a^9*b^2*c^{11}*e^2*k*z + 721529856*a^5*b^9*c^8*d^2*k*z + 613416960*a^9*b^8*c^5*g*k^2*z - 642318336*a^5*b^4*c^{13}*d^2*e*z - 4781506560*a^{11}*b^3*c^8*e*k^2*z - 398131200*a^{12}*b^3*c^7*j^2*k*z - 511377408*a^6*b^3*c^{13}*d^2*g*z - 377487360*a^8*b^4*c^{10}*e^2*k*z + 285212672*a^{11}*b^5*c^6*i*k^2*z + 199065600*a^{11}*b^5*c^6*j^2*k*z + 279183360*a^8*b^9*c^5*e*k^2*z + 321159168*a^5*b^5*c^{12}*d^2*g*z + 188743680*a^9*b^4*c^9*g^2*k*z + 132120576*a^{10}*b^7*c^5*i*k^2*z - 150994944*a^{10}*b^2*c^{10}*g^2*k*z - 111411200*a^9*b^9*c^4*i*k^2*z - 126812160*a^{10}*b^3*c^9*h^2*k*z + 225312768*a^7*b^2*c^{13}*d^2*i*z - 139591680*a^8*b^{10}*c^4*g*k^2*z - 49766400*a^{10}*b^7*c^5*j^2*k*z - 145463040*a^4*b^{11}*c^7*d^2*k*z - 94371840*a^8*b^6*c^8*g^2*k*z + 223395840*a^4*b^6*c^{12}*d^2*e*z + 33751040*a^8*b^{11}*c^3*i*k^2*z - 78970880*a^9*b^3*c^{10}*f^2*k*z + 94371840*a^7*b^6*c^9*e^2*k*z + 25165824*a^{10}*b^4*c^8*i^2*k*z + 6220800*a^9*b^9*c^4*j^2*k*z + 39223296*a^9*b^5*c^8*h^2*k*z - 311040*a^8*b^{11}*c^3*j^2*k*z + 16777216*a^{11}*b^2*c^9*i^2*k*z - 10485760*a^9*b^6*c^7*i^2*k*z - 5406720*a^7*b^{13}*c^2*i*k^2*z + 1376256*a^7*b^{10}*c^5*i^2*k*z - 1310720*a^8*b^8*c^6*i^2*k*z - 262144*a^6*b^{12}*c^4*i^2*k*z + 16384*a^5*b^{14}*c^3*i^2*k*z + 10354688*a^{11}*b^2*c^9*i*j^2*z + 23592960*a^7*b^8*c^7*g^2*k*z + 38559744*a^7*b^7*c^8*f^2*k*z + 19169280*a^7*b^12*c^3*g*k^2*z - 2048000*a^9*b^6*c^7*i*j^2*z - 1520640*a^7*b^9*c^6*h^2*k*z - 1105920*a^8*b^7*c^7*h^2*k*z + 849920*a^8*b^8*c^6*i*j^2*z - 393216*a^{10}*b^4*c^8*i*j^2*z + 195840*a^6*b^{11}*c^5*h^2*k*z - 145920*a^7*b^{10}*c^5*i*j^2*z + 11520*a^5*b^{13}*c^4*h^2*k*z + 11008*a^6*b^{12}*c^4*i*j^2*z - 2304*a^4*b^{15}*c^3*h^2*k*z - 256*a^5*b^{14}*c^3*i*j^2*z - 25362432*a^{10}*b^3*c^9*g*j^2*z - 24739840*a^8*b^5*c^9*f^2*k*z - 38338560*a^7*b^{11}*c^4*e*k^2*z - 2949120*a^6*b^{10}*c^6*g^2*k*z - 1474560*a^6*b^{14}*c^2*g*k^2*z + 50724864*a^{10}*b^2*c^{10}*e*j^2*z + 147456*a^5*b^{12}*c^5*g^2*k*z - 15150080*a^6*b^9*c^7*f^2*k*z + 13271040*a^9*b^5*c^8*g*j^2*z - 111697920*a^4*b^7*c^{11}*d^2*g*z - 3563520*a^8*b^7*c^7*g*j^2*z + 3538944*a^9*b^2*c^{11}*h^2*i*z + 2912000*a^5*b^{11}*c^6*f^2*k*z - 737280*a^7*b^6*c^9*h^2*i*z + 506880*a^7*b^9*c^6*g*j^2*z - 291840*a^4*b^{13}*c^5*f^2*k*z + 276480*a^6*b^8*c^8*h^2*i*z - 41472*a^5*b^{10}*c^7*h^2*i*z - 34560*a^6*b^{11}*c^5*g*j^2*z + 14080*a^3*b^{15}*c^4*f^2*k*z + 2304*a^4*b^{12}*c^6*h^2*i*z + 768*a^5*b^{13}*c^4*g*j^2*z - 256*a^2*b^{17}*c^3*f^2*k*z - 11796480*a^6*b^8*c^8*e^2*k*z - 26542080*a^9*b^4*c^9*e*j^2*z + 19837440*a^3*b^{13}*c^6*d^2*k*z +$

$$\begin{aligned}
& 2949120a^6b^{13}c^3e^k^2z + 589824a^5b^{10}c^7e^2k^2z - 98304a^5b^{15} \\
& c^2e^k^2z - 10354688a^8b^2c^{12}f^2i^2z - 43646976a^6b^4c^{12}d^2i^2z \\
& - 8847360a^8b^3c^{11}g^*h^2z + 7127040a^8b^6c^8e^*j^2z + 4423680a^7 \\
& b^5c^{10}g^*h^2z + 2048000a^6b^6c^{10}f^2i^2z - 1771776a^2b^{15}c^5d^2 \\
& k^2z - 1105920a^6b^7c^9g^*h^2z - 1013760a^7b^8c^7e^*j^2z - 849920a^5 \\
& b^8c^9f^2i^2z + 393216a^7b^4c^{11}f^2i^2z + 145920a^4b^{10}c^8f^2i^2z \\
& + 138240a^5b^9c^8g^*h^2z + 69120a^6b^{10}c^6e^*j^2z - 11008a^3b^{12} \\
& c^7f^2i^2z - 6912a^4b^{11}c^7g^*h^2z - 1536a^5b^{12}c^5e^*j^2z + 256a^2 \\
& b^{14}c^6f^2i^2z - 32587776a^5b^6c^{11}d^2i^2z + 25362432a^7b^3c^{12} \\
& f^2g^*z + 21657600a^4b^8c^{10}d^2i^2z + 17694720a^8b^2c^{12}e^*h^2z \\
& - 50724864a^7b^2c^{13}e^*f^2z - 13271040a^6b^5c^{11}f^2g^*z - 8847360 \\
& a^7b^4c^{11}e^*h^2z - 5810688a^3b^{10}c^9d^2i^2z + 3563520a^5b^7c^10 \\
& f^2g^*z + 2211840a^6b^6c^{10}e^*h^2z + 845568a^2b^{12}c^8d^2i^2z - 50 \\
& 6880a^4b^9c^9f^2g^*z - 276480a^5b^8c^9e^*h^2z + 34560a^3b^{11}c^8f^2 \\
& g^*z + 13824a^4b^{10}c^8e^*h^2z - 768a^2b^{13}c^7f^2g^*z + 26542080a^6 \\
& b^4c^{12}e^*f^2z + 23362560a^3b^9c^{10}d^2g^*z - 46725120a^3b^8c^{11} \\
& d^2e^*z - 7127040a^5b^6c^{11}e^*f^2z - 2965248a^2b^{11}c^9d^2g^*z + 1 \\
& 013760a^4b^8c^{10}e^*f^2z - 69120a^3b^{10}c^9e^*f^2z + 1536a^2b^{12}c^8 \\
& e^*f^2z + 5930496a^2b^{10}c^{10}d^2e^*z + 1006632960a^{13}b^*c^8i^*k^2z + \\
& 3246391296a^{10}b^5c^7e^*k^2z + 318504960a^{13}b^*c^8j^2k^2z + 61538304a^{10} \\
& b^{10}c^2k^3z - 603979776a^{10}c^{12}e^2k^2z - 693633024a^7c^{15}d^2e^*z \\
& - 231211008a^8c^{14}d^2i^2z - 67108864a^{12}c^{10}i^2k^2z - 13107200a^{12} \\
& c^{10}i^*j^2z - 16384a^5b^{17}i^*k^2z - 39321600a^{11}c^{11}e^*j^2z - 471 \\
& 8592a^{10}c^{12}h^2i^2z - 2304b^{19}c^3d^2k^2z + 13107200a^9c^{13}f^2i^2z \\
& + 2304b^{16}c^6d^2i^2z - 14155776a^9c^{13}e^*h^2z + 39321600a^8c^{14}e^*f^2 \\
& z - 4833280a^9b^{12}c^k^3z - 6912b^{15}c^7d^2g^*z + 6962544640a^{14}b^2 \\
& c^6k^3z + 13824b^{14}c^8d^2e^*z + 1876951040a^{12}b^6c^4k^3z - 484 \\
& 4421120a^{13}b^4c^5k^3z - 437780480a^{11}b^8c^3k^3z - 4294967296a^{15} \\
& c^7k^3z + 163840a^8b^{14}k^3z + 6144000a^{10}b^*c^8f^*i^*j^*k - 5898240a^{10} \\
& b^*c^8g^*h^*j^*k - 41287680a^9b^*c^9d^*g^*j^*k + 4472832a^9b^*c^9f^*h^*i^*k \\
& + 18432000a^9b^*c^9e^*f^*j^*k + 3391488a^8b^*c^{10}e^*h^*i^*j + 1228800a^8b^*c^{10} \\
& f^*g^*i^*j - 24772608a^8b^*c^{10}d^*g^*h^*k + 13418496a^8b^*c^{10}e^*f^*h^*k + 1 \\
& 1649024a^8b^*c^{10}d^*f^*i^*k + 737280a^7b^*c^{11}f^*g^*h^*i - 768a^*b^{15}c^3d^*f^* \\
& i^*k - 19307520a^7b^*c^{11}d^*f^*h^*j + 16367616a^7b^*c^{11}d^*e^*i^*j + 3686400a^7 \\
& b^*c^{11}e^*f^*g^*j + 34947072a^7b^*c^{11}d^*e^*f^*k + 2304a^*b^{14}c^4d^*f^*g^*k \\
& - 180a^*b^{13}c^5d^*f^*h^*j + 11059200a^6b^*c^{12}d^*e^*h^*i + 5160960a^6b^*c^{12} \\
& d^*f^*g^*i + 2211840a^6b^*c^{12}e^*f^*g^*h - 4608a^*b^{13}c^5d^*e^*f^*k - 2304a^*b^{11} \\
& c^7d^*f^*g^*i + 4608a^*b^{10}c^8d^*e^*f^*i + 15482880a^5b^*c^{13}d^*e^*f^*g - 13 \\
& 824a^*b^9c^9d^*e^*f^*g - 225976320a^8b^2c^9d^*e^*j^*k + 112988160a^8b^3c^8 \\
& d^*g^*j^*k - 11427840a^{10}b^2c^7h^*i^*j^*k - 4177920a^9b^4c^6h^*i^*j^*k + \\
& 1399296a^8b^6c^5h^*i^*j^*k - 26880a^6b^{10}c^3h^*i^*j^*k + 16128a^7b^8c^4 \\
& h^*i^*j^*k - 61562880a^9b^2c^8d^*i^*j^*k + 20090880a^9b^3c^7g^*h^*j^*k + 1 \\
& 19623680a^7b^4c^8d^*e^*j^*k + 10485760a^9b^3c^7f^*i^*j^*k - 40181760a^9b^2 \\
& c^8e^*h^*j^*k - 3778560a^8b^5c^6g^*h^*j^*k - 137797632a^7b^2c^{10}d^*e^* \\
& h^*k - 1248768a^7b^7c^5f^*i^*j^*k + 229376a^6b^9c^4f^*i^*j^*k + 220160a^8
\end{aligned}$$

$$\begin{aligned}
& *b^5c^6f*i*j*k - 209664a^7b^7c^5g*h*j*k + 80640a^6b^9c^4g*h*j*k - \\
& 8960a^5b^{11}c^3f*i*j*k - 59811840a^7b^5c^7d*g*j*k + 53084160a^8b^2c^9e*g*i*k - 11120640a^8b^4c^7f*g*j*k + 10455552a^7b^6c^6d*i*j*k \\
& - 9216000a^9b^2c^8f*g*j*k + 7557120a^8b^4c^7e*h*j*k + 7397376a^8b^3c^8f*h*i*k + 5230080a^7b^6c^6f*g*j*k - 37675008a^8b^2c^9d*h*i*k \\
& - 3633408a^6b^8c^5d*i*j*k + 2211840a^8b^4c^7d*i*j*k + 68898816a^7b^3c^9d*g*h*k - 1695744a^8b^2c^9g*h*i*j - 1400832a^7b^4c^8g*h*i*j \\
& + 967680a^7b^5c^7f*h*i*k - 783360a^6b^7c^6f*h*i*k - 741888a^6b^8c^5f*g*j*k + 499968a^5b^{10}c^4d*i*j*k + 419328a^7b^6c^6e*h*j*k - \\
& 253440a^6b^6c^7g*h*i*j - 161280a^6b^8c^5e*h*j*k + 42240a^5b^9c^5f*h*i*k + 26880a^5b^{10}c^4f*g*j*k - 26880a^4b^{12}c^3d*i*j*k + 13824 \\
& a^4b^{11}c^4f*h*i*k + 11520a^5b^8c^6g*h*i*j - 768a^3b^{13}c^3f*h*i*k + 22241280a^8b^3c^8e*f*j*k + 14222592a^6b^7c^6d*g*j*k - 10460160a^7b^5c^7e*f*j*k \\
& + 8847360a^7b^4c^8e*g*i*k - 7741440a^7b^4c^8f*g*h*k - 7077888a^6b^6c^7e*g*i*k + 6935040a^6b^6c^7d*h*i*k - 6709248a^8b^2c^9f*g*h*k \\
& - 3612672a^7b^4c^8d*h*i*k + 2801664a^7b^3c^9e*h*i*j + 2506752a^7b^3c^9f*g*i*j + 2419200a^6b^6c^7f*g*h*k - 1661184a^5b^9c^5d*g*j*k \\
& + 1483776a^6b^7c^6e*f*j*k - 1463040a^5b^8c^6d*h*i*k + 884736a^5b^8c^6e*g*i*k + 838656a^6b^5c^8f*g*i*j + 506880a^6b^5c^8e*h*i*j \\
& + 80640a^4b^{11}c^4d*g*j*k - 53760a^5b^9c^5e*f*j*k - 53760a^5b^7c^7f*g*i*j - 46080a^4b^{10}c^5f*g*h*k - 34560a^5b^8c^6f*g*h*k \\
& + 25344a^3b^{12}c^4d*h*i*k - 23040a^5b^7c^7e*h*i*j + 13824a^4b^{10}c^5d*h*i*k + 2304a^3b^{12}c^4f*g*h*k - 2304a^2b^{14}c^3d*h*i*k \\
& - 29030400a^6b^5c^8d*g*h*k + 28606464a^7b^3c^9d*f*i*k - 28445184a^6b^6c^7d*e*j*k + 58060800a^6b^4c^9d*e*h*k + 15482880a^7b^3c^9e*f*h*k \\
& - 8183808a^7b^2c^{10}d*g*i*j - 6718464a^6b^5c^8d*f*i*k - 5087232a^7b^2c^{10}e*g*h*j - 5013504a^7b^2c^{10}e*f*i*j - 4838400a^6b^5c^8e*f*h*k \\
& + 4112640a^5b^7c^7d*g*h*k - 3663360a^5b^7c^7d*f*i*k + 3322368a^5b^8c^6d*e*j*k - 2285568a^6b^4c^9d*g*i*j + 1896960a^4b^9c^6d*f*i*k \\
& + 1843200a^6b^3c^{10}f*g*h*i - 1677312a^6b^4c^9e*f*i*j - 1658880a^6b^4c^9e*g*h*j + 68345856a^6b^3c^{10}d*e*f*k + 783360a^5b^5c^9f*g*h*i \\
& + 741888a^5b^6c^8d*g*i*j - 34172928a^6b^4c^9d*f*g*k - 340992a^3b^{11}c^5d*f*i*k - 161280a^4b^{10}c^5d*e*j*k + 138240a^4b^9c^6d*g*h*k \\
& + 107520a^5b^6c^8e*f*i*j + 92160a^4b^9c^6e*f*h*k - 89856a^3b^{11}c^5d*g*h*k - 80640a^4b^8c^7d*g*i*j + 69120a^5b^7c^7e*f*h*k + 69120a^5b^6c^8e*g*h*j \\
& + 27648a^2b^{13}c^4d*f*i*k + 18432a^4b^7c^8f*g*h*i + 6912a^2b^{13}c^4d*g*h*k - 4608a^3b^{11}c^5e*f*h*k - 2304a^3b^9c^7f*g*h*i \\
& + 27164160a^5b^6c^8d*f*g*k - 22164480a^6b^3c^{10}d*f*h*j - 54328320a^5b^5c^9d*e*f*k - 17473536a^7b^2c^{10}d*f*g*k - 8225280a^5b^6c^8d*e*h*k \\
& - 8087040a^4b^8c^7d*f*g*k + 5677056a^6b^3c^{10}e*f*g*j - 5529600a^6b^2c^{11}d*g*h*i + 4571136a^6b^3c^{10}d*e*i*j - 3686400a^6b^2c^{11}e*f*h*i \\
& + 2805120a^5b^5c^9d*f*h*j - 2211840a^5b^4c^{10}d*g*h*i - 1566720a^5b^4c^{10}e*f*h*i - 1483776a^5b^5c^9d*e*i*j + 1198080a^3b^{10}c^6d*f*g*k \\
& + 437184a^4b^7c^8d*f*h*j - 322560a^5b^5c^9e*f*g*j + 317952a^4b^6c^9d*g*h*i - 276480a^4b^8c^7d*e*h*k +
\end{aligned}$$



$179712a^3b^{10}c^6d^6e^6h^6k + 161280a^4b^7c^8d^6e^6i^6j - 146268a^3b^9c^7d^6f^6h^6j - 87552a^2b^{12}c^5d^6f^6g^6k - 36864a^4b^6c^9e^6f^6h^6i - 13824a^2b^{12}c^5d^6e^6h^6k + 9360a^2b^{11}c^6d^6f^6h^6j + 6912a^3b^8c^8d^6g^6h^6i - 6912a^2b^{10}c^7d^6g^6h^6i + 4608a^3b^8c^8e^6f^6h^6i - 24551424a^6b^2c^{11}d^6e^6g^6j + 16174080a^4b^7c^8d^6e^6f^6k + 5419008a^5b^4c^{10}d^6e^6g^6j + 5160960a^5b^3c^{11}d^6f^6g^6i + 4423680a^5b^3c^{11}e^6f^6g^6h + 4423680a^5b^3c^{11}d^6e^6h^6i - 2396160a^3b^9c^7d^6e^6f^6k - 635904a^4b^5c^{10}d^6e^6h^6i - 483840a^4b^6c^9d^6e^6g^6j - 354816a^3b^7c^9d^6f^6g^6i + 322560a^4b^5c^{10}d^6f^6g^6i + 175104a^2b^{11}c^6d^6e^6f^6k + 138240a^4b^5c^{10}e^6f^6g^6h + 59904a^2b^9c^8d^6f^6g^6i - 13824a^3b^7c^9e^6f^6g^6h - 13824a^3b^7c^9d^6e^6h^6i + 13824a^2b^9c^8d^6e^6h^6i - 16588800a^5b^2c^{12}d^6e^6g^6h - 10321920a^5b^2c^{12}d^6e^6f^6i + 1658880a^4b^4c^{11}d^6e^6g^6h + 709632a^3b^6c^{10}d^6e^6f^6i - 645120a^4b^4c^{11}d^6e^6f^6i + 124416a^3b^6c^{10}d^6e^6g^6h - 119808a^2b^8c^9d^6e^6f^6i - 41472a^2b^8c^9d^6e^6g^6h + 7741440a^4b^3c^{12}d^6e^6f^6g - 2903040a^3b^5c^{11}d^6e^6f^6g + 387072a^2b^7c^{10}d^6e^6f^6g - 381026304a^{11}b^6c^7d^6j^6k^2 - 241827840a^{10}b^6c^8d^6h^6k^2 - 65667072a^{12}b^6c^6h^6j^6k^2 - 169344a^7b^{11}c^6h^6j^6k^2 - 25165824a^{11}b^6c^7g^6i^6k^2 - 4915200a^{11}b^6c^7g^6j^6k^2 - 53084160a^8b^6c^{10}e^6i^6k^2 - 75497472a^{10}b^6c^8e^6g^6k^2 - 86704128a^7b^6c^{11}d^6i^6g^6k^2 + 565248a^9b^6c^9h^6i^6j^2 - 168448a^6b^{12}c^6f^6j^6k^2 - 24576a^5b^{13}c^6g^6i^6k^2 - 1769472a^9b^6c^9g^6h^6i^2k - 17694720a^9b^6c^9e^6i^6j^2k - 411264a^5b^{13}c^6d^6j^6k^2 - 11520a^4b^14c^6f^6h^6k^2 + 4915200a^8b^6c^{10}f^6i^2g^6k^2 + 2580480a^9b^6c^9e^6i^6j^2 - 2496000a^9b^6c^9f^6h^6j^2 - 1543680a^8b^6c^{10}f^6h^6i^2j^2 + 33408a^6b^{14}c^4d^6i^6k^2 - 59512320a^6b^6c^{12}d^6i^2f^6j^2 + 5087232a^7b^6c^{11}e^6i^2h^6j^2 + 2727936a^8b^6c^{10}d^6i^2j^2 - 26496a^3b^{15}c^6d^6h^6k^2 + 1105920a^7b^6c^{11}e^6h^6i^2j^2 - 107136a^6b^{13}c^5d^6i^2g^6k^2 + 10260a^6b^{12}c^6d^6i^2h^6j^2 - 10616832a^6b^6c^{12}e^6i^2g^6j^2 - 3538944a^7b^6c^{11}e^6g^6i^2 + 1843200a^7b^6c^{11}d^6h^6i^2 - 18432a^2b^{16}c^6d^6f^6k^2 - 15552000a^8b^6c^{10}d^6f^6j^2 + 24551424a^6b^6c^{12}d^6e^6i^2j^2 - 37062144a^5b^6c^{13}d^6i^2f^6h^2 + 2580480a^6b^6c^{12}e^6f^6i^2j^2 + 214272a^6b^{12}c^6d^6i^2e^6k^2 + 65664a^6b^{10}c^8d^6i^2g^6j^2 - 25074a^6b^{11}c^7d^6i^2f^6j^2 + 420a^6b^{12}c^6d^6f^6i^2j^2 + 6a^6b^{15}c^3d^6f^6j^2 + 23224320a^5b^6c^{13}d^6i^2e^6j^2 + 384a^6b^{12}c^6d^6f^6i^2 - 5985792a^6b^6c^{12}d^6f^6h^2 + 206010a^6b^9c^9d^6i^2f^6h - 131328a^6b^9c^9d^6i^2e^6j^2 - 6300a^6b^{10}c^8d^6f^6i^2h^2 + 1350a^6b^{11}c^7d^6f^6h^2 + 16588800a^5b^6c^{13}d^6e^6i^2h^2 + 3456a^6b^{10}c^8d^6f^6g^2 + 435456a^6b^8c^{10}d^6i^2e^6g^2 + 13824a^6b^8c^{10}d^6e^6i^2f^2 + 3932160a^{11}c^8h^6i^6j^6k^2 + 27525120a^{10}c^9d^6i^6j^6k^2 + 82575360a^9c^{10}d^6e^6j^6k^2 + 11796480a^{10}c^9e^6h^6j^6k^2 + 16515072a^9c^{10}d^6h^6i^6k^2 + 49545216a^8c^{11}d^6e^6h^6k^2 - 2457600a^8c^{11}e^6f^6i^6j^2 - 1474560a^7c^{12}e^6f^6h^6i^2 - 10321920a^6c^{13}d^6e^6f^6i^2 + 737077248a^{10}b^3c^6d^6j^6k^2 - 518814720a^9b^5c^5d^6j^6k^2 + 441354240a^9b^3c^7d^6h^6k^2 - 429871104a^6b^2c^{11}d^6i^2e^6k^2 - 272212992a^8b^5c^6d^6h^6k^2 + 305731584a^5b^4c^{10}d^6i^2e^6k^2 + 192412800a^8b^7c^4d^6j^6k^2 + 111912960a^{11}b^3c^5h^6j^6k^2 + 214935552a^6b^3c^{10}d^6i^2g^6k^2 + 202427136a^7b^6c^6d^6f^6k^2 - 49904640a^{10}b^5c^4h^6j^6k^2 - 178513920a^8b^4c^7d^6f^6k^2 - 152865792a^5b^5c^9d^6i^2g^6k^2 - 114388992a^7b^2c^{10}d^6i^2k^2 + 94961664a^{10}b^2c^7e^6i^6k^2 - 9039872a^{11}b^2c^6i^6j^2k^2 - 56494080a^{10}b$

$$\begin{aligned}
& ^4c^5f*jk^2 - 2052096a^{10}b^4c^5i*j^2k + 1327360a^9b^6c^4i*j^2k \\
& - 158080a^8b^8c^3i*j^2k - 47480832a^{10}b^3c^6g*i*k^2 + 45576960a^9b^6c^4f*jk^2 + 7954560a^9b^7c^3h*jk^2 - 104693760a^9b^3c^7e*g \\
& *k^2 + 142080a^8b^9c^2h*jk^2 + 16017408a^{10}b^3c^6g*j^2k - 4930560 \\
& *a^9b^5c^5g*j^2k - 3649536a^9b^2c^8h^2i*k - 1843200a^8b^4c^7h^2 \\
& *i*k + 85524480a^8b^5c^6e*g*k^2 + 474240a^8b^7c^4g*j^2k + 288000* \\
& a^7b^6c^6h^2i*k + 63360a^6b^8c^5h^2i*k - 8064a^5b^10c^4h^2i*k \\
& - 1152a^4b^12c^3h^2i*k - 15437824a^{11}b^2c^6f*jk^2 - 32034816a^1 \\
& 0b^2c^7e*j^2k - 14369280a^8b^8c^3f*jk^2 - 13271040a^8b^3c^8g^2 \\
& *i*k + 80267904a^7b^7c^5d*h*k^2 + 79626240a^7b^2c^10e^2g*k + 11059 \\
& 200a^9b^5c^5g*i*k^2 + 8847360a^9b^2c^8g*i^2k - 42113280a^7b^9c^ \\
& 3d*j*k^2 + 6389760a^8b^7c^4g*i*k^2 + 5898240a^8b^4c^7g*i^2k - 376 \\
& 01280a^9b^4c^6f*h*k^2 - 2949120a^7b^9c^3g*i*k^2 + 2242560a^7b^10* \\
& c^2f*jk^2 - 2211840a^7b^5c^7g^2i*k + 1769472a^6b^7c^6g^2i*k + 7 \\
& 49568a^8b^3c^8h*i^2j - 442368a^7b^6c^6g*i^2k + 442368a^6b^11c^ \\
& 2g*i*k^2 - 442368a^6b^8c^5g*i^2k + 317952a^7b^5c^7h*i^2j - 22118 \\
& 4a^5b^9c^5g^2i*k + 73728a^5b^10c^4g*i^2k + 38400a^6b^7c^6h*i^ \\
& 2j - 1920a^5b^9c^5h*i^2j + 9861120a^9b^4c^6e*j^2k - 110280960a^ \\
& 4b^6c^9d^2e*k - 93330432a^6b^8c^5d*f*k^2 + 24645888a^8b^6c^5f*h \\
& *k^2 + 6359040a^8b^3c^8g*h^2k - 22118400a^9b^4c^6e*i*k^2 - 3862528 \\
& *a^8b^2c^9f^2i*k - 2248704a^7b^4c^8f^2i*k - 1290240a^9b^2c^8g* \\
& i*j^2 - 948480a^8b^6c^5e*j^2k - 860160a^8b^4c^7g*i*j^2 - 414720a^ \\
& 7b^5c^7g*h^2k + 303360a^6b^6c^7f^2i*k + 266880a^5b^8c^6f^2i*k \\
& - 224640a^6b^7c^6g*h^2k - 80640a^7b^6c^6g*i*j^2 - 72960a^4b^10* \\
& c^5f^2i*k + 17280a^5b^9c^5g*h^2k + 12672a^6b^8c^5g*i*j^2 + 5504* \\
& a^3b^12c^4f^2i*k + 3456a^4b^11c^4g*h^2k - 384a^5b^10c^4g*i*j^2 \\
& - 128a^2b^14c^3f^2i*k + 30265344a^6b^4c^9d^2i*k - 12779520a^8b \\
& ^6c^5e*i*k^2 - 11796480a^8b^3c^8e*i^2k - 8847360a^7b^3c^9e^2i*k \\
& - 7925760a^{10}b^2c^7f*h*k^2 + 7077888a^6b^5c^8e^2i*k - 39813120a^ \\
& 7b^3c^9e*g^2k - 73175040a^9b^2c^8d*f*k^2 + 5898240a^7b^8c^4e*i* \\
& k^2 + 5542272a^6b^11c^2d*j*k^2 - 5420160a^7b^8c^4f*h*k^2 + 55140480 \\
& *a^4b^7c^8d^2g*k + 1271808a^7b^3c^9g^2h*j - 1040384a^8b^2c^9f* \\
& i^2j + 884736a^7b^5c^7e*i^2k - 884736a^6b^10c^3e*i*k^2 + 884736a \\
& ^6b^7c^6e*i^2k - 884736a^5b^7c^7e^2i*k - 697344a^7b^4c^8f*i^2* \\
& j + 414720a^6b^5c^8g^2h*j + 226560a^6b^10c^3f*h*k^2 - 147456a^5b \\
& ^9c^5e*i^2k - 121856a^6b^6c^7f*i^2j + 82560a^5b^12c^2f*h*k^2 + \\
& 49152a^5b^12c^2e*i*k^2 - 17280a^5b^7c^7g^2h*j + 8960a^5b^8c^6f \\
& *i^2j + 14194944a^5b^6c^8d^2i*k - 12718080a^8b^2c^9e*h^2k - 1061 \\
& 5680a^4b^8c^7d^2i*k - 26542080a^6b^4c^9e^2g*k - 23592960a^7b^7* \\
& c^5e*g*k^2 - 5142528a^8b^3c^8f*h*j^2 + 5068800a^7b^2c^10f^2h*j - \\
& 3755520a^7b^3c^9f*h^2j + 3336192a^7b^3c^9f^2g*k + 3000960a^6b^4 \\
& *c^9f^2h*j + 2893824a^3b^10c^6d^2i*k + 1720320a^8b^3c^8e*i*j^2 + \\
& 1704960a^6b^5c^8f^2g*k - 1307520a^5b^7c^7f^2g*k - 1085760a^6b^ \\
& 5c^8f*h^2j - 959040a^7b^5c^7f*h*j^2 + 829440a^7b^4c^8e*h^2k - 5 \\
& 52960a^7b^2c^10g*h^2i - 552960a^6b^4c^9g*h^2i + 449280a^6b^6c^
\end{aligned}$$

$7e^*h^2*k - 422784*a^2*b^12*c^5*d^2*i*k + 253440*a^4*b^9*c^6*f^2*g*k + 1612$   
 $80*a^7*b^5*c^7*e*i*j^2 - 145152*a^5*b^6*c^8*g*h^2*i + 103200*a^6*b^7*c^6*f*$   
 $h*j^2 + 41280*a^5*b^6*c^8*f^2*h*j - 37188*a^4*b^8*c^7*f^2*h*j - 34560*a^5*b$   
 $^8*c^6*e*h^2*k - 25344*a^6*b^7*c^6*e*i*j^2 - 17280*a^3*b^11*c^5*f^2*g*k + 1$   
 $3536*a^5*b^7*c^7*f*h^2*j - 6912*a^4*b^10*c^5*e*h^2*k + 5490*a^4*b^9*c^6*f*h$   
 $^2*j - 3456*a^4*b^8*c^7*g*h^2*i + 1980*a^3*b^10*c^6*f^2*h*j + 810*a^5*b^9*c$   
 $^5*f*h*j^2 + 768*a^5*b^9*c^5*e*i*j^2 + 384*a^2*b^13*c^4*f^2*g*k - 270*a^4*b$   
 $^11*c^4*f*h*j^2 - 180*a^3*b^11*c^5*f*h^2*j - 30*a^2*b^12*c^5*f^2*h*j + 6*a^$   
 $3*b^13*c^3*f*h*j^2 + 30067200*a^6*b^2*c^11*d^2*h*j + 13271040*a^6*b^5*c^8*e$   
 $*g^2*k - 10857600*a^6*b^9*c^4*d*h*k^2 + 2949120*a^6*b^9*c^4*e*g*k^2 + 26542$   
 $08*a^5*b^6*c^8*e^2*g*k + 2125824*a^7*b^3*c^9*d*i^2*j + 1658880*a^6*b^3*c^10$   
 $*e^2*h*j - 1419264*a^6*b^4*c^9*f*g^2*j - 1327104*a^5*b^7*c^7*e*g^2*k - 9216$   
 $00*a^7*b^2*c^10*f*g^2*j - 737280*a^7*b^2*c^10*f*h*i^2 - 568320*a^6*b^4*c^9*$   
 $f*h*i^2 + 207360*a^4*b^13*c^2*d*h*k^2 - 147456*a^5*b^11*c^3*e*g*k^2 - 13670$   
 $4*a^5*b^6*c^8*f*h*i^2 + 133632*a^6*b^5*c^8*d*i^2*j - 96768*a^5*b^7*c^7*d*i^$   
 $2*j + 80640*a^5*b^6*c^8*f*g^2*j - 69120*a^5*b^5*c^9*e^2*h*j + 13440*a^4*b^9$   
 $*c^6*d*i^2*j - 5760*a^5*b^11*c^3*d*h*k^2 - 2304*a^4*b^8*c^7*f*h*i^2 + 384*a$   
 $^3*b^10*c^6*f*h*i^2 + 11930112*a^8*b^2*c^9*d*h*j^2 - 11646720*a^3*b^9*c^7*d$   
 $^2*g*k + 8432640*a^7*b^2*c^10*d*h^2*j + 24140160*a^5*b^10*c^4*d*f*k^2 - 667$   
 $2384*a^7*b^2*c^10*e*f^2*k + 4450176*a^7*b^4*c^8*d*h*j^2 + 4337280*a^6*b^4*c$   
 $^9*d*h^2*j - 3870720*a^8*b^2*c^9*e*g*j^2 - 3409920*a^6*b^4*c^9*e*f^2*k - 28$   
 $85760*a^5*b^4*c^10*d^2*h*j - 2844288*a^4*b^6*c^9*d^2*h*j + 2615040*a^5*b^6*$   
 $c^8*e*f^2*k - 1687680*a^6*b^6*c^7*d*h*j^2 + 1482624*a^2*b^11*c^6*d^2*g*k -$   
 $1290240*a^6*b^2*c^11*f^2*g*i + 1105920*a^6*b^3*c^10*e*h^2*i + 1019412*a^3*b$   
 $^8*c^8*d^2*h*j - 1007424*a^5*b^6*c^8*d*h^2*j - 860160*a^5*b^4*c^10*f^2*g*i$   
 $- 645120*a^7*b^4*c^8*e*g*j^2 - 506880*a^4*b^8*c^7*e*f^2*k + 290304*a^5*b^5*$   
 $c^9*e*h^2*i + 197460*a^5*b^8*c^6*d*h*j^2 - 143802*a^2*b^10*c^7*d^2*h*j + 80$   
 $640*a^6*b^6*c^7*e*g*j^2 - 80640*a^4*b^6*c^9*f^2*g*i + 51948*a^4*b^8*c^7*d*h$   
 $^2*j + 34560*a^3*b^10*c^6*e*f^2*k + 12672*a^3*b^8*c^8*f^2*g*i + 10800*a^3*b$   
 $^10*c^6*d*h^2*j + 6912*a^4*b^7*c^8*e*h^2*i - 2304*a^5*b^8*c^6*e*g*j^2 - 768$   
 $*a^2*b^12*c^5*e*f^2*k - 684*a^3*b^12*c^4*d*h*j^2 - 540*a^2*b^12*c^5*d*h^2*j$   
 $- 384*a^2*b^10*c^7*f^2*g*i - 90*a^4*b^10*c^5*d*h*j^2 + 18*a^2*b^14*c^3*d*h$   
 $*j^2 + 23385600*a^6*b^2*c^11*d*f^2*j + 23293440*a^3*b^8*c^8*d^2*e*k + 61378$   
 $56*a^6*b^3*c^10*d*g^2*j - 5677056*a^6*b^2*c^11*e^2*f*j + 5308416*a^6*b^2*c^$   
 $11*e*g^2*i - 5308416*a^5*b^3*c^11*e^2*g*i - 3786240*a^4*b^12*c^3*d*f*k^2 -$   
 $3538944*a^6*b^3*c^10*e*g*i^2 + 2654208*a^5*b^4*c^10*e*g^2*i + 1658880*a^6*b$   
 $^3*c^10*d*h*i^2 - 1354752*a^5*b^5*c^9*d*g^2*j - 1105920*a^5*b^4*c^10*f*g^2*$   
 $h - 884736*a^5*b^5*c^9*e*g*i^2 - 552960*a^6*b^2*c^11*f*g^2*h + 357120*a^3*b$   
 $^14*c^2*d*f*k^2 + 322560*a^5*b^4*c^10*e^2*f*j + 262656*a^5*b^5*c^9*d*h*i^2$   
 $+ 120960*a^4*b^7*c^8*d*g^2*j - 55296*a^4*b^7*c^8*d*h*i^2 - 34560*a^4*b^6*c^$   
 $9*f*g^2*h + 3456*a^3*b^8*c^8*f*g^2*h + 1152*a^3*b^9*c^7*d*h*i^2 + 1152*a^2*$   
 $b^11*c^6*d*h*i^2 - 13149696*a^7*b^3*c^9*d*f*j^2 - 11612160*a^5*b^2*c^12*d^2$   
 $*g*i + 10906560*a^4*b^5*c^10*d^2*f*j - 7418880*a^5*b^3*c^11*d^2*f*j + 31489$   
 $92*a^6*b^5*c^8*d*f*j^2 - 2985696*a^3*b^7*c^9*d^2*f*j - 2965248*a^2*b^10*c^7$   
 $*d^2*e*k + 1720320*a^5*b^3*c^11*e*f^2*i - 1658880*a^6*b^2*c^11*e*g*h^2 + 15$

$96672a^3b^6c^{10}d^2g^i - 1505280a^4b^6c^9d^2f^2j - 829440a^5b^4c^{10}e^2g^h^2 - 508032a^2b^8c^9d^2g^i + 378954a^2b^9c^8d^2f^2j + 362880a^5b^4c^{10}d^2f^2j + 296964a^3b^8c^8d^2f^2j + 161280a^4b^5c^{10}e^2f^2i - 77070a^4b^9c^6d^2f^2j - 30240a^5b^7c^7d^2f^2j - 25344a^3b^7c^9e^2f^2i - 20736a^4b^6c^9e^2g^h^2 - 19278a^2b^{10}c^7d^2f^2j + 8820a^3b^{11}c^5d^2f^2j + 768a^2b^9c^8e^2f^2i - 378a^2b^{13}c^4d^2f^2j - 5419008a^5b^3c^{11}d^2e^2j - 4423680a^5b^2c^{12}e^2f^2h + 4147200a^5b^3c^{11}d^2g^2h - 2580480a^6b^2c^{11}d^2f^2i - 967680a^5b^4c^{10}d^2f^2i + 483840a^4b^5c^{10}d^2e^2j - 414720a^4b^5c^{10}d^2g^2h - 138240a^4b^4c^{11}e^2f^2h + 64512a^4b^6c^9d^2f^2i + 39168a^3b^8c^8d^2f^2i - 31104a^3b^7c^9d^2g^2h + 13824a^3b^6c^{10}e^2f^2h + 10368a^2b^9c^8d^2g^2h - 9216a^2b^{10}c^7d^2f^2i + 15630336a^5b^2c^{12}d^2f^2h - 14459904a^4b^3c^{12}d^2f^2h + 9630144a^3b^5c^{11}d^2f^2h - 8764416a^5b^3c^{11}d^2f^2h - 3870720a^5b^2c^{12}e^2f^2g - 3193344a^3b^5c^{11}d^2e^2i + 2867328a^4b^4c^{11}d^2f^2h - 2095200a^2b^7c^{10}d^2f^2h - 1414080a^3b^6c^{10}d^2f^2h - 34836480a^4b^2c^{13}d^2e^2g + 1016064a^2b^7c^{10}d^2e^2i - 645120a^4b^4c^{11}e^2f^2g + 306720a^3b^7c^9d^2f^2h + 197820a^2b^8c^9d^2f^2h + 146880a^4b^5c^{10}d^2f^2h + 80640a^3b^6c^{10}e^2f^2g - 55350a^2b^9c^8d^2f^2h - 2304a^2b^8c^9e^2f^2g - 3870720a^5b^2c^{12}d^2f^2g - 1935360a^4b^4c^{11}d^2f^2g - 1658880a^4b^3c^{12}d^2e^2h + 725760a^3b^6c^{10}d^2f^2g + 17418240a^3b^4c^{12}d^2e^2g - 124416a^3b^5c^{11}d^2e^2h - 96768a^2b^8c^9d^2f^2g + 41472a^2b^7c^{10}d^2e^2h - 3919104a^2b^6c^{11}d^2e^2g - 7741440a^4b^2c^{13}d^2e^2f + 2903040a^3b^4c^{12}d^2e^2f - 387072a^2b^6c^{11}d^2e^2f - 681246720a^9b^6c^9d^2k^2 + 265912320a^{11}b^3c^5e^2k^3 + 188743680a^{12}b^2c^5g^2k^3 - 132956160a^{11}b^4c^4g^2k^3 - 52101120a^{13}b^5c^5j^2k^2 + 25722880a^{12}b^3c^4i^2k^3 + 19644416a^{11}b^5c^3i^2k^3 - 1583680a^9b^9c^5j^2k^2 - 9142272a^{10}b^7c^2i^2k^3 - 74022912a^{10}b^5c^4e^2k^3 - 20643840a^{11}b^6c^7h^2k^2 + 37011456a^{10}b^6c^3g^2k^3 - 2293760a^9b^3c^7i^3k - 557056a^8b^5c^6i^3k + 147456a^7b^7c^5i^3k - 65536a^6b^{12}c^5i^2k^2 + 32768a^6b^9c^4i^3k - 8192a^5b^{11}c^3i^3k + 430080a^{10}b^6c^8i^2j^2 - 2880a^5b^{13}c^4h^2k^2 + 6635520a^7b^4c^8g^3k - 4792320a^9b^8c^2g^2k^3 - 2211840a^6b^6c^7g^3k + 1359360a^{10}b^2c^7h^3j^3 + 1173120a^9b^4c^6h^3j^3 + 743040a^7b^4c^8h^3j + 622080a^8b^2c^9h^3j + 221184a^5b^8c^6g^3k + 107136a^6b^6c^7h^3j - 32640a^8b^6c^5h^3j^3 - 5796a^7b^8c^4h^3j^3 + 540a^5b^8c^6h^3j - 270a^4b^{10}c^5h^3j + 210a^6b^{10}c^3h^3j^3 - 2949120a^{10}b^6c^8f^2k^2 + 17694720a^6b^3c^{10}e^3k + 184320a^8b^6c^{10}h^2i^2 - 3520a^3b^{15}c^2f^2k^2 + 9584640a^9b^7c^3e^2k^3 - 2293760a^9b^3c^7f^2j^3 - 2293760a^6b^3c^{10}f^3j - 1769472a^5b^5c^9e^3k - 884736a^6b^3c^{10}g^3i - 589824a^7b^3c^9g^3i - 491520a^8b^9c^2e^2k^3 - 442368a^5b^5c^9g^3i - 294912a^6b^5c^8g^3i - 199360a^8b^5c^6f^2j^3 - 199360a^5b^5c^9f^3j + 61920a^7b^7c^5f^2j^3 + 61920a^4b^7c^8f^3j - 49152a^5b^7c^7g^3i - 3682a^6b^9c^4f^2j^3 - 3682a^3b^9c^7f^3j + 70a^5b^{11}c^3f^2j^3 + 70a^2b^{11}c^6f^3j + 3870720a^8b^6c^{10}e^2j^2 + 430080a^7b^6c^{11}f^2i$

$$\begin{aligned}
&^2 - 14152320*a^4*b^4*c^{11}*d^3*j + 10644480*a^5*b^2*c^{12}*d^3*j + 5483520*a^9*b^2*c^8*d*j^3 + 4269888*a^3*b^6*c^{10}*d^3*j + 3538944*a^5*b^2*c^{12}*e^3*i - \\
&1648128*a^5*b^3*c^{11}*f^3*h + 1330560*a^8*b^4*c^7*d*j^3 + 1179648*a^7*b^2*c^{10}*e*i^3 - 898560*a^6*b^3*c^{10}*f*h^3 - 826560*a^7*b^6*c^6*d*j^3 - 607068*a^2*b^8*c^9*d^3*j + 589824*a^6*b^4*c^9*e*i^3 - 354240*a^5*b^5*c^9*f*h^3 - 35 \\
&4240*a^4*b^5*c^{10}*f^3*h + 145188*a^6*b^8*c^5*d*j^3 + 98304*a^5*b^6*c^8*e*i^3 + 43680*a^3*b^7*c^9*f^3*h - 21600*a^4*b^7*c^8*f*h^3 - 9576*a^5*b^10*c^4*d*j^3 + 1350*a^3*b^9*c^7*f*h^3 - 1050*a^2*b^9*c^8*f^3*h - 504*a*b^14*c^4*d^2*j^2 + 210*a^4*b^12*c^3*d*j^3 + 3870720*a^6*b*c^{12}*d^2*i^2 + 1658880*a^6*b*c^{12}*e^2*h^2 - 9792*a*b^11*c^7*d^2*i^2 + 16547328*a^4*b^2*c^{13}*d^3*h - 1230 \\
&6816*a^3*b^4*c^{12}*d^3*h + 37310976*a^3*b^3*c^{13}*d^3*f + 3037824*a^2*b^6*c^11*d^3*h - 2654208*a^5*b^3*c^{11}*e*g^3 + 1949184*a^6*b^2*c^{11}*d*h^3 + 1296000*a^5*b^4*c^{10}*d*h^3 - 155520*a^4*b^6*c^9*d*h^3 - 40500*a*b^10*c^8*d^2*h^2 - 8100*a^3*b^8*c^8*d*h^3 + 4050*a^2*b^10*c^7*d*h^3 + 3870720*a^5*b*c^{13}*e^2*f^2 + 34836480*a^4*b*c^{14}*d^2*e^2 - 108864*a*b^9*c^9*d^2*g^2 - 8068032*a^2*b^5*c^{12}*d^3*f - 5623296*a^4*b^3*c^{12}*d*f^3 + 1737792*a^3*b^5*c^{11}*d*f^3 - 260190*a*b^8*c^{10}*d^2*f^2 - 211680*a^2*b^7*c^{10}*d*f^3 - 435456*a*b^7*c^{11}*d^2*e^2 - 377487360*a^12*b*c^6*e*k^3 + 1434977280*a^8*b^3*c^8*d^2*k^2 + 1734 \\
&08256*a^7*c^{12}*d^2*e*k + 3276800*a^12*c^7*i*j^2*k - 125829120*a^13*b*c^5*i*k^3 + 26214400*a^12*c^7*f*j*k^2 + 1179648*a^10*c^9*h^2*i*k + 13440*a^6*b^13*h*j*k^2 + 50331648*a^11*c^8*e*i*k^2 + 110100480*a^10*c^9*d*f*k^2 + 57802752*a^8*c^{11}*d^2*i*k + 9830400*a^11*c^8*e*j^2*k - 3276800*a^9*c^{10}*f^2*i*k + 4480*a^5*b^14*f*j*k^2 + 15728640*a^11*c^8*f*h*k^2 - 409600*a^9*c^{10}*f*i^2*j - 1152*b^16*c^3*d^2*i*k - 1220516352*a^7*b^5*c^7*d^2*k^2 + 3538944*a^9*c^10*e*h^2*k + 384000*a^8*c^{11}*f^2*h*j + 13440*a^4*b^15*d*j*k^2 + 384*a^3*b^16*f*h*k^2 + 20321280*a^7*c^{12}*d^2*h*j - 245760*a^8*c^{11}*f*h*i^2 + 3456*b^15*c^4*d^2*g*k - 270*b^14*c^5*d^2*h*j - 9830400*a^8*c^{11}*e*f^2*k + 4838400*a^9*c^{10}*d*h*j^2 + 2903040*a^8*c^{11}*d*h^2*j - 1966080*a^10*b*c^8*i^3*k + 1433600*a^9*b^9*c*i*k^3 + 1152*a^2*b^17*d*h*k^2 - 3686400*a^7*c^{12}*e^2*f*j - 53084160*a^7*b*c^{11}*e^3*k - 6912*b^14*c^5*d^2*e*k - 3456*b^12*c^7*d^2*g*i + 630*b^13*c^6*d^2*f*j + 2688000*a^7*c^{12}*d*f^2*j + 245760*a^8*b^10*c*g*k^3 - 2211840*a^6*c^{13}*e^2*f*h - 1720320*a^7*c^{12}*d*f*i^2 - 9450*b^11*c^8*d^2*f*h + 6912*b^11*c^8*d^2*e*i + 1612800*a^6*c^{13}*d*f^2*h - 1344000*a^10*b*c^8*f*j^3 - 1344000*a^7*b*c^{11}*f^3*j - 393216*a^8*b*c^{10}*g*i^3 - 23616*a*b^17*c*d^2*k^2 - 20736*b^10*c^9*d^2*e*g - 75188736*a^4*b*c^{14}*d^3*f - 883200*a^6*b*c^{12}*f^3*h - 317952*a^7*b*c^{11}*f*h^3 + 43416*a*b^10*c^8*d^3*j - 15482880*a^5*c^{14}*d*e^2*f - 10616832*a^5*b*c^{13}*e^3*g - 345060*a*b^8*c^{10}*d^3*h - 4262400*a^5*b*c^{13}*d*f^3 + 852768*a*b^7*c^{11}*d^3*f + 7350*a*b^9*c^9*d*f^3 + 584578368*a^6*b^7*c^6*d^2*k^2 + 93905920*a^12*b^3*c^4*j^2*k^2 - 177997248*a^5*b^9*c^5*d^2*k^2 - 50967040*a^11*b^5*c^3*j^2*k^2 + 104693760*a^9*b^2*c^8*e^2*k^2 + 12849984*a^10*b^7*c^2*j^2*k^2 + 20021248*a^11*b^2*c^6*i^2*k^2 - 85524480*a^8*b^4*c^7*e^2*k^2 + 33223680*a^10*b^3*c^6*h^2*k^2 + 4227072*a^10*b^4*c^5*i^2*k^2 - 3973120*a^9*b^6*c^4*i^2*k^2 + 344064*a^7*b^10*c^2*i^2*k^2 - 81920*a^8*b^8*c^3*i^2*k^2 - 11386368*a^9*b^5*c^5*h^2*k^2 + 26173440*a^9*b^4*c^6*g^2*k^2 - 21381120*a^8*b^6*c^5*g^2*k^2 + 18874368*a^10*b^2*c^7*g^2*k^2
\end{aligned}$$

$$\begin{aligned}
& + 501760a^9b^3c^7i^2j^2 + 452160a^8b^7c^4h^2k^2 + 385920a^7b^9c^3h^2k^2 + 170240a^8b^5c^6i^2j^2 - 48960a^6b^{11}c^2h^2k^2 + 9216a^7b^7c^5i^2j^2 - 1984a^6b^9c^4i^2j^2 + 64a^5b^{11}c^3i^2j^2 \\
& + 5898240a^7b^8c^4g^2k^2 + 1419840a^8b^4c^7h^2j^2 + 1387008a^9b^2c^8h^2j^2 - 737280a^6b^{10}c^3g^2k^2 + 84960a^7b^6c^6h^2j^2 + 36864a^5b^{12}c^2g^2k^2 - 8010a^6b^8c^5h^2j^2 - 180a^5b^{10}c^4h^2j^2 + 9a^4b^{12}c^3h^2j^2 + 14115840a^9b^3c^7f^2k^2 - 9231552a^7b^7c^5f^2k^2 + 23592960a^7b^6c^6e^2k^2 + 4984320a^8b^5c^6f^2k^2 + 3759040a^6b^9c^4f^2k^2 + 36190080a^4b^{11}c^4d^2k^2 + 967680a^8b^3c^8g^2j^2 - 727360a^5b^{11}c^3f^2k^2 + 276480a^7b^3c^9h^2i^2 + 161280a^7b^5c^7g^2j^2 + 140544a^6b^5c^8h^2i^2 + 72960a^4b^{13}c^2f^2k^2 + 25344a^5b^7c^7h^2i^2 - 20160a^6b^7c^6g^2j^2 + 576a^5b^9c^5g^2j^2 + 576a^4b^9c^6h^2i^2 + 3808000a^8b^2c^9f^2j^2 - 2949120a^6b^8c^5e^2k^2 + 1643712a^7b^4c^8f^2j^2 + 884736a^7b^2c^{10}g^2i^2 + 884736a^6b^4c^9g^2i^2 + 221184a^5b^6c^8g^2i^2 + 147456a^5b^{10}c^4e^2k^2 - 125440a^6b^6c^7f^2j^2 - 13790a^5b^8c^6f^2j^2 + 1785a^4b^{10}c^5f^2j^2 - 70a^3b^{12}c^4f^2j^2 - 4953600a^3b^{13}c^3d^2k^2 + 18427392a^7b^2c^{10}d^2j^2 + 645120a^7b^3c^9e^2j^2 + 501760a^6b^3c^{10}f^2i^2 + 442944a^2b^{15}c^2d^2k^2 + 414720a^6b^3c^{10}g^2h^2 + 207360a^5b^5c^9g^2h^2 + 170240a^5b^5c^9f^2i^2 - 80640a^6b^5c^8e^2j^2 + 9216a^4b^7c^8f^2i^2 + 5184a^4b^7c^8g^2h^2 + 2304a^5b^7c^7e^2j^2 - 1984a^3b^9c^7f^2i^2 + 64a^2b^{11}c^6f^2i^2 - 4148928a^6b^4c^9d^2j^2 + 3538944a^6b^2c^{11}e^2i^2 + 1684224a^6b^2c^{11}f^2h^2 + 1264320a^5b^4c^{10}f^2h^2 - 1183392a^5b^6c^8d^2j^2 + 884736a^5b^4c^{10}e^2i^2 + 645750a^4b^8c^7d^2j^2 + 126720a^4b^6c^9f^2h^2 - 115920a^3b^{10}c^6d^2j^2 - 13950a^3b^8c^8f^2h^2 + 10836a^2b^{12}c^5d^2j^2 + 225a^2b^{10}c^7f^2h^2 + 1935360a^5b^3c^{11}d^2i^2 + 967680a^5b^3c^{11}f^2g^2 + 829440a^5b^3c^{11}e^2h^2 - 532224a^4b^5c^{10}d^2i^2 + 161280a^4b^5c^{10}f^2g^2 - 96768a^3b^7c^9d^2i^2 + 62784a^2b^9c^8d^2i^2 + 20736a^4b^5c^10e^2h^2 - 20160a^3b^7c^9f^2g^2 + 576a^2b^9c^8f^2g^2 + 11487744a^5b^2c^{12}d^2h^2 + 7962624a^5b^2c^{12}e^2g^2 + 35525376a^4b^2c^{13}d^2f^2 - 1412640a^3b^6c^{10}d^2h^2 + 461376a^4b^4c^{11}d^2h^2 + 375030a^2b^8c^9d^2h^2 + 8709120a^4b^3c^{12}d^2g^2 - 4354560a^3b^5c^{11}d^2g^2 + 979776a^2b^7c^{10}d^2g^2 + 645120a^4b^3c^{12}e^2f^2 - 80640a^3b^5c^{11}e^2f^2 + 2304a^2b^7c^{10}e^2f^2 - 15269184a^3b^4c^{12}d^2f^2 + 2870784a^2b^6c^{11}d^2f^2 - 17418240a^3b^3c^{13}d^2e^2 + 3919104a^2b^5c^{12}d^2e^2 + 384a^2b^{18}d^2f^2k^2 - 199229440a^{14}b^2c^3k^4 + 8388608a^{12}c^7i^2k^2 + 75497472a^{10}c^9e^2k^2 + 78400a^8b^{11}j^2k^2 + 4096a^5b^{14}i^2k^2 + 345600a^{10}c^9h^2j^2 + 576a^4b^{15}h^2k^2 + 57937920a^{13}b^4c^2k^4 + 320000a^9c^{10}f^2j^2 + 64a^2b^{17}f^2k^2 + 16934400a^8c^{11}d^2j^2 + 9b^{16}c^3d^2j^2 + 3538944a^7c^{12}e^2i^2 + 115200a^7c^{12}f^2h^2 + 576b^{13}c^6d^2i^2 + 2025b^{12}c^7d^2h^2 + 6096384a^6c^{13}d^2h^2 + 492800a^{11}b^2c^6j^4 + 351456a^{10}b^4c^5j^4 - 43120a^9b^6c^4j^4 + 5184b^{11}c^8d^2g^2 + 1225a^8b^8c
\end{aligned}$$

$$\begin{aligned}
&^3*j^4 + 131072*a^8*b^2*c^9*i^4 + 98304*a^7*b^4*c^8*i^4 + 32768*a^6*b^6*c^7 \\
&*i^4 + 11025*b^10*c^9*d^2*f^2 + 4096*a^5*b^8*c^6*i^4 + 5644800*a^5*c^14*d^2 \\
&*f^2 + 142560*a^6*b^4*c^9*h^4 + 103680*a^7*b^2*c^10*h^4 + 32400*a^5*b^6*c^8 \\
&*h^4 + 20736*b^9*c^10*d^2*e^2 + 2025*a^4*b^8*c^7*h^4 + 331776*a^5*b^4*c^10* \\
&g^4 + 492800*a^5*b^2*c^12*f^4 + 351456*a^4*b^4*c^11*f^4 - 43120*a^3*b^6*c^1 \\
&0*f^4 + 1225*a^2*b^8*c^9*f^4 - 27433728*a^3*b^2*c^14*d^4 + 6446304*a^2*b^4* \\
&c^13*d^4 + a^2*b^14*c^3*f^2*j^2 - 81920*a^8*b^11*i*k^3 + 384000*a^11*c^8*h* \\
&j^3 + 138240*a^9*c^10*h^3*j + 47416320*a^6*c^13*d^3*j - 1134*b^12*c^7*d^3*j \\
&+ 7077888*a^6*c^13*e^3*i + 2688000*a^10*c^9*d*j^3 + 786432*a^8*c^11*e*i^3 \\
&+ 28449792*a^5*c^14*d^3*h - 7782400*a^12*b^6*c*k^4 + 17010*b^10*c^9*d^3*h + \\
&580608*a^7*c^12*d*h^3 - 39690*b^9*c^10*d^3*f - 734832*a*b^6*c^12*d^4 + 268 \\
&435456*a^15*c^4*k^4 + 576*b^19*d^2*k^2 + 409600*a^11*b^8*k^4 + 160000*a^12* \\
&c^7*j^4 + 65536*a^9*c^10*i^4 + 20736*a^8*c^11*h^4 + 49787136*a^4*c^15*d^4 + \\
&160000*a^6*c^13*f^4 + 5308416*a^5*c^14*e^4 + 35721*b^8*c^11*d^4, z, n)*((1 \\
&1010048*a^9*c^10*d*k - 327680*a^8*c^11*f*i - 983040*a^7*c^12*e*f + 1572864* \\
&a^10*c^9*h*k + 2621440*a^11*c^8*j*k + 3244032*a^6*b*c^12*d*e + 1081344*a^7* \\
&b*c^11*d*i + 884736*a^7*b*c^11*e*h + 491520*a^7*b*c^11*f*g + 1277952*a^8*b* \\
&c^10*e*j + 294912*a^8*b*c^10*h*i + 360448*a^9*b*c^9*f*k + 425984*a^9*b*c^9* \\
&i*j + 4608*a^2*b^9*c^8*d*e - 87552*a^3*b^7*c^9*d*e + 681984*a^4*b^5*c^10*d* \\
&e - 2433024*a^5*b^3*c^11*d*e - 2304*a^2*b^10*c^7*d*g + 43776*a^3*b^8*c^8*d* \\
&g + 1536*a^3*b^8*c^8*e*f - 340992*a^4*b^6*c^9*d*g - 39936*a^4*b^6*c^9*e*f + \\
&1216512*a^5*b^4*c^10*d*g + 184320*a^5*b^4*c^10*e*f - 1622016*a^6*b^2*c^11* \\
&d*g + 49152*a^6*b^2*c^11*e*f + 768*a^2*b^11*c^6*d*i - 13056*a^3*b^9*c^7*d*i \\
&- 768*a^3*b^9*c^7*f*g + 84480*a^4*b^7*c^8*d*i + 4608*a^4*b^7*c^8*e*h + 199 \\
&68*a^4*b^7*c^8*f*g - 178176*a^5*b^5*c^9*d*i + 18432*a^5*b^5*c^9*e*h - 92160 \\
&*a^5*b^5*c^9*f*g - 270336*a^6*b^3*c^10*d*i - 368640*a^6*b^3*c^10*e*h - 2457 \\
&6*a^6*b^3*c^10*f*g - 768*a^2*b^14*c^3*d*k + 256*a^3*b^10*c^6*f*i + 22272*a^ \\
&3*b^12*c^4*d*k - 6144*a^4*b^8*c^7*f*i - 2304*a^4*b^8*c^7*g*h - 282624*a^4*b \\
&^10*c^5*d*k + 17408*a^5*b^6*c^8*f*i - 9216*a^5*b^6*c^8*g*h - 1536*a^5*b^7*c \\
&^7*e*j + 2003712*a^5*b^8*c^6*d*k + 69632*a^6*b^4*c^9*f*i + 184320*a^6*b^4*c \\
&^9*g*h + 92160*a^6*b^5*c^8*e*j - 8426496*a^6*b^6*c^7*d*k - 147456*a^7*b^2*c \\
&^10*f*i - 442368*a^7*b^2*c^10*g*h - 663552*a^7*b^3*c^9*e*j + 20484096*a^7*b \\
&^4*c^8*d*k - 25411584*a^8*b^2*c^9*d*k - 256*a^3*b^13*c^3*f*k + 768*a^4*b^9* \\
&c^6*h*i + 9216*a^4*b^11*c^4*f*k + 4608*a^5*b^7*c^7*h*i + 768*a^5*b^8*c^6*g* \\
&j - 113920*a^5*b^9*c^5*f*k - 55296*a^6*b^5*c^8*h*i - 46080*a^6*b^6*c^7*g*j \\
&+ 658944*a^6*b^7*c^6*f*k + 24576*a^7*b^3*c^9*h*i + 331776*a^7*b^4*c^8*g*j - \\
&1812480*a^7*b^5*c^7*f*k - 638976*a^8*b^2*c^9*g*j + 1810432*a^8*b^3*c^8*f*k \\
&- 768*a^4*b^12*c^3*h*k - 256*a^5*b^9*c^5*i*j + 8448*a^5*b^10*c^4*h*k + 148 \\
&48*a^6*b^7*c^6*i*j + 3840*a^6*b^8*c^5*h*k - 79872*a^7*b^5*c^7*i*j - 427008* \\
&a^7*b^6*c^6*h*k - 8192*a^8*b^3*c^8*i*j + 2150400*a^8*b^4*c^7*h*k - 3784704* \\
&a^9*b^2*c^8*h*k - 8960*a^6*b^10*c^3*j*k + 166656*a^7*b^8*c^4*j*k - 1217536* \\
&a^8*b^6*c^5*j*k + 4198400*a^9*b^4*c^6*j*k - 6340608*a^10*b^2*c^7*j*k)/(512* \\
&(4096*a^10*c^10 + a^4*b^12*c^4 - 24*a^5*b^10*c^5 + 240*a^6*b^8*c^6 - 1280*a \\
&^7*b^6*c^7 + 3840*a^8*b^4*c^8 - 6144*a^9*b^2*c^9)) + \text{root}(56371445760*a^11* \\
&b^8*c^12*z^4 - 503316480*a^8*b^14*c^9*z^4 + 47185920*a^7*b^16*c^8*z^4 - 262
\end{aligned}$$

$$\begin{aligned}
& 1440*a^6*b^18*c^7*z^4 + 65536*a^5*b^20*c^6*z^4 - 171798691840*a^14*b^2*c^15 \\
& *z^4 + 193273528320*a^13*b^4*c^14*z^4 - 128849018880*a^12*b^6*c^13*z^4 - 16 \\
& 911433728*a^10*b^10*c^11*z^4 + 3523215360*a^9*b^12*c^10*z^4 + 68719476736*a \\
& ^15*c^16*z^4 - 47185920*a^7*b^16*c^5*k*z^3 + 2621440*a^6*b^18*c^4*k*z^3 - 6 \\
& 5536*a^5*b^20*c^3*k*z^3 + 171798691840*a^14*b^2*c^12*k*z^3 - 193273528320*a \\
& ^13*b^4*c^11*k*z^3 + 128849018880*a^12*b^6*c^10*k*z^3 + 16911433728*a^10*b^ \\
& 10*c^8*k*z^3 - 3523215360*a^9*b^12*c^7*k*z^3 - 56371445760*a^11*b^8*c^9*k*z \\
& ^3 + 503316480*a^8*b^14*c^6*k*z^3 - 68719476736*a^15*c^13*k*z^3 + 1536*a*b^ \\
& 18*c^6*d*f*z^2 - 2571632640*a^9*b^5*c^11*d*j*z^2 + 2548039680*a^9*b^3*c^13* \\
& d*h*z^2 + 2453667840*a^9*b^7*c^9*e*k*z^2 + 2181038080*a^12*b^3*c^10*i*k*z^2 \\
& - 6492782592*a^10*b^5*c^10*e*k*z^2 + 1509949440*a^9*b^3*c^13*e*g*z^2 - 140 \\
& 1421824*a^8*b^5*c^12*d*h*z^2 - 1226833920*a^9*b^8*c^8*g*k*z^2 - 1321205760* \\
& a^9*b^2*c^14*d*f*z^2 - 2793406464*a^11*b*c^13*d*j*z^2 + 9563013120*a^11*b^3 \\
& *c^11*e*k*z^2 + 890634240*a^8*b^7*c^10*d*j*z^2 - 754974720*a^8*b^5*c^12*e*g \\
& *z^2 - 570425344*a^11*b^5*c^9*i*k*z^2 + 732168192*a^7*b^6*c^12*d*f*z^2 - 58 \\
& 1959680*a^10*b^4*c^11*f*j*z^2 - 603979776*a^10*b^2*c^13*e*i*z^2 + 534773760 \\
& *a^11*b^3*c^11*h*j*z^2 - 558366720*a^8*b^9*c^8*e*k*z^2 - 4781506560*a^11*b^ \\
& 4*c^10*g*k*z^2 - 2013265920*a^13*b*c^11*i*k*z^2 - 456130560*a^9*b^4*c^12*f* \\
& h*z^2 + 384040960*a^9*b^6*c^10*f*j*z^2 - 264241152*a^10*b^7*c^8*i*k*z^2 + 3 \\
& 90463488*a^7*b^7*c^11*d*h*z^2 + 279183360*a^8*b^10*c^7*g*k*z^2 + 301989888* \\
& a^10*b^3*c^12*g*i*z^2 + 222822400*a^9*b^9*c^7*i*k*z^2 - 366280704*a^6*b^8*c \\
& ^11*d*f*z^2 - 330301440*a^8*b^4*c^13*d*f*z^2 + 254017536*a^8*b^6*c^11*f*h*z \\
& ^2 - 1887436800*a^10*b*c^14*d*h*z^2 + 188743680*a^10*b^2*c^13*f*h*z^2 - 185 \\
& 303040*a^7*b^9*c^9*d*j*z^2 - 117964800*a^10*b^5*c^10*h*j*z^2 - 6039797760*a \\
& ^12*b*c^12*e*k*z^2 - 67502080*a^8*b^11*c^6*i*k*z^2 + 121634816*a^11*b^2*c^1 \\
& 2*f*j*z^2 + 188743680*a^7*b^7*c^11*e*g*z^2 - 115671040*a^8*b^8*c^9*f*j*z^2 \\
& + 125829120*a^8*b^6*c^11*e*i*z^2 + 10813440*a^7*b^13*c^5*i*k*z^2 + 76677120 \\
& *a^7*b^11*c^7*e*k*z^2 - 38338560*a^7*b^12*c^6*g*k*z^2 - 37355520*a^9*b^7*c^ \\
& 9*h*j*z^2 - 917504*a^6*b^15*c^4*i*k*z^2 + 32768*a^5*b^17*c^3*i*k*z^2 - 6291 \\
& 4560*a^8*b^7*c^10*g*i*z^2 + 23101440*a^8*b^9*c^8*h*j*z^2 - 4349952*a^7*b^11 \\
& *c^7*h*j*z^2 + 2949120*a^6*b^14*c^5*g*k*z^2 + 337920*a^6*b^13*c^6*h*j*z^2 - \\
& 98304*a^5*b^16*c^4*g*k*z^2 - 7680*a^5*b^15*c^5*h*j*z^2 - 61931520*a^7*b^8* \\
& c^10*f*h*z^2 + 23592960*a^7*b^9*c^9*g*i*z^2 + 17940480*a^7*b^10*c^8*f*j*z^2 \\
& - 47185920*a^7*b^8*c^10*e*i*z^2 - 5898240*a^6*b^13*c^6*e*k*z^2 - 3538944*a \\
& ^6*b^11*c^8*g*i*z^2 - 1347584*a^6*b^12*c^7*f*j*z^2 + 196608*a^5*b^15*c^5*e* \\
& k*z^2 + 196608*a^5*b^13*c^7*g*i*z^2 + 35840*a^5*b^14*c^6*f*j*z^2 + 96583680 \\
& *a^5*b^10*c^10*d*f*z^2 + 23371776*a^6*b^11*c^8*d*j*z^2 - 51609600*a^6*b^9*c \\
& ^10*d*h*z^2 + 7077888*a^6*b^10*c^9*e*i*z^2 + 6144000*a^6*b^10*c^9*f*h*z^2 - \\
& 1677312*a^5*b^13*c^7*d*j*z^2 - 393216*a^5*b^12*c^8*e*i*z^2 + 61440*a^5*b^1 \\
& 2*c^8*f*h*z^2 + 53760*a^4*b^15*c^6*d*j*z^2 - 46080*a^4*b^14*c^7*f*h*z^2 + 1 \\
& 536*a^3*b^16*c^6*f*h*z^2 - 23592960*a^6*b^9*c^10*e*g*z^2 + 1179648*a^5*b^11 \\
& *c^9*e*g*z^2 + 829440*a^4*b^13*c^8*d*h*z^2 + 368640*a^5*b^11*c^9*d*h*z^2 - \\
& 105984*a^3*b^15*c^7*d*h*z^2 + 4608*a^2*b^17*c^6*d*h*z^2 - 15175680*a^4*b^12 \\
& *c^9*d*f*z^2 + 1428480*a^3*b^14*c^8*d*f*z^2 - 73728*a^2*b^16*c^7*d*f*z^2 + \\
& 4108320768*a^10*b^3*c^12*d*j*z^2 - 1207959552*a^10*b*c^14*e*g*z^2 - 5788139
\end{aligned}$$





$b^3c^{11}d^*g^*j^*z - 206438400a^7b^4c^{11}d^*e^*j^*z - 101646336a^8b^6c^8f^*h^*k^*z - 29245440a^9b^7c^6h^*j^*k^*z - 60817408a^{11}b^2c^9f^*j^*k^*z + 57835520a^8b^8c^6f^*j^*k^*z + 219414528a^7b^2c^{13}d^*e^*h^*z - 70778880a^{10}b^2c^{10}f^*h^*k^*z + 677376a^7b^{11}c^4h^*j^*k^*z - 645120a^8b^9c^5h^*j^*k^*z - 53760a^6b^{13}c^3h^*j^*k^*z + 31457280a^8b^7c^7g^*i^*k^*z - 62914560a^8b^6c^8e^*i^*k^*z - 94371840a^7b^7c^8e^*g^*k^*z - 221773824a^6b^3c^{13}d^*e^*f^*z + 82575360a^9b^2c^{11}d^*i^*j^*z + 11796480a^{10}b^2c^{10}h^*i^*j^*z - 11796480a^7b^9c^6g^*i^*k^*z - 8970240a^7b^{10}c^5f^*j^*k^*z + 103219200a^7b^5c^{10}d^*g^*j^*z - 2457600a^8b^6c^8h^*i^*j^*z + 1769472a^6b^{11}c^5g^*i^*k^*z + 921600a^7b^8c^7h^*i^*j^*z + 673792a^6b^{12}c^4f^*j^*k^*z - 138240a^6b^{10}c^6h^*i^*j^*z - 98304a^5b^{13}c^4g^*i^*k^*z - 17920a^5b^{14}c^3f^*j^*k^*z + 7680a^5b^{12}c^5h^*i^*j^*z - 97136640a^5b^{10}c^7d^*f^*k^*z - 29491200a^9b^3c^{10}g^*h^*j^*z + 58982400a^9b^2c^{11}e^*h^*j^*z + 23592960a^7b^8c^7e^*i^*k^*z - 22169088a^6b^{11}c^5d^*j^*k^*z + 21381120a^7b^8c^7f^*h^*k^*z + 14745600a^8b^5c^9g^*h^*j^*z + 42854400a^6b^9c^7d^*h^*k^*z - 109707264a^7b^3c^{12}d^*g^*h^*z - 3686400a^7b^7c^8g^*h^*j^*z - 3538944a^6b^{10}c^6e^*i^*k^*z + 1645056a^5b^{13}c^4d^*j^*k^*z - 890880a^6b^{10}c^6f^*h^*k^*z + 460800a^6b^9c^7g^*h^*j^*z - 330240a^5b^{12}c^5f^*h^*k^*z + 196608a^5b^{12}c^5e^*i^*k^*z - 53760a^4b^{15}c^3d^*j^*k^*z + 46080a^4b^{14}c^4f^*h^*k^*z - 23040a^5b^{11}c^6g^*h^*j^*z - 1536a^3b^{16}c^3f^*h^*k^*z - 29491200a^8b^4c^{10}e^*h^*j^*z - 17203200a^7b^6c^9d^*i^*j^*z + 11796480a^6b^9c^7e^*g^*k^*z + 110886912a^6b^4c^{12}d^*f^*g^*z + 7372800a^7b^6c^9e^*h^*j^*z + 40108032a^8b^2c^{12}d^*h^*i^*z + 6451200a^6b^8c^8d^*i^*j^*z + 2359296a^8b^3c^{11}f^*h^*i^*z - 967680a^5b^{10}c^7d^*i^*j^*z - 921600a^6b^8c^8e^*h^*j^*z - 829440a^4b^{13}c^5d^*h^*k^*z - 589824a^5b^{11}c^6e^*g^*k^*z - 491520a^6b^7c^9f^*h^*i^*z + 184320a^5b^9c^8f^*h^*i^*z + 105984a^3b^{15}c^4d^*h^*k^*z + 69120a^5b^{11}c^6d^*h^*k^*z + 53760a^4b^{12}c^6d^*i^*j^*z + 46080a^5b^{10}c^7e^*h^*j^*z - 27648a^4b^{11}c^7f^*h^*i^*z - 4608a^2b^{17}c^3d^*h^*k^*z + 1536a^3b^{13}c^6f^*h^*i^*z - 25804800a^6b^7c^9d^*g^*j^*z - 88473600a^6b^4c^{12}d^*e^*h^*z + 51609600a^6b^6c^{10}d^*e^*j^*z - 84934656a^7b^2c^{13}d^*f^*g^*z + 117964800a^5b^5c^{12}d^*e^*f^*z + 15160320a^4b^{12}c^6d^*f^*k^*z - 45613056a^7b^3c^{12}d^*f^*i^*z + 44236800a^6b^5c^{11}d^*g^*h^*z - 10321920a^6b^6c^{10}d^*h^*i^*z + 7077888a^7b^4c^{11}d^*h^*i^*z - 5898240a^7b^4c^{11}f^*g^*h^*z + 4718592a^8b^2c^{12}f^*g^*h^*z + 3225600a^5b^9c^8d^*g^*j^*z + 2949120a^6b^6c^{10}f^*g^*h^*z + 2396160a^5b^8c^9d^*h^*i^*z - 1428480a^3b^{14}c^5d^*f^*k^*z - 737280a^5b^8c^9f^*g^*h^*z - 161280a^4b^{11}c^7d^*g^*j^*z + 92160a^4b^{10}c^8f^*g^*h^*z + 73728a^2b^{16}c^4d^*f^*k^*z - 50688a^3b^{12}c^7d^*h^*i^*z - 27648a^4b^{10}c^8d^*h^*i^*z - 4608a^3b^{12}c^7f^*g^*h^*z + 4608a^2b^{14}c^6d^*h^*i^*z - 58982400a^5b^6c^{11}d^*f^*g^*z + 11796480a^7b^3c^{12}e^*f^*h^*z + 8847360a^5b^7c^{10}d^*f^*i^*z - 6635520a^5b^7c^{10}d^*g^*h^*z - 6451200a^5b^8c^9d^*e^*j^*z - 5898240a^6b^5c^{11}e^*f^*h^*z - 3809280a^4b^9c^9d^*f^*i^*z + 2359296a^6b^5c^{11}d^*f^*i^*z + 1474560a^5b^7c^{10}e^*f^*h^*z + 681984a^3b^{11}c^8d^*f^*i^*z + 322560a^4b^{10}c^8d^*e^*j^*z - 276480a^4b^9c^9d^*g^*h^*z - 184320a^4b^9c^9e^*f^*h^*z + 179712a^3b^{11}c^8d^*g^*h^*z - 55296a^2b^{13}c^7d^*f^*i^*z - 13824a^2b^{13}c^7d^*g^*h^*z + 9216a^3b^{11}c^8e^*f^*h^*z + 16220160a^4b^8c^{10}d^*f^*g^*z + 13$

271040\*a^5\*b^6\*c^11\*d\*e\*h\*z - 2396160\*a^3\*b^10\*c^9\*d\*f\*g\*z + 552960\*a^4\*b^8\*c^10\*d\*e\*h\*z - 359424\*a^3\*b^10\*c^9\*d\*e\*h\*z + 175104\*a^2\*b^12\*c^8\*d\*f\*g\*z + 27648\*a^2\*b^12\*c^8\*d\*e\*h\*z - 32440320\*a^4\*b^7\*c^11\*d\*e\*f\*z + 4792320\*a^3\*b^9\*c^10\*d\*e\*f\*z - 350208\*a^2\*b^11\*c^9\*d\*e\*f\*z + 1439170560\*a^10\*b\*c^11\*d\*h\*k\*z - 3361603584\*a^10\*b^3\*c^9\*d\*j\*k\*z + 603979776\*a^10\*b\*c^11\*e\*g\*k\*z + 407371776\*a^12\*b\*c^9\*h\*j\*k\*z + 201326592\*a^11\*b\*c^10\*g\*i\*k\*z + 346816512\*a^7\*b\*c^14\*d^2\*g\*z + 129761280\*a^11\*b\*c^10\*h^2\*k\*z + 121896960\*a^10\*b\*c^11\*f^2\*k\*z + 458752\*a^6\*b^15\*c\*i\*k^2\*z + 19660800\*a^11\*b\*c^10\*g\*j^2\*z + 49152\*a^5\*b^16\*c\*g\*k^2\*z + 7077888\*a^9\*b\*c^12\*g\*h^2\*z + 94464\*a\*b^17\*c^4\*d^2\*k\*z - 19660800\*a^8\*b\*c^13\*f^2\*g\*z - 66816\*a\*b^14\*c^7\*d^2\*i\*z + 214272\*a\*b^13\*c^8\*d^2\*g\*z - 428544\*a\*b^12\*c^9\*d^2\*e\*z + 2390753280\*a^11\*b^4\*c^7\*g\*k^2\*z - 2411421696\*a^6\*b^7\*c^9\*d^2\*k\*z - 6603079680\*a^8\*b^3\*c^11\*d^2\*k\*z + 3715891200\*a^9\*b\*c^12\*d^2\*k\*z - 880803840\*a^10\*c^12\*d\*f\*k\*z - 1623195648\*a^10\*b^6\*c^6\*g\*k^2\*z - 402653184\*a^11\*c^11\*e\*i\*k\*z - 1509949440\*a^12\*b^2\*c^8\*g\*k^2\*z - 209715200\*a^12\*c^10\*f\*j\*k\*z - 330301440\*a^9\*c^13\*d\*e\*j\*z + 3019898880\*a^12\*b\*c^9\*e\*k^2\*z - 125829120\*a^11\*c^11\*f\*h\*k\*z - 110100480\*a^10\*c^12\*d\*i\*j\*z - 198180864\*a^8\*c^14\*d\*e\*h\*z - 15728640\*a^11\*c^11\*h\*i\*j\*z - 1226833920\*a^9\*b^7\*c^6\*e\*k^2\*z - 47185920\*a^10\*c^12\*e\*h\*j\*z - 66060288\*a^9\*c^13\*d\*h\*i\*z - 1090519040\*a^12\*b^3\*c^7\*i\*k^2\*z + 1022754816\*a^6\*b^2\*c^14\*d^2\*e\*z + 5216108544\*a^7\*b^5\*c^10\*d^2\*k\*z + 754974720\*a^9\*b^2\*c^11\*e^2\*k\*z + 721529856\*a^5\*b^9\*c^8\*d^2\*k\*z + 613416960\*a^9\*b^8\*c^5\*g\*k^2\*z - 642318336\*a^5\*b^4\*c^13\*d^2\*e\*z - 4781506560\*a^11\*b^3\*c^8\*e\*k^2\*z - 398131200\*a^12\*b^3\*c^7\*j^2\*k\*z - 511377408\*a^6\*b^3\*c^13\*d^2\*g\*z - 377487360\*a^8\*b^4\*c^10\*e^2\*k\*z + 285212672\*a^11\*b^5\*c^6\*i\*k^2\*z + 199065600\*a^11\*b^5\*c^6\*j^2\*k\*z + 279183360\*a^8\*b^9\*c^5\*e\*k^2\*z + 321159168\*a^5\*b^5\*c^12\*d^2\*g\*z + 188743680\*a^9\*b^4\*c^9\*g^2\*k\*z + 132120576\*a^10\*b^7\*c^5\*i\*k^2\*z - 150994944\*a^10\*b^2\*c^10\*g^2\*k\*z - 111411200\*a^9\*b^9\*c^4\*i\*k^2\*z - 126812160\*a^10\*b^3\*c^9\*h^2\*k\*z + 225312768\*a^7\*b^2\*c^13\*d^2\*i\*z - 139591680\*a^8\*b^10\*c^4\*g\*k^2\*z - 49766400\*a^10\*b^7\*c^5\*j^2\*k\*z - 145463040\*a^4\*b^11\*c^7\*d^2\*k\*z - 94371840\*a^8\*b^6\*c^8\*g^2\*k\*z + 223395840\*a^4\*b^6\*c^12\*d^2\*e\*z + 33751040\*a^8\*b^11\*c^3\*i\*k^2\*z - 78970880\*a^9\*b^3\*c^10\*f^2\*k\*z + 94371840\*a^7\*b^6\*c^9\*e^2\*k\*z + 25165824\*a^10\*b^4\*c^8\*i^2\*k\*z + 6220800\*a^9\*b^9\*c^4\*j^2\*k\*z + 39223296\*a^9\*b^5\*c^8\*h^2\*k\*z - 311040\*a^8\*b^11\*c^3\*j^2\*k\*z + 16777216\*a^11\*b^2\*c^9\*i^2\*k\*z - 10485760\*a^9\*b^6\*c^7\*i^2\*k\*z - 5406720\*a^7\*b^13\*c^2\*i\*k^2\*z + 1376256\*a^7\*b^10\*c^5\*i^2\*k\*z - 1310720\*a^8\*b^8\*c^6\*i^2\*k\*z - 262144\*a^6\*b^12\*c^4\*i^2\*k\*z + 16384\*a^5\*b^14\*c^3\*i^2\*k\*z + 10354688\*a^11\*b^2\*c^9\*i\*j^2\*z + 23592960\*a^7\*b^8\*c^7\*g^2\*k\*z + 3859744\*a^7\*b^7\*c^8\*f^2\*k\*z + 19169280\*a^7\*b^12\*c^3\*g\*k^2\*z - 2048000\*a^9\*b^6\*c^7\*i\*j^2\*z - 1520640\*a^7\*b^9\*c^6\*h^2\*k\*z - 1105920\*a^8\*b^7\*c^7\*h^2\*k\*z + 849920\*a^8\*b^8\*c^6\*i\*j^2\*z - 393216\*a^10\*b^4\*c^8\*i\*j^2\*z + 195840\*a^6\*b^11\*c^5\*h^2\*k\*z - 145920\*a^7\*b^10\*c^5\*i\*j^2\*z + 11520\*a^5\*b^13\*c^4\*h^2\*k\*z + 11008\*a^6\*b^12\*c^4\*i\*j^2\*z - 2304\*a^4\*b^15\*c^3\*h^2\*k\*z - 256\*a^5\*b^14\*c^3\*i\*j^2\*z - 25362432\*a^10\*b^3\*c^9\*g\*j^2\*z - 24739840\*a^8\*b^5\*c^9\*f^2\*k\*z - 38338560\*a^7\*b^11\*c^4\*e\*k^2\*z - 2949120\*a^6\*b^10\*c^6\*g^2\*k\*z - 1474560\*a^6\*b^14\*c^2\*g\*k^2\*z + 50724864\*a^10\*b^2\*c^10\*e\*j^2\*z + 147456\*a^5\*b^12\*c^5\*g^2\*k\*z - 15150080\*a^6\*b^9\*c^7\*f^2\*k\*z + 13271040\*a^9\*b^5\*c^8\*g\*j^2\*z - 111697920\*a^4

$$\begin{aligned}
& *b^7*c^{11}*d^2*g*z - 3563520*a^8*b^7*c^7*g*j^2*z + 3538944*a^9*b^2*c^{11}*h^2* \\
& i*z + 2912000*a^5*b^{11}*c^6*f^2*k*z - 737280*a^7*b^6*c^9*h^2*i*z + 506880*a^7* \\
& b^9*c^6*g*j^2*z - 291840*a^4*b^{13}*c^5*f^2*k*z + 276480*a^6*b^8*c^8*h^2*i* \\
& z - 41472*a^5*b^{10}*c^7*h^2*i*z - 34560*a^6*b^{11}*c^5*g*j^2*z + 14080*a^3*b^{11} \\
& 5*c^4*f^2*k*z + 2304*a^4*b^{12}*c^6*h^2*i*z + 768*a^5*b^{13}*c^4*g*j^2*z - 256* \\
& a^2*b^{17}*c^3*f^2*k*z - 11796480*a^6*b^8*c^8*e^2*k*z - 26542080*a^9*b^4*c^9* \\
& e*j^2*z + 19837440*a^3*b^{13}*c^6*d^2*k*z + 2949120*a^6*b^{13}*c^3*e*k^2*z + 58 \\
& 9824*a^5*b^{10}*c^7*e^2*k*z - 98304*a^5*b^{15}*c^2*e*k^2*z - 10354688*a^8*b^2*c^ \\
& ^{12}*f^2*i*z - 43646976*a^6*b^4*c^{12}*d^2*i*z - 8847360*a^8*b^3*c^{11}*g*h^2*z \\
& + 7127040*a^8*b^6*c^8*e*j^2*z + 4423680*a^7*b^5*c^{10}*g*h^2*z + 2048000*a^6* \\
& b^6*c^{10}*f^2*i*z - 1771776*a^2*b^{15}*c^5*d^2*k*z - 1105920*a^6*b^7*c^9*g*h^2 \\
& *z - 1013760*a^7*b^8*c^7*e*j^2*z - 849920*a^5*b^8*c^9*f^2*i*z + 393216*a^7* \\
& b^4*c^{11}*f^2*i*z + 145920*a^4*b^{10}*c^8*f^2*i*z + 138240*a^5*b^9*c^8*g*h^2*z \\
& + 69120*a^6*b^{10}*c^6*e*j^2*z - 11008*a^3*b^{12}*c^7*f^2*i*z - 6912*a^4*b^{11}* \\
& c^7*g*h^2*z - 1536*a^5*b^{12}*c^5*e*j^2*z + 256*a^2*b^{14}*c^6*f^2*i*z - 325877 \\
& 76*a^5*b^6*c^{11}*d^2*i*z + 25362432*a^7*b^3*c^{12}*f^2*g*z + 21657600*a^4*b^8* \\
& c^{10}*d^2*i*z + 17694720*a^8*b^2*c^{12}*e*h^2*z - 50724864*a^7*b^2*c^{13}*e*f^2* \\
& z - 13271040*a^6*b^5*c^{11}*f^2*g*z - 8847360*a^7*b^4*c^{11}*e*h^2*z - 5810688* \\
& a^3*b^{10}*c^9*d^2*i*z + 3563520*a^5*b^7*c^{10}*f^2*g*z + 2211840*a^6*b^6*c^{10}* \\
& e*h^2*z + 845568*a^2*b^{12}*c^8*d^2*i*z - 506880*a^4*b^9*c^9*f^2*g*z - 276480 \\
& *a^5*b^8*c^9*e*h^2*z + 34560*a^3*b^{11}*c^8*f^2*g*z + 13824*a^4*b^{10}*c^8*e*h^2* \\
& z - 768*a^2*b^{13}*c^7*f^2*g*z + 26542080*a^6*b^4*c^{12}*e*f^2*z + 23362560*a^ \\
& ^3*b^9*c^{10}*d^2*g*z - 46725120*a^3*b^8*c^{11}*d^2*e*z - 7127040*a^5*b^6*c^{11}* \\
& e*f^2*z - 2965248*a^2*b^{11}*c^9*d^2*g*z + 1013760*a^4*b^8*c^{10}*e*f^2*z - 691 \\
& 20*a^3*b^{10}*c^9*e*f^2*z + 1536*a^2*b^{12}*c^8*e*f^2*z + 5930496*a^2*b^{10}*c^{10} \\
& *d^2*e*z + 1006632960*a^{13}*b*c^8*i*k^2*z + 3246391296*a^{10}*b^5*c^7*e*k^2*z \\
& + 318504960*a^{13}*b*c^8*j^2*k*z + 61538304*a^{10}*b^{10}*c^2*k^3*z - 603979776*a^ \\
& ^{10}*c^{12}*e^2*k*z - 693633024*a^7*c^{15}*d^2*e*z - 231211008*a^8*c^{14}*d^2*i*z \\
& - 67108864*a^{12}*c^{10}*i^2*k*z - 13107200*a^{12}*c^{10}*i*j^2*z - 16384*a^5*b^{17}* \\
& i*k^2*z - 39321600*a^{11}*c^{11}*e*j^2*z - 4718592*a^{10}*c^{12}*h^2*i*z - 2304*b^{11} \\
& 9*c^3*d^2*k*z + 13107200*a^9*c^{13}*f^2*i*z + 2304*b^{16}*c^6*d^2*i*z - 1415577 \\
& 6*a^9*c^{13}*e*h^2*z + 39321600*a^8*c^{14}*e*f^2*z - 4833280*a^9*b^{12}*k^3*z - \\
& 6912*b^{15}*c^7*d^2*g*z + 6962544640*a^{14}*b^2*c^6*k^3*z + 13824*b^{14}*c^8*d^2 \\
& *e*z + 1876951040*a^{12}*b^6*c^4*k^3*z - 4844421120*a^{13}*b^4*c^5*k^3*z - 4377 \\
& 80480*a^{11}*b^8*c^3*k^3*z - 4294967296*a^{15}*c^7*k^3*z + 163840*a^8*b^{14}*k^3* \\
& z + 6144000*a^{10}*b*c^8*f*i*j*k - 5898240*a^{10}*b*c^8*g*h*j*k - 41287680*a^9* \\
& b*c^9*d*g*j*k + 4472832*a^9*b*c^9*f*h*i*k + 18432000*a^9*b*c^9*e*f*j*k + 33 \\
& 91488*a^8*b*c^{10}*e*h*i*j + 1228800*a^8*b*c^{10}*f*g*i*j - 24772608*a^8*b*c^{10} \\
& *d*g*h*k + 13418496*a^8*b*c^{10}*e*f*h*k + 11649024*a^8*b*c^{10}*d*f*i*k + 7372 \\
& 80*a^7*b*c^{11}*f*g*h*i - 768*a*b^{15}*c^3*d*f*i*k - 19307520*a^7*b*c^{11}*d*f*h* \\
& j + 16367616*a^7*b*c^{11}*d*e*i*j + 3686400*a^7*b*c^{11}*e*f*g*j + 34947072*a^7 \\
& *b*c^{11}*d*e*f*k + 2304*a*b^{14}*c^4*d*f*g*k - 180*a*b^{13}*c^5*d*f*h*j + 110592 \\
& 00*a^6*b*c^{12}*d*e*h*i + 5160960*a^6*b*c^{12}*d*f*g*i + 2211840*a^6*b*c^{12}*e*f \\
& *g*h - 4608*a*b^{13}*c^5*d*e*f*k - 2304*a*b^{11}*c^7*d*f*g*i + 4608*a*b^{10}*c^8* \\
& d*e*f*i + 15482880*a^5*b*c^{13}*d*e*f*g - 13824*a*b^9*c^9*d*e*f*g - 225976320
\end{aligned}$$

$a^8 b^2 c^9 d e^j k + 112988160 a^8 b^3 c^8 d g^j k - 11427840 a^{10} b^2 c^7 h^i j k - 4177920 a^9 b^4 c^6 h^i j k + 1399296 a^8 b^6 c^5 h^i j k - 26880 a^6 b^{10} c^3 h^i j k + 16128 a^7 b^8 c^4 h^i j k - 61562880 a^9 b^2 c^8 d^i j k + 20090880 a^9 b^3 c^7 g^h j k + 119623680 a^7 b^4 c^8 d e^j k + 10485760 a^9 b^3 c^7 f^i j k - 40181760 a^9 b^2 c^8 e^h j k - 3778560 a^8 b^5 c^6 g^h j k - 137797632 a^7 b^2 c^{10} d e^h k - 1248768 a^7 b^7 c^5 f^i j k + 229376 a^6 b^9 c^4 f^i j k + 220160 a^8 b^5 c^6 f^i j k - 209664 a^7 b^7 c^5 g^h j k + 80640 a^6 b^9 c^4 g^h j k - 8960 a^5 b^{11} c^3 f^i j k - 59811840 a^7 b^5 c^7 d g^j k + 53084160 a^8 b^2 c^9 e g^i k - 11120640 a^8 b^4 c^7 f g^j k + 10455552 a^7 b^6 c^6 d^i j k - 9216000 a^9 b^2 c^8 f g^j k + 7557120 a^8 b^4 c^7 e^h j k + 7397376 a^8 b^3 c^8 f^h i k + 5230080 a^7 b^6 c^6 f g^j k - 37675008 a^8 b^2 c^9 d^h i k - 3633408 a^6 b^8 c^5 d^i j k + 2211840 a^8 b^4 c^7 d^i j k + 68898816 a^7 b^3 c^9 d g^h k - 1695744 a^8 b^2 c^9 g^h i j - 1400832 a^7 b^4 c^8 g^h i j + 967680 a^7 b^5 c^7 f^h i k - 783360 a^6 b^7 c^6 f^h i k - 741888 a^6 b^8 c^5 f g^j k + 499968 a^5 b^{10} c^4 d^i j k + 419328 a^7 b^6 c^6 e^h j k - 253440 a^6 b^6 c^7 g^h i j - 161280 a^6 b^8 c^5 e^h j k + 42240 a^5 b^9 c^5 f^h i k + 26880 a^5 b^{10} c^4 f g^j k - 26880 a^4 b^{12} c^3 d^i j k + 13824 a^4 b^{11} c^4 f^h i k + 11520 a^5 b^8 c^6 g^h i j - 768 a^3 b^{13} c^3 f^h i k + 22241280 a^8 b^3 c^8 e f^j k + 14222592 a^6 b^7 c^6 d g^j k - 10460160 a^7 b^5 c^7 e f^j k + 8847360 a^7 b^4 c^8 e g^i k - 7741440 a^7 b^4 c^8 f g^h k - 7077888 a^6 b^6 c^7 e g^i k + 6935040 a^6 b^6 c^7 d^h i k - 6709248 a^8 b^2 c^9 f g^h k - 3612672 a^7 b^4 c^8 d^h i k + 2801664 a^7 b^3 c^9 e^h i j + 2506752 a^7 b^3 c^9 f g^i j + 2419200 a^6 b^6 c^7 f g^h k - 1661184 a^5 b^9 c^5 d g^j k + 1483776 a^6 b^7 c^6 e f^j k - 1463040 a^5 b^8 c^6 d^h i k + 884736 a^5 b^8 c^6 e g^i k + 838656 a^6 b^5 c^8 f g^i j + 506880 a^6 b^5 c^8 e^h i j + 80640 a^4 b^{11} c^4 d g^j k - 53760 a^5 b^9 c^5 e f^j k - 53760 a^5 b^7 c^7 f g^i j - 46080 a^4 b^{10} c^5 f g^h k - 34560 a^5 b^8 c^6 f g^h k + 25344 a^3 b^{12} c^4 d^h i k - 23040 a^5 b^7 c^7 e^h i j + 13824 a^4 b^{10} c^5 d^h i k + 2304 a^3 b^{12} c^4 f g^h k - 2304 a^2 b^{14} c^3 d^h i k - 29030400 a^6 b^5 c^8 d g^h k + 28606464 a^7 b^3 c^9 d f^i k - 28445184 a^6 b^6 c^7 d e^j k + 58060800 a^6 b^4 c^9 d e^h k + 15482880 a^7 b^3 c^9 e f^h k - 8183808 a^7 b^2 c^{10} d g^i j - 6718464 a^6 b^5 c^8 d f^i k - 5087232 a^7 b^2 c^{10} e g^h j - 5013504 a^7 b^2 c^{10} e f^i j - 4838400 a^6 b^5 c^8 e f^h k + 4112640 a^5 b^7 c^7 d g^h k - 3663360 a^5 b^7 c^7 d f^i k + 3322368 a^5 b^8 c^6 d e^j k - 2285568 a^6 b^4 c^9 d g^i j + 1896960 a^4 b^9 c^6 d f^i k + 1843200 a^6 b^3 c^{10} f g^h i - 1677312 a^6 b^4 c^9 e f^i j - 1658880 a^6 b^4 c^9 e g^h j + 68345856 a^6 b^3 c^{10} d e f^k + 783360 a^5 b^5 c^9 f g^h i + 741888 a^5 b^6 c^8 d g^i j - 34172928 a^6 b^4 c^9 d f g^k - 340992 a^3 b^{11} c^5 d f^i k - 161280 a^4 b^{10} c^5 d e^j k + 138240 a^4 b^9 c^6 d g^h k + 107520 a^5 b^6 c^8 e f^i j + 92160 a^4 b^9 c^6 e f^h k - 89856 a^3 b^{11} c^5 d g^h k - 80640 a^4 b^8 c^7 d g^i j + 69120 a^5 b^7 c^7 e f^h k + 69120 a^5 b^6 c^8 e g^h j + 27648 a^2 b^{13} c^4 d f^i k + 18432 a^4 b^7 c^8 f g^h i + 6912 a^2 b^{13} c^4 d g^h k - 4608 a^3 b^{11} c^5 e f^h k - 2304 a^3 b^9 c^7 f g^h i + 27164160 a^5 b^6 c^8 d f g^k - 22164480 a^6 b^3 c^{10} d f^h j - 54328320 a^5 b^5 c^9 d$

$e*f*k - 17473536*a^7*b^2*c^{10}*d*f*g*k - 8225280*a^5*b^6*c^8*d*e*h*k - 80870$   
 $40*a^4*b^8*c^7*d*f*g*k + 5677056*a^6*b^3*c^{10}*e*f*g*j - 5529600*a^6*b^2*c^1$   
 $1*d*g*h*i + 4571136*a^6*b^3*c^{10}*d*e*i*j - 3686400*a^6*b^2*c^{11}*e*f*h*i + 2$   
 $805120*a^5*b^5*c^9*d*f*h*j - 2211840*a^5*b^4*c^{10}*d*g*h*i - 1566720*a^5*b^4$   
 $*c^{10}*e*f*h*i - 1483776*a^5*b^5*c^9*d*e*i*j + 1198080*a^3*b^{10}*c^6*d*f*g*k$   
 $+ 437184*a^4*b^7*c^8*d*f*h*j - 322560*a^5*b^5*c^9*e*f*g*j + 317952*a^4*b^6*$   
 $c^9*d*g*h*i - 276480*a^4*b^8*c^7*d*e*h*k + 179712*a^3*b^{10}*c^6*d*e*h*k + 16$   
 $1280*a^4*b^7*c^8*d*e*i*j - 146268*a^3*b^9*c^7*d*f*h*j - 87552*a^2*b^{12}*c^5*$   
 $d*f*g*k - 36864*a^4*b^6*c^9*e*f*h*i - 13824*a^2*b^{12}*c^5*d*e*h*k + 9360*a^2$   
 $*b^{11}*c^6*d*f*h*j + 6912*a^3*b^8*c^8*d*g*h*i - 6912*a^2*b^{10}*c^7*d*g*h*i +$   
 $4608*a^3*b^8*c^8*e*f*h*i - 24551424*a^6*b^2*c^{11}*d*e*g*j + 16174080*a^4*b^7$   
 $*c^8*d*e*f*k + 5419008*a^5*b^4*c^{10}*d*e*g*j + 5160960*a^5*b^3*c^{11}*d*f*g*i$   
 $+ 4423680*a^5*b^3*c^{11}*e*f*g*h + 4423680*a^5*b^3*c^{11}*d*e*h*i - 2396160*a^3$   
 $*b^9*c^7*d*e*f*k - 635904*a^4*b^5*c^{10}*d*e*h*i - 483840*a^4*b^6*c^9*d*e*g*j$   
 $- 354816*a^3*b^7*c^9*d*f*g*i + 322560*a^4*b^5*c^{10}*d*f*g*i + 175104*a^2*b^$   
 $11*c^6*d*e*f*k + 138240*a^4*b^5*c^{10}*e*f*g*h + 59904*a^2*b^9*c^8*d*f*g*i -$   
 $13824*a^3*b^7*c^9*e*f*g*h - 13824*a^3*b^7*c^9*d*e*h*i + 13824*a^2*b^9*c^8*d$   
 $*e*h*i - 16588800*a^5*b^2*c^{12}*d*e*g*h - 10321920*a^5*b^2*c^{12}*d*e*f*i + 16$   
 $58880*a^4*b^4*c^{11}*d*e*g*h + 709632*a^3*b^6*c^{10}*d*e*f*i - 645120*a^4*b^4*c$   
 $^{11}*d*e*f*i + 124416*a^3*b^6*c^{10}*d*e*g*h - 119808*a^2*b^8*c^9*d*e*f*i - 41$   
 $472*a^2*b^8*c^9*d*e*g*h + 7741440*a^4*b^3*c^{12}*d*e*f*g - 2903040*a^3*b^5*c^$   
 $11*d*e*f*g + 387072*a^2*b^7*c^{10}*d*e*f*g - 381026304*a^{11}*b*c^7*d*j*k^2 - 2$   
 $41827840*a^{10}*b*c^8*d*h*k^2 - 65667072*a^{12}*b*c^6*h*j*k^2 - 169344*a^7*b^{11}$   
 $*c*h*j*k^2 - 25165824*a^{11}*b*c^7*g*i*k^2 - 4915200*a^{11}*b*c^7*g*j^2*k - 530$   
 $84160*a^8*b*c^{10}*e^2*i*k - 75497472*a^{10}*b*c^8*e*g*k^2 - 86704128*a^7*b*c^1$   
 $1*d^2*g*k + 565248*a^9*b*c^9*h*i^2*j - 168448*a^6*b^{12}*c*f*j*k^2 - 24576*a^$   
 $5*b^{13}*c*g*i*k^2 - 1769472*a^9*b*c^9*g*h^2*k - 17694720*a^9*b*c^9*e*i^2*k -$   
 $411264*a^5*b^{13}*c*d*j*k^2 - 11520*a^4*b^{14}*c*f*h*k^2 + 4915200*a^8*b*c^{10}$   
 $f^2*g*k + 2580480*a^9*b*c^9*e*i*j^2 - 2496000*a^9*b*c^9*f*h*j^2 - 1543680*a^$   
 $8*b*c^{10}*f*h^2*j + 33408*a*b^{14}*c^4*d^2*i*k - 59512320*a^6*b*c^{12}*d^2*f*j$   
 $+ 5087232*a^7*b*c^{11}*e^2*h*j + 2727936*a^8*b*c^{10}*d*i^2*j - 26496*a^3*b^{15}$   
 $*c*d*h*k^2 + 1105920*a^7*b*c^{11}*e*h^2*i - 107136*a*b^{13}*c^5*d^2*g*k + 10260*$   
 $a*b^{12}*c^6*d^2*h*j - 10616832*a^6*b*c^{12}*e^2*g*i - 3538944*a^7*b*c^{11}*e*g*i$   
 $^2 + 1843200*a^7*b*c^{11}*d*h*i^2 - 18432*a^2*b^{16}*c*d*f*k^2 - 15552000*a^8*b$   
 $*c^{10}*d*f*j^2 + 24551424*a^6*b*c^{12}*d*e^2*j - 37062144*a^5*b*c^{13}*d^2*f*h +$   
 $2580480*a^6*b*c^{12}*e*f^2*i + 214272*a*b^{12}*c^6*d^2*e*k + 65664*a*b^{10}*c^8*$   
 $d^2*g*i - 25074*a*b^{11}*c^7*d^2*f*j + 420*a*b^{12}*c^6*d*f^2*j + 6*a*b^{15}*c^3*$   
 $d*f*j^2 + 23224320*a^5*b*c^{13}*d^2*e*i + 384*a*b^{12}*c^6*d*f*i^2 - 5985792*a^$   
 $6*b*c^{12}*d*f*h^2 + 206010*a*b^9*c^9*d^2*f*h - 131328*a*b^9*c^9*d^2*e*i - 63$   
 $00*a*b^{10}*c^8*d*f^2*h + 1350*a*b^{11}*c^7*d*f*h^2 + 16588800*a^5*b*c^{13}*d*e^2$   
 $*h + 3456*a*b^{10}*c^8*d*f*g^2 + 435456*a*b^8*c^{10}*d^2*e*g + 13824*a*b^8*c^{10}$   
 $*d*e^2*f + 3932160*a^{11}*c^8*h*i*j*k + 27525120*a^{10}*c^9*d*i*j*k + 82575360*$   
 $a^9*c^{10}*d*e*j*k + 11796480*a^{10}*c^9*e*h*j*k + 16515072*a^9*c^{10}*d*h*i*k +$   
 $49545216*a^8*c^{11}*d*e*h*k - 2457600*a^8*c^{11}*e*f*i*j - 1474560*a^7*c^{12}*e*f$   
 $*h*i - 10321920*a^6*c^{13}*d*e*f*i + 737077248*a^{10}*b^3*c^6*d*j*k^2 - 5188147$

$$\begin{aligned}
& 20a^9b^5c^5d^2j^2k^2 + 441354240a^9b^3c^7d^2h^2k^2 - 429871104a^6b^2c^{11}d^2e^2k - 272212992a^8b^5c^6d^2h^2k^2 + 305731584a^5b^4c^{10}d^2e^2k + 192412800a^8b^7c^4d^2j^2k^2 + 111912960a^{11}b^3c^5h^2j^2k^2 + 214935552a^6b^3c^{10}d^2g^2k + 202427136a^7b^6c^6d^2f^2k^2 - 49904640a^{10}b^5c^4h^2j^2k^2 - 178513920a^8b^4c^7d^2f^2k^2 - 152865792a^5b^5c^9d^2g^2k - 114388992a^7b^2c^{10}d^2i^2k + 94961664a^{10}b^2c^7e^2i^2k - 9039872a^{11}b^2c^6i^2j^2k - 56494080a^{10}b^4c^5f^2j^2k - 2052096a^{10}b^4c^5i^2j^2k + 1327360a^9b^6c^4i^2j^2k - 158080a^8b^8c^3i^2j^2k - 47480832a^{10}b^3c^6g^2i^2k + 45576960a^9b^6c^4f^2j^2k + 7954560a^9b^7c^3h^2j^2k - 104693760a^9b^3c^7e^2g^2k + 142080a^8b^9c^2h^2j^2k + 16017408a^{10}b^3c^6g^2j^2k - 4930560a^9b^5c^5g^2j^2k - 3649536a^9b^2c^8h^2i^2k - 1843200a^8b^4c^7h^2i^2k + 85524480a^8b^5c^6e^2g^2k + 474240a^8b^7c^4g^2j^2k + 288000a^7b^6c^6h^2i^2k + 63360a^6b^8c^5h^2i^2k - 8064a^5b^{10}c^4h^2i^2k - 1152a^4b^{12}c^3h^2i^2k - 15437824a^{11}b^2c^6f^2j^2k - 32034816a^{10}b^2c^7e^2j^2k - 14369280a^8b^8c^3f^2j^2k - 13271040a^8b^3c^8g^2i^2k + 80267904a^7b^7c^5d^2h^2k^2 + 79626240a^7b^2c^{10}e^2g^2k + 11059200a^9b^5c^5g^2i^2k + 8847360a^9b^2c^8g^2i^2k - 42113280a^7b^9c^3d^2j^2k + 6389760a^8b^7c^4g^2i^2k + 5898240a^8b^4c^7g^2i^2k - 37601280a^9b^4c^6f^2h^2k - 2949120a^7b^9c^3g^2i^2k + 2242560a^7b^{10}c^2f^2j^2k - 2211840a^7b^5c^7g^2i^2k + 1769472a^6b^7c^6g^2i^2k + 749568a^8b^3c^8h^2i^2j - 442368a^7b^6c^6g^2i^2k + 442368a^6b^{11}c^2g^2i^2k - 442368a^6b^8c^5g^2i^2k + 317952a^7b^5c^7h^2i^2j - 221184a^5b^9c^5g^2i^2k + 73728a^5b^{10}c^4g^2i^2k + 38400a^6b^7c^6h^2i^2j - 1920a^5b^9c^5h^2i^2j + 9861120a^9b^4c^6e^2j^2k - 110280960a^4b^6c^9d^2e^2k - 93330432a^6b^8c^5d^2f^2k + 24645888a^8b^6c^5f^2h^2k + 6359040a^8b^3c^8g^2h^2k - 22118400a^9b^4c^6e^2i^2k - 3862528a^8b^2c^9f^2i^2k - 2248704a^7b^4c^8f^2i^2k - 1290240a^9b^2c^8g^2i^2j - 948480a^8b^6c^5e^2j^2k - 860160a^8b^4c^7g^2i^2j - 414720a^7b^5c^7g^2h^2k + 303360a^6b^6c^7f^2i^2k + 266880a^5b^8c^6f^2i^2k - 224640a^6b^7c^6g^2h^2k - 80640a^7b^6c^6g^2i^2j - 72960a^4b^{10}c^5f^2i^2k + 17280a^5b^9c^5g^2h^2k + 12672a^6b^8c^5g^2i^2j + 5504a^3b^{12}c^4f^2i^2k + 3456a^4b^{11}c^4g^2h^2k - 384a^5b^{10}c^4g^2i^2j - 128a^2b^{14}c^3f^2i^2k + 30265344a^6b^4c^9d^2i^2k - 12779520a^8b^6c^5e^2i^2k - 11796480a^8b^3c^8e^2i^2k - 8847360a^7b^3c^9e^2i^2k - 7925760a^{10}b^2c^7f^2h^2k + 7077888a^6b^5c^8e^2i^2k - 39813120a^7b^3c^9e^2g^2k - 73175040a^9b^2c^8d^2f^2k + 5898240a^7b^8c^4e^2i^2k + 5542272a^6b^{11}c^2d^2j^2k - 5420160a^7b^8c^4f^2h^2k + 55140480a^4b^7c^8d^2g^2k + 1271808a^7b^3c^9g^2h^2j - 1040384a^8b^2c^9f^2i^2j + 884736a^7b^5c^7e^2i^2k - 884736a^6b^{10}c^3e^2i^2k + 884736a^6b^7c^6e^2i^2k - 884736a^5b^7c^7e^2i^2k - 697344a^7b^4c^8f^2i^2j + 414720a^6b^5c^8g^2h^2j + 226560a^6b^{10}c^3f^2h^2k - 147456a^5b^9c^5e^2i^2k - 121856a^6b^6c^7f^2i^2j + 82560a^5b^{12}c^2f^2h^2k + 49152a^5b^{12}c^2e^2i^2k - 17280a^5b^7c^7g^2h^2j + 8960a^5b^8c^6f^2i^2j + 14194944a^5b^6c^8d^2i^2k - 12718080a^8b^2c^9e^2h^2k - 10615680a^4b^8c^7d^2i^2k - 265420
\end{aligned}$$

$80a^6b^4c^9e^2g^k - 23592960a^7b^7c^5e^*g^k^2 - 5142528a^8b^3c^8$   
 $*f^*h^j^2 + 5068800a^7b^2c^{10}f^2h^*j - 3755520a^7b^3c^9f^*h^2*j + 333$   
 $6192a^7b^3c^9f^2g^*k + 3000960a^6b^4c^9f^2h^*j + 2893824a^3b^{10}c$   
 $^6d^2i^*k + 1720320a^8b^3c^8e^*i^j^2 + 1704960a^6b^5c^8f^2g^*k - 13$   
 $07520a^5b^7c^7f^2g^*k - 1085760a^6b^5c^8f^*h^2*j - 959040a^7b^5c^$   
 $7f^*h^j^2 + 829440a^7b^4c^8e^*h^2*k - 552960a^7b^2c^{10}g^*h^2*i - 5529$   
 $60a^6b^4c^9g^*h^2*i + 449280a^6b^6c^7e^*h^2*k - 422784a^2b^{12}c^5d$   
 $^2i^*k + 253440a^4b^9c^6f^2g^*k + 161280a^7b^5c^7e^*i^j^2 - 145152a$   
 $^5b^6c^8g^*h^2*i + 103200a^6b^7c^6f^*h^j^2 + 41280a^5b^6c^8f^2h^*j$   
 $- 37188a^4b^8c^7f^2h^*j - 34560a^5b^8c^6e^*h^2*k - 25344a^6b^7c^$   
 $6e^*i^j^2 - 17280a^3b^{11}c^5f^2g^*k + 13536a^5b^7c^7f^*h^2*j - 6912a$   
 $^4b^{10}c^5e^*h^2*k + 5490a^4b^9c^6f^*h^2*j - 3456a^4b^8c^7g^*h^2*i +$   
 $1980a^3b^{10}c^6f^2h^*j + 810a^5b^9c^5f^*h^j^2 + 768a^5b^9c^5e^*i^$   
 $j^2 + 384a^2b^{13}c^4f^2g^*k - 270a^4b^{11}c^4f^*h^j^2 - 180a^3b^{11}c^$   
 $5f^*h^2*j - 30a^2b^{12}c^5f^2h^*j + 6a^3b^{13}c^3f^*h^j^2 + 30067200a^6$   
 $b^2c^{11}d^2h^*j + 13271040a^6b^5c^8e^*g^2*k - 10857600a^6b^9c^4d^*h$   
 $*k^2 + 2949120a^6b^9c^4e^*g^k^2 + 2654208a^5b^6c^8e^2g^*k + 2125824*$   
 $a^7b^3c^9d^i^2*j + 1658880a^6b^3c^{10}e^2h^*j - 1419264a^6b^4c^9f^*$   
 $g^2*j - 1327104a^5b^7c^7e^*g^2*k - 921600a^7b^2c^{10}f^*g^2*j - 737280*$   
 $a^7b^2c^{10}f^*h^i^2 - 568320a^6b^4c^9f^*h^i^2 + 207360a^4b^{13}c^2d^*h$   
 $*k^2 - 147456a^5b^{11}c^3e^*g^k^2 - 136704a^5b^6c^8f^*h^i^2 + 133632a^$   
 $6b^5c^8d^i^2*j - 96768a^5b^7c^7d^i^2*j + 80640a^5b^6c^8f^*g^2*j -$   
 $69120a^5b^5c^9e^2h^*j + 13440a^4b^9c^6d^i^2*j - 5760a^5b^{11}c^3*$   
 $d^*h^k^2 - 2304a^4b^8c^7f^*h^i^2 + 384a^3b^{10}c^6f^*h^i^2 + 11930112a^$   
 $8b^2c^9d^*h^j^2 - 11646720a^3b^9c^7d^2g^*k + 8432640a^7b^2c^{10}d^*h$   
 $^2*j + 24140160a^5b^{10}c^4d^*f^k^2 - 6672384a^7b^2c^{10}e^*f^2*k + 44501$   
 $76a^7b^4c^8d^*h^j^2 + 4337280a^6b^4c^9d^*h^2*j - 3870720a^8b^2c^9*$   
 $e^*g^j^2 - 3409920a^6b^4c^9e^*f^2*k - 2885760a^5b^4c^{10}d^2h^*j - 2844$   
 $288a^4b^6c^9d^2h^*j + 2615040a^5b^6c^8e^*f^2*k - 1687680a^6b^6c^7$   
 $*d^*h^j^2 + 1482624a^2b^{11}c^6d^2g^*k - 1290240a^6b^2c^{11}f^2g^*i + 11$   
 $05920a^6b^3c^{10}e^*h^2*i + 1019412a^3b^8c^8d^2h^*j - 1007424a^5b^6*$   
 $c^8d^*h^2*j - 860160a^5b^4c^{10}f^2g^*i - 645120a^7b^4c^8e^*g^j^2 - 50$   
 $6880a^4b^8c^7e^*f^2*k + 290304a^5b^5c^9e^*h^2*i + 197460a^5b^8c^6*$   
 $d^*h^j^2 - 143802a^2b^{10}c^7d^2h^*j + 80640a^6b^6c^7e^*g^j^2 - 80640a$   
 $^4b^6c^9f^2g^*i + 51948a^4b^8c^7d^*h^2*j + 34560a^3b^{10}c^6e^*f^2*k$   
 $+ 12672a^3b^8c^8f^2g^*i + 10800a^3b^{10}c^6d^*h^2*j + 6912a^4b^7c^$   
 $8e^*h^2*i - 2304a^5b^8c^6e^*g^j^2 - 768a^2b^{12}c^5e^*f^2*k - 684a^3b$   
 $^12c^4d^*h^j^2 - 540a^2b^{12}c^5d^*h^2*j - 384a^2b^{10}c^7f^2g^*i - 90*$   
 $a^4b^{10}c^5d^*h^j^2 + 18a^2b^{14}c^3d^*h^j^2 + 23385600a^6b^2c^{11}d^*f^$   
 $2*j + 23293440a^3b^8c^8d^2e^*k + 6137856a^6b^3c^{10}d^*g^2*j - 5677056$   
 $*a^6b^2c^{11}e^2f^*j + 5308416a^6b^2c^{11}e^*g^2*i - 5308416a^5b^3c^{11}$   
 $e^2g^*i - 3786240a^4b^{12}c^3d^*f^k^2 - 3538944a^6b^3c^{10}e^*g^i^2 + 26$   
 $54208a^5b^4c^{10}e^*g^2*i + 1658880a^6b^3c^{10}d^*h^i^2 - 1354752a^5b^5$   
 $*c^9d^*g^2*j - 1105920a^5b^4c^{10}f^*g^2*h - 884736a^5b^5c^9e^*g^i^2 -$   
 $552960a^6b^2c^{11}f^*g^2*h + 357120a^3b^{14}c^2d^*f^k^2 + 322560a^5b^4*$



$c^{10}e^{2f*j} + 262656a^5b^5c^9d*h*i^2 + 120960a^4b^7c^8*d*g^2*j - 55$   
 $296a^4b^7c^8*d*h*i^2 - 34560a^4b^6c^9*f*g^2*h + 3456a^3b^8c^8*f*g^2$   
 $2*h + 1152a^3b^9c^7*d*h*i^2 + 1152a^2b^{11}c^6*d*h*i^2 - 13149696a^7b$   
 $^3c^9*d*f*j^2 - 11612160a^5b^2c^{12}d^2*g*i + 10906560a^4b^5c^{10}d^2*$   
 $f*j - 7418880a^5b^3c^{11}d^2*f*j + 3148992a^6b^5c^8*d*f*j^2 - 2985696*$   
 $a^3b^7c^9d^2*f*j - 2965248a^2b^{10}c^7d^2*e*k + 1720320a^5b^3c^{11}e$   
 $*f^2*i - 1658880a^6b^2c^{11}e*g*h^2 + 1596672a^3b^6c^{10}d^2*g*i - 1505$   
 $280a^4b^6c^9*d*f^2*j - 829440a^5b^4c^{10}e*g*h^2 - 508032a^2b^8c^9*$   
 $d^2*g*i + 378954a^2b^9c^8d^2*f*j + 362880a^5b^4c^{10}d*f^2*j + 296964$   
 $*a^3b^8c^8*d*f^2*j + 161280a^4b^5c^{10}e*f^2*i - 77070a^4b^9c^6*d*f*$   
 $j^2 - 30240a^5b^7c^7*d*f*j^2 - 25344a^3b^7c^9e*f^2*i - 20736a^4b^6$   
 $*c^9e*g*h^2 - 19278a^2b^{10}c^7*d*f^2*j + 8820a^3b^{11}c^5*d*f*j^2 + 768$   
 $*a^2b^9c^8e*f^2*i - 378a^2b^{13}c^4*d*f*j^2 - 5419008a^5b^3c^{11}d*e^$   
 $2*j - 4423680a^5b^2c^{12}e^2*f*h + 4147200a^5b^3c^{11}d*g^2*h - 2580480$   
 $*a^6b^2c^{11}d*f*i^2 - 967680a^5b^4c^{10}d*f*i^2 + 483840a^4b^5c^{10}d$   
 $*e^2*j - 414720a^4b^5c^{10}d*g^2*h - 138240a^4b^4c^{11}e^2*f*h + 64512*$   
 $a^4b^6c^9*d*f*i^2 + 39168a^3b^8c^8*d*f*i^2 - 31104a^3b^7c^9*d*g^2*h$   
 $+ 13824a^3b^6c^{10}e^2*f*h + 10368a^2b^9c^8*d*g^2*h - 9216a^2b^{10}c$   
 $^7*d*f*i^2 + 15630336a^5b^2c^{12}d*f^2*h - 14459904a^4b^3c^{12}d^2*f*h$   
 $+ 9630144a^3b^5c^{11}d^2*f*h - 8764416a^5b^3c^{11}d*f*h^2 - 3870720a^5$   
 $b^2c^{12}e*f^2*g - 3193344a^3b^5c^{11}d^2*e*i + 2867328a^4b^4c^{11}d*f$   
 $^2*h - 2095200a^2b^7c^{10}d^2*f*h - 1414080a^3b^6c^{10}d*f^2*h - 348364$   
 $80a^4b^2c^{13}d^2*e*g + 1016064a^2b^7c^{10}d^2*e*i - 645120a^4b^4c^1$   
 $1*e*f^2*g + 306720a^3b^7c^9*d*f*h^2 + 197820a^2b^8c^9*d*f^2*h + 14688$   
 $0a^4b^5c^{10}d*f*h^2 + 80640a^3b^6c^{10}e*f^2*g - 55350a^2b^9c^8*d*f$   
 $*h^2 - 2304a^2b^8c^9e*f^2*g - 3870720a^5b^2c^{12}d*f*g^2 - 1935360a^$   
 $4b^4c^{11}d*f*g^2 - 1658880a^4b^3c^{12}d*e^2*h + 725760a^3b^6c^{10}d*f$   
 $*g^2 + 17418240a^3b^4c^{12}d^2*e*g - 124416a^3b^5c^{11}d*e^2*h - 96768*$   
 $a^2b^8c^9*d*f*g^2 + 41472a^2b^7c^{10}d*e^2*h - 3919104a^2b^6c^{11}d^2$   
 $*e*g - 7741440a^4b^2c^{13}d*e^2*f + 2903040a^3b^4c^{12}d*e^2*f - 387072$   
 $*a^2b^6c^{11}d*e^2*f - 681246720a^9b*c^9d^2*k^2 + 265912320a^{11}b^3c^$   
 $5*e*k^3 + 188743680a^{12}b^2c^5*g*k^3 - 132956160a^{11}b^4c^4*g*k^3 - 521$   
 $01120a^{13}b*c^5*j^2*k^2 + 25722880a^{12}b^3c^4*i*k^3 + 19644416a^{11}b^5*$   
 $c^3*i*k^3 - 1583680a^9b^9c*j^2*k^2 - 9142272a^{10}b^7c^2*i*k^3 - 740229$   
 $12a^{10}b^5c^4*e*k^3 - 20643840a^{11}b*c^7*h^2*k^2 + 37011456a^{10}b^6c^3$   
 $*g*k^3 - 2293760a^9b^3c^7*i^3*k - 557056a^8b^5c^6*i^3*k + 147456a^7*$   
 $b^7c^5*i^3*k - 65536a^6b^{12}c*i^2*k^2 + 32768a^6b^9c^4*i^3*k - 8192a^$   
 $5b^{11}c^3*i^3*k + 430080a^{10}b*c^8*i^2*j^2 - 2880a^5b^{13}c*h^2*k^2 + 6$   
 $635520a^7b^4c^8*g^3*k - 4792320a^9b^8c^2*g*k^3 - 2211840a^6b^6c^7*$   
 $g^3*k + 1359360a^{10}b^2c^7*h*j^3 + 1173120a^9b^4c^6*h*j^3 + 743040a^7$   
 $*b^4c^8*h^3*j + 622080a^8b^2c^9*h^3*j + 221184a^5b^8c^6*g^3*k + 1071$   
 $36a^6b^6c^7*h^3*j - 32640a^8b^6c^5*h*j^3 - 5796a^7b^8c^4*h*j^3 + 5$   
 $40a^5b^8c^6*h^3*j - 270a^4b^{10}c^5*h^3*j + 210a^6b^{10}c^3*h*j^3 - 29$   
 $49120a^{10}b*c^8*f^2*k^2 + 17694720a^6b^3c^{10}e^3*k + 184320a^8b*c^{10}$   
 $h^2*i^2 - 3520a^3b^{15}c*f^2*k^2 + 9584640a^9b^7c^3*e*k^3 - 2293760a^9$

$$\begin{aligned}
& *b^3*c^7*f*j^3 - 2293760*a^6*b^3*c^{10}*f^3*j - 1769472*a^5*b^5*c^9*e^3*k - 8 \\
& 84736*a^6*b^3*c^{10}*g^3*i - 589824*a^7*b^3*c^9*g*i^3 - 491520*a^8*b^9*c^2*e* \\
& k^3 - 442368*a^5*b^5*c^9*g^3*i - 294912*a^6*b^5*c^8*g*i^3 - 199360*a^8*b^5* \\
& c^6*f*j^3 - 199360*a^5*b^5*c^9*f^3*j + 61920*a^7*b^7*c^5*f*j^3 + 61920*a^4* \\
& b^7*c^8*f^3*j - 49152*a^5*b^7*c^7*g*i^3 - 3682*a^6*b^9*c^4*f*j^3 - 3682*a^3 \\
& *b^9*c^7*f^3*j + 70*a^5*b^{11}*c^3*f*j^3 + 70*a^2*b^{11}*c^6*f^3*j + 3870720*a^ \\
& 8*b*c^{10}*e^2*j^2 + 430080*a^7*b*c^{11}*f^2*i^2 - 14152320*a^4*b^4*c^{11}*d^3*j \\
& + 10644480*a^5*b^2*c^{12}*d^3*j + 5483520*a^9*b^2*c^8*d*j^3 + 4269888*a^3*b^6 \\
& *c^{10}*d^3*j + 3538944*a^5*b^2*c^{12}*e^3*i - 1648128*a^5*b^3*c^{11}*f^3*h + 133 \\
& 0560*a^8*b^4*c^7*d*j^3 + 1179648*a^7*b^2*c^{10}*e*i^3 - 898560*a^6*b^3*c^{10}*f \\
& *h^3 - 826560*a^7*b^6*c^6*d*j^3 - 607068*a^2*b^8*c^9*d^3*j + 589824*a^6*b^4 \\
& *c^9*e*i^3 - 354240*a^5*b^5*c^9*f*h^3 - 354240*a^4*b^5*c^{10}*f^3*h + 145188* \\
& a^6*b^8*c^5*d*j^3 + 98304*a^5*b^6*c^8*e*i^3 + 43680*a^3*b^7*c^9*f^3*h - 216 \\
& 00*a^4*b^7*c^8*f*h^3 - 9576*a^5*b^{10}*c^4*d*j^3 + 1350*a^3*b^9*c^7*f*h^3 - 1 \\
& 050*a^2*b^9*c^8*f^3*h - 504*a*b^{14}*c^4*d^2*j^2 + 210*a^4*b^{12}*c^3*d*j^3 + 3 \\
& 870720*a^6*b*c^{12}*d^2*i^2 + 1658880*a^6*b*c^{12}*e^2*h^2 - 9792*a*b^{11}*c^7*d^ \\
& 2*i^2 + 16547328*a^4*b^2*c^{13}*d^3*h - 12306816*a^3*b^4*c^{12}*d^3*h + 3731097 \\
& 6*a^3*b^3*c^{13}*d^3*f + 3037824*a^2*b^6*c^{11}*d^3*h - 2654208*a^5*b^3*c^{11}*e* \\
& g^3 + 1949184*a^6*b^2*c^{11}*d*h^3 + 1296000*a^5*b^4*c^{10}*d*h^3 - 155520*a^4* \\
& b^6*c^9*d*h^3 - 40500*a*b^{10}*c^8*d^2*h^2 - 8100*a^3*b^8*c^8*d*h^3 + 4050*a^ \\
& 2*b^{10}*c^7*d*h^3 + 3870720*a^5*b*c^{13}*e^2*f^2 + 34836480*a^4*b*c^{14}*d^2*e^2 \\
& - 108864*a*b^9*c^9*d^2*g^2 - 8068032*a^2*b^5*c^{12}*d^3*f - 5623296*a^4*b^3* \\
& c^{12}*d*f^3 + 1737792*a^3*b^5*c^{11}*d*f^3 - 260190*a*b^8*c^{10}*d^2*f^2 - 21168 \\
& 0*a^2*b^7*c^{10}*d*f^3 - 435456*a*b^7*c^{11}*d^2*e^2 - 377487360*a^{12}*b*c^6*e*k \\
& ^3 + 1434977280*a^8*b^3*c^8*d^2*k^2 + 173408256*a^7*c^{12}*d^2*e*k + 3276800* \\
& a^{12}*c^7*i*j^2*k - 125829120*a^{13}*b*c^5*i*k^3 + 26214400*a^{12}*c^7*f*j*k^2 + \\
& 1179648*a^{10}*c^9*h^2*i*k + 13440*a^6*b^{13}*h*j*k^2 + 50331648*a^{11}*c^8*e*i* \\
& k^2 + 110100480*a^{10}*c^9*d*f*k^2 + 57802752*a^8*c^{11}*d^2*i*k + 9830400*a^{11} \\
& *c^8*e*j^2*k - 3276800*a^9*c^{10}*f^2*i*k + 4480*a^5*b^{14}*f*j*k^2 + 15728640* \\
& a^{11}*c^8*f*h*k^2 - 409600*a^9*c^{10}*f*i^2*j - 1152*b^{16}*c^3*d^2*i*k - 122051 \\
& 6352*a^7*b^5*c^7*d^2*k^2 + 3538944*a^9*c^{10}*e*h^2*k + 384000*a^8*c^{11}*f^2*h \\
& *j + 13440*a^4*b^{15}*d*j*k^2 + 384*a^3*b^{16}*f*h*k^2 + 20321280*a^7*c^{12}*d^2* \\
& h*j - 245760*a^8*c^{11}*f*h*i^2 + 3456*b^{15}*c^4*d^2*g*k - 270*b^{14}*c^5*d^2*h* \\
& j - 9830400*a^8*c^{11}*e*f^2*k + 4838400*a^9*c^{10}*d*h*j^2 + 2903040*a^8*c^{11}* \\
& d*h^2*j - 1966080*a^{10}*b*c^8*i^3*k + 1433600*a^9*b^9*c*i*k^3 + 1152*a^2*b^{11} \\
& 7*d*h*k^2 - 3686400*a^7*c^{12}*e^2*f*j - 53084160*a^7*b*c^{11}*e^3*k - 6912*b^{11} \\
& 4*c^5*d^2*e*k - 3456*b^{12}*c^7*d^2*g*i + 630*b^{13}*c^6*d^2*f*j + 2688000*a^7* \\
& c^{12}*d*f^2*j + 245760*a^8*b^{10}*c*g*k^3 - 2211840*a^6*c^{13}*e^2*f*h - 1720320 \\
& *a^7*c^{12}*d*f*i^2 - 9450*b^{11}*c^8*d^2*f*h + 6912*b^{11}*c^8*d^2*e*i + 1612800 \\
& *a^6*c^{13}*d*f^2*h - 1344000*a^{10}*b*c^8*f*j^3 - 1344000*a^7*b*c^{11}*f^3*j - 3 \\
& 93216*a^8*b*c^{10}*g*i^3 - 23616*a*b^{17}*c*d^2*k^2 - 20736*b^{10}*c^9*d^2*e*g - \\
& 75188736*a^4*b*c^{14}*d^3*f - 883200*a^6*b*c^{12}*f^3*h - 317952*a^7*b*c^{11}*f*h \\
& ^3 + 43416*a*b^{10}*c^8*d^3*j - 15482880*a^5*c^{14}*d*e^2*f - 10616832*a^5*b*c^ \\
& 13*e^3*g - 345060*a*b^8*c^{10}*d^3*h - 4262400*a^5*b*c^{13}*d*f^3 + 852768*a*b^ \\
& 7*c^{11}*d^3*f + 7350*a*b^9*c^9*d*f^3 + 584578368*a^6*b^7*c^6*d^2*k^2 + 93905
\end{aligned}$$

$$\begin{aligned}
& 920a^{12}b^3c^4j^2k^2 - 177997248a^5b^9c^5d^2k^2 - 50967040a^{11}b^5c^3j^2k^2 + 104693760a^9b^2c^8e^2k^2 + 12849984a^{10}b^7c^2j^2k^2 \\
& + 20021248a^{11}b^2c^6i^2k^2 - 85524480a^8b^4c^7e^2k^2 + 33223680a^{10}b^3c^6h^2k^2 + 4227072a^{10}b^4c^5i^2k^2 - 3973120a^9b^6c^4i^2k^2 + 344064a^7b^{10}c^2i^2k^2 - 81920a^8b^8c^3i^2k^2 - 113863 \\
& 68a^9b^5c^5h^2k^2 + 26173440a^9b^4c^6g^2k^2 - 21381120a^8b^6c^5g^2k^2 + 18874368a^{10}b^2c^7g^2k^2 + 501760a^9b^3c^7i^2j^2 + 45 \\
& 2160a^8b^7c^4h^2k^2 + 385920a^7b^9c^3h^2k^2 + 170240a^8b^5c^6i^2j^2 - 48960a^6b^{11}c^2h^2k^2 + 9216a^7b^7c^5i^2j^2 - 1984a^6b^9c^4i^2j^2 + 64a^5b^{11}c^3i^2j^2 + 5898240a^7b^8c^4g^2k^2 + 1 \\
& 419840a^8b^4c^7h^2j^2 + 1387008a^9b^2c^8h^2j^2 - 737280a^6b^{10}c^3g^2k^2 + 84960a^7b^6c^6h^2j^2 + 36864a^5b^{12}c^2g^2k^2 - 8010 \\
& a^6b^8c^5h^2j^2 - 180a^5b^{10}c^4h^2j^2 + 9a^4b^{12}c^3h^2j^2 + 14115840a^9b^3c^7f^2k^2 - 9231552a^7b^7c^5f^2k^2 + 23592960a^7b^6c^6e^2k^2 + 4984320a^8b^5c^6f^2k^2 + 3759040a^6b^9c^4f^2k^2 \\
& + 36190080a^4b^{11}c^4d^2k^2 + 967680a^8b^3c^8g^2j^2 - 727360a^5b^{11}c^3f^2k^2 + 276480a^7b^3c^9h^2i^2 + 161280a^7b^5c^7g^2j^2 + 140544a^6b^5c^8h^2i^2 + 72960a^4b^{13}c^2f^2k^2 + 25344a^5b^7c^7h^2i^2 - 20160a^6b^7c^6g^2j^2 + 576a^5b^9c^5g^2j^2 + 576a^4b^9c^6h^2i^2 + 3808000a^8b^2c^9f^2j^2 - 2949120a^6b^8c^5e^2k^2 \\
& + 1643712a^7b^4c^8f^2j^2 + 884736a^7b^2c^{10}g^2i^2 + 884736a^6b^4c^9g^2i^2 + 221184a^5b^6c^8g^2i^2 + 147456a^5b^{10}c^4e^2k^2 - 125440a^6b^6c^7f^2j^2 - 13790a^5b^8c^6f^2j^2 + 1785a^4b^{10}c^5f^2j^2 - 70a^3b^{12}c^4f^2j^2 - 4953600a^3b^{13}c^3d^2k^2 + 18427392 \\
& a^7b^2c^{10}d^2j^2 + 645120a^7b^3c^9e^2j^2 + 501760a^6b^3c^{10}f^2i^2 + 442944a^2b^{15}c^2d^2k^2 + 414720a^6b^3c^{10}g^2h^2 + 207360a^5b^5c^9g^2h^2 + 170240a^5b^5c^9f^2i^2 - 80640a^6b^5c^8e^2j^2 + 9216a^4b^7c^8f^2i^2 + 5184a^4b^7c^8g^2h^2 + 2304a^5b^7c^7e^2j^2 - 1984a^3b^9c^7f^2i^2 + 64a^2b^{11}c^6f^2i^2 - 4148928a^6b^4c^9d^2j^2 + 3538944a^6b^2c^{11}e^2i^2 + 1684224a^6b^2c^{11}f^2h^2 + 1264320a^5b^4c^{10}f^2h^2 - 1183392a^5b^6c^8d^2j^2 + 884736a^5b^4c^{10}e^2i^2 + 645750a^4b^8c^7d^2j^2 + 126720a^4b^6c^9f^2h^2 - 115920a^3b^{10}c^6d^2j^2 - 13950a^3b^8c^8f^2h^2 + 10836a^2b^{12}c^5d^2j^2 + 225a^2b^{10}c^7f^2h^2 + 1935360a^5b^3c^{11}d^2i^2 + 967680a^5b^3c^{11}f^2g^2 + 829440a^5b^3c^{11}e^2h^2 - 532224a^4b^5c^{10}d^2i^2 + 161280a^4b^5c^{10}f^2g^2 - 96768a^3b^7c^9d^2i^2 + 62784a^2b^9c^8d^2i^2 + 20736a^4b^5c^{10}e^2h^2 - 20160a^3b^7c^9f^2g^2 + 576a^2b^9c^8f^2g^2 + 11487744a^5b^2c^{12}d^2h^2 + 7962624a^5b^2c^{12}e^2g^2 + 35525376a^4b^2c^{13}d^2f^2 - 1412640a^3b^6c^{10}d^2h^2 + 461376a^4b^4c^{11}d^2h^2 + 375030a^2b^8c^9d^2h^2 + 8709120a^4b^3c^{12}d^2g^2 - 4354560a^3b^5c^{11}d^2g^2 + 979776a^2b^7c^{10}d^2g^2 + 645120a^4b^3c^{12}e^2f^2 - 80640a^3b^5c^{11}e^2f^2 + 2304a^2b^7c^{10}e^2f^2 - 15269184a^3b^4c^{12}d^2f^2 + 2870784a^2b^6c^{11}d^2f^2 - 17418240a^3b^3c^{13}d^2e^2 + 3919104a^2b^5c^{12}d^2e^2 + 384a^2b^18d^2f^2k^2 - 199229440a^{14}b^2c^3k^4 + 8388608a^{12}c^7i^2k^2 +
\end{aligned}$$

$$\begin{aligned}
& 75497472*a^{10}*c^9*e^{2*k^2} + 78400*a^8*b^{11}*j^{2*k^2} + 4096*a^5*b^{14}*i^{2*k^2} \\
& + 345600*a^{10}*c^9*h^{2*j^2} + 576*a^4*b^{15}*h^{2*k^2} + 57937920*a^{13}*b^4*c^{2*k^2} \\
& + 320000*a^9*c^{10}*f^{2*j^2} + 64*a^2*b^{17}*f^{2*k^2} + 16934400*a^8*c^{11}*d^{2*j^2} \\
& + 9*b^{16}*c^3*d^{2*j^2} + 3538944*a^7*c^{12}*e^{2*i^2} + 115200*a^7*c^{12}*f^{2*h^2} \\
& + 576*b^{13}*c^6*d^{2*i^2} + 2025*b^{12}*c^7*d^{2*h^2} + 6096384*a^6*c^{13}*d^{2*h^2} \\
& + 492800*a^{11}*b^2*c^6*j^4 + 351456*a^{10}*b^4*c^5*j^4 - 43120*a^9*b^6*c^4*j^4 \\
& + 5184*b^{11}*c^8*d^2*g^2 + 1225*a^8*b^8*c^3*j^4 + 131072*a^8*b^2*c^9*i^4 + \\
& 98304*a^7*b^4*c^8*i^4 + 32768*a^6*b^6*c^7*i^4 + 11025*b^{10}*c^9*d^2*f^2 + 4 \\
& 096*a^5*b^8*c^6*i^4 + 5644800*a^5*c^{14}*d^2*f^2 + 142560*a^6*b^4*c^9*h^4 + 1 \\
& 03680*a^7*b^2*c^{10}*h^4 + 32400*a^5*b^6*c^8*h^4 + 20736*b^9*c^{10}*d^2*e^2 + 2 \\
& 025*a^4*b^8*c^7*h^4 + 331776*a^5*b^4*c^{10}*g^4 + 492800*a^5*b^2*c^{12}*f^4 + 3 \\
& 51456*a^4*b^4*c^{11}*f^4 - 43120*a^3*b^6*c^{10}*f^4 + 1225*a^2*b^8*c^9*f^4 - 27 \\
& 433728*a^3*b^2*c^{14}*d^4 + 6446304*a^2*b^4*c^{13}*d^4 + a^2*b^{14}*c^3*f^2*j^2 - \\
& 81920*a^8*b^{11}*i*k^3 + 384000*a^{11}*c^8*h*j^3 + 138240*a^9*c^{10}*h^3*j + 474 \\
& 16320*a^6*c^{13}*d^3*j - 1134*b^{12}*c^7*d^3*j + 7077888*a^6*c^{13}*e^3*i + 26880 \\
& 00*a^{10}*c^9*d*j^3 + 786432*a^8*c^{11}*e*i^3 + 28449792*a^5*c^{14}*d^3*h - 77824 \\
& 00*a^{12}*b^6*c*k^4 + 17010*b^{10}*c^9*d^3*h + 580608*a^7*c^{12}*d*h^3 - 39690*b^ \\
& 9*c^{10}*d^3*f - 734832*a*b^6*c^{12}*d^4 + 268435456*a^{15}*c^4*k^4 + 576*b^{19}*d^ \\
& 2*k^2 + 409600*a^{11}*b^8*k^4 + 160000*a^{12}*c^7*j^4 + 65536*a^9*c^{10}*i^4 + 20 \\
& 736*a^8*c^{11}*h^4 + 49787136*a^4*c^{15}*d^4 + 160000*a^6*c^{13}*f^4 + 5308416*a^ \\
& 5*c^{14}*e^4 + 35721*b^8*c^{11}*d^4, z, n)*((768*a^2*b^{14}*c^6*d - 3145728*a^{10}* \\
& c^{12}*h - 5242880*a^{11}*c^{11}*j - 22020096*a^9*c^{13}*d - 22272*a^3*b^{12}*c^7*d + \\
& 282624*a^4*b^{10}*c^8*d - 2027520*a^5*b^8*c^9*d + 8847360*a^6*b^6*c^{10}*d - 2 \\
& 3396352*a^7*b^4*c^{11}*d + 34603008*a^8*b^2*c^{12}*d + 256*a^3*b^{13}*c^6*f - 921 \\
& 6*a^4*b^{11}*c^7*f + 122880*a^5*b^9*c^8*f - 819200*a^6*b^7*c^9*f + 2949120*a^ \\
& 7*b^5*c^{10}*f - 5505024*a^8*b^3*c^{11}*f + 768*a^4*b^{12}*c^6*h - 12288*a^5*b^{10} \\
& *c^7*h + 61440*a^6*b^8*c^8*h - 983040*a^8*b^4*c^{10}*h + 3145728*a^9*b^2*c^{11} \\
& *h + 256*a^5*b^{12}*c^5*j - 61440*a^7*b^8*c^7*j + 655360*a^8*b^6*c^8*j - 2949 \\
& 120*a^9*b^4*c^9*j + 6291456*a^{10}*b^2*c^{10}*j + 4194304*a^9*b*c^{12}*f)/(512*(4 \\
& 096*a^{10}*c^{10} + a^4*b^{12}*c^4 - 24*a^5*b^{10}*c^5 + 240*a^6*b^8*c^6 - 1280*a^7 \\
& *b^6*c^7 + 3840*a^8*b^4*c^8 - 6144*a^9*b^2*c^9)) + (x*(1572864*a^9*c^{13}*e + \\
& 524288*a^{10}*c^{12}*i - 1536*a^4*b^{10}*c^8*e + 30720*a^5*b^8*c^9*e - 245760*a^ \\
& 6*b^6*c^{10}*e + 983040*a^7*b^4*c^{11}*e - 1966080*a^8*b^2*c^{12}*e + 768*a^4*b^1 \\
& 1*c^7*g - 15360*a^5*b^9*c^8*g + 122880*a^6*b^7*c^9*g - 491520*a^7*b^5*c^{10}* \\
& g + 983040*a^8*b^3*c^{11}*g - 256*a^4*b^{12}*c^6*i + 4608*a^5*b^{10}*c^7*i - 3072 \\
& 0*a^6*b^8*c^8*i + 81920*a^7*b^6*c^9*i - 393216*a^9*b^2*c^{11}*i + 512*a^4*b^1 \\
& 5*c^3*k - 14592*a^5*b^{13}*c^4*k + 178944*a^6*b^{11}*c^5*k - 1223680*a^7*b^9*c^ \\
& 6*k + 5038080*a^8*b^7*c^7*k - 12484608*a^9*b^5*c^8*k + 17235968*a^{10}*b^3*c^ \\
& 9*k - 786432*a^9*b*c^{12}*g - 10223616*a^{11}*b*c^{10}*k))/(64*(4096*a^{10}*c^{10} + \\
& a^4*b^{12}*c^4 - 24*a^5*b^{10}*c^5 + 240*a^6*b^8*c^6 - 1280*a^7*b^6*c^7 + 3840* \\
& a^8*b^4*c^8 - 6144*a^9*b^2*c^9)) + (root(56371445760*a^{11}*b^8*c^{12}*z^4 - 50 \\
& 3316480*a^8*b^{14}*c^9*z^4 + 47185920*a^7*b^{16}*c^8*z^4 - 2621440*a^6*b^{18}*c^7 \\
& *z^4 + 65536*a^5*b^{20}*c^6*z^4 - 171798691840*a^{14}*b^2*c^{15}*z^4 + 1932735283 \\
& 20*a^{13}*b^4*c^{14}*z^4 - 128849018880*a^{12}*b^6*c^{13}*z^4 - 16911433728*a^{10}*b^ \\
& 10*c^{11}*z^4 + 3523215360*a^9*b^{12}*c^{10}*z^4 + 68719476736*a^{15}*c^{16}*z^4 - 47
\end{aligned}$$

$185920a^7b^{16}c^5k^3 + 2621440a^6b^{18}c^4k^3 - 65536a^5b^{20}c^3k^3 + 171798691840a^{14}b^2c^{12}k^3 - 193273528320a^{13}b^4c^{11}k^3 + 128849018880a^{12}b^6c^{10}k^3 + 16911433728a^{10}b^{10}c^8k^3 - 3523215360a^9b^{12}c^7k^3 - 56371445760a^{11}b^8c^9k^3 + 503316480a^8b^{14}c^6k^3 - 68719476736a^{15}c^{13}k^3 + 1536a^6b^{18}c^6d^2f^2 - 2571632640a^9b^5c^{11}d^2j^2 + 2548039680a^9b^3c^{13}d^2h^2 + 2453667840a^9b^7c^9e^2k^2 + 2181038080a^{12}b^3c^{10}i^2k^2 - 6492782592a^{10}b^5c^{10}e^2k^2 + 1509949440a^9b^3c^{13}e^2g^2 - 1401421824a^8b^5c^{12}d^2h^2 - 1226833920a^9b^8c^8g^2k^2 - 1321205760a^9b^2c^{14}d^2f^2 - 2793406464a^{11}b^3c^{11}e^2k^2 + 890634240a^8b^7c^{10}d^2j^2 - 754974720a^8b^5c^{12}e^2g^2 - 570425344a^{11}b^5c^9i^2k^2 + 732168192a^7b^6c^{12}d^2f^2 - 581959680a^{10}b^4c^{11}f^2j^2 - 603979776a^{10}b^2c^{13}e^2i^2 + 534773760a^{11}b^3c^{11}h^2j^2 - 558366720a^8b^9c^8e^2k^2 - 4781506560a^{11}b^4c^{10}g^2k^2 - 2013265920a^{13}b^3c^{11}i^2k^2 - 456130560a^9b^4c^{12}f^2h^2 + 384040960a^9b^6c^{10}f^2j^2 - 264241152a^{10}b^7c^8i^2k^2 + 390463488a^7b^7c^{11}d^2h^2 + 279183360a^8b^{10}c^7g^2k^2 + 301989888a^{10}b^3c^{12}g^2i^2 + 222822400a^9b^9c^7i^2k^2 - 366280704a^6b^8c^{11}d^2f^2 - 330301440a^8b^4c^{13}d^2f^2 + 254017536a^8b^6c^{11}f^2h^2 - 1887436800a^{10}b^3c^{14}d^2h^2 + 188743680a^{10}b^2c^{13}f^2h^2 - 185303040a^7b^9c^9d^2j^2 - 117964800a^{10}b^5c^{10}h^2j^2 - 6039797760a^{12}b^3c^{12}e^2k^2 - 67502080a^8b^{11}c^6i^2k^2 + 121634816a^{11}b^2c^{12}f^2j^2 + 188743680a^7b^7c^{11}e^2g^2 - 115671040a^8b^8c^9f^2j^2 + 125829120a^8b^6c^{11}e^2i^2 + 10813440a^7b^{13}c^5i^2k^2 + 76677120a^7b^{11}c^7e^2k^2 - 38338560a^7b^{12}c^6g^2k^2 - 37355520a^9b^7c^9h^2j^2 - 917504a^6b^{15}c^4i^2k^2 + 32768a^5b^{17}c^3i^2k^2 - 62914560a^8b^7c^{10}g^2i^2 + 23101440a^8b^9c^8h^2j^2 - 4349952a^7b^{11}c^7h^2j^2 + 2949120a^6b^{14}c^5g^2k^2 + 337920a^6b^{13}c^6h^2j^2 - 98304a^5b^{16}c^4g^2k^2 - 7680a^5b^{15}c^5h^2j^2 - 61931520a^7b^8c^{10}f^2h^2 + 23592960a^7b^9c^9g^2i^2 + 17940480a^7b^{10}c^8f^2j^2 - 47185920a^7b^8c^{10}e^2i^2 - 5898240a^6b^{13}c^6e^2k^2 - 3538944a^6b^{11}c^8g^2i^2 - 1347584a^6b^{12}c^7f^2j^2 + 196608a^5b^{15}c^5e^2k^2 + 196608a^5b^{13}c^7g^2i^2 + 35840a^5b^{14}c^6f^2j^2 + 96583680a^5b^{10}c^{10}d^2f^2 + 23371776a^6b^{11}c^8d^2j^2 - 51609600a^6b^9c^{10}d^2h^2 + 7077888a^6b^{10}c^9e^2i^2 + 6144000a^6b^{10}c^9f^2h^2 - 1677312a^5b^{13}c^7d^2j^2 - 393216a^5b^{12}c^8e^2i^2 + 61440a^5b^{12}c^8f^2h^2 + 53760a^4b^{15}c^6d^2j^2 - 46080a^4b^{14}c^7f^2h^2 + 1536a^3b^{16}c^6f^2h^2 - 23592960a^6b^9c^{10}e^2g^2 + 1179648a^5b^{11}c^9e^2g^2 + 829440a^4b^{13}c^8d^2h^2 + 368640a^5b^{11}c^9d^2h^2 - 105984a^3b^{15}c^7d^2h^2 + 4608a^2b^{17}c^6d^2h^2 - 15175680a^4b^{12}c^9d^2f^2 + 1428480a^3b^{14}c^8d^2f^2 - 73728a^2b^{16}c^7d^2f^2 + 4108320768a^{10}b^3c^{12}d^2j^2 - 1207959552a^{10}b^3c^{14}e^2g^2 - 578813952a^{12}b^3c^{12}h^2j^2 + 3246391296a^{10}b^6c^9g^2k^2 - 402653184a^{11}b^3c^{13}g^2i^2 + 3019898880a^{12}b^2c^{11}g^2k^2 - 440401920a^{10}b^3c^{14}f^2z^2 - 188743680a^{11}b^3c^{13}h^2z^2 + 1761607680a^{10}c^{15}d^2f^2 - 655360a^6b^{18}c^6k^2$

$z^2 - 94464a^8b^{17}c^7d^2z^2 + 6936330240a^8b^3c^{14}d^2z^2 + 2464874$   
 $496a^6b^7c^{12}d^2z^2 - 3963617280a^9b^3c^{15}d^2z^2 + 58007224320a^{13}$   
 $b^4c^8k^2z^2 + 14968422400a^{11}b^8c^6k^2z^2 + 805306368a^{11}c^{14}e$   
 $i^2z^2 - 35966156800a^{12}b^6c^7k^2z^2 + 419430400a^{12}c^{13}f^2j^2z^2 - 1$   
 $509949440a^9b^2c^{14}e^2z^2 + 251658240a^{11}c^{14}f^2h^2z^2 - 56874762240a$   
 $a^{14}b^2c^9k^2z^2 - 5400428544a^7b^5c^{13}d^2z^2 + 890470400a^9b^{12}$   
 $c^4k^2z^2 + 754974720a^8b^4c^{13}e^2z^2 - 730054656a^5b^9c^{11}d^2*$   
 $z^2 + 477102080a^{12}b^3c^{10}j^2z^2 + 477102080a^9b^3c^{13}f^2z^2 - 37$   
 $7487360a^9b^4c^{12}g^2z^2 + 301989888a^{10}b^2c^{13}g^2z^2 - 174325760*$   
 $a^{11}b^5c^9j^2z^2 - 126156800a^8b^{14}c^3k^2z^2 + 188743680a^8b^6c$   
 $^{11}g^2z^2 + 141557760a^{10}b^3c^{12}h^2z^2 - 174325760a^8b^5c^{12}f^2*$   
 $z^2 - 188743680a^7b^6c^{12}e^2z^2 - 4350935040a^{10}b^{10}c^5k^2z^2 + 1$   
 $46165760a^4b^{11}c^{10}d^2z^2 - 50331648a^{10}b^4c^{11}i^2z^2 + 11796480*$   
 $a^7b^{16}c^2k^2z^2 - 33554432a^{11}b^2c^{12}i^2z^2 + 11206656a^{10}b^7c$   
 $^8j^2z^2 + 8929280a^9b^9c^7j^2z^2 + 20971520a^9b^6c^{10}i^2z^2 -$   
 $2600960a^8b^{11}c^6j^2z^2 + 291840a^7b^{13}c^5j^2z^2 - 14080a^6b^{15}$   
 $c^4j^2z^2 + 256a^5b^{17}c^3j^2z^2 - 47185920a^7b^8c^{10}g^2z^2 - 2$   
 $6542080a^8b^7c^{10}h^2z^2 - 2752512a^7b^{10}c^8i^2z^2 + 2621440a^8b$   
 $^8c^9i^2z^2 + 524288a^6b^{12}c^7i^2z^2 - 32768a^5b^{14}c^6i^2z^2 +$   
 $9584640a^7b^9c^9h^2z^2 - 2359296a^9b^5c^{11}h^2z^2 - 1290240a^6b$   
 $^{11}c^8h^2z^2 + 46080a^5b^{13}c^7h^2z^2 + 2304a^4b^{15}c^6h^2z^2 +$   
 $5898240a^6b^{10}c^9g^2z^2 - 294912a^5b^{12}c^8g^2z^2 + 11206656a^7b$   
 $^7c^{11}f^2z^2 + 8929280a^6b^9c^{10}f^2z^2 + 23592960a^6b^8c^{11}e^2*$   
 $z^2 - 2600960a^5b^{11}c^9f^2z^2 + 291840a^4b^{13}c^8f^2z^2 - 14080a^$   
 $3b^{15}c^7f^2z^2 + 256a^2b^{17}c^6f^2z^2 - 19860480a^3b^{13}c^9d^2z$   
 $^2 - 1179648a^5b^{10}c^{10}e^2z^2 + 1771776a^2b^{15}c^8d^2z^2 - 4404019$   
 $20a^{13}b^3c^{11}j^2z^2 + 1207959552a^{10}c^{15}e^2z^2 + 134217728a^{12}c^{13}$   
 $i^2z^2 + 25769803776a^{15}c^{10}k^2z^2 + 16384a^5b^{20}k^2z^2 + 2304b^$   
 $19c^6d^2z^2 + 165150720a^9b^3c^{12}d^2g^2j^2z^2 + 23592960a^{10}b^3c^{11}g^2h^2j^2$   
 $z^2 + 169869312a^7b^3c^{14}d^2e^2f^2z^2 + 99090432a^8b^3c^{13}d^2g^2h^2z^2 - 3145728a^$   
 $9b^3c^{12}f^2h^2i^2z^2 + 56623104a^8b^3c^{13}d^2f^2i^2z^2 - 1536a^8b^{18}c^3d^2f^2k^2z^2 -$   
 $9437184a^8b^3c^{13}e^2f^2h^2z^2 + 1536a^8b^{15}c^6d^2f^2i^2z^2 - 4608a^8b^{14}c^7d^2f^2$   
 $g^2z^2 + 9216a^8b^{13}c^8d^2e^2f^2z^2 + 2173501440a^9b^5c^8d^2j^2k^2z^2 - 1987706880$   
 $a^9b^3c^{10}d^2h^2k^2z^2 + 1121255424a^8b^5c^9d^2h^2k^2z^2 + 861143040a^8b^4*$   
 $c^{10}d^2f^2k^2z^2 - 859963392a^7b^6c^9d^2f^2k^2z^2 - 780779520a^8b^7c^7d^2j^2k^2$   
 $z^2 - 754974720a^9b^3c^{10}e^2g^2k^2z^2 + 2222456832a^{11}b^3c^{10}d^2j^2k^2z^2 - 45416$   
 $4480a^{11}b^3c^8h^2j^2k^2z^2 + 377487360a^8b^5c^9e^2g^2k^2z^2 + 290979840a^{10}$   
 $b^4c^8f^2j^2k^2z^2 + 381026304a^6b^8c^8d^2f^2k^2z^2 + 412876800a^8b^2c^{12}d^2$   
 $e^2j^2z^2 + 301989888a^{10}b^2c^{10}e^2i^2k^2z^2 - 320421888a^7b^7c^8d^2h^2k^2z^2 + 1$   
 $85794560a^{10}b^5c^7h^2j^2k^2z^2 - 192020480a^9b^6c^7f^2j^2k^2z^2 + 190709760a^$   
 $9b^4c^9f^2h^2k^2z^2 - 150994944a^{10}b^3c^9g^2i^2k^2z^2 + 168990720a^7b^9c^6$   
 $d^2j^2k^2z^2 + 235929600a^9b^2c^{11}d^2f^2k^2z^2 - 206438400a^8b^3c^{11}d^2g^2j^2z^2$   
 $- 206438400a^7b^4c^{11}d^2e^2j^2z^2 - 101646336a^8b^6c^8f^2h^2k^2z^2 - 29245440$   
 $a^9b^7c^6h^2j^2k^2z^2 - 60817408a^{11}b^2c^9f^2j^2k^2z^2 + 57835520a^8b^8c^6$   
 $f^2j^2k^2z^2 + 219414528a^7b^2c^{13}d^2e^2h^2z^2 - 70778880a^{10}b^2c^{10}f^2h^2k^2z^2$

$$\begin{aligned}
& + 677376a^7b^{11}c^4h^j k^k z - 645120a^8b^9c^5h^j k^k z - 53760a^6b^{13} \\
& *c^3h^j k^k z + 31457280a^8b^7c^7g^i k^k z - 62914560a^8b^6c^8e^i k^k z \\
& - 94371840a^7b^7c^8e^g k^k z - 221773824a^6b^3c^{13}d^e f^f z + 82575360* \\
& a^9b^2c^{11}d^i j^j z + 11796480a^{10}b^2c^{10}h^i j^j z - 11796480a^7b^9c^ \\
& 6g^i k^k z - 8970240a^7b^{10}c^5f^j k^k z + 103219200a^7b^5c^{10}d^g j^j z - \\
& 2457600a^8b^6c^8h^i j^j z + 1769472a^6b^{11}c^5g^i k^k z + 921600a^7b^ \\
& 8c^7h^i j^j z + 673792a^6b^{12}c^4f^j k^k z - 138240a^6b^{10}c^6h^i j^j z - \\
& 98304a^5b^{13}c^4g^i k^k z - 17920a^5b^{14}c^3f^j k^k z + 7680a^5b^{12}c^ \\
& 5h^i j^j z - 97136640a^5b^{10}c^7d^f k^k z - 29491200a^9b^3c^{10}g^h j^j z + \\
& 58982400a^9b^2c^{11}e^h j^j z + 23592960a^7b^8c^7e^i k^k z - 22169088a^ \\
& 6b^{11}c^5d^j k^k z + 21381120a^7b^8c^7f^h k^k z + 14745600a^8b^5c^9g^ \\
& h^j z + 42854400a^6b^9c^7d^h k^k z - 109707264a^7b^3c^{12}d^g h^h z - 368 \\
& 6400a^7b^7c^8g^h j^j z - 3538944a^6b^{10}c^6e^i k^k z + 1645056a^5b^{13}c^ \\
& 4d^j k^k z - 890880a^6b^{10}c^6f^h k^k z + 460800a^6b^9c^7g^h j^j z - 33 \\
& 0240a^5b^{12}c^5f^h k^k z + 196608a^5b^{12}c^5e^i k^k z - 53760a^4b^{15}c^ \\
& 3d^j k^k z + 46080a^4b^{14}c^4f^h k^k z - 23040a^5b^{11}c^6g^h j^j z - 1536* \\
& a^3b^{16}c^3f^h k^k z - 29491200a^8b^4c^{10}e^h j^j z - 17203200a^7b^6c^9 \\
& *d^i j^j z + 11796480a^6b^9c^7e^g k^k z + 110886912a^6b^4c^{12}d^f g^g z + \\
& 7372800a^7b^6c^9e^h j^j z + 40108032a^8b^2c^{12}d^h i^i z + 6451200a^6b^ \\
& ^8c^8d^i j^j z + 2359296a^8b^3c^{11}f^h i^i z - 967680a^5b^{10}c^7d^i j^j z \\
& - 921600a^6b^8c^8e^h j^j z - 829440a^4b^{13}c^5d^h k^k z - 589824a^5b^ \\
& 11c^6e^g k^k z - 491520a^6b^7c^9f^h i^i z + 184320a^5b^9c^8f^h i^i z + \\
& 105984a^3b^{15}c^4d^h k^k z + 69120a^5b^{11}c^6d^h k^k z + 53760a^4b^{12}c^ \\
& ^6d^i j^j z + 46080a^5b^{10}c^7e^h j^j z - 27648a^4b^{11}c^7f^h i^i z - 4608 \\
& *a^2b^{17}c^3d^h k^k z + 1536a^3b^{13}c^6f^h i^i z - 25804800a^6b^7c^9d^ \\
& g^j z - 88473600a^6b^4c^{12}d^e h^h z + 51609600a^6b^6c^{10}d^e j^j z - 849 \\
& 34656a^7b^2c^{13}d^f g^g z + 117964800a^5b^5c^{12}d^e f^f z + 15160320a^4* \\
& b^{12}c^6d^f k^k z - 45613056a^7b^3c^{12}d^f i^i z + 44236800a^6b^5c^{11}d^ \\
& g^h z - 10321920a^6b^6c^{10}d^h i^i z + 7077888a^7b^4c^{11}d^h i^i z - 5898 \\
& 240a^7b^4c^{11}f^g h^h z + 4718592a^8b^2c^{12}f^g h^h z + 3225600a^5b^9c^ \\
& ^8d^g j^j z + 2949120a^6b^6c^{10}f^g h^h z + 2396160a^5b^8c^9d^h i^i z - 1 \\
& 428480a^3b^{14}c^5d^f k^k z - 737280a^5b^8c^9f^g h^h z - 161280a^4b^{11}c^ \\
& ^7d^g j^j z + 92160a^4b^{10}c^8f^g h^h z + 73728a^2b^{16}c^4d^f k^k z - 506 \\
& 88a^3b^{12}c^7d^h i^i z - 27648a^4b^{10}c^8d^h i^i z - 4608a^3b^{12}c^7f^ \\
& g^h z + 4608a^2b^{14}c^6d^h i^i z - 58982400a^5b^6c^{11}d^f g^g z + 1179648 \\
& 0a^7b^3c^{12}e^f h^h z + 8847360a^5b^7c^{10}d^f i^i z - 6635520a^5b^7c^1 \\
& 0d^g h^h z - 6451200a^5b^8c^9d^e j^j z - 5898240a^6b^5c^{11}e^f h^h z - 38 \\
& 09280a^4b^9c^9d^f i^i z + 2359296a^6b^5c^{11}d^f i^i z + 1474560a^5b^7c^ \\
& ^10e^f h^h z + 681984a^3b^{11}c^8d^f i^i z + 322560a^4b^{10}c^8d^e j^j z - \\
& 276480a^4b^9c^9d^g h^h z - 184320a^4b^9c^9e^f h^h z + 179712a^3b^{11}c^ \\
& ^8d^g h^h z - 55296a^2b^{13}c^7d^f i^i z - 13824a^2b^{13}c^7d^g h^h z + 9216 \\
& *a^3b^{11}c^8e^f h^h z + 16220160a^4b^8c^{10}d^f g^g z + 13271040a^5b^6c^ \\
& ^11d^e h^h z - 2396160a^3b^{10}c^9d^f g^g z + 552960a^4b^8c^{10}d^e h^h z - 3 \\
& 59424a^3b^{10}c^9d^e h^h z + 175104a^2b^{12}c^8d^f g^g z + 27648a^2b^{12}c^ \\
& ^8d^e h^h z - 32440320a^4b^7c^{11}d^e f^f z + 4792320a^3b^9c^{10}d^e f^f z -
\end{aligned}$$

$350208a^2b^{11}c^9d^9e^9f^9z + 1439170560a^{10}b^9c^{11}d^9h^9k^9z - 3361603584a^{10}b^9c^9d^9j^9k^9z + 603979776a^{10}b^9c^{11}e^9g^9k^9z + 407371776a^{12}b^9c^9h^9j^9k^9z + 201326592a^{11}b^9c^{10}g^9i^9k^9z + 346816512a^7b^9c^{14}d^9g^9z + 129761280a^{11}b^9c^{10}h^9k^9z + 121896960a^{10}b^9c^{11}f^9k^9z + 458752a^6b^{15}c^9i^9k^9z + 19660800a^{11}b^9c^{10}g^9j^9k^9z + 49152a^5b^{16}c^9g^9k^9z + 7077888a^9b^9c^{12}g^9h^9k^9z + 94464a^8b^{17}c^4d^9k^9z - 19660800a^8b^9c^{13}f^9g^9z - 66816a^8b^{14}c^7d^9i^9z + 214272a^8b^{13}c^8d^9g^9z - 428544a^8b^{12}c^9d^9e^9z + 2390753280a^{11}b^4c^7g^9k^9z - 2411421696a^6b^7c^9d^9k^9z - 6603079680a^8b^3c^{11}d^9k^9z + 3715891200a^9b^9c^{12}d^9k^9z - 880803840a^{10}c^{12}d^9f^9k^9z - 1623195648a^{10}b^6c^6g^9k^9z - 402653184a^{11}c^{11}e^9i^9k^9z - 1509949440a^{12}b^2c^8g^9k^9z - 209715200a^{12}c^{10}f^9j^9k^9z - 330301440a^9c^{13}d^9e^9j^9z + 3019898880a^{12}b^9c^9e^9k^9z - 125829120a^{11}c^{11}f^9h^9k^9z - 110100480a^{10}c^{12}d^9i^9j^9z - 198180864a^8c^{14}d^9e^9h^9z - 15728640a^{11}c^{11}h^9i^9j^9z - 1226833920a^9b^7c^6e^9k^9z - 47185920a^{10}c^{12}e^9h^9j^9z - 66060288a^9c^{13}d^9h^9i^9z - 1090519040a^{12}b^3c^7i^9k^9z + 1022754816a^6b^2c^{14}d^9e^9z + 5216108544a^7b^5c^{10}d^9k^9z + 754974720a^9b^2c^{11}e^9k^9z + 721529856a^5b^9c^8d^9k^9z + 613416960a^9b^8c^5g^9k^9z - 642318336a^5b^4c^{13}d^9e^9z - 4781506560a^{11}b^3c^8e^9k^9z - 398131200a^{12}b^3c^7j^9k^9z - 511377408a^6b^3c^{13}d^9g^9z - 377487360a^8b^4c^{10}e^9k^9z + 285212672a^{11}b^5c^6i^9k^9z + 199065600a^{11}b^5c^6j^9k^9z + 279183360a^8b^9c^5e^9k^9z + 321159168a^5b^5c^{12}d^9g^9z + 188743680a^9b^4c^9g^9k^9z + 132120576a^{10}b^7c^5i^9k^9z - 150994944a^{10}b^2c^{10}g^9k^9z - 111411200a^9b^9c^4i^9k^9z - 126812160a^{10}b^3c^9h^9k^9z + 225312768a^7b^2c^{13}d^9i^9z - 139591680a^8b^{10}c^4g^9k^9z - 49766400a^{10}b^7c^5j^9k^9z - 145463040a^4b^{11}c^7d^9k^9z - 94371840a^8b^6c^8g^9k^9z + 223395840a^4b^6c^{12}d^9e^9z + 33751040a^8b^{11}c^3i^9k^9z - 78970880a^9b^3c^{10}f^9k^9z + 94371840a^7b^6c^9e^9k^9z + 25165824a^{10}b^4c^8i^9k^9z + 6220800a^9b^9c^4j^9k^9z + 39223296a^9b^5c^8h^9k^9z - 311040a^8b^{11}c^3j^9k^9z + 16777216a^{11}b^2c^9i^9k^9z - 10485760a^9b^6c^7i^9k^9z - 5406720a^7b^{13}c^2i^9k^9z + 1376256a^7b^{10}c^5i^9k^9z - 1310720a^8b^8c^6i^9k^9z - 262144a^6b^{12}c^4i^9k^9z + 16384a^5b^{14}c^3i^9k^9z + 10354688a^{11}b^2c^9i^9j^9k^9z + 23592960a^7b^8c^7g^9k^9z + 38559744a^7b^7c^8f^9k^9z + 19169280a^7b^{12}c^3g^9k^9z - 2048000a^9b^6c^7i^9j^9k^9z - 1520640a^7b^9c^6h^9k^9z - 1105920a^8b^7c^7h^9k^9z + 849920a^8b^8c^6i^9j^9k^9z - 393216a^{10}b^4c^8i^9j^9k^9z + 195840a^6b^{11}c^5h^9k^9z - 145920a^7b^{10}c^5i^9j^9k^9z + 11520a^5b^{13}c^4h^9k^9z + 11008a^6b^{12}c^4i^9j^9k^9z - 2304a^4b^{15}c^3h^9k^9z - 256a^5b^{14}c^3i^9j^9k^9z - 25362432a^10b^3c^9g^9j^9k^9z - 24739840a^8b^5c^9f^9k^9z - 38338560a^7b^{11}c^4e^9k^9z - 2949120a^6b^{10}c^6g^9k^9z - 1474560a^6b^{14}c^2g^9k^9z + 50724864a^{10}b^2c^{10}e^9j^9k^9z + 147456a^5b^{12}c^5g^9k^9z - 15150080a^6b^9c^7f^9k^9z + 13271040a^9b^5c^8g^9j^9k^9z - 111697920a^4b^7c^{11}d^9g^9z - 3563520a^8b^7c^7g^9j^9k^9z + 3538944a^9b^2c^{11}h^9i^9z + 2912000a^5b^{11}c^6f^9k^9z - 737280a^7b^6c^9h^9i^9z + 506880a^7b^9c^6g^9j^9k^9z - 291840a^4b^{13}c^5f^9k^9z + 276480a^6b^8c^8h^9i^9z - 41472a^5b^1$



$0*c^7*h^2*i*z - 34560*a^6*b^11*c^5*g*j^2*z + 14080*a^3*b^15*c^4*f^2*k*z + 2$   
 $304*a^4*b^12*c^6*h^2*i*z + 768*a^5*b^13*c^4*g*j^2*z - 256*a^2*b^17*c^3*f^2*$   
 $k*z - 11796480*a^6*b^8*c^8*e^2*k*z - 26542080*a^9*b^4*c^9*e*j^2*z + 1983744$   
 $0*a^3*b^13*c^6*d^2*k*z + 2949120*a^6*b^13*c^3*e*k^2*z + 589824*a^5*b^10*c^7$   
 $*e^2*k*z - 98304*a^5*b^15*c^2*e*k^2*z - 10354688*a^8*b^2*c^12*f^2*i*z - 436$   
 $46976*a^6*b^4*c^12*d^2*i*z - 8847360*a^8*b^3*c^11*g*h^2*z + 7127040*a^8*b^6$   
 $*c^8*e*j^2*z + 4423680*a^7*b^5*c^10*g*h^2*z + 2048000*a^6*b^6*c^10*f^2*i*z$   
 $- 1771776*a^2*b^15*c^5*d^2*k*z - 1105920*a^6*b^7*c^9*g*h^2*z - 1013760*a^7*$   
 $b^8*c^7*e*j^2*z - 849920*a^5*b^8*c^9*f^2*i*z + 393216*a^7*b^4*c^11*f^2*i*z$   
 $+ 145920*a^4*b^10*c^8*f^2*i*z + 138240*a^5*b^9*c^8*g*h^2*z + 69120*a^6*b^10$   
 $*c^6*e*j^2*z - 11008*a^3*b^12*c^7*f^2*i*z - 6912*a^4*b^11*c^7*g*h^2*z - 153$   
 $6*a^5*b^12*c^5*e*j^2*z + 256*a^2*b^14*c^6*f^2*i*z - 32587776*a^5*b^6*c^11*d$   
 $^2*i*z + 25362432*a^7*b^3*c^12*f^2*g*z + 21657600*a^4*b^8*c^10*d^2*i*z + 17$   
 $694720*a^8*b^2*c^12*e*h^2*z - 50724864*a^7*b^2*c^13*e*f^2*z - 13271040*a^6*$   
 $b^5*c^11*f^2*g*z - 8847360*a^7*b^4*c^11*e*h^2*z - 5810688*a^3*b^10*c^9*d^2*$   
 $i*z + 3563520*a^5*b^7*c^10*f^2*g*z + 2211840*a^6*b^6*c^10*e*h^2*z + 845568*$   
 $a^2*b^12*c^8*d^2*i*z - 506880*a^4*b^9*c^9*f^2*g*z - 276480*a^5*b^8*c^9*e*h$   
 $^2*z + 34560*a^3*b^11*c^8*f^2*g*z + 13824*a^4*b^10*c^8*e*h^2*z - 768*a^2*b^1$   
 $3*c^7*f^2*g*z + 26542080*a^6*b^4*c^12*e*f^2*z + 23362560*a^3*b^9*c^10*d^2*g$   
 $*z - 46725120*a^3*b^8*c^11*d^2*e*z - 7127040*a^5*b^6*c^11*e*f^2*z - 2965248$   
 $*a^2*b^11*c^9*d^2*g*z + 1013760*a^4*b^8*c^10*e*f^2*z - 69120*a^3*b^10*c^9*e$   
 $*f^2*z + 1536*a^2*b^12*c^8*e*f^2*z + 5930496*a^2*b^10*c^10*d^2*e*z + 100663$   
 $2960*a^13*b*c^8*i*k^2*z + 3246391296*a^10*b^5*c^7*e*k^2*z + 318504960*a^13*$   
 $b*c^8*j^2*k*z + 61538304*a^10*b^10*c^2*k^3*z - 603979776*a^10*c^12*e^2*k*z$   
 $- 693633024*a^7*c^15*d^2*e*z - 231211008*a^8*c^14*d^2*i*z - 67108864*a^12*c$   
 $^10*i^2*k*z - 13107200*a^12*c^10*i*j^2*z - 16384*a^5*b^17*i*k^2*z - 3932160$   
 $0*a^11*c^11*e*j^2*z - 4718592*a^10*c^12*h^2*i*z - 2304*b^19*c^3*d^2*k*z + 1$   
 $3107200*a^9*c^13*f^2*i*z + 2304*b^16*c^6*d^2*i*z - 14155776*a^9*c^13*e*h^2*$   
 $z + 39321600*a^8*c^14*e*f^2*z - 4833280*a^9*b^12*c*k^3*z - 6912*b^15*c^7*d$   
 $^2*g*z + 6962544640*a^14*b^2*c^6*k^3*z + 13824*b^14*c^8*d^2*e*z + 1876951040$   
 $*a^12*b^6*c^4*k^3*z - 4844421120*a^13*b^4*c^5*k^3*z - 437780480*a^11*b^8*c$   
 $^3*k^3*z - 4294967296*a^15*c^7*k^3*z + 163840*a^8*b^14*k^3*z + 6144000*a^10*$   
 $b*c^8*f*i*j*k - 5898240*a^10*b*c^8*g*h*j*k - 41287680*a^9*b*c^9*d*g*j*k + 4$   
 $472832*a^9*b*c^9*f*h*i*k + 18432000*a^9*b*c^9*e*f*j*k + 3391488*a^8*b*c^10*$   
 $e*h*i*j + 1228800*a^8*b*c^10*f*g*i*j - 24772608*a^8*b*c^10*d*g*h*k + 134184$   
 $96*a^8*b*c^10*e*f*h*k + 11649024*a^8*b*c^10*d*f*i*k + 737280*a^7*b*c^11*f*g$   
 $*h*i - 768*a*b^15*c^3*d*f*i*k - 19307520*a^7*b*c^11*d*f*h*j + 16367616*a^7*$   
 $b*c^11*d*e*i*j + 3686400*a^7*b*c^11*e*f*g*j + 34947072*a^7*b*c^11*d*e*f*k +$   
 $2304*a*b^14*c^4*d*f*g*k - 180*a*b^13*c^5*d*f*h*j + 11059200*a^6*b*c^12*d*e$   
 $*h*i + 5160960*a^6*b*c^12*d*f*g*i + 2211840*a^6*b*c^12*e*f*g*h - 4608*a*b^1$   
 $3*c^5*d*e*f*k - 2304*a*b^11*c^7*d*f*g*i + 4608*a*b^10*c^8*d*e*f*i + 1548288$   
 $0*a^5*b*c^13*d*e*f*g - 13824*a*b^9*c^9*d*e*f*g - 225976320*a^8*b^2*c^9*d*e*$   
 $j*k + 112988160*a^8*b^3*c^8*d*g*j*k - 11427840*a^10*b^2*c^7*h*i*j*k - 41779$   
 $20*a^9*b^4*c^6*h*i*j*k + 1399296*a^8*b^6*c^5*h*i*j*k - 26880*a^6*b^10*c^3*h$   
 $*i*j*k + 16128*a^7*b^8*c^4*h*i*j*k - 61562880*a^9*b^2*c^8*d*i*j*k + 2009088$

$0a^9b^3c^7g^hjk + 119623680a^7b^4c^8d^e^jk + 10485760a^9b^3c^7f^i^jk - 40181760a^9b^2c^8e^h^jk - 3778560a^8b^5c^6g^h^jk - 137797632a^7b^2c^10d^e^hk - 1248768a^7b^7c^5f^i^jk + 229376a^6b^9c^4f^i^jk + 220160a^8b^5c^6f^i^jk - 209664a^7b^7c^5g^h^jk + 80640a^6b^9c^4g^h^jk - 8960a^5b^11c^3f^i^jk - 59811840a^7b^5c^7d^g^jk + 53084160a^8b^2c^9e^g^ik - 11120640a^8b^4c^7f^g^jk + 10455552a^7b^6c^6d^i^jk - 9216000a^9b^2c^8f^g^jk + 7557120a^8b^4c^7e^h^jk + 7397376a^8b^3c^8f^h^ik + 5230080a^7b^6c^6f^g^jk - 37675008a^8b^2c^9d^h^ik - 3633408a^6b^8c^5d^i^jk + 2211840a^8b^4c^7d^i^jk + 68898816a^7b^3c^9d^g^hk - 1695744a^8b^2c^9g^h^ij - 1400832a^7b^4c^8g^h^ij + 967680a^7b^5c^7f^h^ik - 783360a^6b^7c^6f^h^ik - 741888a^6b^8c^5f^g^jk + 499968a^5b^10c^4d^i^jk + 419328a^7b^6c^6e^h^jk - 253440a^6b^6c^7g^h^ij - 161280a^6b^8c^5e^h^jk + 42240a^5b^9c^5f^h^ik + 26880a^5b^10c^4f^g^jk - 26880a^4b^12c^3d^i^jk + 13824a^4b^11c^4f^h^ik + 11520a^5b^8c^6g^h^ij - 768a^3b^13c^3f^h^ik + 22241280a^8b^3c^8e^f^jk + 14222592a^6b^7c^6d^g^jk - 10460160a^7b^5c^7e^f^jk + 8847360a^7b^4c^8e^g^ik - 7741440a^7b^4c^8f^g^hk - 7077888a^6b^6c^7e^g^ik + 6935040a^6b^6c^7d^h^ik - 6709248a^8b^2c^9f^g^hk - 3612672a^7b^4c^8d^h^ik + 2801664a^7b^3c^9e^h^ij + 2506752a^7b^3c^9f^g^ij + 2419200a^6b^6c^7f^g^hk - 1661184a^5b^9c^5d^g^jk + 1483776a^6b^7c^6e^f^jk - 1463040a^5b^8c^6d^h^ik + 884736a^5b^8c^6e^g^ik + 838656a^6b^5c^8f^g^ij + 506880a^6b^5c^8e^h^ij + 80640a^4b^11c^4d^g^jk - 53760a^5b^9c^5e^f^jk - 53760a^5b^7c^7f^g^ij - 46080a^4b^10c^5f^g^hk - 34560a^5b^8c^6f^g^hk + 25344a^3b^12c^4d^h^ik - 23040a^5b^7c^7e^h^ij + 13824a^4b^10c^5d^h^ik + 2304a^3b^12c^4f^g^hk - 2304a^2b^14c^3d^h^ik - 29030400a^6b^5c^8d^g^hk + 28606464a^7b^3c^9d^f^ik - 28445184a^6b^6c^7d^e^jk + 58060800a^6b^4c^9d^e^hk + 15482880a^7b^3c^9e^f^hk - 8183808a^7b^2c^10d^g^ij - 6718464a^6b^5c^8d^f^ik - 5087232a^7b^2c^10e^g^hj - 5013504a^7b^2c^10e^f^ij - 4838400a^6b^5c^8e^f^hk + 4112640a^5b^7c^7d^g^hk - 3663360a^5b^7c^7d^f^ik + 3322368a^5b^8c^6d^e^jk - 2285568a^6b^4c^9d^g^ij + 1896960a^4b^9c^6d^f^ik + 1843200a^6b^3c^10f^g^hi - 1677312a^6b^4c^9e^f^ij - 1658880a^6b^4c^9e^g^hj + 68345856a^6b^3c^10d^e^fk + 783360a^5b^5c^9f^g^hi + 741888a^5b^6c^8d^g^ij - 34172928a^6b^4c^9d^f^gk - 340992a^3b^11c^5d^f^ik - 161280a^4b^10c^5d^e^jk + 138240a^4b^9c^6d^g^hk + 107520a^5b^6c^8e^f^ij + 92160a^4b^9c^6e^f^hk - 89856a^3b^11c^5d^g^hk - 80640a^4b^8c^7d^g^ij + 69120a^5b^7c^7e^f^hk + 69120a^5b^6c^8e^g^hj + 27648a^2b^13c^4d^f^ik + 18432a^4b^7c^8f^g^hi + 6912a^2b^13c^4d^g^hk - 4608a^3b^11c^5e^f^hk - 2304a^3b^9c^7f^g^hi + 27164160a^5b^6c^8d^f^gk - 22164480a^6b^3c^10d^f^hj - 54328320a^5b^5c^9d^e^fk - 17473536a^7b^2c^10d^f^gk - 8225280a^5b^6c^8d^e^hk - 8087040a^4b^8c^7d^f^gk + 5677056a^6b^3c^10e^f^gj - 5529600a^6b^2c^11d^g^hi + 4571136a^6b^3c^10d^e^ij - 3686400a^6b^2c^11e^f^hi + 2805120a^5b^5c^$

$9*d*f*h*j - 2211840*a^5*b^4*c^{10}*d*g*h*i - 1566720*a^5*b^4*c^{10}*e*f*h*i - 1483776*a^5*b^5*c^9*d*e*i*j + 1198080*a^3*b^{10}*c^6*d*f*g*k + 437184*a^4*b^7*c^8*d*f*h*j - 322560*a^5*b^5*c^9*e*f*g*j + 317952*a^4*b^6*c^9*d*g*h*i - 276480*a^4*b^8*c^7*d*e*h*k + 179712*a^3*b^{10}*c^6*d*e*h*k + 161280*a^4*b^7*c^8*d*e*i*j - 146268*a^3*b^9*c^7*d*f*h*j - 87552*a^2*b^{12}*c^5*d*f*g*k - 36864*a^4*b^6*c^9*e*f*h*i - 13824*a^2*b^{12}*c^5*d*e*h*k + 9360*a^2*b^{11}*c^6*d*f*h*j + 6912*a^3*b^8*c^8*d*g*h*i - 6912*a^2*b^{10}*c^7*d*g*h*i + 4608*a^3*b^8*c^8*e*f*h*i - 24551424*a^6*b^2*c^{11}*d*e*g*j + 16174080*a^4*b^7*c^8*d*e*f*k + 5419008*a^5*b^4*c^{10}*d*e*g*j + 5160960*a^5*b^3*c^{11}*d*f*g*i + 4423680*a^5*b^3*c^{11}*e*f*g*h + 4423680*a^5*b^3*c^{11}*d*e*h*i - 2396160*a^3*b^9*c^7*d*e*f*k - 635904*a^4*b^5*c^{10}*d*e*h*i - 483840*a^4*b^6*c^9*d*e*g*j - 354816*a^3*b^7*c^9*d*f*g*i + 322560*a^4*b^5*c^{10}*d*f*g*i + 175104*a^2*b^{11}*c^6*d*e*f*k + 138240*a^4*b^5*c^{10}*e*f*g*h + 59904*a^2*b^9*c^8*d*f*g*i - 13824*a^3*b^7*c^9*e*f*g*h - 13824*a^3*b^7*c^9*d*e*h*i + 13824*a^2*b^9*c^8*d*e*h*i - 16588800*a^5*b^2*c^{12}*d*e*g*h - 10321920*a^5*b^2*c^{12}*d*e*f*i + 16588800*a^4*b^4*c^11*d*e*g*h + 709632*a^3*b^6*c^{10}*d*e*f*i - 645120*a^4*b^4*c^{11}*d*e*f*i + 124416*a^3*b^6*c^{10}*d*e*g*h - 119808*a^2*b^8*c^9*d*e*f*i - 41472*a^2*b^8*c^9*d*e*g*h + 7741440*a^4*b^3*c^{12}*d*e*f*g - 2903040*a^3*b^5*c^{11}*d*e*f*g + 387072*a^2*b^7*c^{10}*d*e*f*g - 381026304*a^{11}*b*c^7*d*j*k^2 - 241827840*a^{10}*b*c^8*d*h*k^2 - 65667072*a^{12}*b*c^6*h*j*k^2 - 169344*a^7*b^{11}*c*h*j*k^2 - 25165824*a^{11}*b*c^7*g*i*k^2 - 4915200*a^{11}*b*c^7*g*j^2*k - 53084160*a^8*b*c^{10}*e^2*i*k - 75497472*a^{10}*b*c^8*e*g*k^2 - 86704128*a^7*b*c^{11}*d^2*g*k + 565248*a^9*b*c^9*h*i^2*j - 168448*a^6*b^{12}*c*f*j*k^2 - 24576*a^5*b^{13}*c*g*i*k^2 - 1769472*a^9*b*c^9*g*h^2*k - 17694720*a^9*b*c^9*e*i^2*k - 411264*a^5*b^{13}*c*d*j*k^2 - 11520*a^4*b^{14}*c*f*h*k^2 + 4915200*a^8*b*c^{10}*f^2*g*k + 2580480*a^9*b*c^9*e*i*j^2 - 2496000*a^9*b*c^9*f*h*j^2 - 1543680*a^8*b*c^{10}*f*h^2*j + 33408*a*b^{14}*c^4*d^2*i*k - 59512320*a^6*b*c^{12}*d^2*f*j + 5087232*a^7*b*c^{11}*e^2*h*j + 2727936*a^8*b*c^{10}*d*i^2*j - 26496*a^3*b^{15}*c*d*h*k^2 + 1105920*a^7*b*c^{11}*e*h^2*i - 107136*a*b^{13}*c^5*d^2*g*k + 10260*a*b^{12}*c^6*d^2*h*j - 10616832*a^6*b*c^{12}*e^2*g*i - 3538944*a^7*b*c^{11}*e*g*i^2 + 1843200*a^7*b*c^{11}*d*h*i^2 - 18432*a^2*b^{16}*c*d*f*k^2 - 15552000*a^8*b*c^{10}*d*f*j^2 + 24551424*a^6*b*c^{12}*d*e^2*j - 37062144*a^5*b*c^{13}*d^2*f*h + 2580480*a^6*b*c^{12}*e*f^2*i + 214272*a*b^{12}*c^6*d^2*e*k + 65664*a*b^{10}*c^8*d^2*g*i - 25074*a*b^{11}*c^7*d^2*f*j + 420*a*b^{12}*c^6*d*f^2*j + 6*a*b^{15}*c^3*d*f*j^2 + 23224320*a^5*b*c^{13}*d^2*e*i + 384*a*b^{12}*c^6*d*f*i^2 - 5985792*a^6*b*c^{12}*d*f*h^2 + 206010*a*b^9*c^9*d^2*f*h - 131328*a*b^9*c^9*d^2*e*i - 6300*a*b^{10}*c^8*d*f^2*h + 1350*a*b^{11}*c^7*d*f*h^2 + 16588800*a^5*b*c^{13}*d*e^2*h + 3456*a*b^{10}*c^8*d*f*g^2 + 435456*a*b^8*c^{10}*d^2*e*g + 13824*a*b^8*c^{10}*d*e^2*f + 3932160*a^{11}*c^8*h*i*j*k + 27525120*a^{10}*c^9*d*i*j*k + 82575360*a^9*c^{10}*d*e*j*k + 11796480*a^{10}*c^9*e*h*j*k + 16515072*a^9*c^{10}*d*h*i*k + 49545216*a^8*c^{11}*d*e*h*k - 2457600*a^8*c^{11}*e*f*i*j - 1474560*a^7*c^{12}*e*f*h*i - 10321920*a^6*c^{13}*d*e*f*i + 737077248*a^{10}*b^3*c^6*d*j*k^2 - 518814720*a^9*b^5*c^5*d*j*k^2 + 441354240*a^9*b^3*c^7*d*h*k^2 - 429871104*a^6*b^2*c^{11}*d^2*e*k - 272212992*a^8*b^5*c^6*d*h*k^2 + 305731584*a^5*b^4*c^{10}*d^2*e*k + 192412800*a^8*b^7*c^4*d*j*k^2 + 111912960*a^{11}*b^3*c^5*h*j*k^2 + 214935552*a^6*b^3*c^{10}$

$$\begin{aligned}
& *d^2*g*k + 202427136*a^7*b^6*c^6*d*f*k^2 - 49904640*a^10*b^5*c^4*h*j*k^2 - \\
& 178513920*a^8*b^4*c^7*d*f*k^2 - 152865792*a^5*b^5*c^9*d^2*g*k - 114388992*a \\
& ^7*b^2*c^10*d^2*i*k + 94961664*a^10*b^2*c^7*e*i*k^2 - 9039872*a^11*b^2*c^6* \\
& i*j^2*k - 56494080*a^10*b^4*c^5*f*j*k^2 - 2052096*a^10*b^4*c^5*i*j^2*k + 13 \\
& 27360*a^9*b^6*c^4*i*j^2*k - 158080*a^8*b^8*c^3*i*j^2*k - 47480832*a^10*b^3* \\
& c^6*g*i*k^2 + 45576960*a^9*b^6*c^4*f*j*k^2 + 7954560*a^9*b^7*c^3*h*j*k^2 - \\
& 104693760*a^9*b^3*c^7*e*g*k^2 + 142080*a^8*b^9*c^2*h*j*k^2 + 16017408*a^10* \\
& b^3*c^6*g*j^2*k - 4930560*a^9*b^5*c^5*g*j^2*k - 3649536*a^9*b^2*c^8*h^2*i*k \\
& - 1843200*a^8*b^4*c^7*h^2*i*k + 85524480*a^8*b^5*c^6*e*g*k^2 + 474240*a^8* \\
& b^7*c^4*g*j^2*k + 288000*a^7*b^6*c^6*h^2*i*k + 63360*a^6*b^8*c^5*h^2*i*k - \\
& 8064*a^5*b^10*c^4*h^2*i*k - 1152*a^4*b^12*c^3*h^2*i*k - 15437824*a^11*b^2*c \\
& ^6*f*j*k^2 - 32034816*a^10*b^2*c^7*e*j^2*k - 14369280*a^8*b^8*c^3*f*j*k^2 - \\
& 13271040*a^8*b^3*c^8*g^2*i*k + 80267904*a^7*b^7*c^5*d*h*k^2 + 79626240*a^7 \\
& *b^2*c^10*e^2*g*k + 11059200*a^9*b^5*c^5*g*i*k^2 + 8847360*a^9*b^2*c^8*g*i^ \\
& 2*k - 42113280*a^7*b^9*c^3*d*j*k^2 + 6389760*a^8*b^7*c^4*g*i*k^2 + 5898240* \\
& a^8*b^4*c^7*g*i^2*k - 37601280*a^9*b^4*c^6*f*h*k^2 - 2949120*a^7*b^9*c^3*g* \\
& i*k^2 + 2242560*a^7*b^10*c^2*f*j*k^2 - 2211840*a^7*b^5*c^7*g^2*i*k + 176947 \\
& 2*a^6*b^7*c^6*g^2*i*k + 749568*a^8*b^3*c^8*h*i^2*j - 442368*a^7*b^6*c^6*g*i \\
& ^2*k + 442368*a^6*b^11*c^2*g*i*k^2 - 442368*a^6*b^8*c^5*g*i^2*k + 317952*a^ \\
& 7*b^5*c^7*h*i^2*j - 221184*a^5*b^9*c^5*g^2*i*k + 73728*a^5*b^10*c^4*g*i^2*k \\
& + 38400*a^6*b^7*c^6*h*i^2*j - 1920*a^5*b^9*c^5*h*i^2*j + 9861120*a^9*b^4*c \\
& ^6*e*j^2*k - 110280960*a^4*b^6*c^9*d^2*e*k - 93330432*a^6*b^8*c^5*d*f*k^2 + \\
& 24645888*a^8*b^6*c^5*f*h*k^2 + 6359040*a^8*b^3*c^8*g*h^2*k - 22118400*a^9* \\
& b^4*c^6*e*i*k^2 - 3862528*a^8*b^2*c^9*f^2*i*k - 2248704*a^7*b^4*c^8*f^2*i*k \\
& - 1290240*a^9*b^2*c^8*g*i*j^2 - 948480*a^8*b^6*c^5*e*j^2*k - 860160*a^8*b^ \\
& 4*c^7*g*i*j^2 - 414720*a^7*b^5*c^7*g*h^2*k + 303360*a^6*b^6*c^7*f^2*i*k + 2 \\
& 66880*a^5*b^8*c^6*f^2*i*k - 224640*a^6*b^7*c^6*g*h^2*k - 80640*a^7*b^6*c^6* \\
& g*i*j^2 - 72960*a^4*b^10*c^5*f^2*i*k + 17280*a^5*b^9*c^5*g*h^2*k + 12672*a^ \\
& 6*b^8*c^5*g*i*j^2 + 5504*a^3*b^12*c^4*f^2*i*k + 3456*a^4*b^11*c^4*g*h^2*k - \\
& 384*a^5*b^10*c^4*g*i*j^2 - 128*a^2*b^14*c^3*f^2*i*k + 30265344*a^6*b^4*c^9 \\
& *d^2*i*k - 12779520*a^8*b^6*c^5*e*i*k^2 - 11796480*a^8*b^3*c^8*e*i^2*k - 88 \\
& 47360*a^7*b^3*c^9*e^2*i*k - 7925760*a^10*b^2*c^7*f*h*k^2 + 7077888*a^6*b^5* \\
& c^8*e^2*i*k - 39813120*a^7*b^3*c^9*e*g^2*k - 73175040*a^9*b^2*c^8*d*f*k^2 + \\
& 5898240*a^7*b^8*c^4*e*i*k^2 + 5542272*a^6*b^11*c^2*d*j*k^2 - 5420160*a^7*b \\
& ^8*c^4*f*h*k^2 + 55140480*a^4*b^7*c^8*d^2*g*k + 1271808*a^7*b^3*c^9*g^2*h*j \\
& - 1040384*a^8*b^2*c^9*f*i^2*j + 884736*a^7*b^5*c^7*e*i^2*k - 884736*a^6*b^ \\
& 10*c^3*e*i*k^2 + 884736*a^6*b^7*c^6*e*i^2*k - 884736*a^5*b^7*c^7*e^2*i*k - \\
& 697344*a^7*b^4*c^8*f*i^2*j + 414720*a^6*b^5*c^8*g^2*h*j + 226560*a^6*b^10*c \\
& ^3*f*h*k^2 - 147456*a^5*b^9*c^5*e*i^2*k - 121856*a^6*b^6*c^7*f*i^2*j + 8256 \\
& 0*a^5*b^12*c^2*f*h*k^2 + 49152*a^5*b^12*c^2*e*i*k^2 - 17280*a^5*b^7*c^7*g^2 \\
& *h*j + 8960*a^5*b^8*c^6*f*i^2*j + 14194944*a^5*b^6*c^8*d^2*i*k - 12718080*a \\
& ^8*b^2*c^9*e*h^2*k - 10615680*a^4*b^8*c^7*d^2*i*k - 26542080*a^6*b^4*c^9*e^ \\
& 2*g*k - 23592960*a^7*b^7*c^5*e*g*k^2 - 5142528*a^8*b^3*c^8*f*h*j^2 + 506880 \\
& 0*a^7*b^2*c^10*f^2*h*j - 3755520*a^7*b^3*c^9*f*h^2*j + 3336192*a^7*b^3*c^9* \\
& f^2*g*k + 3000960*a^6*b^4*c^9*f^2*h*j + 2893824*a^3*b^10*c^6*d^2*i*k + 1720
\end{aligned}$$

$$\begin{aligned}
& 320a^8b^3c^8e^i j^2 + 1704960a^6b^5c^8f^2g^k - 1307520a^5b^7c^7 \\
& f^2g^k - 1085760a^6b^5c^8f^2h^2j - 959040a^7b^5c^7f^2h^2j + 82944 \\
& 0a^7b^4c^8e^h^2k - 552960a^7b^2c^10g^h^2i - 552960a^6b^4c^9g^h \\
& h^2i + 449280a^6b^6c^7e^h^2k - 422784a^2b^12c^5d^2i^k + 253440a \\
& ^4b^9c^6f^2g^k + 161280a^7b^5c^7e^i j^2 - 145152a^5b^6c^8g^h^2i \\
& + 103200a^6b^7c^6f^2h^2j + 41280a^5b^6c^8f^2h^2j - 37188a^4b^8c \\
& ^7f^2h^2j - 34560a^5b^8c^6e^h^2k - 25344a^6b^7c^6e^i j^2 - 17280 \\
& a^3b^11c^5f^2g^k + 13536a^5b^7c^7f^2h^2j - 6912a^4b^10c^5e^h^2 \\
& k + 5490a^4b^9c^6f^2h^2j - 3456a^4b^8c^7g^h^2i + 1980a^3b^10c^6 \\
& f^2h^2j + 810a^5b^9c^5f^2h^2j + 768a^5b^9c^5e^i j^2 + 384a^2b^1 \\
& 3c^4f^2g^k - 270a^4b^11c^4f^2h^2j - 180a^3b^11c^5f^2h^2j - 30a^ \\
& 2b^12c^5f^2h^2j + 6a^3b^13c^3f^2h^2j + 30067200a^6b^2c^11d^2h^2j \\
& + 13271040a^6b^5c^8e^g^2k - 10857600a^6b^9c^4d^2h^2k + 2949120a^ \\
& 6b^9c^4e^g^2k + 2654208a^5b^6c^8e^2g^k + 2125824a^7b^3c^9d^2i^2 \\
& j + 1658880a^6b^3c^10e^2h^2j - 1419264a^6b^4c^9f^2g^2j - 1327104a \\
& ^5b^7c^7e^g^2k - 921600a^7b^2c^10f^2g^2j - 737280a^7b^2c^10f^2h^2 \\
& i^2 - 568320a^6b^4c^9f^2h^2i^2 + 207360a^4b^13c^2d^2h^2k^2 - 147456a^5 \\
& b^11c^3e^g^2k^2 - 136704a^5b^6c^8f^2h^2i^2 + 133632a^6b^5c^8d^2i^2j \\
& - 96768a^5b^7c^7d^2i^2j + 80640a^5b^6c^8f^2g^2j - 69120a^5b^5c^ \\
& 9e^2h^2j + 13440a^4b^9c^6d^2i^2j - 5760a^5b^11c^3d^2h^2k^2 - 2304a^ \\
& 4b^8c^7f^2h^2i^2 + 384a^3b^10c^6f^2h^2i^2 + 11930112a^8b^2c^9d^2h^2j^2 \\
& - 11646720a^3b^9c^7d^2g^2k + 8432640a^7b^2c^10d^2h^2j + 24140160a \\
& ^5b^10c^4d^2f^2k^2 - 6672384a^7b^2c^10e^f^2k + 4450176a^7b^4c^8d^2 \\
& h^2j + 4337280a^6b^4c^9d^2h^2j - 3870720a^8b^2c^9e^g^2j^2 - 3409920 \\
& a^6b^4c^9e^f^2k - 2885760a^5b^4c^10d^2h^2j - 2844288a^4b^6c^9d^ \\
& ^2h^2j + 2615040a^5b^6c^8e^f^2k - 1687680a^6b^6c^7d^2h^2j + 148262 \\
& 4a^2b^11c^6d^2g^2k - 1290240a^6b^2c^11f^2g^2i + 1105920a^6b^3c^1 \\
& 0e^h^2i + 1019412a^3b^8c^8d^2h^2j - 1007424a^5b^6c^8d^2h^2j - 860 \\
& 160a^5b^4c^10f^2g^2i - 645120a^7b^4c^8e^g^2j^2 - 506880a^4b^8c^7e \\
& f^2k + 290304a^5b^5c^9e^h^2i + 197460a^5b^8c^6d^2h^2j^2 - 143802a \\
& ^2b^10c^7d^2h^2j + 80640a^6b^6c^7e^g^2j^2 - 80640a^4b^6c^9f^2g^2i \\
& + 51948a^4b^8c^7d^2h^2j + 34560a^3b^10c^6e^f^2k + 12672a^3b^8c^ \\
& ^8f^2g^2i + 10800a^3b^10c^6d^2h^2j + 6912a^4b^7c^8e^h^2i - 2304a \\
& ^5b^8c^6e^g^2j^2 - 768a^2b^12c^5e^f^2k - 684a^3b^12c^4d^2h^2j^2 - \\
& 540a^2b^12c^5d^2h^2j - 384a^2b^10c^7f^2g^2i - 90a^4b^10c^5d^2h^2 \\
& j^2 + 18a^2b^14c^3d^2h^2j^2 + 23385600a^6b^2c^11d^2f^2j + 23293440a^ \\
& 3b^8c^8d^2e^k + 6137856a^6b^3c^10d^2g^2j - 5677056a^6b^2c^11e^2 \\
& f^2j + 5308416a^6b^2c^11e^g^2i - 5308416a^5b^3c^11e^2g^2i - 378624 \\
& 0a^4b^12c^3d^2f^2k^2 - 3538944a^6b^3c^10e^g^2i^2 + 2654208a^5b^4c^1 \\
& 0e^g^2i + 1658880a^6b^3c^10d^2h^2i^2 - 1354752a^5b^5c^9d^2g^2j - 11 \\
& 05920a^5b^4c^10f^2g^2h - 884736a^5b^5c^9e^g^2i^2 - 552960a^6b^2c^ \\
& 11f^2g^2h + 357120a^3b^14c^2d^2f^2k^2 + 322560a^5b^4c^10e^2f^2j + 26 \\
& 2656a^5b^5c^9d^2h^2i^2 + 120960a^4b^7c^8d^2g^2j - 55296a^4b^7c^8d^ \\
& ^2h^2i^2 - 34560a^4b^6c^9f^2g^2h + 3456a^3b^8c^8f^2g^2h + 1152a^3b^ \\
& 9c^7d^2h^2i^2 + 1152a^2b^11c^6d^2h^2i^2 - 13149696a^7b^3c^9d^2f^2j^2 -
\end{aligned}$$

$11612160a^5b^2c^{12}d^2g^*i + 10906560a^4b^5c^{10}d^2f^*j - 7418880a^5$   
 $*b^3c^{11}d^2f^*j + 3148992a^6b^5c^8d^2f^*j^2 - 2985696a^3b^7c^9d^2f^*$   
 $*j - 2965248a^2b^{10}c^7d^2e^*k + 1720320a^5b^3c^{11}e^*f^2i - 1658880*$   
 $a^6b^2c^{11}e^*g^*h^2 + 1596672a^3b^6c^{10}d^2g^*i - 1505280a^4b^6c^9d$   
 $*f^2j - 829440a^5b^4c^{10}e^*g^*h^2 - 508032a^2b^8c^9d^2g^*i + 378954*$   
 $a^2b^9c^8d^2f^*j + 362880a^5b^4c^{10}d^2f^2j + 296964a^3b^8c^8d^2f^$   
 $2j + 161280a^4b^5c^{10}e^*f^2i - 77070a^4b^9c^6d^2f^*j^2 - 30240a^5b$   
 $^7c^7d^2f^*j^2 - 25344a^3b^7c^9e^*f^2i - 20736a^4b^6c^9e^*g^*h^2 - 19$   
 $278a^2b^{10}c^7d^2f^2j + 8820a^3b^{11}c^5d^2f^*j^2 + 768a^2b^9c^8e^*f^$   
 $2i - 378a^2b^{13}c^4d^2f^*j^2 - 5419008a^5b^3c^{11}d^2e^2j - 4423680a^5$   
 $*b^2c^{12}e^2f^*h + 4147200a^5b^3c^{11}d^2g^2h - 2580480a^6b^2c^{11}d^2f$   
 $*i^2 - 967680a^5b^4c^{10}d^2f^*i^2 + 483840a^4b^5c^{10}d^2e^2j - 414720a$   
 $^4b^5c^{10}d^2g^2h - 138240a^4b^4c^{11}e^2f^*h + 64512a^4b^6c^9d^2f^*i$   
 $^2 + 39168a^3b^8c^8d^2f^*i^2 - 31104a^3b^7c^9d^2g^2h + 13824a^3b^6*$   
 $c^{10}e^2f^*h + 10368a^2b^9c^8d^2g^2h - 9216a^2b^{10}c^7d^2f^*i^2 + 1563$   
 $0336a^5b^2c^{12}d^2f^2h - 14459904a^4b^3c^{12}d^2f^*h + 9630144a^3b^5$   
 $*c^{11}d^2f^*h - 8764416a^5b^3c^{11}d^2f^*h^2 - 3870720a^5b^2c^{12}e^*f^2g$   
 $- 3193344a^3b^5c^{11}d^2e^*i + 2867328a^4b^4c^{11}d^2f^2h - 2095200a^$   
 $2b^7c^{10}d^2f^*h - 1414080a^3b^6c^{10}d^2f^2h - 34836480a^4b^2c^{13}d$   
 $^2e^*g + 1016064a^2b^7c^{10}d^2e^*i - 645120a^4b^4c^{11}e^*f^2g + 30672$   
 $0a^3b^7c^9d^2f^*h^2 + 197820a^2b^8c^9d^2f^2h + 146880a^4b^5c^{10}d*$   
 $f^*h^2 + 80640a^3b^6c^{10}e^*f^2g - 55350a^2b^9c^8d^2f^*h^2 - 2304a^2b$   
 $^8c^9e^*f^2g - 3870720a^5b^2c^{12}d^2f^*g^2 - 1935360a^4b^4c^{11}d^2f^*g^$   
 $2 - 1658880a^4b^3c^{12}d^2e^2h + 725760a^3b^6c^{10}d^2f^*g^2 + 17418240a$   
 $^3b^4c^{12}d^2e^*g - 124416a^3b^5c^{11}d^2e^2h - 96768a^2b^8c^9d^2f^*g$   
 $^2 + 41472a^2b^7c^{10}d^2e^2h - 3919104a^2b^6c^{11}d^2e^*g - 7741440a^$   
 $4b^2c^{13}d^2e^2f + 2903040a^3b^4c^{12}d^2e^2f - 387072a^2b^6c^{11}d^2e$   
 $^2f - 681246720a^9b^*c^9d^2k^2 + 265912320a^{11}b^3c^5e^*k^3 + 1887436$   
 $80a^{12}b^2c^5g^*k^3 - 132956160a^{11}b^4c^4g^*k^3 - 52101120a^{13}b^*c^5*$   
 $j^2k^2 + 25722880a^{12}b^3c^4i^*k^3 + 19644416a^{11}b^5c^3i^*k^3 - 15836$   
 $80a^9b^9c^*j^2k^2 - 9142272a^{10}b^7c^2i^*k^3 - 74022912a^{10}b^5c^4e$   
 $*k^3 - 20643840a^{11}b^*c^7h^2k^2 + 37011456a^{10}b^6c^3g^*k^3 - 2293760*$   
 $a^9b^3c^7i^3k - 557056a^8b^5c^6i^3k + 147456a^7b^7c^5i^3k - 6$   
 $5536a^6b^{12}c^*i^2k^2 + 32768a^6b^9c^4i^3k - 8192a^5b^{11}c^3i^3k$   
 $+ 430080a^{10}b^*c^8i^2j^2 - 2880a^5b^{13}c^*h^2k^2 + 6635520a^7b^4c^$   
 $8g^3k - 4792320a^9b^8c^2g^*k^3 - 2211840a^6b^6c^7g^3k + 1359360a$   
 $^{10}b^2c^7h^*j^3 + 1173120a^9b^4c^6h^*j^3 + 743040a^7b^4c^8h^3j +$   
 $622080a^8b^2c^9h^3j + 221184a^5b^8c^6g^3k + 107136a^6b^6c^7h^$   
 $3j - 32640a^8b^6c^5h^*j^3 - 5796a^7b^8c^4h^*j^3 + 540a^5b^8c^6h^$   
 $3j - 270a^4b^{10}c^5h^3j + 210a^6b^{10}c^3h^*j^3 - 2949120a^{10}b^*c^8*$   
 $f^2k^2 + 17694720a^6b^3c^{10}e^3k + 184320a^8b^*c^{10}h^2i^2 - 3520a^$   
 $3b^{15}c^*f^2k^2 + 9584640a^9b^7c^3e^*k^3 - 2293760a^9b^3c^7f^*j^3 -$   
 $2293760a^6b^3c^{10}f^3j - 1769472a^5b^5c^9e^3k - 884736a^6b^3c^{1$   
 $0g^3i - 589824a^7b^3c^9g^*i^3 - 491520a^8b^9c^2e^*k^3 - 442368a^5*$   
 $b^5c^9g^3i - 294912a^6b^5c^8g^*i^3 - 199360a^8b^5c^6f^*j^3 - 19936$

$0*a^5*b^5*c^9*f^3*j + 61920*a^7*b^7*c^5*f*j^3 + 61920*a^4*b^7*c^8*f^3*j - 4$   
 $9152*a^5*b^7*c^7*g*i^3 - 3682*a^6*b^9*c^4*f*j^3 - 3682*a^3*b^9*c^7*f^3*j +$   
 $70*a^5*b^11*c^3*f*j^3 + 70*a^2*b^11*c^6*f^3*j + 3870720*a^8*b*c^10*e^2*j^2$   
 $+ 430080*a^7*b*c^11*f^2*i^2 - 14152320*a^4*b^4*c^11*d^3*j + 10644480*a^5*b^$   
 $2*c^12*d^3*j + 5483520*a^9*b^2*c^8*d*j^3 + 4269888*a^3*b^6*c^10*d^3*j + 353$   
 $8944*a^5*b^2*c^12*e^3*i - 1648128*a^5*b^3*c^11*f^3*h + 1330560*a^8*b^4*c^7*$   
 $d*j^3 + 1179648*a^7*b^2*c^10*e*i^3 - 898560*a^6*b^3*c^10*f*h^3 - 826560*a^7$   
 $*b^6*c^6*d*j^3 - 607068*a^2*b^8*c^9*d^3*j + 589824*a^6*b^4*c^9*e*i^3 - 3542$   
 $40*a^5*b^5*c^9*f*h^3 - 354240*a^4*b^5*c^10*f^3*h + 145188*a^6*b^8*c^5*d*j^3$   
 $+ 98304*a^5*b^6*c^8*e*i^3 + 43680*a^3*b^7*c^9*f^3*h - 21600*a^4*b^7*c^8*f*$   
 $h^3 - 9576*a^5*b^10*c^4*d*j^3 + 1350*a^3*b^9*c^7*f*h^3 - 1050*a^2*b^9*c^8*f$   
 $^3*h - 504*a*b^14*c^4*d^2*j^2 + 210*a^4*b^12*c^3*d*j^3 + 3870720*a^6*b*c^12$   
 $*d^2*i^2 + 1658880*a^6*b*c^12*e^2*h^2 - 9792*a*b^11*c^7*d^2*i^2 + 16547328*$   
 $a^4*b^2*c^13*d^3*h - 12306816*a^3*b^4*c^12*d^3*h + 37310976*a^3*b^3*c^13*d^$   
 $3*f + 3037824*a^2*b^6*c^11*d^3*h - 2654208*a^5*b^3*c^11*e*g^3 + 1949184*a^6$   
 $*b^2*c^11*d*h^3 + 1296000*a^5*b^4*c^10*d*h^3 - 155520*a^4*b^6*c^9*d*h^3 - 4$   
 $0500*a*b^10*c^8*d^2*h^2 - 8100*a^3*b^8*c^8*d*h^3 + 4050*a^2*b^10*c^7*d*h^3$   
 $+ 3870720*a^5*b*c^13*e^2*f^2 + 34836480*a^4*b*c^14*d^2*e^2 - 108864*a*b^9*c$   
 $^9*d^2*g^2 - 8068032*a^2*b^5*c^12*d^3*f - 5623296*a^4*b^3*c^12*d*f^3 + 1737$   
 $792*a^3*b^5*c^11*d*f^3 - 260190*a*b^8*c^10*d^2*f^2 - 211680*a^2*b^7*c^10*d*$   
 $f^3 - 435456*a*b^7*c^11*d^2*e^2 - 377487360*a^12*b*c^6*e*k^3 + 1434977280*a$   
 $^8*b^3*c^8*d^2*k^2 + 173408256*a^7*c^12*d^2*e*k + 3276800*a^12*c^7*i*j^2*k$   
 $- 125829120*a^13*b*c^5*i*k^3 + 26214400*a^12*c^7*f*j*k^2 + 1179648*a^10*c^9$   
 $*h^2*i*k + 13440*a^6*b^13*h*j*k^2 + 50331648*a^11*c^8*e*i*k^2 + 110100480*a$   
 $^10*c^9*d*f*k^2 + 57802752*a^8*c^11*d^2*i*k + 9830400*a^11*c^8*e*j^2*k - 32$   
 $76800*a^9*c^10*f^2*i*k + 4480*a^5*b^14*f*j*k^2 + 15728640*a^11*c^8*f*h*k^2$   
 $- 409600*a^9*c^10*f*i^2*j - 1152*b^16*c^3*d^2*i*k - 1220516352*a^7*b^5*c^7*$   
 $d^2*k^2 + 3538944*a^9*c^10*e*h^2*k + 384000*a^8*c^11*f^2*h*j + 13440*a^4*b^$   
 $15*d*j*k^2 + 384*a^3*b^16*f*h*k^2 + 20321280*a^7*c^12*d^2*h*j - 245760*a^8*$   
 $c^11*f*h*i^2 + 3456*b^15*c^4*d^2*g*k - 270*b^14*c^5*d^2*h*j - 9830400*a^8*c$   
 $^11*e*f^2*k + 4838400*a^9*c^10*d*h*j^2 + 2903040*a^8*c^11*d*h^2*j - 1966080$   
 $*a^10*b*c^8*i^3*k + 1433600*a^9*b^9*c*i*k^3 + 1152*a^2*b^17*d*h*k^2 - 36864$   
 $00*a^7*c^12*e^2*f*j - 53084160*a^7*b*c^11*e^3*k - 6912*b^14*c^5*d^2*e*k - 3$   
 $456*b^12*c^7*d^2*g*i + 630*b^13*c^6*d^2*f*j + 2688000*a^7*c^12*d*f^2*j + 24$   
 $5760*a^8*b^10*c*g*k^3 - 2211840*a^6*c^13*e^2*f*h - 1720320*a^7*c^12*d*f*i^2$   
 $- 9450*b^11*c^8*d^2*f*h + 6912*b^11*c^8*d^2*e*i + 1612800*a^6*c^13*d*f^2*h$   
 $- 1344000*a^10*b*c^8*f*j^3 - 1344000*a^7*b*c^11*f^3*j - 393216*a^8*b*c^10*$   
 $g*i^3 - 23616*a*b^17*c*d^2*k^2 - 20736*b^10*c^9*d^2*e*g - 75188736*a^4*b*c^$   
 $14*d^3*f - 883200*a^6*b*c^12*f^3*h - 317952*a^7*b*c^11*f*h^3 + 43416*a*b^10$   
 $*c^8*d^3*j - 15482880*a^5*c^14*d*e^2*f - 10616832*a^5*b*c^13*e^3*g - 345060$   
 $*a*b^8*c^10*d^3*h - 4262400*a^5*b*c^13*d*f^3 + 852768*a*b^7*c^11*d^3*f + 73$   
 $50*a*b^9*c^9*d*f^3 + 584578368*a^6*b^7*c^6*d^2*k^2 + 93905920*a^12*b^3*c^4*$   
 $j^2*k^2 - 177997248*a^5*b^9*c^5*d^2*k^2 - 50967040*a^11*b^5*c^3*j^2*k^2 + 1$   
 $04693760*a^9*b^2*c^8*e^2*k^2 + 12849984*a^10*b^7*c^2*j^2*k^2 + 20021248*a^1$   
 $1*b^2*c^6*i^2*k^2 - 85524480*a^8*b^4*c^7*e^2*k^2 + 33223680*a^10*b^3*c^6*h^$

$$\begin{aligned}
& 2*k^2 + 4227072*a^{10}*b^4*c^5*i^2*k^2 - 3973120*a^9*b^6*c^4*i^2*k^2 + 344064 \\
& *a^7*b^{10}*c^2*i^2*k^2 - 81920*a^8*b^8*c^3*i^2*k^2 - 11386368*a^9*b^5*c^5*h^ \\
& 2*k^2 + 26173440*a^9*b^4*c^6*g^2*k^2 - 21381120*a^8*b^6*c^5*g^2*k^2 + 18874 \\
& 368*a^{10}*b^2*c^7*g^2*k^2 + 501760*a^9*b^3*c^7*i^2*j^2 + 452160*a^8*b^7*c^4* \\
& h^2*k^2 + 385920*a^7*b^9*c^3*h^2*k^2 + 170240*a^8*b^5*c^6*i^2*j^2 - 48960*a \\
& ^6*b^{11}*c^2*h^2*k^2 + 9216*a^7*b^7*c^5*i^2*j^2 - 1984*a^6*b^9*c^4*i^2*j^2 + \\
& 64*a^5*b^{11}*c^3*i^2*j^2 + 5898240*a^7*b^8*c^4*g^2*k^2 + 1419840*a^8*b^4*c^ \\
& 7*h^2*j^2 + 1387008*a^9*b^2*c^8*h^2*j^2 - 737280*a^6*b^{10}*c^3*g^2*k^2 + 849 \\
& 60*a^7*b^6*c^6*h^2*j^2 + 36864*a^5*b^{12}*c^2*g^2*k^2 - 8010*a^6*b^8*c^5*h^2* \\
& j^2 - 180*a^5*b^{10}*c^4*h^2*j^2 + 9*a^4*b^{12}*c^3*h^2*j^2 + 14115840*a^9*b^3* \\
& c^7*f^2*k^2 - 9231552*a^7*b^7*c^5*f^2*k^2 + 23592960*a^7*b^6*c^6*e^2*k^2 + \\
& 4984320*a^8*b^5*c^6*f^2*k^2 + 3759040*a^6*b^9*c^4*f^2*k^2 + 36190080*a^4*b^ \\
& 11*c^4*d^2*k^2 + 967680*a^8*b^3*c^8*g^2*j^2 - 727360*a^5*b^{11}*c^3*f^2*k^2 + \\
& 276480*a^7*b^3*c^9*h^2*i^2 + 161280*a^7*b^5*c^7*g^2*j^2 + 140544*a^6*b^5*c \\
& ^8*h^2*i^2 + 72960*a^4*b^{13}*c^2*f^2*k^2 + 25344*a^5*b^7*c^7*h^2*i^2 - 20160 \\
& *a^6*b^7*c^6*g^2*j^2 + 576*a^5*b^9*c^5*g^2*j^2 + 576*a^4*b^9*c^6*h^2*i^2 + \\
& 3808000*a^8*b^2*c^9*f^2*j^2 - 2949120*a^6*b^8*c^5*e^2*k^2 + 1643712*a^7*b^4 \\
& *c^8*f^2*j^2 + 884736*a^7*b^2*c^{10}*g^2*i^2 + 884736*a^6*b^4*c^9*g^2*i^2 + 2 \\
& 21184*a^5*b^6*c^8*g^2*i^2 + 147456*a^5*b^{10}*c^4*e^2*k^2 - 125440*a^6*b^6*c^ \\
& 7*f^2*j^2 - 13790*a^5*b^8*c^6*f^2*j^2 + 1785*a^4*b^{10}*c^5*f^2*j^2 - 70*a^3* \\
& b^{12}*c^4*f^2*j^2 - 4953600*a^3*b^{13}*c^3*d^2*k^2 + 18427392*a^7*b^2*c^{10}*d^2 \\
& *j^2 + 645120*a^7*b^3*c^9*e^2*j^2 + 501760*a^6*b^3*c^{10}*f^2*i^2 + 442944*a^ \\
& 2*b^{15}*c^2*d^2*k^2 + 414720*a^6*b^3*c^{10}*g^2*h^2 + 207360*a^5*b^5*c^9*g^2*h \\
& ^2 + 170240*a^5*b^5*c^9*f^2*i^2 - 80640*a^6*b^5*c^8*e^2*j^2 + 9216*a^4*b^7* \\
& c^8*f^2*i^2 + 5184*a^4*b^7*c^8*g^2*h^2 + 2304*a^5*b^7*c^7*e^2*j^2 - 1984*a^ \\
& 3*b^9*c^7*f^2*i^2 + 64*a^2*b^{11}*c^6*f^2*i^2 - 4148928*a^6*b^4*c^9*d^2*j^2 + \\
& 3538944*a^6*b^2*c^{11}*e^2*i^2 + 1684224*a^6*b^2*c^{11}*f^2*h^2 + 1264320*a^5* \\
& b^4*c^{10}*f^2*h^2 - 1183392*a^5*b^6*c^8*d^2*j^2 + 884736*a^5*b^4*c^{10}*e^2*i^ \\
& 2 + 645750*a^4*b^8*c^7*d^2*j^2 + 126720*a^4*b^6*c^9*f^2*h^2 - 115920*a^3*b^ \\
& 10*c^6*d^2*j^2 - 13950*a^3*b^8*c^8*f^2*h^2 + 10836*a^2*b^{12}*c^5*d^2*j^2 + 2 \\
& 25*a^2*b^{10}*c^7*f^2*h^2 + 1935360*a^5*b^3*c^{11}*d^2*i^2 + 967680*a^5*b^3*c^1 \\
& 1*f^2*g^2 + 829440*a^5*b^3*c^{11}*e^2*h^2 - 532224*a^4*b^5*c^{10}*d^2*i^2 + 161 \\
& 280*a^4*b^5*c^{10}*f^2*g^2 - 96768*a^3*b^7*c^9*d^2*i^2 + 62784*a^2*b^9*c^8*d^ \\
& 2*i^2 + 20736*a^4*b^5*c^{10}*e^2*h^2 - 20160*a^3*b^7*c^9*f^2*g^2 + 576*a^2*b^ \\
& 9*c^8*f^2*g^2 + 11487744*a^5*b^2*c^{12}*d^2*h^2 + 7962624*a^5*b^2*c^{12}*e^2*g^ \\
& 2 + 35525376*a^4*b^2*c^{13}*d^2*f^2 - 1412640*a^3*b^6*c^{10}*d^2*h^2 + 461376*a \\
& ^4*b^4*c^{11}*d^2*h^2 + 375030*a^2*b^8*c^9*d^2*h^2 + 8709120*a^4*b^3*c^{12}*d^2 \\
& *g^2 - 4354560*a^3*b^5*c^{11}*d^2*g^2 + 979776*a^2*b^7*c^{10}*d^2*g^2 + 645120* \\
& a^4*b^3*c^{12}*e^2*f^2 - 80640*a^3*b^5*c^{11}*e^2*f^2 + 2304*a^2*b^7*c^{10}*e^2*f \\
& ^2 - 15269184*a^3*b^4*c^{12}*d^2*f^2 + 2870784*a^2*b^6*c^{11}*d^2*f^2 - 1741824 \\
& 0*a^3*b^3*c^{13}*d^2*e^2 + 3919104*a^2*b^5*c^{12}*d^2*e^2 + 384*a*b^{18}*d*f*k^2 \\
& - 199229440*a^{14}*b^2*c^3*k^4 + 8388608*a^{12}*c^7*i^2*k^2 + 75497472*a^{10}*c^9 \\
& *e^2*k^2 + 78400*a^8*b^{11}*j^2*k^2 + 4096*a^5*b^{14}*i^2*k^2 + 345600*a^{10}*c^9 \\
& *h^2*j^2 + 576*a^4*b^{15}*h^2*k^2 + 57937920*a^{13}*b^4*c^2*k^4 + 320000*a^9*c^ \\
& 10*f^2*j^2 + 64*a^2*b^{17}*f^2*k^2 + 16934400*a^8*c^{11}*d^2*j^2 + 9*b^{16}*c^3*d
\end{aligned}$$



$$\begin{aligned}
&^2*j^2 + 3538944*a^7*c^12*e^2*i^2 + 115200*a^7*c^12*f^2*h^2 + 576*b^13*c^6* \\
&d^2*i^2 + 2025*b^12*c^7*d^2*h^2 + 6096384*a^6*c^13*d^2*h^2 + 492800*a^11*b^ \\
&2*c^6*j^4 + 351456*a^10*b^4*c^5*j^4 - 43120*a^9*b^6*c^4*j^4 + 5184*b^11*c^8 \\
&*d^2*g^2 + 1225*a^8*b^8*c^3*j^4 + 131072*a^8*b^2*c^9*i^4 + 98304*a^7*b^4*c^ \\
&8*i^4 + 32768*a^6*b^6*c^7*i^4 + 11025*b^10*c^9*d^2*f^2 + 4096*a^5*b^8*c^6*i \\
&^4 + 5644800*a^5*c^14*d^2*f^2 + 142560*a^6*b^4*c^9*h^4 + 103680*a^7*b^2*c^1 \\
&0*h^4 + 32400*a^5*b^6*c^8*h^4 + 20736*b^9*c^10*d^2*e^2 + 2025*a^4*b^8*c^7*h \\
&^4 + 331776*a^5*b^4*c^10*g^4 + 492800*a^5*b^2*c^12*f^4 + 351456*a^4*b^4*c^1 \\
&1*f^4 - 43120*a^3*b^6*c^10*f^4 + 1225*a^2*b^8*c^9*f^4 - 27433728*a^3*b^2*c^ \\
&14*d^4 + 6446304*a^2*b^4*c^13*d^4 + a^2*b^14*c^3*f^2*j^2 - 81920*a^8*b^11*i \\
&*k^3 + 384000*a^11*c^8*h*j^3 + 138240*a^9*c^10*h^3*j + 47416320*a^6*c^13*d^ \\
&3*j - 1134*b^12*c^7*d^3*j + 7077888*a^6*c^13*e^3*i + 2688000*a^10*c^9*d*j^3 \\
&+ 786432*a^8*c^11*e*i^3 + 28449792*a^5*c^14*d^3*h - 7782400*a^12*b^6*c*k^4 \\
&+ 17010*b^10*c^9*d^3*h + 580608*a^7*c^12*d*h^3 - 39690*b^9*c^10*d^3*f - 73 \\
&4832*a*b^6*c^12*d^4 + 268435456*a^15*c^4*k^4 + 576*b^19*d^2*k^2 + 409600*a^ \\
&11*b^8*k^4 + 160000*a^12*c^7*j^4 + 65536*a^9*c^10*i^4 + 20736*a^8*c^11*h^4 \\
&+ 49787136*a^4*c^15*d^4 + 160000*a^6*c^13*f^4 + 5308416*a^5*c^14*e^4 + 3572 \\
&1*b^8*c^11*d^4, z, n)*x*(8388608*a^11*b*c^13 - 512*a^4*b^15*c^6 + 14336*a^5 \\
&*b^13*c^7 - 172032*a^6*b^11*c^8 + 1146880*a^7*b^9*c^9 - 4587520*a^8*b^7*c^1 \\
&0 + 11010048*a^9*b^5*c^11 - 14680064*a^10*b^3*c^12))/(64*(4096*a^10*c^10 + \\
&a^4*b^12*c^4 - 24*a^5*b^10*c^5 + 240*a^6*b^8*c^6 - 1280*a^7*b^6*c^7 + 3840* \\
&a^8*b^4*c^8 - 6144*a^9*b^2*c^9))) - (x*(451584*a^6*c^13*d^2 + 18*b^12*c^7*d \\
&^2 - 25600*a^7*c^12*f^2 + 9216*a^8*c^11*h^2 + 128*a^4*b^15*k^2 + 25600*a^10 \\
&*c^9*j^2 - 504*a*b^10*c^8*d^2 - 73728*a^6*b*c^12*e^2 - 8192*a^8*b*c^10*i^2 \\
&- 3712*a^5*b^13*c*k^2 - 3538944*a^11*b*c^7*k^2 + 6228*a^2*b^8*c^9*d^2 - 426 \\
&24*a^3*b^6*c^10*d^2 + 176256*a^4*b^4*c^11*d^2 - 423936*a^5*b^2*c^12*d^2 - 4 \\
&608*a^4*b^5*c^10*e^2 + 36864*a^5*b^3*c^11*e^2 + 2*a^2*b^10*c^7*f^2 - 84*a^3 \\
&*b^8*c^8*f^2 + 3520*a^4*b^6*c^9*f^2 - 26240*a^5*b^4*c^10*f^2 + 59904*a^6*b^ \\
&2*c^11*f^2 - 1152*a^4*b^7*c^8*g^2 + 9216*a^5*b^5*c^9*g^2 - 18432*a^6*b^3*c^ \\
&10*g^2 + 468*a^4*b^8*c^7*h^2 - 3456*a^5*b^6*c^8*h^2 + 5760*a^6*b^4*c^9*h^2 \\
&- 128*a^4*b^9*c^6*i^2 + 512*a^5*b^7*c^7*i^2 + 1536*a^6*b^5*c^8*i^2 - 4096*a \\
&^7*b^3*c^9*i^2 + 2*a^4*b^12*c^3*j^2 - 88*a^5*b^10*c^4*j^2 + 1236*a^6*b^8*c^ \\
&5*j^2 - 5760*a^7*b^6*c^6*j^2 + 8320*a^8*b^4*c^7*j^2 - 6144*a^9*b^2*c^8*j^2 \\
&+ 46464*a^6*b^11*c^2*k^2 - 326400*a^7*b^9*c^3*k^2 + 1394560*a^8*b^7*c^4*k^2 \\
&- 3640320*a^9*b^5*c^5*k^2 + 5404672*a^10*b^3*c^6*k^2 + 129024*a^7*c^12*d*h \\
&+ 215040*a^8*c^11*d*j + 786432*a^9*c^10*e*k + 30720*a^9*c^10*h*j + 262144* \\
&a^10*c^9*i*k + 12*a*b^11*c^7*d*f - 218112*a^6*b*c^12*d*f - 49152*a^7*b*c^11 \\
&*e*i - 9216*a^7*b*c^11*f*h - 25600*a^8*b*c^10*f*j - 393216*a^9*b*c^9*g*k - \\
&420*a^2*b^9*c^8*d*f + 4992*a^3*b^7*c^9*d*f - 36480*a^4*b^5*c^10*d*f + 14438 \\
&4*a^5*b^3*c^11*d*f + 36*a^2*b^10*c^7*d*h - 360*a^3*b^8*c^8*d*h + 3456*a^4*b \\
&^6*c^9*d*h + 4608*a^4*b^6*c^9*e*g - 11520*a^5*b^4*c^10*d*h - 36864*a^5*b^4* \\
&c^10*e*g - 27648*a^6*b^2*c^11*d*h + 73728*a^6*b^2*c^11*e*g + 12*a^3*b^9*c^7 \\
&*f*h - 1536*a^4*b^7*c^8*e*i - 2304*a^4*b^7*c^8*f*h + 168*a^4*b^8*c^7*d*j + \\
&9216*a^5*b^5*c^9*e*i + 17280*a^5*b^5*c^9*f*h - 768*a^5*b^6*c^8*d*j - 30720* \\
&a^6*b^3*c^10*f*h + 11520*a^6*b^4*c^9*d*j - 98304*a^7*b^2*c^10*d*j + 768*a^4
\end{aligned}$$

$$\begin{aligned}
& *b^8c^7g^i + 140a^4b^9c^6f^j - 4608a^5b^6c^8g^i - 3584a^5b^7c^7f^j + 1536a^5b^8c^6e^k + 20352a^6b^5c^8f^j - 26112a^6b^6c^7e^k \\
& k + 24576a^7b^2c^10g^i - 26624a^7b^3c^9f^j + 184320a^7b^4c^8e^k - 614400a^8b^2c^9e^k - 60a^4b^10c^5h^j + 1560a^5b^8c^6h^j - 76 \\
& 8a^5b^9c^5g^k - 8832a^6b^6c^7h^j + 13056a^6b^7c^6g^k + 13056a^7b^4c^8h^j - 92160a^7b^5c^7g^k - 3072a^8b^2c^9h^j + 307200a^8b^3c^8g^k \\
& + 256a^5b^10c^4i^k - 3840a^6b^8c^5i^k + 22016a^7b^6c^6i^k - 40960a^8b^4c^7i^k - 73728a^9b^2c^8i^k) / (64(4096a^10c^10 + a^4b^12c^4 - 24a^5b^10c^5 + 240a^6b^8c^6 - 1280a^7b^6c^7 + 3840a^8b^4c^8 - 6144a^9b^2c^9)) + (x((13824a^4c^12e^3 + 512a^7c^9i^3 - 640a^7b^9k^3 - 54b^7c^9d^2e + 27b^8c^8d^2g + 11840a^8b^7c^k^3 - 376832a^11b^c^4k^3 + 13824a^5c^11e^2i + 4608a^6c^10e^i^2 - 9b^9c^7d^2i + 112896a^6c^10d^2k + 98304a^9c^7e^k^2 + 9b^12c^4d^2k - 6400a^7c^9f^2k + 64a^4b^12i^k^2 + 2304a^8c^8h^2k + 32768a^10c^6i^k^2 + 6400a^10c^6j^2k - 1728a^4b^3c^9g^3 + 64a^4b^6c^6i^3 + 384a^5b^4c^7i^3 + 768a^6b^2c^8i^3 - 85824a^9b^5c^2k^3 + 287296a^10b^3c^3k^3 - 20160a^4c^12d^e^f - 6720a^5c^11d^f^i - 2880a^5c^11e^f^h - 4800a^6c^10e^f^j - 960a^6c^10f^h^i + 32256a^7c^9d^h^k - 1600a^7c^9f^i^j + 53760a^8c^8d^j^k + 7680a^9c^7h^j^k + 972a^ab^5c^10d^2e + 24192a^3b^c^12d^2e - 486a^b^6c^9d^2g + 6240a^4b^c^11e^f^2 - 20736a^4b^c^11e^2g + 144a^b^7c^8d^2i + 8064a^4b^c^11d^2i + 1728a^5b^c^10e^h^2 - 252a^b^10c^5d^2k + 2080a^5b^c^10f^2i + 3840a^7b^c^8e^j^2 - 2304a^6b^c^9g^i^2 - 122112a^6b^c^9e^2k + 576a^6b^c^9h^2i - 192a^4b^11c^g^k^2 - 49152a^9b^c^6g^k^2 + 1280a^8b^c^7i^j^2 - 1088a^5b^10c^i^k^2 - 13568a^8b^c^7i^2k - 7344a^2b^3c^11d^2e + 3672a^2b^4c^10d^2g - 6a^2b^5c^9e^f^2 - 12096a^3b^2c^11d^2g + 192a^3b^3c^10e^f^2 + 10368a^4b^2c^10e^g^2 - 900a^2b^5c^9d^2i + 3a^2b^6c^8f^2g + 1584a^3b^3c^10d^2i - 96a^3b^4c^9f^2g - 3120a^4b^2c^10f^2g + 1296a^4b^3c^9e^h^2 + 6912a^4b^2c^10e^2i + 1152a^4b^4c^8e^i^2 + 4608a^5b^2c^9e^i^2 - a^2b^7c^7f^2i + 3114a^2b^8c^6d^2k + 30a^3b^5c^8f^2i - 21222a^3b^6c^7d^2k + 1104a^4b^3c^9f^2i - 648a^4b^4c^8g^h^2 + 82584a^4b^4c^8d^2k + 6a^4b^7c^5e^j^2 - 864a^5b^2c^9g^h^2 - 166464a^5b^2c^9d^2k - 204a^5b^5c^6e^j^2 + 1488a^6b^3c^7e^j^2 + 1728a^4b^4c^8g^2i - 576a^4b^5c^7g^i^2 - 4608a^4b^5c^7e^2k + 384a^4b^10c^2e^k^2 + 3456a^5b^2c^9g^2i - 2304a^5b^3c^8g^i^2 + 43776a^5b^3c^8e^2k - 7296a^5b^8c^3e^k^2 + 54912a^6b^6c^4e^k^2 - 188160a^7b^4c^5e^k^2 + 228480a^8b^2c^6e^k^2 + a^2b^10c^4f^2k - 42a^3b^8c^5f^2k + 216a^4b^5c^7h^2i + 535a^4b^6c^6f^2k - 3a^4b^8c^4g^j^2 + 720a^5b^3c^8h^2i - 1840a^5b^4c^7f^2k + 102a^5b^6c^5g^j^2 - 624a^6b^2c^8f^2k - 744a^6b^4c^6g^j^2 - 1920a^7b^2c^7g^j^2 - 1152a^4b^7c^5g^2k + 10944a^5b^5c^6g^2k + 3648a^5b^9c^2g^k^2 - 30528a^6b^3c^7g^2k - 27456a^6b^7c^3g^k^2 + 94080a^7b^5c^4g^k^2 - 114240a^8b^3c^5g^k^2 + 9a^4b^8c^4h^2k + a^4b^9c^3i^j^2 + 72a^5b^6c^5h^2k - 32a^5b^7c^4i^j^2 - 360a^6b^4c^6h^2k + 1
\end{aligned}$$

$$\begin{aligned}
& 80a^6b^5c^5i^2j^2 - 4320a^7b^2c^7h^2k + 1136a^7b^3c^6i^2j^2 - 128a^4b^9c^3i^2k + 704a^5b^7c^4i^2k + 960a^6b^5c^5i^2k + 6720a^6b^8c^2i^2k^2 - 8704a^7b^3c^6i^2k - 13056a^7b^6c^3i^2k^2 - 24640a^8b^4c^4i^2k^2 + 92544a^9b^2c^5i^2k^2 - 10a^7b^6c^3j^2k + 1560a^8b^4c^4j^2k - 11136a^9b^2c^5j^2k - 36a^6b^6c^9d^2e^2f + 18a^6b^7c^8d^2f^2g + 15552a^4b^3c^11d^2e^2h + 10080a^4b^3c^11d^2f^2g - 6a^6b^8c^7d^2f^2i + 21888a^5b^3c^10d^2e^2j + 6a^6b^11c^4d^2f^2k + 5184a^5b^3c^10d^2h^2i - 13824a^5b^3c^10e^2g^2i + 1440a^5b^3c^10f^2g^2h - 4128a^6b^3c^9d^2f^2k + 7296a^6b^3c^9d^2i^2j + 5184a^6b^3c^9e^2h^2j + 2400a^6b^3c^9f^2g^2j - 81408a^7b^3c^8e^2i^2k + 4896a^7b^3c^8f^2h^2k + 1728a^7b^3c^8h^2i^2j + 5600a^8b^3c^7f^2j^2k + 900a^2b^4c^10d^2e^2f - 4896a^3b^2c^11d^2e^2f - 108a^2b^5c^9d^2e^2h - 450a^2b^5c^9d^2f^2g + 2448a^3b^3c^10d^2f^2g + 138a^2b^6c^8d^2f^2i + 54a^2b^6c^8d^2g^2h - 516a^3b^4c^9d^2f^2i - 36a^3b^4c^9e^2f^2h - 4992a^4b^2c^10d^2f^2i - 7776a^4b^2c^10d^2g^2h - 6048a^4b^2c^10e^2f^2h - 2016a^4b^3c^9d^2e^2j - 18a^2b^7c^7d^2h^2i - 210a^2b^9c^5d^2f^2k - 36a^3b^5c^8d^2h^2i + 18a^3b^5c^8f^2g^2h + 2496a^3b^7c^6d^2f^2k + 2592a^4b^3c^9d^2h^2i - 6912a^4b^3c^9e^2g^2i + 3024a^4b^3c^9f^2g^2h + 1008a^4b^4c^8d^2g^2j + 420a^4b^4c^8e^2f^2j - 13770a^4b^5c^7d^2f^2k - 10944a^5b^2c^9d^2g^2j - 7392a^5b^2c^9e^2f^2j + 31536a^5b^3c^8d^2f^2k + 18a^2b^10c^4d^2h^2k - 6a^3b^6c^7f^2h^2i - 180a^3b^8c^5d^2h^2k - 1020a^4b^4c^8f^2h^2i - 336a^4b^5c^7d^2i^2j - 180a^4b^5c^7e^2h^2j - 210a^4b^5c^7f^2g^2j - 162a^4b^6c^6d^2h^2k + 4608a^4b^6c^6e^2g^2k - 2496a^5b^2c^9f^2h^2i + 2976a^5b^3c^8d^2i^2j + 2880a^5b^3c^8e^2h^2j + 3696a^5b^3c^8f^2g^2j + 10080a^5b^4c^7d^2h^2k - 43776a^5b^4c^7e^2g^2k - 45792a^6b^2c^8d^2h^2k + 122112a^6b^2c^8e^2g^2k + 6a^3b^9c^4f^2h^2k + 70a^4b^6c^6f^2i^2j + 90a^4b^6c^6g^2h^2j - 1536a^4b^7c^5e^2i^2k - 102a^4b^7c^5f^2h^2k + 210a^4b^8c^4d^2j^2k - 1092a^5b^4c^7f^2i^2j - 1440a^5b^4c^7g^2h^2j + 11520a^5b^5c^6e^2i^2k - 390a^5b^5c^6f^2h^2k - 3696a^5b^6c^5d^2j^2k - 3264a^6b^2c^8f^2i^2j - 2592a^6b^2c^8g^2h^2j - 11520a^6b^3c^7e^2i^2k + 5040a^6b^3c^7f^2h^2k + 26160a^6b^4c^6d^2j^2k - 79296a^7b^2c^7d^2j^2k - 30a^4b^7c^5h^2i^2j + 768a^4b^8c^4g^2i^2k + 420a^5b^5c^6h^2i^2j - 5760a^5b^6c^5g^2i^2k + 70a^5b^7c^4f^2j^2k + 1824a^6b^3c^7h^2i^2j + 5760a^6b^4c^6g^2i^2k - 1722a^6b^5c^5f^2j^2k + 40704a^7b^2c^7g^2i^2k + 7824a^7b^3c^6f^2j^2k + 210a^6b^6c^4h^2j^2k + 384a^7b^4c^5h^2j^2k - 13728a^8b^2c^6h^2j^2k) / ((64*(4096a^10c^10 + a^4b^12c^4 - 24a^5b^10c^5 + 240a^6b^8c^6 - 1280a^7b^6c^7 + 3840a^8b^4c^8 - 6144a^9b^2c^9))) * root(56371445760a^11b^8c^12z^4 - 503316480a^8b^14c^9z^4 + 47185920a^7b^16c^8z^4 - 2621440a^6b^18c^7z^4 + 65536a^5b^20c^6z^4 - 171798691840a^14b^2c^15z^4 + 193273528320a^13b^4c^14z^4 - 128849018880a^12b^6c^13z^4 - 16911433728a^10b^10c^11z^4 + 3523215360a^9b^12c^10z^4 + 68719476736a^15c^16z^4 - 47185920a^7b^16c^5kz^3 + 2621440a^6b^18c^4kz^3 - 65536a^5b^20c^3kz^3 + 171798691840a^14b^2c^12kz^3 - 193273528320a^13b^4c^11kz^3 + 128849018880a^12b^6c^10kz^3 + 16911433728a^10b^10c^8kz^3 - 3523215360a^9b^12c^7kz^3 - 56371445760a^11b^8c^9kz^3 + 503316480a^8b^14c^6kz^3
\end{aligned}$$

$$\begin{aligned}
& - 68719476736a^{15}c^{13}k^3z^3 + 1536a^8b^{18}c^6d^2f^2z^2 - 2571632640a^9b^5c^{11}d^2j^2z^2 + 2548039680a^9b^3c^{13}d^2h^2z^2 + 2453667840a^9b^7c^9e^2k^2z^2 + 2181038080a^{12}b^3c^{10}i^2k^2z^2 - 6492782592a^{10}b^5c^{10}e^2k^2z^2 + 1509949440a^9b^3c^{13}e^2g^2z^2 - 1401421824a^8b^5c^{12}d^2h^2z^2 - 1226833920a^9b^8c^8g^2k^2z^2 - 1321205760a^9b^2c^{14}d^2f^2z^2 - 2793406464a^{11}b^3c^{13}d^2j^2z^2 + 9563013120a^{11}b^3c^{11}e^2k^2z^2 + 890634240a^8b^7c^{10}d^2j^2z^2 - 754974720a^8b^5c^{12}e^2g^2z^2 - 570425344a^{11}b^5c^9i^2k^2z^2 + 732168192a^7b^6c^{12}d^2f^2z^2 - 581959680a^{10}b^4c^{11}f^2j^2z^2 - 603979776a^{10}b^2c^{13}e^2i^2z^2 + 534773760a^{11}b^3c^{11}h^2j^2z^2 - 558366720a^8b^9c^8e^2k^2z^2 - 4781506560a^{11}b^4c^{10}g^2k^2z^2 - 2013265920a^{13}b^3c^{11}i^2k^2z^2 - 456130560a^9b^4c^{12}f^2h^2z^2 + 384040960a^9b^6c^{10}f^2j^2z^2 - 264241152a^{10}b^7c^8i^2k^2z^2 + 390463488a^7b^7c^{11}d^2h^2z^2 + 279183360a^8b^{10}c^7g^2k^2z^2 + 301989888a^{10}b^3c^{12}g^2i^2z^2 + 222822400a^9b^9c^7i^2k^2z^2 - 366280704a^6b^8c^{11}d^2f^2z^2 - 330301440a^8b^4c^{13}d^2f^2z^2 + 254017536a^8b^6c^{11}f^2h^2z^2 - 1887436800a^{10}b^3c^{14}d^2h^2z^2 + 188743680a^{10}b^2c^{13}f^2h^2z^2 - 185303040a^7b^9c^9d^2j^2z^2 - 117964800a^{10}b^5c^{10}h^2j^2z^2 - 6039797760a^{12}b^3c^{12}e^2k^2z^2 - 67502080a^8b^{11}c^6i^2k^2z^2 + 121634816a^{11}b^2c^{12}f^2j^2z^2 + 188743680a^7b^7c^{11}e^2g^2z^2 - 115671040a^8b^8c^9f^2j^2z^2 + 125829120a^8b^6c^{11}e^2i^2z^2 + 10813440a^7b^{13}c^5i^2k^2z^2 + 76677120a^7b^{11}c^7e^2k^2z^2 - 38338560a^7b^{12}c^6g^2k^2z^2 - 37355520a^9b^7c^9h^2j^2z^2 - 917504a^6b^{15}c^4i^2k^2z^2 + 32768a^5b^{17}c^3i^2k^2z^2 - 62914560a^8b^7c^{10}g^2i^2z^2 + 23101440a^8b^9c^8h^2j^2z^2 - 4349952a^7b^{11}c^7h^2j^2z^2 + 2949120a^6b^{14}c^5g^2k^2z^2 + 337920a^6b^{13}c^6h^2j^2z^2 - 98304a^5b^{16}c^4g^2k^2z^2 - 7680a^5b^{15}c^5h^2j^2z^2 - 61931520a^7b^8c^{10}f^2h^2z^2 + 23592960a^7b^9c^9g^2i^2z^2 + 17940480a^7b^{10}c^8f^2j^2z^2 - 47185920a^7b^8c^{10}e^2i^2z^2 - 5898240a^6b^{13}c^6e^2k^2z^2 - 3538944a^6b^{11}c^8g^2i^2z^2 - 1347584a^6b^{12}c^7f^2j^2z^2 + 196608a^5b^{15}c^5e^2k^2z^2 + 196608a^5b^{13}c^7g^2i^2z^2 + 35840a^5b^{14}c^6f^2j^2z^2 + 96583680a^5b^{10}c^{10}d^2f^2z^2 + 23371776a^6b^{11}c^8d^2j^2z^2 - 51609600a^6b^9c^{10}d^2h^2z^2 + 7077888a^6b^{10}c^9e^2i^2z^2 + 6144000a^6b^{10}c^9f^2h^2z^2 - 1677312a^5b^{13}c^7d^2j^2z^2 - 393216a^5b^{12}c^8e^2i^2z^2 + 61440a^5b^{12}c^8f^2h^2z^2 + 53760a^4b^{15}c^6d^2j^2z^2 - 46080a^4b^{14}c^7f^2h^2z^2 + 1536a^3b^{16}c^6f^2h^2z^2 - 23592960a^6b^9c^{10}e^2g^2z^2 + 1179648a^5b^{11}c^9e^2g^2z^2 + 829440a^4b^{13}c^8d^2h^2z^2 + 368640a^5b^{11}c^9d^2h^2z^2 - 105984a^3b^{15}c^7d^2h^2z^2 + 4608a^2b^{17}c^6d^2h^2z^2 - 15175680a^4b^{12}c^9d^2f^2z^2 + 1428480a^3b^{14}c^8d^2f^2z^2 - 73728a^2b^{16}c^7d^2f^2z^2 + 4108320768a^{10}b^3c^{12}d^2j^2z^2 - 1207959552a^{10}b^3c^{14}e^2g^2z^2 - 578813952a^{12}b^3c^{12}h^2j^2z^2 + 3246391296a^{10}b^6c^9g^2k^2z^2 - 402653184a^{11}b^3c^{13}g^2i^2z^2 + 3019898880a^{12}b^2c^{11}g^2k^2z^2 - 440401920a^{10}b^3c^{14}f^2z^2 - 188743680a^{11}b^3c^{13}h^2z^2 + 1761607680a^{10}c^{15}d^2f^2z^2 - 655360a^6b^{18}c^2k^2z^2 - 94464a^8b^{17}c^7d^2z^2 + 6936330240a^8b^3c^{14}d^2z^2 + 2464874496a^6b^7c^{12}d^2z^2 - 3963617280a^9b^3c^{15}d^2z^2 + 58007224320a^{13}b^4c^8k^2z^2 + 14968422400a^{11}b^8c^6k^2z^2 + 805306368a^{11}c^{14}e^2i^2z^2 - 35966156800a^{12}b^6c^7k^2z^2 + 419430400a^{12}c^{13}f^2j^2z^2 - 1509949440a^9b^
\end{aligned}$$

$2*c^{14}*e^{2*z^2} + 251658240*a^{11}*c^{14}*f*h*z^2 - 56874762240*a^{14}*b^2*c^9*k^2$   
 $*z^2 - 5400428544*a^7*b^5*c^{13}*d^2*z^2 + 890470400*a^9*b^{12}*c^4*k^2*z^2 + 7$   
 $54974720*a^8*b^4*c^{13}*e^2*z^2 - 730054656*a^5*b^9*c^{11}*d^2*z^2 + 477102080*$   
 $a^{12}*b^3*c^{10}*j^2*z^2 + 477102080*a^9*b^3*c^{13}*f^2*z^2 - 377487360*a^9*b^4*$   
 $c^{12}*g^2*z^2 + 301989888*a^{10}*b^2*c^{13}*g^2*z^2 - 174325760*a^{11}*b^5*c^9*j^2$   
 $*z^2 - 126156800*a^8*b^{14}*c^3*k^2*z^2 + 188743680*a^8*b^6*c^{11}*g^2*z^2 + 14$   
 $1557760*a^{10}*b^3*c^{12}*h^2*z^2 - 174325760*a^8*b^5*c^{12}*f^2*z^2 - 188743680*$   
 $a^7*b^6*c^{12}*e^2*z^2 - 4350935040*a^{10}*b^{10}*c^5*k^2*z^2 + 146165760*a^4*b^1$   
 $1*c^{10}*d^2*z^2 - 50331648*a^{10}*b^4*c^{11}*i^2*z^2 + 11796480*a^7*b^{16}*c^2*k^2$   
 $*z^2 - 33554432*a^{11}*b^2*c^{12}*i^2*z^2 + 11206656*a^{10}*b^7*c^8*j^2*z^2 + 892$   
 $9280*a^9*b^9*c^7*j^2*z^2 + 20971520*a^9*b^6*c^{10}*i^2*z^2 - 2600960*a^8*b^{11}$   
 $*c^6*j^2*z^2 + 291840*a^7*b^{13}*c^5*j^2*z^2 - 14080*a^6*b^{15}*c^4*j^2*z^2 + 2$   
 $56*a^5*b^{17}*c^3*j^2*z^2 - 47185920*a^7*b^8*c^{10}*g^2*z^2 - 26542080*a^8*b^7*$   
 $c^{10}*h^2*z^2 - 2752512*a^7*b^{10}*c^8*i^2*z^2 + 2621440*a^8*b^8*c^9*i^2*z^2 +$   
 $524288*a^6*b^{12}*c^7*i^2*z^2 - 32768*a^5*b^{14}*c^6*i^2*z^2 + 9584640*a^7*b^9$   
 $*c^9*h^2*z^2 - 2359296*a^9*b^5*c^{11}*h^2*z^2 - 1290240*a^6*b^{11}*c^8*h^2*z^2$   
 $+ 46080*a^5*b^{13}*c^7*h^2*z^2 + 2304*a^4*b^{15}*c^6*h^2*z^2 + 5898240*a^6*b^{10}$   
 $*c^9*g^2*z^2 - 294912*a^5*b^{12}*c^8*g^2*z^2 + 11206656*a^7*b^7*c^{11}*f^2*z^2$   
 $+ 8929280*a^6*b^9*c^{10}*f^2*z^2 + 23592960*a^6*b^8*c^{11}*e^2*z^2 - 2600960*a^$   
 $5*b^{11}*c^9*f^2*z^2 + 291840*a^4*b^{13}*c^8*f^2*z^2 - 14080*a^3*b^{15}*c^7*f^2*z$   
 $^2 + 256*a^2*b^{17}*c^6*f^2*z^2 - 19860480*a^3*b^{13}*c^9*d^2*z^2 - 1179648*a^5$   
 $*b^{10}*c^{10}*e^2*z^2 + 1771776*a^2*b^{15}*c^8*d^2*z^2 - 440401920*a^{13}*b*c^{11}*j$   
 $^2*z^2 + 1207959552*a^{10}*c^{15}*e^2*z^2 + 134217728*a^{12}*c^{13}*i^2*z^2 + 25769$   
 $803776*a^{15}*c^{10}*k^2*z^2 + 16384*a^5*b^{20}*k^2*z^2 + 2304*b^{19}*c^6*d^2*z^2 +$   
 $165150720*a^9*b*c^{12}*d*g*j*z + 23592960*a^{10}*b*c^{11}*g*h*j*z + 169869312*a^$   
 $7*b*c^{14}*d*e*f*z + 99090432*a^8*b*c^{13}*d*g*h*z - 3145728*a^9*b*c^{12}*f*h*i*z$   
 $+ 56623104*a^8*b*c^{13}*d*f*i*z - 1536*a*b^{18}*c^3*d*f*k*z - 9437184*a^8*b*c^$   
 $13*e*f*h*z + 1536*a*b^{15}*c^6*d*f*i*z - 4608*a*b^{14}*c^7*d*f*g*z + 9216*a*b^1$   
 $3*c^8*d*e*f*z + 2173501440*a^9*b^5*c^8*d*j*k*z - 1987706880*a^9*b^3*c^{10}*d*$   
 $h*k*z + 1121255424*a^8*b^5*c^9*d*h*k*z + 861143040*a^8*b^4*c^{10}*d*f*k*z - 8$   
 $59963392*a^7*b^6*c^9*d*f*k*z - 780779520*a^8*b^7*c^7*d*j*k*z - 754974720*a^$   
 $9*b^3*c^{10}*e*g*k*z + 2222456832*a^{11}*b*c^{10}*d*j*k*z - 454164480*a^{11}*b^3*c^$   
 $8*h*j*k*z + 377487360*a^8*b^5*c^9*e*g*k*z + 290979840*a^{10}*b^4*c^8*f*j*k*z$   
 $+ 381026304*a^6*b^8*c^8*d*f*k*z + 412876800*a^8*b^2*c^{12}*d*e*j*z + 30198988$   
 $8*a^{10}*b^2*c^{10}*e*i*k*z - 320421888*a^7*b^7*c^8*d*h*k*z + 185794560*a^{10}*b^$   
 $5*c^7*h*j*k*z - 192020480*a^9*b^6*c^7*f*j*k*z + 190709760*a^9*b^4*c^9*f*h*k$   
 $*z - 150994944*a^{10}*b^3*c^9*g*i*k*z + 168990720*a^7*b^9*c^6*d*j*k*z + 23592$   
 $9600*a^9*b^2*c^{11}*d*f*k*z - 206438400*a^8*b^3*c^{11}*d*g*j*z - 206438400*a^7*$   
 $b^4*c^{11}*d*e*j*z - 101646336*a^8*b^6*c^8*f*h*k*z - 29245440*a^9*b^7*c^6*h*j$   
 $*k*z - 60817408*a^{11}*b^2*c^9*f*j*k*z + 57835520*a^8*b^8*c^6*f*j*k*z + 21941$   
 $4528*a^7*b^2*c^{13}*d*e*h*z - 70778880*a^{10}*b^2*c^{10}*f*h*k*z + 677376*a^7*b^1$   
 $1*c^4*h*j*k*z - 645120*a^8*b^9*c^5*h*j*k*z - 53760*a^6*b^{13}*c^3*h*j*k*z + 3$   
 $1457280*a^8*b^7*c^7*g*i*k*z - 62914560*a^8*b^6*c^8*e*i*k*z - 94371840*a^7*b$   
 $^7*c^8*e*g*k*z - 221773824*a^6*b^3*c^{13}*d*e*f*z + 82575360*a^9*b^2*c^{11}*d*i$   
 $*j*z + 11796480*a^{10}*b^2*c^{10}*h*i*j*z - 11796480*a^7*b^9*c^6*g*i*k*z - 8970$

$240a^7b^{10}c^5f^*j^*k^*z + 103219200a^7b^5c^{10}d^*g^*j^*z - 2457600a^8b^6$   
 $c^8h^*i^*j^*z + 1769472a^6b^{11}c^5g^*i^*k^*z + 921600a^7b^8c^7h^*i^*j^*z +$   
 $673792a^6b^{12}c^4f^*j^*k^*z - 138240a^6b^{10}c^6h^*i^*j^*z - 98304a^5b^{13}$   
 $c^4g^*i^*k^*z - 17920a^5b^{14}c^3f^*j^*k^*z + 7680a^5b^{12}c^5h^*i^*j^*z - 9713$   
 $6640a^5b^{10}c^7d^*f^*k^*z - 29491200a^9b^3c^{10}g^*h^*j^*z + 58982400a^9b^2$   
 $c^{11}e^*h^*j^*z + 23592960a^7b^8c^7e^*i^*k^*z - 22169088a^6b^{11}c^5d^*j^*k^*$   
 $z + 21381120a^7b^8c^7f^*h^*k^*z + 14745600a^8b^5c^9g^*h^*j^*z + 42854400$   
 $a^6b^9c^7d^*h^*k^*z - 109707264a^7b^3c^{12}d^*g^*h^*z - 3686400a^7b^7c^8$   
 $g^*h^*j^*z - 3538944a^6b^{10}c^6e^*i^*k^*z + 1645056a^5b^{13}c^4d^*j^*k^*z - 89$   
 $0880a^6b^{10}c^6f^*h^*k^*z + 460800a^6b^9c^7g^*h^*j^*z - 330240a^5b^{12}c^5$   
 $f^*h^*k^*z + 196608a^5b^{12}c^5e^*i^*k^*z - 53760a^4b^{15}c^3d^*j^*k^*z + 4608$   
 $0a^4b^{14}c^4f^*h^*k^*z - 23040a^5b^{11}c^6g^*h^*j^*z - 1536a^3b^{16}c^3f^*h^*$   
 $k^*z - 29491200a^8b^4c^{10}e^*h^*j^*z - 17203200a^7b^6c^9d^*i^*j^*z + 11796$   
 $480a^6b^9c^7e^*g^*k^*z + 110886912a^6b^4c^{12}d^*f^*g^*z + 7372800a^7b^6$   
 $c^9e^*h^*j^*z + 40108032a^8b^2c^{12}d^*h^*i^*z + 6451200a^6b^8c^8d^*i^*j^*z +$   
 $2359296a^8b^3c^{11}f^*h^*i^*z - 967680a^5b^{10}c^7d^*i^*j^*z - 921600a^6b^8$   
 $c^8e^*h^*j^*z - 829440a^4b^{13}c^5d^*h^*k^*z - 589824a^5b^{11}c^6e^*g^*k^*z -$   
 $491520a^6b^7c^9f^*h^*i^*z + 184320a^5b^9c^8f^*h^*i^*z + 105984a^3b^{15}$   
 $c^4d^*h^*k^*z + 69120a^5b^{11}c^6d^*h^*k^*z + 53760a^4b^{12}c^6d^*i^*j^*z + 460$   
 $80a^5b^{10}c^7e^*h^*j^*z - 27648a^4b^{11}c^7f^*h^*i^*z - 4608a^2b^{17}c^3d^*$   
 $h^*k^*z + 1536a^3b^{13}c^6f^*h^*i^*z - 25804800a^6b^7c^9d^*g^*j^*z - 88473600$   
 $a^6b^4c^{12}d^*e^*h^*z + 51609600a^6b^6c^{10}d^*e^*j^*z - 84934656a^7b^2c^13$   
 $d^*f^*g^*z + 117964800a^5b^5c^{12}d^*e^*f^*z + 15160320a^4b^{12}c^6d^*f^*k^*z$   
 $- 45613056a^7b^3c^{12}d^*f^*i^*z + 44236800a^6b^5c^{11}d^*g^*h^*z - 10321920$   
 $a^6b^6c^{10}d^*h^*i^*z + 7077888a^7b^4c^{11}d^*h^*i^*z - 5898240a^7b^4c^{11}$   
 $f^*g^*h^*z + 4718592a^8b^2c^{12}f^*g^*h^*z + 3225600a^5b^9c^8d^*g^*j^*z + 294$   
 $9120a^6b^6c^{10}f^*g^*h^*z + 2396160a^5b^8c^9d^*h^*i^*z - 1428480a^3b^{14}$   
 $c^5d^*f^*k^*z - 737280a^5b^8c^9f^*g^*h^*z - 161280a^4b^{11}c^7d^*g^*j^*z + 92$   
 $160a^4b^{10}c^8f^*g^*h^*z + 73728a^2b^{16}c^4d^*f^*k^*z - 50688a^3b^{12}c^7$   
 $d^*h^*i^*z - 27648a^4b^{10}c^8d^*h^*i^*z - 4608a^3b^{12}c^7f^*g^*h^*z + 4608a^2$   
 $b^{14}c^6d^*h^*i^*z - 58982400a^5b^6c^{11}d^*f^*g^*z + 11796480a^7b^3c^{12}e^*$   
 $f^*h^*z + 8847360a^5b^7c^{10}d^*f^*i^*z - 6635520a^5b^7c^{10}d^*g^*h^*z - 6451$   
 $200a^5b^8c^9d^*e^*j^*z - 5898240a^6b^5c^{11}e^*f^*h^*z - 3809280a^4b^9c^9$   
 $d^*f^*i^*z + 2359296a^6b^5c^{11}d^*f^*i^*z + 1474560a^5b^7c^{10}e^*f^*h^*z + 6$   
 $81984a^3b^{11}c^8d^*f^*i^*z + 322560a^4b^{10}c^8d^*e^*j^*z - 276480a^4b^9c^9$   
 $d^*g^*h^*z - 184320a^4b^9c^9e^*f^*h^*z + 179712a^3b^{11}c^8d^*g^*h^*z - 552$   
 $96a^2b^{13}c^7d^*f^*i^*z - 13824a^2b^{13}c^7d^*g^*h^*z + 9216a^3b^{11}c^8e^*$   
 $f^*h^*z + 16220160a^4b^8c^{10}d^*f^*g^*z + 13271040a^5b^6c^{11}d^*e^*h^*z - 239$   
 $6160a^3b^{10}c^9d^*f^*g^*z + 552960a^4b^8c^{10}d^*e^*h^*z - 359424a^3b^{10}c^9$   
 $d^*e^*h^*z + 175104a^2b^{12}c^8d^*f^*g^*z + 27648a^2b^{12}c^8d^*e^*h^*z - 324$   
 $40320a^4b^7c^{11}d^*e^*f^*z + 4792320a^3b^9c^{10}d^*e^*f^*z - 350208a^2b^{11}$   
 $c^9d^*e^*f^*z + 1439170560a^{10}b^*c^{11}d^*h^*k^*z - 3361603584a^{10}b^3c^9d^*j^*$   
 $k^*z + 603979776a^{10}b^*c^{11}e^*g^*k^*z + 407371776a^{12}b^*c^9h^*j^*k^*z + 20132$   
 $6592a^{11}b^*c^{10}g^*i^*k^*z + 346816512a^7b^*c^{14}d^2g^*z + 129761280a^{11}b^*$   
 $c^{10}h^2k^*z + 121896960a^{10}b^*c^{11}f^2k^*z + 458752a^6b^{15}c^*i^*k^2z +$

19660800\*a<sup>11</sup>\*b\*c<sup>10</sup>\*g\*j<sup>2</sup>\*z + 49152\*a<sup>5</sup>\*b<sup>16</sup>\*c\*g\*k<sup>2</sup>\*z + 7077888\*a<sup>9</sup>\*b\*c<sup>11</sup>  
 2\*g\*h<sup>2</sup>\*z + 94464\*a\*b<sup>17</sup>\*c<sup>4</sup>\*d<sup>2</sup>\*k\*z - 19660800\*a<sup>8</sup>\*b\*c<sup>13</sup>\*f<sup>2</sup>\*g\*z - 66816\*  
 a\*b<sup>14</sup>\*c<sup>7</sup>\*d<sup>2</sup>\*i\*z + 214272\*a\*b<sup>13</sup>\*c<sup>8</sup>\*d<sup>2</sup>\*g\*z - 428544\*a\*b<sup>12</sup>\*c<sup>9</sup>\*d<sup>2</sup>\*e\*z  
 + 2390753280\*a<sup>11</sup>\*b<sup>4</sup>\*c<sup>7</sup>\*g\*k<sup>2</sup>\*z - 2411421696\*a<sup>6</sup>\*b<sup>7</sup>\*c<sup>9</sup>\*d<sup>2</sup>\*k\*z - 660307  
 9680\*a<sup>8</sup>\*b<sup>3</sup>\*c<sup>11</sup>\*d<sup>2</sup>\*k\*z + 3715891200\*a<sup>9</sup>\*b\*c<sup>12</sup>\*d<sup>2</sup>\*k\*z - 880803840\*a<sup>10</sup>\*  
 c<sup>12</sup>\*d\*f\*k\*z - 1623195648\*a<sup>10</sup>\*b<sup>6</sup>\*c<sup>6</sup>\*g\*k<sup>2</sup>\*z - 402653184\*a<sup>11</sup>\*c<sup>11</sup>\*e\*i\*k\*  
 z - 1509949440\*a<sup>12</sup>\*b<sup>2</sup>\*c<sup>8</sup>\*g\*k<sup>2</sup>\*z - 209715200\*a<sup>12</sup>\*c<sup>10</sup>\*f\*j\*k\*z - 3303014  
 40\*a<sup>9</sup>\*c<sup>13</sup>\*d\*e\*j\*z + 3019898880\*a<sup>12</sup>\*b\*c<sup>9</sup>\*e\*k<sup>2</sup>\*z - 125829120\*a<sup>11</sup>\*c<sup>11</sup>\*f  
 \*h\*k\*z - 110100480\*a<sup>10</sup>\*c<sup>12</sup>\*d\*i\*j\*z - 198180864\*a<sup>8</sup>\*c<sup>14</sup>\*d\*e\*h\*z - 1572864  
 0\*a<sup>11</sup>\*c<sup>11</sup>\*h\*i\*j\*z - 1226833920\*a<sup>9</sup>\*b<sup>7</sup>\*c<sup>6</sup>\*e\*k<sup>2</sup>\*z - 47185920\*a<sup>10</sup>\*c<sup>12</sup>\*e  
 \*h\*j\*z - 66060288\*a<sup>9</sup>\*c<sup>13</sup>\*d\*h\*i\*z - 1090519040\*a<sup>12</sup>\*b<sup>3</sup>\*c<sup>7</sup>\*i\*k<sup>2</sup>\*z + 1022  
 754816\*a<sup>6</sup>\*b<sup>2</sup>\*c<sup>14</sup>\*d<sup>2</sup>\*e\*z + 5216108544\*a<sup>7</sup>\*b<sup>5</sup>\*c<sup>10</sup>\*d<sup>2</sup>\*k\*z + 754974720\*a  
<sup>9</sup>\*b<sup>2</sup>\*c<sup>11</sup>\*e<sup>2</sup>\*k\*z + 721529856\*a<sup>5</sup>\*b<sup>9</sup>\*c<sup>8</sup>\*d<sup>2</sup>\*k\*z + 613416960\*a<sup>9</sup>\*b<sup>8</sup>\*c<sup>5</sup>  
 \*g\*k<sup>2</sup>\*z - 642318336\*a<sup>5</sup>\*b<sup>4</sup>\*c<sup>13</sup>\*d<sup>2</sup>\*e\*z - 4781506560\*a<sup>11</sup>\*b<sup>3</sup>\*c<sup>8</sup>\*e\*k<sup>2</sup>\*z  
 - 398131200\*a<sup>12</sup>\*b<sup>3</sup>\*c<sup>7</sup>\*j<sup>2</sup>\*k\*z - 511377408\*a<sup>6</sup>\*b<sup>3</sup>\*c<sup>13</sup>\*d<sup>2</sup>\*g\*z - 377487  
 360\*a<sup>8</sup>\*b<sup>4</sup>\*c<sup>10</sup>\*e<sup>2</sup>\*k\*z + 285212672\*a<sup>11</sup>\*b<sup>5</sup>\*c<sup>6</sup>\*i\*k<sup>2</sup>\*z + 199065600\*a<sup>11</sup>\*  
 b<sup>5</sup>\*c<sup>6</sup>\*j<sup>2</sup>\*k\*z + 279183360\*a<sup>8</sup>\*b<sup>9</sup>\*c<sup>5</sup>\*e\*k<sup>2</sup>\*z + 321159168\*a<sup>5</sup>\*b<sup>5</sup>\*c<sup>12</sup>\*d<sup>2</sup>  
 2\*g\*z + 188743680\*a<sup>9</sup>\*b<sup>4</sup>\*c<sup>9</sup>\*g<sup>2</sup>\*k\*z + 132120576\*a<sup>10</sup>\*b<sup>7</sup>\*c<sup>5</sup>\*i\*k<sup>2</sup>\*z - 15  
 0994944\*a<sup>10</sup>\*b<sup>2</sup>\*c<sup>10</sup>\*g<sup>2</sup>\*k\*z - 111411200\*a<sup>9</sup>\*b<sup>9</sup>\*c<sup>4</sup>\*i\*k<sup>2</sup>\*z - 126812160\*a  
<sup>10</sup>\*b<sup>3</sup>\*c<sup>9</sup>\*h<sup>2</sup>\*k\*z + 225312768\*a<sup>7</sup>\*b<sup>2</sup>\*c<sup>13</sup>\*d<sup>2</sup>\*i\*z - 139591680\*a<sup>8</sup>\*b<sup>10</sup>\*c  
<sup>4</sup>\*g\*k<sup>2</sup>\*z - 49766400\*a<sup>10</sup>\*b<sup>7</sup>\*c<sup>5</sup>\*j<sup>2</sup>\*k\*z - 145463040\*a<sup>4</sup>\*b<sup>11</sup>\*c<sup>7</sup>\*d<sup>2</sup>\*k\*z  
 - 94371840\*a<sup>8</sup>\*b<sup>6</sup>\*c<sup>8</sup>\*g<sup>2</sup>\*k\*z + 223395840\*a<sup>4</sup>\*b<sup>6</sup>\*c<sup>12</sup>\*d<sup>2</sup>\*e\*z + 33751040  
 \*a<sup>8</sup>\*b<sup>11</sup>\*c<sup>3</sup>\*i\*k<sup>2</sup>\*z - 78970880\*a<sup>9</sup>\*b<sup>3</sup>\*c<sup>10</sup>\*f<sup>2</sup>\*k\*z + 94371840\*a<sup>7</sup>\*b<sup>6</sup>\*c<sup>9</sup>  
 \*e<sup>2</sup>\*k\*z + 25165824\*a<sup>10</sup>\*b<sup>4</sup>\*c<sup>8</sup>\*i<sup>2</sup>\*k\*z + 6220800\*a<sup>9</sup>\*b<sup>9</sup>\*c<sup>4</sup>\*j<sup>2</sup>\*k\*z + 3  
 9223296\*a<sup>9</sup>\*b<sup>5</sup>\*c<sup>8</sup>\*h<sup>2</sup>\*k\*z - 311040\*a<sup>8</sup>\*b<sup>11</sup>\*c<sup>3</sup>\*j<sup>2</sup>\*k\*z + 16777216\*a<sup>11</sup>\*b  
<sup>2</sup>\*c<sup>9</sup>\*i<sup>2</sup>\*k\*z - 10485760\*a<sup>9</sup>\*b<sup>6</sup>\*c<sup>7</sup>\*i<sup>2</sup>\*k\*z - 5406720\*a<sup>7</sup>\*b<sup>13</sup>\*c<sup>2</sup>\*i\*k<sup>2</sup>\*  
 z + 1376256\*a<sup>7</sup>\*b<sup>10</sup>\*c<sup>5</sup>\*i<sup>2</sup>\*k\*z - 1310720\*a<sup>8</sup>\*b<sup>8</sup>\*c<sup>6</sup>\*i<sup>2</sup>\*k\*z - 262144\*a<sup>6</sup>  
 \*b<sup>12</sup>\*c<sup>4</sup>\*i<sup>2</sup>\*k\*z + 16384\*a<sup>5</sup>\*b<sup>14</sup>\*c<sup>3</sup>\*i<sup>2</sup>\*k\*z + 10354688\*a<sup>11</sup>\*b<sup>2</sup>\*c<sup>9</sup>\*i\*j<sup>2</sup>  
 2\*z + 23592960\*a<sup>7</sup>\*b<sup>8</sup>\*c<sup>7</sup>\*g<sup>2</sup>\*k\*z + 38559744\*a<sup>7</sup>\*b<sup>7</sup>\*c<sup>8</sup>\*f<sup>2</sup>\*k\*z + 1916928  
 0\*a<sup>7</sup>\*b<sup>12</sup>\*c<sup>3</sup>\*g\*k<sup>2</sup>\*z - 2048000\*a<sup>9</sup>\*b<sup>6</sup>\*c<sup>7</sup>\*i\*j<sup>2</sup>\*z - 1520640\*a<sup>7</sup>\*b<sup>9</sup>\*c<sup>6</sup>\*  
 h<sup>2</sup>\*k\*z - 1105920\*a<sup>8</sup>\*b<sup>7</sup>\*c<sup>7</sup>\*h<sup>2</sup>\*k\*z + 849920\*a<sup>8</sup>\*b<sup>8</sup>\*c<sup>6</sup>\*i\*j<sup>2</sup>\*z - 393216  
 \*a<sup>10</sup>\*b<sup>4</sup>\*c<sup>8</sup>\*i\*j<sup>2</sup>\*z + 195840\*a<sup>6</sup>\*b<sup>11</sup>\*c<sup>5</sup>\*h<sup>2</sup>\*k\*z - 145920\*a<sup>7</sup>\*b<sup>10</sup>\*c<sup>5</sup>\*i  
 \*j<sup>2</sup>\*z + 11520\*a<sup>5</sup>\*b<sup>13</sup>\*c<sup>4</sup>\*h<sup>2</sup>\*k\*z + 11008\*a<sup>6</sup>\*b<sup>12</sup>\*c<sup>4</sup>\*i\*j<sup>2</sup>\*z - 2304\*a<sup>4</sup>  
 \*b<sup>15</sup>\*c<sup>3</sup>\*h<sup>2</sup>\*k\*z - 256\*a<sup>5</sup>\*b<sup>14</sup>\*c<sup>3</sup>\*i\*j<sup>2</sup>\*z - 25362432\*a<sup>10</sup>\*b<sup>3</sup>\*c<sup>9</sup>\*g\*j<sup>2</sup>\*  
 z - 24739840\*a<sup>8</sup>\*b<sup>5</sup>\*c<sup>9</sup>\*f<sup>2</sup>\*k\*z - 38338560\*a<sup>7</sup>\*b<sup>11</sup>\*c<sup>4</sup>\*e\*k<sup>2</sup>\*z - 2949120\*  
 a<sup>6</sup>\*b<sup>10</sup>\*c<sup>6</sup>\*g<sup>2</sup>\*k\*z - 1474560\*a<sup>6</sup>\*b<sup>14</sup>\*c<sup>2</sup>\*g\*k<sup>2</sup>\*z + 50724864\*a<sup>10</sup>\*b<sup>2</sup>\*c<sup>11</sup>  
 0\*e\*j<sup>2</sup>\*z + 147456\*a<sup>5</sup>\*b<sup>12</sup>\*c<sup>5</sup>\*g<sup>2</sup>\*k\*z - 15150080\*a<sup>6</sup>\*b<sup>9</sup>\*c<sup>7</sup>\*f<sup>2</sup>\*k\*z + 13  
 271040\*a<sup>9</sup>\*b<sup>5</sup>\*c<sup>8</sup>\*g\*j<sup>2</sup>\*z - 111697920\*a<sup>4</sup>\*b<sup>7</sup>\*c<sup>11</sup>\*d<sup>2</sup>\*g\*z - 3563520\*a<sup>8</sup>\*b  
<sup>7</sup>\*c<sup>7</sup>\*g\*j<sup>2</sup>\*z + 3538944\*a<sup>9</sup>\*b<sup>2</sup>\*c<sup>11</sup>\*h<sup>2</sup>\*i\*z + 2912000\*a<sup>5</sup>\*b<sup>11</sup>\*c<sup>6</sup>\*f<sup>2</sup>\*k\*  
 z - 737280\*a<sup>7</sup>\*b<sup>6</sup>\*c<sup>9</sup>\*h<sup>2</sup>\*i\*z + 506880\*a<sup>7</sup>\*b<sup>9</sup>\*c<sup>6</sup>\*g\*j<sup>2</sup>\*z - 291840\*a<sup>4</sup>\*b<sup>13</sup>  
 \*c<sup>5</sup>\*f<sup>2</sup>\*k\*z + 276480\*a<sup>6</sup>\*b<sup>8</sup>\*c<sup>8</sup>\*h<sup>2</sup>\*i\*z - 41472\*a<sup>5</sup>\*b<sup>10</sup>\*c<sup>7</sup>\*h<sup>2</sup>\*i\*z -  
 34560\*a<sup>6</sup>\*b<sup>11</sup>\*c<sup>5</sup>\*g\*j<sup>2</sup>\*z + 14080\*a<sup>3</sup>\*b<sup>15</sup>\*c<sup>4</sup>\*f<sup>2</sup>\*k\*z + 2304\*a<sup>4</sup>\*b<sup>12</sup>\*c<sup>6</sup>  
 \*h<sup>2</sup>\*i\*z + 768\*a<sup>5</sup>\*b<sup>13</sup>\*c<sup>4</sup>\*g\*j<sup>2</sup>\*z - 256\*a<sup>2</sup>\*b<sup>17</sup>\*c<sup>3</sup>\*f<sup>2</sup>\*k\*z - 11796480\*a  
<sup>6</sup>\*b<sup>8</sup>\*c<sup>8</sup>\*e<sup>2</sup>\*k\*z - 26542080\*a<sup>9</sup>\*b<sup>4</sup>\*c<sup>9</sup>\*e\*j<sup>2</sup>\*z + 19837440\*a<sup>3</sup>\*b<sup>13</sup>\*c<sup>6</sup>\*d  
<sup>2</sup>\*k\*z + 2949120\*a<sup>6</sup>\*b<sup>13</sup>\*c<sup>3</sup>\*e\*k<sup>2</sup>\*z + 589824\*a<sup>5</sup>\*b<sup>10</sup>\*c<sup>7</sup>\*e<sup>2</sup>\*k\*z - 98304

$a^5b^{15}c^2ek^2z - 10354688a^8b^2c^{12}f^2i^2z - 43646976a^6b^4c^{12}d^2i^2z - 8847360a^8b^3c^{11}g^*h^2z + 7127040a^8b^6c^8e^*j^2z + 423680a^7b^5c^{10}g^*h^2z + 2048000a^6b^6c^{10}f^2i^2z - 1771776a^2b^{15}c^5d^2k^2z - 1105920a^6b^7c^9g^*h^2z - 1013760a^7b^8c^7e^*j^2z - 849920a^5b^8c^9f^2i^2z + 393216a^7b^4c^{11}f^2i^2z + 145920a^4b^{10}c^8f^2i^2z + 138240a^5b^9c^8g^*h^2z + 69120a^6b^{10}c^6e^*j^2z - 11008a^3b^{12}c^7f^2i^2z - 6912a^4b^{11}c^7g^*h^2z - 1536a^5b^{12}c^5e^*j^2z + 256a^2b^{14}c^6f^2i^2z - 32587776a^5b^6c^{11}d^2i^2z + 25362432a^7b^3c^{12}f^2g^*z + 21657600a^4b^8c^{10}d^2i^2z + 17694720a^8b^2c^{12}e^*h^2z - 50724864a^7b^2c^{13}e^*f^2z - 13271040a^6b^5c^{11}f^2g^*z - 8847360a^7b^4c^{11}e^*h^2z - 5810688a^3b^{10}c^9d^2i^2z + 3563520a^5b^7c^{10}f^2g^*z + 2211840a^6b^6c^{10}e^*h^2z + 845568a^2b^{12}c^8d^2i^2z - 506880a^4b^9c^9f^2g^*z - 276480a^5b^8c^9e^*h^2z + 34560a^3b^{11}c^8f^2g^*z + 13824a^4b^{10}c^8e^*h^2z - 768a^2b^{13}c^7f^2g^*z + 26542080a^6b^4c^{12}e^*f^2z + 23362560a^3b^9c^{10}d^2g^*z - 46725120a^3b^8c^{11}d^2e^*z - 7127040a^5b^6c^{11}e^*f^2z - 2965248a^2b^{11}c^9d^2g^*z + 1013760a^4b^8c^{10}e^*f^2z - 69120a^3b^{10}c^9e^*f^2z + 1536a^2b^{12}c^8e^*f^2z + 5930496a^2b^{10}c^{10}d^2e^*z + 1006632960a^{13}b^*c^8i^*k^2z + 3246391296a^{10}b^5c^7e^*k^2z + 318504960a^{13}b^*c^8j^2k^2z + 61538304a^{10}b^{10}c^2k^3z - 603979776a^{10}c^{12}e^2k^2z - 693633024a^7c^{15}d^2e^*z - 231211008a^8c^{14}d^2i^2z - 67108864a^{12}c^{10}i^2k^2z - 13107200a^{12}c^{10}i^*j^2z - 16384a^5b^{17}i^*k^2z - 39321600a^{11}c^{11}e^*j^2z - 4718592a^{10}c^{12}h^2i^2z - 2304b^{19}c^3d^2k^2z + 13107200a^9c^{13}f^2i^2z + 2304b^{16}c^6d^2i^2z - 14155776a^9c^{13}e^*h^2z + 39321600a^8c^{14}e^*f^2z - 4833280a^9b^{12}c^*k^3z - 6912b^{15}c^7d^2g^*z + 6962544640a^{14}b^2c^6k^3z + 13824b^{14}c^8d^2e^*z + 1876951040a^{12}b^6c^4k^3z - 4844421120a^{13}b^4c^5k^3z - 437780480a^{11}b^8c^3k^3z - 4294967296a^{15}c^7k^3z + 163840a^8b^{14}k^3z + 6144000a^{10}b^*c^8f^*i^*j^*k - 5898240a^{10}b^*c^8g^*h^*j^*k - 41287680a^9b^*c^9d^*g^*j^*k + 4472832a^9b^*c^9f^*h^*i^*k + 18432000a^9b^*c^9e^*f^*j^*k + 3391488a^8b^*c^{10}e^*h^*i^*j + 1228800a^8b^*c^{10}f^*g^*i^*j - 24772608a^8b^*c^{10}d^*g^*h^*k + 13418496a^8b^*c^{10}e^*f^*h^*k + 11649024a^8b^*c^{10}d^*f^*i^*k + 737280a^7b^*c^{11}f^*g^*h^*i - 768a^*b^{15}c^3d^*f^*i^*k - 19307520a^7b^*c^{11}d^*f^*h^*j + 16367616a^7b^*c^{11}d^*e^*i^*j + 3686400a^7b^*c^{11}e^*f^*g^*j + 34947072a^7b^*c^{11}d^*e^*f^*k + 2304a^*b^{14}c^4d^*f^*g^*k - 180a^*b^{13}c^5d^*f^*h^*j + 11059200a^6b^*c^{12}d^*e^*h^*i + 5160960a^6b^*c^{12}d^*f^*g^*i + 2211840a^6b^*c^{12}e^*f^*g^*h - 4608a^*b^{13}c^5d^*e^*f^*k - 2304a^*b^{11}c^7d^*f^*g^*i + 4608a^*b^{10}c^8d^*e^*f^*i + 15482880a^5b^*c^{13}d^*e^*f^*g - 13824a^*b^9c^9d^*e^*f^*g - 225976320a^8b^2c^9d^*e^*j^*k + 112988160a^8b^3c^8d^*g^*j^*k - 11427840a^{10}b^2c^7h^*i^*j^*k - 4177920a^9b^4c^6h^*i^*j^*k + 1399296a^8b^6c^5h^*i^*j^*k - 26880a^6b^{10}c^3h^*i^*j^*k + 16128a^7b^8c^4h^*i^*j^*k - 61562880a^9b^2c^8d^*i^*j^*k + 20090880a^9b^3c^7g^*h^*j^*k + 119623680a^7b^4c^8d^*e^*j^*k + 10485760a^9b^3c^7f^*i^*j^*k - 40181760a^9b^2c^8e^*h^*j^*k - 3778560a^8b^5c^6g^*h^*j^*k - 137797632a^7b^2c^{10}d^*e^*h^*k - 1248768a^7b^7c^5f^*i^*j^*k + 229376a^6b^9c^4f^*i^*j^*k + 220160a^8b^5c^6f^*i^*j^*k - 209664a^7b^7c^5g^*h^*j^*k + 80640a^6b^9c^4*$



$g^*h^*j^*k - 8960*a^5*b^{11}*c^3*f^*i^*j^*k - 59811840*a^7*b^5*c^7*d^*g^*j^*k + 530841$   
 $60*a^8*b^2*c^9*e^*g^*i^*k - 11120640*a^8*b^4*c^7*f^*g^*j^*k + 10455552*a^7*b^6*c^$   
 $6*d^*i^*j^*k - 9216000*a^9*b^2*c^8*f^*g^*j^*k + 7557120*a^8*b^4*c^7*e^*h^*j^*k + 739$   
 $7376*a^8*b^3*c^8*f^*h^*i^*k + 5230080*a^7*b^6*c^6*f^*g^*j^*k - 37675008*a^8*b^2*c^$   
 $9*d^*h^*i^*k - 3633408*a^6*b^8*c^5*d^*i^*j^*k + 2211840*a^8*b^4*c^7*d^*i^*j^*k + 68$   
 $898816*a^7*b^3*c^9*d^*g^*h^*k - 1695744*a^8*b^2*c^9*g^*h^*i^*j - 1400832*a^7*b^4*c^$   
 $8*g^*h^*i^*j + 967680*a^7*b^5*c^7*f^*h^*i^*k - 783360*a^6*b^7*c^6*f^*h^*i^*k - 741$   
 $888*a^6*b^8*c^5*f^*g^*j^*k + 499968*a^5*b^{10}*c^4*d^*i^*j^*k + 419328*a^7*b^6*c^6*$   
 $e^*h^*j^*k - 253440*a^6*b^6*c^7*g^*h^*i^*j - 161280*a^6*b^8*c^5*e^*h^*j^*k + 42240*a^$   
 $5*b^9*c^5*f^*h^*i^*k + 26880*a^5*b^{10}*c^4*f^*g^*j^*k - 26880*a^4*b^{12}*c^3*d^*i^*j^*$   
 $k + 13824*a^4*b^{11}*c^4*f^*h^*i^*k + 11520*a^5*b^8*c^6*g^*h^*i^*j - 768*a^3*b^{13}*c^$   
 $3*f^*h^*i^*k + 22241280*a^8*b^3*c^8*e^*f^*j^*k + 14222592*a^6*b^7*c^6*d^*g^*j^*k -$   
 $10460160*a^7*b^5*c^7*e^*f^*j^*k + 8847360*a^7*b^4*c^8*e^*g^*i^*k - 7741440*a^7*b^$   
 $4*c^8*f^*g^*h^*k - 7077888*a^6*b^6*c^7*e^*g^*i^*k + 6935040*a^6*b^6*c^7*d^*h^*i^*k -$   
 $6709248*a^8*b^2*c^9*f^*g^*h^*k - 3612672*a^7*b^4*c^8*d^*h^*i^*k + 2801664*a^7*b^$   
 $3*c^9*e^*h^*i^*j + 2506752*a^7*b^3*c^9*f^*g^*i^*j + 2419200*a^6*b^6*c^7*f^*g^*h^*k -$   
 $1661184*a^5*b^9*c^5*d^*g^*j^*k + 1483776*a^6*b^7*c^6*e^*f^*j^*k - 1463040*a^5*b^$   
 $8*c^6*d^*h^*i^*k + 884736*a^5*b^8*c^6*e^*g^*i^*k + 838656*a^6*b^5*c^8*f^*g^*i^*j + 5$   
 $06880*a^6*b^5*c^8*e^*h^*i^*j + 80640*a^4*b^{11}*c^4*d^*g^*j^*k - 53760*a^5*b^9*c^5*$   
 $e^*f^*j^*k - 53760*a^5*b^7*c^7*f^*g^*i^*j - 46080*a^4*b^{10}*c^5*f^*g^*h^*k - 34560*a^$   
 $5*b^8*c^6*f^*g^*h^*k + 25344*a^3*b^{12}*c^4*d^*h^*i^*k - 23040*a^5*b^7*c^7*e^*h^*i^*j$   
 $+ 13824*a^4*b^{10}*c^5*d^*h^*i^*k + 2304*a^3*b^{12}*c^4*f^*g^*h^*k - 2304*a^2*b^{14}*c^$   
 $3*d^*h^*i^*k - 29030400*a^6*b^5*c^8*d^*g^*h^*k + 28606464*a^7*b^3*c^9*d^*f^*i^*k - 2$   
 $8445184*a^6*b^6*c^7*d^*e^*j^*k + 58060800*a^6*b^4*c^9*d^*e^*h^*k + 15482880*a^7*b^$   
 $3*c^9*e^*f^*h^*k - 8183808*a^7*b^2*c^{10}*d^*g^*i^*j - 6718464*a^6*b^5*c^8*d^*f^*i^*k$   
 $- 5087232*a^7*b^2*c^{10}*e^*g^*h^*j - 5013504*a^7*b^2*c^{10}*e^*f^*i^*j - 4838400*a^$   
 $6*b^5*c^8*e^*f^*h^*k + 4112640*a^5*b^7*c^7*d^*g^*h^*k - 3663360*a^5*b^7*c^7*d^*f^*i^*$   
 $*k + 3322368*a^5*b^8*c^6*d^*e^*j^*k - 2285568*a^6*b^4*c^9*d^*g^*i^*j + 1896960*a^$   
 $4*b^9*c^6*d^*f^*i^*k + 1843200*a^6*b^3*c^{10}*f^*g^*h^*i - 1677312*a^6*b^4*c^9*e^*f^*$   
 $i^*j - 1658880*a^6*b^4*c^9*e^*g^*h^*j + 68345856*a^6*b^3*c^{10}*d^*e^*f^*k + 783360*$   
 $a^5*b^5*c^9*f^*g^*h^*i + 741888*a^5*b^6*c^8*d^*g^*i^*j - 34172928*a^6*b^4*c^9*d^*f^*$   
 $*g^*k - 340992*a^3*b^{11}*c^5*d^*f^*i^*k - 161280*a^4*b^{10}*c^5*d^*e^*j^*k + 138240*a^$   
 $4*b^9*c^6*d^*g^*h^*k + 107520*a^5*b^6*c^8*e^*f^*i^*j + 92160*a^4*b^9*c^6*e^*f^*h^*k$   
 $- 89856*a^3*b^{11}*c^5*d^*g^*h^*k - 80640*a^4*b^8*c^7*d^*g^*i^*j + 69120*a^5*b^7*c^$   
 $7*e^*f^*h^*k + 69120*a^5*b^6*c^8*e^*g^*h^*j + 27648*a^2*b^{13}*c^4*d^*f^*i^*k + 18432$   
 $*a^4*b^7*c^8*f^*g^*h^*i + 6912*a^2*b^{13}*c^4*d^*g^*h^*k - 4608*a^3*b^{11}*c^5*e^*f^*h^*$   
 $k - 2304*a^3*b^9*c^7*f^*g^*h^*i + 27164160*a^5*b^6*c^8*d^*f^*g^*k - 22164480*a^6*$   
 $b^3*c^{10}*d^*f^*h^*j - 54328320*a^5*b^5*c^9*d^*e^*f^*k - 17473536*a^7*b^2*c^{10}*d^*f^*$   
 $*g^*k - 8225280*a^5*b^6*c^8*d^*e^*h^*k - 8087040*a^4*b^8*c^7*d^*f^*g^*k + 5677056*$   
 $a^6*b^3*c^{10}*e^*f^*g^*j - 5529600*a^6*b^2*c^{11}*d^*g^*h^*i + 4571136*a^6*b^3*c^{10}$   
 $d^*e^*i^*j - 3686400*a^6*b^2*c^{11}*e^*f^*h^*i + 2805120*a^5*b^5*c^9*d^*f^*h^*j - 2211$   
 $840*a^5*b^4*c^{10}*d^*g^*h^*i - 1566720*a^5*b^4*c^{10}*e^*f^*h^*i - 1483776*a^5*b^5*c^$   
 $9*d^*e^*i^*j + 1198080*a^3*b^{10}*c^6*d^*f^*g^*k + 437184*a^4*b^7*c^8*d^*f^*h^*j - 32$   
 $2560*a^5*b^5*c^9*e^*f^*g^*j + 317952*a^4*b^6*c^9*d^*g^*h^*i - 276480*a^4*b^8*c^7*$   
 $d^*e^*h^*k + 179712*a^3*b^{10}*c^6*d^*e^*h^*k + 161280*a^4*b^7*c^8*d^*e^*i^*j - 146268$

$a^3b^9c^7d^f h^j - 87552a^2b^{12}c^5d^f g^k - 36864a^4b^6c^9e^f h^i - 13824a^2b^{12}c^5d^e h^k + 9360a^2b^{11}c^6d^f h^j + 6912a^3b^8c^8d^g h^i - 6912a^2b^{10}c^7d^g h^i + 4608a^3b^8c^8e^f h^i - 24551424a^6b^2c^{11}d^e g^j + 16174080a^4b^7c^8d^e f^k + 5419008a^5b^4c^{10}d^e g^j + 5160960a^5b^3c^{11}d^f g^i + 4423680a^5b^3c^{11}e^f g^h + 4423680a^5b^3c^{11}d^e h^i - 2396160a^3b^9c^7d^e f^k - 635904a^4b^5c^{10}d^e h^i - 483840a^4b^6c^9d^e g^j - 354816a^3b^7c^9d^f g^i + 322560a^4b^5c^{10}d^f g^i + 175104a^2b^{11}c^6d^e f^k + 138240a^4b^5c^{10}e^f g^h + 59904a^2b^9c^8d^f g^i - 13824a^3b^7c^9e^f g^h - 13824a^3b^7c^9d^e h^i + 13824a^2b^9c^8d^e h^i - 16588800a^5b^2c^{12}d^e g^h - 10321920a^5b^2c^{12}d^e f^i + 1658880a^4b^4c^{11}d^e g^h + 709632a^3b^6c^{10}d^e f^i - 645120a^4b^4c^{11}d^e f^i + 124416a^3b^6c^{10}d^e g^h - 119808a^2b^8c^9d^e f^i - 41472a^2b^8c^9d^e g^h + 7741440a^4b^3c^{12}d^e f^g - 2903040a^3b^5c^{11}d^e f^g + 387072a^2b^7c^{10}d^e f^g - 381026304a^{11}b^c^7d^j k^2 - 241827840a^{10}b^c^8d^h k^2 - 65667072a^{12}b^c^6h^j k^2 - 169344a^7b^{11}c^h j k^2 - 25165824a^{11}b^c^7g^i k^2 - 4915200a^{11}b^c^7g^j^2 k - 53084160a^8b^c^{10}e^2 i k - 75497472a^{10}b^c^8e^g k^2 - 86704128a^7b^c^{11}d^2 g^k + 565248a^9b^c^9h^i^2 j - 168448a^6b^{12}c^f j k^2 - 24576a^5b^{13}c^g i k^2 - 1769472a^9b^c^9g^h^2 k - 17694720a^9b^c^9e^i^2 k - 411264a^5b^{13}c^d j k^2 - 11520a^4b^{14}c^f h^k^2 + 4915200a^8b^c^{10}f^2 g^k + 2580480a^9b^c^9e^i j^2 - 2496000a^9b^c^9f^h j^2 - 1543680a^8b^c^{10}f^h^2 j + 33408a^b^{14}c^4d^2 i k - 59512320a^6b^c^{12}d^2 f^j + 5087232a^7b^c^{11}e^2 h^j + 2727936a^8b^c^{10}d^i^2 j - 26496a^3b^{15}c^d h^k^2 + 1105920a^7b^c^{11}e^h^2 i - 107136a^b^{13}c^5d^2 g^k + 10260a^b^{12}c^6d^2 h^j - 10616832a^6b^c^{12}e^2 g^i - 3538944a^7b^c^{11}e^g i^2 + 1843200a^7b^c^{11}d^h i^2 - 18432a^2b^{16}c^d f^k^2 - 15552000a^8b^c^{10}d^f j^2 + 24551424a^6b^c^{12}d^e^2 j - 37062144a^5b^c^{13}d^2 f^h + 2580480a^6b^c^{12}e^f^2 i + 214272a^b^{12}c^6d^2 e^k + 65664a^b^{10}c^8d^2 g^i - 25074a^b^{11}c^7d^2 f^j + 420a^b^{12}c^6d^f^2 j + 6a^b^{15}c^3d^f j^2 + 23224320a^5b^c^{13}d^2 e^i + 384a^b^{12}c^6d^f i^2 - 5985792a^6b^c^{12}d^f h^2 + 206010a^b^9c^9d^2 f^h - 131328a^b^9c^9d^2 e^i - 6300a^b^{10}c^8d^f^2 h + 1350a^b^{11}c^7d^f h^2 + 16588800a^5b^c^{13}d^e^2 h + 3456a^b^{10}c^8d^f g^2 + 435456a^b^8c^{10}d^2 e^g + 13824a^b^8c^{10}d^e^2 f + 3932160a^{11}c^8h^i j^k + 27525120a^{10}c^9d^i j^k + 82575360a^9c^{10}d^e j^k + 11796480a^{10}c^9e^h j^k + 16515072a^9c^{10}d^h i^k + 49545216a^8c^{11}d^e h^k - 2457600a^8c^{11}e^f i^j - 1474560a^7c^{12}e^f h^i - 10321920a^6c^{13}d^e f^i + 737077248a^{10}b^3c^6d^j k^2 - 518814720a^9b^5c^5d^j k^2 + 441354240a^9b^3c^7d^h k^2 - 429871104a^6b^2c^{11}d^2 e^k - 272212992a^8b^5c^6d^h k^2 + 305731584a^5b^4c^{10}d^2 e^k + 192412800a^8b^7c^4d^j k^2 + 111912960a^{11}b^3c^5h^j k^2 + 214935552a^6b^3c^{10}d^2 g^k + 202427136a^7b^6c^6d^f k^2 - 49904640a^{10}b^5c^4h^j k^2 - 178513920a^8b^4c^7d^f k^2 - 152865792a^5b^5c^9d^2 g^k - 114388992a^7b^2c^{10}d^2 i^k + 94961664a^{10}b^2c^7e^i k^2 - 9039872a^{11}b^2c^6i^j^2 k - 5649480a^{10}b^4c^5f^j k^2 - 2052096a^{10}b^4c^5i^j^2 k + 1327360a^9b^6c^$

$4*i*j^2*k - 158080*a^8*b^8*c^3*i*j^2*k - 47480832*a^{10}*b^3*c^6*g*i*k^2 + 45$   
 $576960*a^9*b^6*c^4*f*j*k^2 + 7954560*a^9*b^7*c^3*h*j*k^2 - 104693760*a^9*b^$   
 $3*c^7*e*g*k^2 + 142080*a^8*b^9*c^2*h*j*k^2 + 16017408*a^{10}*b^3*c^6*g*j^2*k$   
 $- 4930560*a^9*b^5*c^5*g*j^2*k - 3649536*a^9*b^2*c^8*h^2*i*k - 1843200*a^8*b$   
 $^4*c^7*h^2*i*k + 85524480*a^8*b^5*c^6*e*g*k^2 + 474240*a^8*b^7*c^4*g*j^2*k$   
 $+ 288000*a^7*b^6*c^6*h^2*i*k + 63360*a^6*b^8*c^5*h^2*i*k - 8064*a^5*b^10*c^$   
 $4*h^2*i*k - 1152*a^4*b^12*c^3*h^2*i*k - 15437824*a^{11}*b^2*c^6*f*j*k^2 - 320$   
 $34816*a^{10}*b^2*c^7*e*j^2*k - 14369280*a^8*b^8*c^3*f*j*k^2 - 13271040*a^8*b^$   
 $3*c^8*g^2*i*k + 80267904*a^7*b^7*c^5*d*h*k^2 + 79626240*a^7*b^2*c^{10}*e^2*g*$   
 $k + 11059200*a^9*b^5*c^5*g*i*k^2 + 8847360*a^9*b^2*c^8*g*i^2*k - 42113280*a$   
 $^7*b^9*c^3*d*j*k^2 + 6389760*a^8*b^7*c^4*g*i*k^2 + 5898240*a^8*b^4*c^7*g*i^$   
 $2*k - 37601280*a^9*b^4*c^6*f*h*k^2 - 2949120*a^7*b^9*c^3*g*i*k^2 + 2242560*$   
 $a^7*b^10*c^2*f*j*k^2 - 2211840*a^7*b^5*c^7*g^2*i*k + 1769472*a^6*b^7*c^6*g^$   
 $2*i*k + 749568*a^8*b^3*c^8*h*i^2*j - 442368*a^7*b^6*c^6*g*i^2*k + 442368*a^$   
 $6*b^11*c^2*g*i*k^2 - 442368*a^6*b^8*c^5*g*i^2*k + 317952*a^7*b^5*c^7*h*i^2*$   
 $j - 221184*a^5*b^9*c^5*g^2*i*k + 73728*a^5*b^10*c^4*g*i^2*k + 38400*a^6*b^7$   
 $*c^6*h*i^2*j - 1920*a^5*b^9*c^5*h*i^2*j + 9861120*a^9*b^4*c^6*e*j^2*k - 110$   
 $280960*a^4*b^6*c^9*d^2*e*k - 93330432*a^6*b^8*c^5*d*f*k^2 + 24645888*a^8*b^$   
 $6*c^5*f*h*k^2 + 6359040*a^8*b^3*c^8*g*h^2*k - 22118400*a^9*b^4*c^6*e*i*k^2$   
 $- 3862528*a^8*b^2*c^9*f^2*i*k - 2248704*a^7*b^4*c^8*f^2*i*k - 1290240*a^9*b$   
 $^2*c^8*g*i*j^2 - 948480*a^8*b^6*c^5*e*j^2*k - 860160*a^8*b^4*c^7*g*i*j^2 -$   
 $414720*a^7*b^5*c^7*g*h^2*k + 303360*a^6*b^6*c^7*f^2*i*k + 266880*a^5*b^8*c^$   
 $6*f^2*i*k - 224640*a^6*b^7*c^6*g*h^2*k - 80640*a^7*b^6*c^6*g*i*j^2 - 72960*$   
 $a^4*b^10*c^5*f^2*i*k + 17280*a^5*b^9*c^5*g*h^2*k + 12672*a^6*b^8*c^5*g*i*j^$   
 $2 + 5504*a^3*b^12*c^4*f^2*i*k + 3456*a^4*b^11*c^4*g*h^2*k - 384*a^5*b^10*c^$   
 $4*g*i*j^2 - 128*a^2*b^14*c^3*f^2*i*k + 30265344*a^6*b^4*c^9*d^2*i*k - 12779$   
 $520*a^8*b^6*c^5*e*i*k^2 - 11796480*a^8*b^3*c^8*e*i^2*k - 8847360*a^7*b^3*c^$   
 $9*e^2*i*k - 7925760*a^{10}*b^2*c^7*f*h*k^2 + 7077888*a^6*b^5*c^8*e^2*i*k - 39$   
 $813120*a^7*b^3*c^9*e*g^2*k - 73175040*a^9*b^2*c^8*d*f*k^2 + 5898240*a^7*b^8$   
 $*c^4*e*i*k^2 + 5542272*a^6*b^11*c^2*d*j*k^2 - 5420160*a^7*b^8*c^4*f*h*k^2 +$   
 $55140480*a^4*b^7*c^8*d^2*g*k + 1271808*a^7*b^3*c^9*g^2*h*j - 1040384*a^8*b$   
 $^2*c^9*f*i^2*j + 884736*a^7*b^5*c^7*e*i^2*k - 884736*a^6*b^10*c^3*e*i*k^2 +$   
 $884736*a^6*b^7*c^6*e*i^2*k - 884736*a^5*b^7*c^7*e^2*i*k - 697344*a^7*b^4*c$   
 $^8*f*i^2*j + 414720*a^6*b^5*c^8*g^2*h*j + 226560*a^6*b^10*c^3*f*h*k^2 - 147$   
 $456*a^5*b^9*c^5*e*i^2*k - 121856*a^6*b^6*c^7*f*i^2*j + 82560*a^5*b^12*c^2*f$   
 $*h*k^2 + 49152*a^5*b^12*c^2*e*i*k^2 - 17280*a^5*b^7*c^7*g^2*h*j + 8960*a^5*$   
 $b^8*c^6*f*i^2*j + 14194944*a^5*b^6*c^8*d^2*i*k - 12718080*a^8*b^2*c^9*e*h^2$   
 $*k - 10615680*a^4*b^8*c^7*d^2*i*k - 26542080*a^6*b^4*c^9*e^2*g*k - 23592960$   
 $*a^7*b^7*c^5*e*g*k^2 - 5142528*a^8*b^3*c^8*f*h*j^2 + 5068800*a^7*b^2*c^{10}*f$   
 $^2*h*j - 3755520*a^7*b^3*c^9*f*h^2*j + 3336192*a^7*b^3*c^9*f^2*g*k + 300096$   
 $0*a^6*b^4*c^9*f^2*h*j + 2893824*a^3*b^10*c^6*d^2*i*k + 1720320*a^8*b^3*c^8*$   
 $e*i*j^2 + 1704960*a^6*b^5*c^8*f^2*g*k - 1307520*a^5*b^7*c^7*f^2*g*k - 10857$   
 $60*a^6*b^5*c^8*f*h^2*j - 959040*a^7*b^5*c^7*f*h*j^2 + 829440*a^7*b^4*c^8*e*$   
 $h^2*k - 552960*a^7*b^2*c^{10}*g*h^2*i - 552960*a^6*b^4*c^9*g*h^2*i + 449280*a$   
 $^6*b^6*c^7*e*h^2*k - 422784*a^2*b^12*c^5*d^2*i*k + 253440*a^4*b^9*c^6*f^2*g$

$$\begin{aligned}
& *k + 161280a^7b^5c^7e*ij^2 - 145152a^5b^6c^8g*h^2i + 103200a^6b \\
& ^7c^6f*h*j^2 + 41280a^5b^6c^8f^2*h*j - 37188a^4b^8c^7f^2*h*j - 34 \\
& 560a^5b^8c^6e*h^2k - 25344a^6b^7c^6e*ij^2 - 17280a^3b^11c^5f^ \\
& 2*g*k + 13536a^5b^7c^7f*h^2*j - 6912a^4b^10c^5e*h^2k + 5490a^4b^ \\
& 9c^6f*h^2*j - 3456a^4b^8c^7g*h^2i + 1980a^3b^10c^6f^2*h*j + 810* \\
& a^5b^9c^5f*h*j^2 + 768a^5b^9c^5e*ij^2 + 384a^2b^13c^4f^2*g*k - \\
& 270a^4b^11c^4f*h*j^2 - 180a^3b^11c^5f*h^2*j - 30a^2b^12c^5f^2*h \\
& *j + 6a^3b^13c^3f*h*j^2 + 30067200a^6b^2c^11d^2*h*j + 13271040a^6* \\
& b^5c^8e*g^2k - 10857600a^6b^9c^4d*h*k^2 + 2949120a^6b^9c^4e*g*k^ \\
& 2 + 2654208a^5b^6c^8e^2*g*k + 2125824a^7b^3c^9d*i^2*j + 1658880a^6 \\
& *b^3c^10e^2*h*j - 1419264a^6b^4c^9f*g^2*j - 1327104a^5b^7c^7e*g^2 \\
& *k - 921600a^7b^2c^10f*g^2*j - 737280a^7b^2c^10f*h*i^2 - 568320a^6 \\
& *b^4c^9f*h*i^2 + 207360a^4b^13c^2d*h*k^2 - 147456a^5b^11c^3e*g*k^ \\
& 2 - 136704a^5b^6c^8f*h*i^2 + 133632a^6b^5c^8d*i^2*j - 96768a^5b^7 \\
& *c^7d*i^2*j + 80640a^5b^6c^8f*g^2*j - 69120a^5b^5c^9e^2*h*j + 1344 \\
& 0a^4b^9c^6d*i^2*j - 5760a^5b^11c^3d*h*k^2 - 2304a^4b^8c^7f*h*i^ \\
& 2 + 384a^3b^10c^6f*h*i^2 + 11930112a^8b^2c^9d*h*j^2 - 11646720a^3* \\
& b^9c^7d^2*g*k + 8432640a^7b^2c^10d*h^2*j + 24140160a^5b^10c^4d*f* \\
& k^2 - 6672384a^7b^2c^10e*f^2*k + 4450176a^7b^4c^8d*h*j^2 + 4337280* \\
& a^6b^4c^9d*h^2*j - 3870720a^8b^2c^9e*g*j^2 - 3409920a^6b^4c^9e*f \\
& ^2*k - 2885760a^5b^4c^10d^2*h*j - 2844288a^4b^6c^9d^2*h*j + 2615040 \\
& *a^5b^6c^8e*f^2*k - 1687680a^6b^6c^7d*h*j^2 + 1482624a^2b^11c^6d \\
& ^2*g*k - 1290240a^6b^2c^11f^2*g*i + 1105920a^6b^3c^10e*h^2i + 1019 \\
& 412a^3b^8c^8d^2*h*j - 1007424a^5b^6c^8d*h^2*j - 860160a^5b^4c^10 \\
& *f^2*g*i - 645120a^7b^4c^8e*g*j^2 - 506880a^4b^8c^7e*f^2*k + 290304 \\
& *a^5b^5c^9e*h^2i + 197460a^5b^8c^6d*h*j^2 - 143802a^2b^10c^7d^2 \\
& *h*j + 80640a^6b^6c^7e*g*j^2 - 80640a^4b^6c^9f^2*g*i + 51948a^4b^ \\
& 8c^7d*h^2*j + 34560a^3b^10c^6e*f^2k + 12672a^3b^8c^8f^2*g*i + 10 \\
& 800a^3b^10c^6d*h^2*j + 6912a^4b^7c^8e*h^2i - 2304a^5b^8c^6e*g* \\
& j^2 - 768a^2b^12c^5e*f^2k - 684a^3b^12c^4d*h*j^2 - 540a^2b^12c^ \\
& 5d*h^2*j - 384a^2b^10c^7f^2*g*i - 90a^4b^10c^5d*h*j^2 + 18a^2b^1 \\
& 4c^3d*h*j^2 + 23385600a^6b^2c^11d*f^2*j + 23293440a^3b^8c^8d^2e* \\
& k + 6137856a^6b^3c^10d*g^2*j - 5677056a^6b^2c^11e^2f*j + 5308416a \\
& ^6b^2c^11e*g^2i - 5308416a^5b^3c^11e^2g*i - 3786240a^4b^12c^3d \\
& *f*k^2 - 3538944a^6b^3c^10e*g*i^2 + 2654208a^5b^4c^10e*g^2i + 1658 \\
& 880a^6b^3c^10d*h*i^2 - 1354752a^5b^5c^9d*g^2*j - 1105920a^5b^4c^ \\
& 10f*g^2h - 884736a^5b^5c^9e*g*i^2 - 552960a^6b^2c^11f*g^2h + 357 \\
& 120a^3b^14c^2d*f*k^2 + 322560a^5b^4c^10e^2f*j + 262656a^5b^5c^9 \\
& *d*h*i^2 + 120960a^4b^7c^8d*g^2*j - 55296a^4b^7c^8d*h*i^2 - 34560a \\
& ^4b^6c^9f*g^2h + 3456a^3b^8c^8f*g^2h + 1152a^3b^9c^7d*h*i^2 + \\
& 1152a^2b^11c^6d*h*i^2 - 13149696a^7b^3c^9d*f*j^2 - 11612160a^5b^2 \\
& *c^12d^2*g*i + 10906560a^4b^5c^10d^2f*j - 7418880a^5b^3c^11d^2f* \\
& j + 3148992a^6b^5c^8d*f*j^2 - 2985696a^3b^7c^9d^2f*j - 2965248a^2 \\
& *b^10c^7d^2e*k + 1720320a^5b^3c^11e*f^2i - 1658880a^6b^2c^11e*g \\
& *h^2 + 1596672a^3b^6c^10d^2g*i - 1505280a^4b^6c^9d*f^2*j - 829440*
\end{aligned}$$

$$\begin{aligned}
& a^5 b^4 c^{10} e g h^2 - 508032 a^2 b^8 c^9 d^2 g^* i + 378954 a^2 b^9 c^8 d^2 \\
& f^* j + 362880 a^5 b^4 c^{10} d^* f^2 j + 296964 a^3 b^8 c^8 d^* f^2 j + 161280 a^4 \\
& * b^5 c^{10} e^* f^2 i - 77070 a^4 b^9 c^6 d^* f^* j^2 - 30240 a^5 b^7 c^7 d^* f^* j^2 - \\
& 25344 a^3 b^7 c^9 e^* f^2 i - 20736 a^4 b^6 c^9 e g h^2 - 19278 a^2 b^{10} c^7 \\
& * d^* f^2 j + 8820 a^3 b^{11} c^5 d^* f^* j^2 + 768 a^2 b^9 c^8 e^* f^2 i - 378 a^2 b^ \\
& 13 c^4 d^* f^* j^2 - 5419008 a^5 b^3 c^{11} d^* e^2 j - 4423680 a^5 b^2 c^{12} e^2 f^* \\
& h + 4147200 a^5 b^3 c^{11} d^* g^2 h - 2580480 a^6 b^2 c^{11} d^* f^* i^2 - 967680 a^ \\
& 5 b^4 c^{10} d^* f^* i^2 + 483840 a^4 b^5 c^{10} d^* e^2 j - 414720 a^4 b^5 c^{10} d^* g^ \\
& 2 h - 138240 a^4 b^4 c^{11} e^2 f^* h + 64512 a^4 b^6 c^9 d^* f^* i^2 + 39168 a^3 b \\
& ^8 c^8 d^* f^* i^2 - 31104 a^3 b^7 c^9 d^* g^2 h + 13824 a^3 b^6 c^{10} e^2 f^* h + 1 \\
& 0368 a^2 b^9 c^8 d^* g^2 h - 9216 a^2 b^{10} c^7 d^* f^* i^2 + 15630336 a^5 b^2 c^1 \\
& 2 d^* f^2 h - 14459904 a^4 b^3 c^{12} d^2 f^* h + 9630144 a^3 b^5 c^{11} d^2 f^* h - \\
& 8764416 a^5 b^3 c^{11} d^* f^* h^2 - 3870720 a^5 b^2 c^{12} e^* f^2 g - 3193344 a^3 b \\
& ^5 c^{11} d^2 e^* i + 2867328 a^4 b^4 c^{11} d^* f^2 h - 2095200 a^2 b^7 c^{10} d^2 f^* \\
& * h - 1414080 a^3 b^6 c^{10} d^* f^2 h - 34836480 a^4 b^2 c^{13} d^2 e^* g + 1016064 \\
& * a^2 b^7 c^{10} d^2 e^* i - 645120 a^4 b^4 c^{11} e^* f^2 g + 306720 a^3 b^7 c^9 d^* \\
& f^* h^2 + 197820 a^2 b^8 c^9 d^* f^2 h + 146880 a^4 b^5 c^{10} d^* f^* h^2 + 80640 a^ \\
& 3 b^6 c^{10} e^* f^2 g - 55350 a^2 b^9 c^8 d^* f^* h^2 - 2304 a^2 b^8 c^9 e^* f^2 g - \\
& 3870720 a^5 b^2 c^{12} d^* f^* g^2 - 1935360 a^4 b^4 c^{11} d^* f^* g^2 - 1658880 a^4 \\
& b^3 c^{12} d^* e^2 h + 725760 a^3 b^6 c^{10} d^* f^* g^2 + 17418240 a^3 b^4 c^{12} d^2 \\
& e^* g - 124416 a^3 b^5 c^{11} d^* e^2 h - 96768 a^2 b^8 c^9 d^* f^* g^2 + 41472 a^2 b \\
& ^7 c^{10} d^* e^2 h - 3919104 a^2 b^6 c^{11} d^2 e^* g - 7741440 a^4 b^2 c^{13} d^* e^2 \\
& * f + 2903040 a^3 b^4 c^{12} d^* e^2 f - 387072 a^2 b^6 c^{11} d^* e^2 f - 681246720 \\
& * a^9 b^* c^9 d^2 k^2 + 265912320 a^{11} b^3 c^5 e^* k^3 + 188743680 a^{12} b^2 c^5 \\
& g^* k^3 - 132956160 a^{11} b^4 c^4 g^* k^3 - 52101120 a^{13} b^* c^5 j^2 k^2 + 257228 \\
& 80 a^{12} b^3 c^4 i^* k^3 + 19644416 a^{11} b^5 c^3 i^* k^3 - 1583680 a^9 b^9 c^* j^2 \\
& * k^2 - 9142272 a^{10} b^7 c^2 i^* k^3 - 74022912 a^{10} b^5 c^4 e^* k^3 - 20643840 \\
& a^{11} b^* c^7 h^2 k^2 + 37011456 a^{10} b^6 c^3 g^* k^3 - 2293760 a^9 b^3 c^7 i^3 k \\
& - 557056 a^8 b^5 c^6 i^3 k + 147456 a^7 b^7 c^5 i^3 k - 65536 a^6 b^{12} c^* \\
& i^2 k^2 + 32768 a^6 b^9 c^4 i^3 k - 8192 a^5 b^{11} c^3 i^3 k + 430080 a^{10} b \\
& * c^8 i^2 j^2 - 2880 a^5 b^{13} c^* h^2 k^2 + 6635520 a^7 b^4 c^8 g^3 k - 479232 \\
& 0 a^9 b^8 c^2 g^* k^3 - 2211840 a^6 b^6 c^7 g^3 k + 1359360 a^{10} b^2 c^7 h^* j^ \\
& 3 + 1173120 a^9 b^4 c^6 h^* j^3 + 743040 a^7 b^4 c^8 h^3 j + 622080 a^8 b^2 c^ \\
& ^9 h^3 j + 221184 a^5 b^8 c^6 g^3 k + 107136 a^6 b^6 c^7 h^3 j - 32640 a^8 \\
& b^6 c^5 h^* j^3 - 5796 a^7 b^8 c^4 h^* j^3 + 540 a^5 b^8 c^6 h^3 j - 270 a^4 b^ \\
& 10 c^5 h^3 j + 210 a^6 b^{10} c^3 h^* j^3 - 2949120 a^{10} b^* c^8 f^2 k^2 + 176947 \\
& 20 a^6 b^3 c^{10} e^3 k + 184320 a^8 b^* c^{10} h^2 i^2 - 3520 a^3 b^{15} c^* f^2 k^2 \\
& + 9584640 a^9 b^7 c^3 e^* k^3 - 2293760 a^9 b^3 c^7 f^* j^3 - 2293760 a^6 b^3 \\
& c^{10} f^3 j - 1769472 a^5 b^5 c^9 e^3 k - 884736 a^6 b^3 c^{10} g^3 i - 589824 \\
& * a^7 b^3 c^9 g^* i^3 - 491520 a^8 b^9 c^2 e^* k^3 - 442368 a^5 b^5 c^9 g^3 i - \\
& 294912 a^6 b^5 c^8 g^* i^3 - 199360 a^8 b^5 c^6 f^* j^3 - 199360 a^5 b^5 c^9 f^ \\
& 3 j + 61920 a^7 b^7 c^5 f^* j^3 + 61920 a^4 b^7 c^8 f^3 j - 49152 a^5 b^7 c^7 \\
& * g^* i^3 - 3682 a^6 b^9 c^4 f^* j^3 - 3682 a^3 b^9 c^7 f^3 j + 70 a^5 b^{11} c^3 \\
& f^* j^3 + 70 a^2 b^{11} c^6 f^3 j + 3870720 a^8 b^* c^{10} e^2 j^2 + 430080 a^7 b^* c \\
& ^{11} f^2 i^2 - 14152320 a^4 b^4 c^{11} d^3 j + 10644480 a^5 b^2 c^{12} d^3 j + 5
\end{aligned}$$

$$\begin{aligned}
& 483520*a^9*b^2*c^8*d*j^3 + 4269888*a^3*b^6*c^10*d^3*j + 3538944*a^5*b^2*c^1 \\
& 2*e^3*i - 1648128*a^5*b^3*c^11*f^3*h + 1330560*a^8*b^4*c^7*d*j^3 + 1179648* \\
& a^7*b^2*c^10*e*i^3 - 898560*a^6*b^3*c^10*f*h^3 - 826560*a^7*b^6*c^6*d*j^3 - \\
& 607068*a^2*b^8*c^9*d^3*j + 589824*a^6*b^4*c^9*e*i^3 - 354240*a^5*b^5*c^9*f \\
& *h^3 - 354240*a^4*b^5*c^10*f^3*h + 145188*a^6*b^8*c^5*d*j^3 + 98304*a^5*b^6 \\
& *c^8*e*i^3 + 43680*a^3*b^7*c^9*f^3*h - 21600*a^4*b^7*c^8*f*h^3 - 9576*a^5*b \\
& ^10*c^4*d*j^3 + 1350*a^3*b^9*c^7*f*h^3 - 1050*a^2*b^9*c^8*f^3*h - 504*a*b^1 \\
& 4*c^4*d^2*j^2 + 210*a^4*b^12*c^3*d*j^3 + 3870720*a^6*b*c^12*d^2*i^2 + 16588 \\
& 80*a^6*b*c^12*e^2*h^2 - 9792*a*b^11*c^7*d^2*i^2 + 16547328*a^4*b^2*c^13*d^3 \\
& *h - 12306816*a^3*b^4*c^12*d^3*h + 37310976*a^3*b^3*c^13*d^3*f + 3037824*a^ \\
& 2*b^6*c^11*d^3*h - 2654208*a^5*b^3*c^11*e*g^3 + 1949184*a^6*b^2*c^11*d*h^3 \\
& + 1296000*a^5*b^4*c^10*d*h^3 - 155520*a^4*b^6*c^9*d*h^3 - 40500*a*b^10*c^8* \\
& d^2*h^2 - 8100*a^3*b^8*c^8*d*h^3 + 4050*a^2*b^10*c^7*d*h^3 + 3870720*a^5*b* \\
& c^13*e^2*f^2 + 34836480*a^4*b*c^14*d^2*e^2 - 108864*a*b^9*c^9*d^2*g^2 - 806 \\
& 8032*a^2*b^5*c^12*d^3*f - 5623296*a^4*b^3*c^12*d*f^3 + 1737792*a^3*b^5*c^11 \\
& *d*f^3 - 260190*a*b^8*c^10*d^2*f^2 - 211680*a^2*b^7*c^10*d*f^3 - 435456*a*b \\
& ^7*c^11*d^2*e^2 - 377487360*a^12*b*c^6*e*k^3 + 1434977280*a^8*b^3*c^8*d^2*k \\
& ^2 + 173408256*a^7*c^12*d^2*e*k + 3276800*a^12*c^7*i*j^2*k - 125829120*a^13 \\
& *b*c^5*i*k^3 + 26214400*a^12*c^7*f*j*k^2 + 1179648*a^10*c^9*h^2*i*k + 13440 \\
& *a^6*b^13*h*j*k^2 + 50331648*a^11*c^8*e*i*k^2 + 110100480*a^10*c^9*d*f*k^2 \\
& + 57802752*a^8*c^11*d^2*i*k + 9830400*a^11*c^8*e*j^2*k - 3276800*a^9*c^10*f \\
& ^2*i*k + 4480*a^5*b^14*f*j*k^2 + 15728640*a^11*c^8*f*h*k^2 - 409600*a^9*c^1 \\
& 0*f*i^2*j - 1152*b^16*c^3*d^2*i*k - 1220516352*a^7*b^5*c^7*d^2*k^2 + 353894 \\
& 4*a^9*c^10*e*h^2*k + 384000*a^8*c^11*f^2*h*j + 13440*a^4*b^15*d*j*k^2 + 384 \\
& *a^3*b^16*f*h*k^2 + 20321280*a^7*c^12*d^2*h*j - 245760*a^8*c^11*f*h*i^2 + 3 \\
& 456*b^15*c^4*d^2*g*k - 270*b^14*c^5*d^2*h*j - 9830400*a^8*c^11*e*f^2*k + 48 \\
& 38400*a^9*c^10*d*h*j^2 + 2903040*a^8*c^11*d*h^2*j - 1966080*a^10*b*c^8*i^3* \\
& k + 1433600*a^9*b^9*c*i*k^3 + 1152*a^2*b^17*d*h*k^2 - 3686400*a^7*c^12*e^2* \\
& f*j - 53084160*a^7*b*c^11*e^3*k - 6912*b^14*c^5*d^2*e*k - 3456*b^12*c^7*d^2 \\
& *g*i + 630*b^13*c^6*d^2*f*j + 2688000*a^7*c^12*d*f^2*j + 245760*a^8*b^10*c* \\
& g*k^3 - 2211840*a^6*c^13*e^2*f*h - 1720320*a^7*c^12*d*f*i^2 - 9450*b^11*c^8 \\
& *d^2*f*h + 6912*b^11*c^8*d^2*e*i + 1612800*a^6*c^13*d*f^2*h - 1344000*a^10* \\
& b*c^8*f*j^3 - 1344000*a^7*b*c^11*f^3*j - 393216*a^8*b*c^10*g*i^3 - 23616*a* \\
& b^17*c*d^2*k^2 - 20736*b^10*c^9*d^2*e*g - 75188736*a^4*b*c^14*d^3*f - 88320 \\
& 0*a^6*b*c^12*f^3*h - 317952*a^7*b*c^11*f*h^3 + 43416*a*b^10*c^8*d^3*j - 154 \\
& 82880*a^5*c^14*d*e^2*f - 10616832*a^5*b*c^13*e^3*g - 345060*a*b^8*c^10*d^3* \\
& h - 4262400*a^5*b*c^13*d*f^3 + 852768*a*b^7*c^11*d^3*f + 7350*a*b^9*c^9*d*f \\
& ^3 + 584578368*a^6*b^7*c^6*d^2*k^2 + 93905920*a^12*b^3*c^4*j^2*k^2 - 177997 \\
& 248*a^5*b^9*c^5*d^2*k^2 - 50967040*a^11*b^5*c^3*j^2*k^2 + 104693760*a^9*b^2 \\
& *c^8*e^2*k^2 + 12849984*a^10*b^7*c^2*j^2*k^2 + 20021248*a^11*b^2*c^6*i^2*k^ \\
& 2 - 85524480*a^8*b^4*c^7*e^2*k^2 + 33223680*a^10*b^3*c^6*h^2*k^2 + 4227072* \\
& a^10*b^4*c^5*i^2*k^2 - 3973120*a^9*b^6*c^4*i^2*k^2 + 344064*a^7*b^10*c^2*i^ \\
& 2*k^2 - 81920*a^8*b^8*c^3*i^2*k^2 - 11386368*a^9*b^5*c^5*h^2*k^2 + 26173440 \\
& *a^9*b^4*c^6*g^2*k^2 - 21381120*a^8*b^6*c^5*g^2*k^2 + 18874368*a^10*b^2*c^7 \\
& *g^2*k^2 + 501760*a^9*b^3*c^7*i^2*j^2 + 452160*a^8*b^7*c^4*h^2*k^2 + 385920
\end{aligned}$$

$$\begin{aligned}
& a^7 b^9 c^3 h^2 k^2 + 170240 a^8 b^5 c^6 i^2 j^2 - 48960 a^6 b^{11} c^2 h^2 k^2 + 9216 a^7 b^7 c^5 i^2 j^2 - 1984 a^6 b^9 c^4 i^2 j^2 + 64 a^5 b^{11} c^3 i^2 j^2 + 5898240 a^7 b^8 c^4 g^2 k^2 + 1419840 a^8 b^4 c^7 h^2 j^2 + 1387008 a^9 b^2 c^8 h^2 j^2 - 737280 a^6 b^{10} c^3 g^2 k^2 + 84960 a^7 b^6 c^6 h^2 j^2 + 36864 a^5 b^{12} c^2 g^2 k^2 - 8010 a^6 b^8 c^5 h^2 j^2 - 180 a^5 b^{10} c^4 h^2 j^2 + 9 a^4 b^{12} c^3 h^2 j^2 + 14115840 a^9 b^3 c^7 f^2 k^2 - 9231552 a^7 b^7 c^5 f^2 k^2 + 23592960 a^7 b^6 c^6 e^2 k^2 + 4984320 a^8 b^5 c^6 f^2 k^2 + 3759040 a^6 b^9 c^4 f^2 k^2 + 36190080 a^4 b^{11} c^4 d^2 k^2 + 967680 a^8 b^3 c^8 g^2 j^2 - 727360 a^5 b^{11} c^3 f^2 k^2 + 276480 a^7 b^3 c^9 h^2 i^2 + 161280 a^7 b^5 c^7 g^2 j^2 + 140544 a^6 b^5 c^8 h^2 i^2 + 72960 a^4 b^{13} c^2 f^2 k^2 + 25344 a^5 b^7 c^7 h^2 i^2 - 20160 a^6 b^7 c^6 g^2 j^2 + 576 a^5 b^9 c^5 g^2 j^2 + 576 a^4 b^9 c^6 h^2 i^2 + 3808000 a^8 b^2 c^9 f^2 j^2 - 2949120 a^6 b^8 c^5 e^2 k^2 + 1643712 a^7 b^4 c^8 f^2 j^2 + 884736 a^7 b^2 c^{10} g^2 i^2 + 884736 a^6 b^4 c^9 g^2 i^2 + 221184 a^5 b^6 c^8 g^2 i^2 + 147456 a^5 b^{10} c^4 e^2 k^2 - 125440 a^6 b^6 c^7 f^2 j^2 - 13790 a^5 b^8 c^6 f^2 j^2 + 1785 a^4 b^{10} c^5 f^2 j^2 - 70 a^3 b^{12} c^4 f^2 j^2 - 4953600 a^3 b^{13} c^3 d^2 k^2 + 18427392 a^7 b^2 c^{10} d^2 j^2 + 645120 a^7 b^3 c^9 e^2 j^2 + 501760 a^6 b^3 c^{10} f^2 i^2 + 442944 a^2 b^{15} c^2 d^2 k^2 + 414720 a^6 b^3 c^{10} g^2 h^2 + 207360 a^5 b^5 c^9 g^2 h^2 + 170240 a^5 b^5 c^9 f^2 i^2 - 80640 a^6 b^5 c^8 e^2 j^2 + 9216 a^4 b^7 c^8 f^2 i^2 + 5184 a^4 b^7 c^8 g^2 h^2 + 2304 a^5 b^7 c^7 e^2 j^2 - 1984 a^3 b^9 c^7 f^2 i^2 + 64 a^2 b^{11} c^6 f^2 i^2 - 4148928 a^6 b^4 c^9 d^2 j^2 + 3538944 a^6 b^2 c^{11} e^2 i^2 + 1684224 a^6 b^2 c^{11} f^2 h^2 + 1264320 a^5 b^4 c^{10} f^2 h^2 - 1183392 a^5 b^6 c^8 d^2 j^2 + 884736 a^5 b^4 c^{10} e^2 i^2 + 645750 a^4 b^8 c^7 d^2 j^2 + 126720 a^4 b^6 c^9 f^2 h^2 - 115920 a^3 b^{10} c^6 d^2 j^2 - 13950 a^3 b^8 c^8 f^2 h^2 + 10836 a^2 b^{12} c^5 d^2 j^2 + 225 a^2 b^{10} c^7 f^2 h^2 + 1935360 a^5 b^3 c^{11} d^2 i^2 + 967680 a^5 b^3 c^{11} f^2 g^2 + 829440 a^5 b^3 c^{11} e^2 h^2 - 532224 a^4 b^5 c^{10} d^2 i^2 + 161280 a^4 b^5 c^{10} f^2 g^2 - 96768 a^3 b^7 c^9 d^2 i^2 + 62784 a^2 b^9 c^8 d^2 i^2 + 20736 a^4 b^5 c^{10} e^2 h^2 - 20160 a^3 b^7 c^9 f^2 g^2 + 576 a^2 b^9 c^8 f^2 g^2 + 11487744 a^5 b^2 c^{12} d^2 h^2 + 7962624 a^5 b^2 c^{12} e^2 g^2 + 35525376 a^4 b^2 c^{13} d^2 f^2 - 1412640 a^3 b^6 c^{10} d^2 h^2 + 461376 a^4 b^4 c^{11} d^2 h^2 + 375030 a^2 b^8 c^9 d^2 h^2 + 8709120 a^4 b^3 c^{12} d^2 g^2 - 4354560 a^3 b^5 c^{11} d^2 g^2 + 979776 a^2 b^7 c^{10} d^2 g^2 + 645120 a^4 b^3 c^{12} e^2 f^2 - 80640 a^3 b^5 c^{11} e^2 f^2 + 2304 a^2 b^7 c^{10} e^2 f^2 - 15269184 a^3 b^4 c^{12} d^2 f^2 + 2870784 a^2 b^6 c^{11} d^2 f^2 - 17418240 a^3 b^3 c^{13} d^2 e^2 + 3919104 a^2 b^5 c^{12} d^2 e^2 + 384 a^* b^{18} d^* f^* k^2 - 199229440 a^{14} b^2 c^3 k^4 + 8388608 a^{12} c^7 i^2 k^2 + 75497472 a^{10} c^9 e^2 k^2 + 78400 a^8 b^{11} j^2 k^2 + 4096 a^5 b^{14} i^2 k^2 + 345600 a^{10} c^9 h^2 j^2 + 576 a^4 b^{15} h^2 k^2 + 57937920 a^{13} b^4 c^2 k^4 + 320000 a^9 c^{10} f^2 j^2 + 64 a^2 b^{17} f^2 k^2 + 16934400 a^8 c^{11} d^2 j^2 + 9 b^{16} c^3 d^2 j^2 + 3538944 a^7 c^{12} e^2 i^2 + 115200 a^7 c^{12} f^2 h^2 + 576 b^{13} c^6 d^2 i^2 + 2025 b^{12} c^7 d^2 h^2 + 6096384 a^6 c^{13} d^2 h^2 + 492800 a^{11} b^2 c^6 j^4 + 351456 a^{10} b^4 c^5 j^4 - 43120 a^9 b^6 c^4 j^4 + 5184 b^{11} c^8 d^2 g^2 + 1225 a^8 b^8 c^3 j^4 + 131072 a^8 b^2 c^9 i^4 + 98304 a^7 b^4 c^8 i^4 + 32768 a^
\end{aligned}$$

$$\begin{aligned}
& 6*b^6*c^7*i^4 + 11025*b^10*c^9*d^2*f^2 + 4096*a^5*b^8*c^6*i^4 + 5644800*a^5 \\
& *c^14*d^2*f^2 + 142560*a^6*b^4*c^9*h^4 + 103680*a^7*b^2*c^10*h^4 + 32400*a^ \\
& 5*b^6*c^8*h^4 + 20736*b^9*c^10*d^2*e^2 + 2025*a^4*b^8*c^7*h^4 + 331776*a^5* \\
& b^4*c^10*g^4 + 492800*a^5*b^2*c^12*f^4 + 351456*a^4*b^4*c^11*f^4 - 43120*a^ \\
& 3*b^6*c^10*f^4 + 1225*a^2*b^8*c^9*f^4 - 27433728*a^3*b^2*c^14*d^4 + 6446304 \\
& *a^2*b^4*c^13*d^4 + a^2*b^14*c^3*f^2*j^2 - 81920*a^8*b^11*i*k^3 + 384000*a^ \\
& 11*c^8*h*j^3 + 138240*a^9*c^10*h^3*j + 47416320*a^6*c^13*d^3*j - 1134*b^12* \\
& c^7*d^3*j + 7077888*a^6*c^13*e^3*i + 2688000*a^10*c^9*d*j^3 + 786432*a^8*c^ \\
& 11*e*i^3 + 28449792*a^5*c^14*d^3*h - 7782400*a^12*b^6*c*k^4 + 17010*b^10*c^ \\
& 9*d^3*h + 580608*a^7*c^12*d*h^3 - 39690*b^9*c^10*d^3*f - 734832*a*b^6*c^12* \\
& d^4 + 268435456*a^15*c^4*k^4 + 576*b^19*d^2*k^2 + 409600*a^11*b^8*k^4 + 160 \\
& 000*a^12*c^7*j^4 + 65536*a^9*c^10*i^4 + 20736*a^8*c^11*h^4 + 49787136*a^4*c^ \\
& ^15*d^4 + 160000*a^6*c^13*f^4 + 5308416*a^5*c^14*e^4 + 35721*b^8*c^11*d^4, \\
& z, n), n, 1, 4)
\end{aligned}$$



### 3.60 $\int (a + bx^2 + cx^4)^3 (ad + aex + (bd + af)x^2 + bex^3 +$

Optimal result . . . . .	889
Rubi [A] (verified) . . . . .	890
Mathematica [A] (verified) . . . . .	891
Maple [A] (verified) . . . . .	892
Fricas [A] (verification not implemented) . . . . .	893
Sympy [A] (verification not implemented) . . . . .	894
Maxima [A] (verification not implemented) . . . . .	895
Giac [A] (verification not implemented) . . . . .	895
Mupad [B] (verification not implemented) . . . . .	897

#### Optimal result

Integrand size = 63, antiderivative size = 416

$$\int (a + bx^2 + cx^4)^3 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$$

$$= a^4 dx + \frac{1}{2}a^4 ex^2 + \frac{1}{3}a^3(4bd + af)x^3 + a^3 bex^4 + \frac{2}{5}a^2(3b^2d + 2acd + 2abf)x^5$$

$$+ \frac{1}{3}a^2(3b^2 + 2ac)ex^6 + \frac{2}{7}a(2b^3d + 6abcd + 3ab^2f + 2a^2cf)x^7 + \frac{1}{2}ab(b^2 + 3ac)ex^8$$

$$+ \frac{1}{9}(b^4d + 12ab^2cd + 6a^2c^2d + 4ab^3f + 12a^2bcf)x^9 + \frac{1}{10}(b^4 + 12ab^2c + 6a^2c^2)ex^{10}$$

$$+ \frac{1}{11}(4b^3cd + 12abc^2d + b^4f + 12ab^2cf + 6a^2c^2f)x^{11} + \frac{1}{3}bc(b^2 + 3ac)ex^{12}$$

$$+ \frac{2}{13}c(3b^2cd + 2ac^2d + 2b^3f + 6abcf)x^{13} + \frac{1}{7}c^2(3b^2 + 2ac)ex^{14}$$

$$+ \frac{2}{15}c^2(2bcd + 3b^2f + 2acf)x^{15} + \frac{1}{4}bc^3ex^{16} + \frac{1}{17}c^3(cd + 4bf)x^{17} + \frac{1}{18}c^4ex^{18} + \frac{1}{19}c^4fx^{19}$$

```
[Out] a^4*d*x+1/2*a^4*e*x^2+1/3*a^3*(a*f+4*b*d)*x^3+a^3*b*e*x^4+2/5*a^2*(2*a*b*f+
2*a*c*d+3*b^2*d)*x^5+1/3*a^2*(2*a*c+3*b^2)*e*x^6+2/7*a*(2*a^2*c*f+3*a*b^2*f
+6*a*b*c*d+2*b^3*d)*x^7+1/2*a*b*(3*a*c+b^2)*e*x^8+1/9*(12*a^2*b*c*f+6*a^2*c
^2*d+4*a*b^3*f+12*a*b^2*c*d+b^4*d)*x^9+1/10*(6*a^2*c^2+12*a*b^2*c+b^4)*e*x
^10+1/11*(6*a^2*c^2*f+12*a*b^2*c*f+12*a*b*c^2*d+b^4*f+4*b^3*c*d)*x^11+1/3*b*
c*(3*a*c+b^2)*e*x^12+2/13*c*(6*a*b*c*f+2*a*c^2*d+2*b^3*f+3*b^2*c*d)*x^13+1/
7*c^2*(2*a*c+3*b^2)*e*x^14+2/15*c^2*(2*a*c*f+3*b^2*f+2*b*c*d)*x^15+1/4*b*c^
3*e*x^16+1/17*c^3*(4*b*f+c*d)*x^17+1/18*c^4*e*x^18+1/19*c^4*f*x^19
```

**Rubi [A] (verified)**

Time = 0.41 (sec) , antiderivative size = 416, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.016$ , Rules used = {1685}

$$\int (a + bx^2 + cx^4)^3 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$$

$$= a^4 dx + \frac{1}{2} a^4 ex^2 + \frac{1}{3} a^3 x^3 (af + 4bd) + a^3 bex^4 + \frac{2}{5} a^2 x^5 (2abf + 2acd + 3b^2 d)$$

$$+ \frac{1}{3} a^2 ex^6 (2ac + 3b^2) + \frac{1}{10} ex^{10} (6a^2 c^2 + 12ab^2 c + b^4) + \frac{2}{7} ax^7 (2a^2 cf + 3ab^2 f + 6abcd + 2b^3 d)$$

$$+ \frac{1}{11} x^{11} (6a^2 c^2 f + 12ab^2 cf + 12abc^2 d + b^4 f + 4b^3 cd)$$

$$+ \frac{1}{9} x^9 (12a^2 bcf + 6a^2 c^2 d + 4ab^3 f + 12ab^2 cd + b^4 d)$$

$$+ \frac{2}{15} c^2 x^{15} (2acf + 3b^2 f + 2bcd) + \frac{1}{7} c^2 ex^{14} (2ac + 3b^2) + \frac{1}{3} bcex^{12} (3ac + b^2)$$

$$+ \frac{1}{2} abex^8 (3ac + b^2) + \frac{2}{13} cx^{13} (6abc f + 2ac^2 d + 2b^3 f + 3b^2 cd)$$

$$+ \frac{1}{17} c^3 x^{17} (4bf + cd) + \frac{1}{4} bc^3 ex^{16} + \frac{1}{18} c^4 ex^{18} + \frac{1}{19} c^4 fx^{19}$$

[In] Int[(a + b\*x^2 + c\*x^4)^3\*(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6), x]

[Out] a^4\*d\*x + (a^4\*e\*x^2)/2 + (a^3\*(4\*b\*d + a\*f)\*x^3)/3 + a^3\*b\*e\*x^4 + (2\*a^2\*(3\*b^2\*d + 2\*a\*c\*d + 2\*a\*b\*f)\*x^5)/5 + (a^2\*(3\*b^2 + 2\*a\*c)\*e\*x^6)/3 + (2\*a\*(2\*b^3\*d + 6\*a\*b\*c\*d + 3\*a\*b^2\*f + 2\*a^2\*c\*f)\*x^7)/7 + (a\*b\*(b^2 + 3\*a\*c)\*e\*x^8)/2 + ((b^4\*d + 12\*a\*b^2\*c\*d + 6\*a^2\*c^2\*d + 4\*a\*b^3\*f + 12\*a^2\*b\*c\*f)\*x^9)/9 + ((b^4 + 12\*a\*b^2\*c + 6\*a^2\*c^2)\*e\*x^10)/10 + ((4\*b^3\*c\*d + 12\*a\*b\*c^2\*d + b^4\*f + 12\*a\*b^2\*c\*f + 6\*a^2\*c^2\*f)\*x^11)/11 + (b\*c\*(b^2 + 3\*a\*c)\*e\*x^12)/3 + (2\*c\*(3\*b^2\*c\*d + 2\*a\*c^2\*d + 2\*b^3\*f + 6\*a\*b\*c\*f)\*x^13)/13 + (c^2\*(3\*b^2 + 2\*a\*c)\*e\*x^14)/7 + (2\*c^2\*(2\*b\*c\*d + 3\*b^2\*f + 2\*a\*c\*f)\*x^15)/15 + (b\*c^3\*e\*x^16)/4 + (c^3\*(c\*d + 4\*b\*f)\*x^17)/17 + (c^4\*e\*x^18)/18 + (c^4\*f\*x^19)/19

Rule 1685

Int[(Pq)\*(a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4]^(p\_), x\_Symbol] := Int[ExpandIntegrand[Pq\*(a + b\*x^2 + c\*x^4)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, 0]

Rubi steps

$$\begin{aligned}
\text{integral} &= \int (a^4 d + a^4 e x + a^3(4bd + af)x^2 + 4a^3 b e x^3 + 2a^2(3b^2 d + 2acd + 2abf) x^4 \\
&\quad + 2a^2(3b^2 + 2ac) e x^5 + 2a(2b^3 d + 6abcd + 3ab^2 f + 2a^2 c f) x^6 + 4ab(b^2 + 3ac) e x^7 \\
&\quad + (b^4 d + 12ab^2 c d + 6a^2 c^2 d + 4ab^3 f + 12a^2 b c f) x^8 + (b^4 + 12ab^2 c + 6a^2 c^2) e x^9 \\
&\quad + (4b^3 c d + 12abc^2 d + b^4 f + 12ab^2 c f + 6a^2 c^2 f) x^{10} + 4bc(b^2 + 3ac) e x^{11} \\
&\quad + 2c(3b^2 c d + 2ac^2 d + 2b^3 f + 6abc f) x^{12} + 2c^2(3b^2 + 2ac) e x^{13} \\
&\quad + 2c^2(2bcd + 3b^2 f + 2ac f) x^{14} + 4bc^3 e x^{15} + c^3(cd + 4bf)x^{16} + c^4 e x^{17} + c^4 f x^{18}) dx \\
&= a^4 dx + \frac{1}{2} a^4 e x^2 + \frac{1}{3} a^3(4bd + af)x^3 + a^3 b e x^4 + \frac{2}{5} a^2(3b^2 d + 2acd + 2abf) x^5 \\
&\quad + \frac{1}{3} a^2(3b^2 + 2ac) e x^6 + \frac{2}{7} a(2b^3 d + 6abcd + 3ab^2 f + 2a^2 c f) x^7 \\
&\quad + \frac{1}{2} ab(b^2 + 3ac) e x^8 + \frac{1}{9} (b^4 d + 12ab^2 c d + 6a^2 c^2 d + 4ab^3 f + 12a^2 b c f) x^9 \\
&\quad + \frac{1}{10} (b^4 + 12ab^2 c + 6a^2 c^2) e x^{10} + \frac{1}{11} (4b^3 c d + 12abc^2 d + b^4 f + 12ab^2 c f + 6a^2 c^2 f) x^{11} \\
&\quad + \frac{1}{3} bc(b^2 + 3ac) e x^{12} + \frac{2}{13} c(3b^2 c d + 2ac^2 d + 2b^3 f + 6abc f) x^{13} \\
&\quad + \frac{1}{7} c^2(3b^2 + 2ac) e x^{14} + \frac{2}{15} c^2(2bcd + 3b^2 f + 2ac f) x^{15} \\
&\quad + \frac{1}{4} bc^3 e x^{16} + \frac{1}{17} c^3(cd + 4bf)x^{17} + \frac{1}{18} c^4 e x^{18} + \frac{1}{19} c^4 f x^{19}
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.08 (sec) , antiderivative size = 416, normalized size of antiderivative = 1.00

$$\begin{aligned}
&\int (a + bx^2 + cx^4)^3 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx \\
&= a^4 dx + \frac{1}{2} a^4 e x^2 + \frac{1}{3} a^3(4bd + af)x^3 + a^3 b e x^4 + \frac{2}{5} a^2(3b^2 d + 2acd + 2abf) x^5 \\
&\quad + \frac{1}{3} a^2(3b^2 + 2ac) e x^6 + \frac{2}{7} a(2b^3 d + 6abcd + 3ab^2 f + 2a^2 c f) x^7 + \frac{1}{2} ab(b^2 + 3ac) e x^8 \\
&\quad + \frac{1}{9} (b^4 d + 12ab^2 c d + 6a^2 c^2 d + 4ab^3 f + 12a^2 b c f) x^9 + \frac{1}{10} (b^4 + 12ab^2 c + 6a^2 c^2) e x^{10} \\
&\quad + \frac{1}{11} (4b^3 c d + 12abc^2 d + b^4 f + 12ab^2 c f + 6a^2 c^2 f) x^{11} + \frac{1}{3} bc(b^2 + 3ac) e x^{12} \\
&\quad + \frac{2}{13} c(3b^2 c d + 2ac^2 d + 2b^3 f + 6abc f) x^{13} + \frac{1}{7} c^2(3b^2 + 2ac) e x^{14} \\
&\quad + \frac{2}{15} c^2(2bcd + 3b^2 f + 2ac f) x^{15} + \frac{1}{4} bc^3 e x^{16} + \frac{1}{17} c^3(cd + 4bf)x^{17} + \frac{1}{18} c^4 e x^{18} + \frac{1}{19} c^4 f x^{19}
\end{aligned}$$

[In] Integrate[(a + b\*x^2 + c\*x^4)^3\*(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6), x]

```
[Out] a^4*d*x + (a^4*e*x^2)/2 + (a^3*(4*b*d + a*f)*x^3)/3 + a^3*b*e*x^4 + (2*a^2*(3*b^2*d + 2*a*c*d + 2*a*b*f)*x^5)/5 + (a^2*(3*b^2 + 2*a*c)*e*x^6)/3 + (2*a*(2*b^3*d + 6*a*b*c*d + 3*a*b^2*f + 2*a^2*c*f)*x^7)/7 + (a*b*(b^2 + 3*a*c)*e*x^8)/2 + ((b^4*d + 12*a*b^2*c*d + 6*a^2*c^2*d + 4*a*b^3*f + 12*a^2*b*c*f)*x^9)/9 + ((b^4 + 12*a*b^2*c + 6*a^2*c^2)*e*x^10)/10 + ((4*b^3*c*d + 12*a*b*c^2*d + b^4*f + 12*a*b^2*c*f + 6*a^2*c^2*f)*x^11)/11 + (b*c*(b^2 + 3*a*c)*e*x^12)/3 + (2*c*(3*b^2*c*d + 2*a*c^2*d + 2*b^3*f + 6*a*b*c*f)*x^13)/13 + (c^2*(3*b^2 + 2*a*c)*e*x^14)/7 + (2*c^2*(2*b*c*d + 3*b^2*f + 2*a*c*f)*x^15)/15 + (b*c^3*e*x^16)/4 + (c^3*(c*d + 4*b*f)*x^17)/17 + (c^4*e*x^18)/18 + (c^4*f*x^19)/19
```

## Maple [A] (verified)

Time = 28.81 (sec) , antiderivative size = 412, normalized size of antiderivative = 0.99

method	result
norman	$(\frac{1}{3}f a^4 + \frac{4}{3}d a^3 b) x^3 + (\frac{2}{7}a c^3 e + \frac{3}{7}b^2 c^2 e) x^{14} + (\frac{2}{3}a^3 c e + a^2 b^2 e) x^6 + (\frac{4}{17}b c^3 f + \frac{1}{17}c^4 d) x^{17} + (\frac{1}{2}a^4 e x^2 + \frac{1}{18}c^4 e x^{18} + \frac{1}{19}c^4 f x^{19} + \frac{2}{3}x^6 a^3 c e + x^6 a^2 b^2 e + \frac{4}{5}x^5 f a^3 b + \frac{4}{5}x^5 a^3 c d + \frac{6}{5}x^5 a^2 b^2 d + \frac{4}{3}x^5 a^2 b c d)$
risch	$\frac{1}{2}a^4 e x^2 + \frac{1}{18}c^4 e x^{18} + \frac{1}{19}c^4 f x^{19} + \frac{2}{3}x^6 a^3 c e + x^6 a^2 b^2 e + \frac{4}{5}x^5 f a^3 b + \frac{4}{5}x^5 a^3 c d + \frac{6}{5}x^5 a^2 b^2 d + \frac{4}{3}x^5 a^2 b c d$
parallelrisch	$\frac{1}{2}a^4 e x^2 + \frac{1}{18}c^4 e x^{18} + \frac{1}{19}c^4 f x^{19} + \frac{2}{3}x^6 a^3 c e + x^6 a^2 b^2 e + \frac{4}{5}x^5 f a^3 b + \frac{4}{5}x^5 a^3 c d + \frac{6}{5}x^5 a^2 b^2 d + \frac{4}{3}x^5 a^2 b c d$
gospers	$x(3063060f c^4 x^{18} + 3233230c^4 e x^{17} + 13693680b c^3 f x^{16} + 3423420c^4 d x^{16} + 14549535b c^3 e x^{15} + 15519504a c^3 f x^{14} + 23279256b^2 c^2 e x^{13} + 15519504a c^3 f x^{14} + 23279256b^2 c^2 e x^{13})$
default	$\frac{c^4 f x^{19}}{19} + \frac{c^4 e x^{18}}{18} + \frac{(3b c^3 f + c^3 (b f + c d)) x^{17}}{17} + \frac{b c^3 e x^{16}}{4} + \frac{((a c^2 + 2b^2 c + c(2ac + b^2)) c f + 3b c^2 (b f + c d) + c^3 (a f + b d)) x^{15}}{15}$

```
[In] int((c*x^4+b*x^2+a)^3*(d*a+a*e*x+(a*f+b*d)*x^2+e*x^3*b+(b*f+c*d)*x^4+c*e*x^5+c*f*x^6),x,method=_RETURNVERBOSE)
```

```
[Out] (1/3*f*a^4+4/3*d*a^3*b)*x^3+(2/7*a*c^3*e+3/7*b^2*c^2*e)*x^14+(2/3*a^3*c*e+a^2*b^2*e)*x^6+(4/17*b*c^3*f+1/17*c^4*d)*x^17+(a*b*c^2*e+1/3*b^3*c*e)*x^12+(3/2*a^2*b*c*e+1/2*a*b^3*e)*x^8+(4/15*a*c^3*f+2/5*b^2*c^2*f+4/15*b*c^3*d)*x^15+(3/5*a^2*c^2*e+6/5*a*b^2*c*e+1/10*b^4*e)*x^10+(4/5*f*a^3*b+4/5*a^3*c*d+6/5*a^2*b^2*d)*x^5+(4/7*a^3*c*f+6/7*a^2*b^2*f+12/7*a^2*b*c*d+4/7*a*b^3*d)*x^7+(12/13*a*b*c^2*f+4/13*a*c^3*d+4/13*b^3*c*f+6/13*b^2*c^2*d)*x^13+(6/11*a^2*c^2*f+12/11*a*b^2*c*f+12/11*a*b*c^2*d+1/11*b^4*f+4/11*b^3*c*d)*x^11+(4/3*a^2*b*c*f+2/3*a^2*c^2*d+4/9*a*b^3*f+4/3*a*b^2*c*d+1/9*d*b^4)*x^9+a^4*d*x+a^3*b*e*x^4+1/2*a^4*e*x^2+1/18*c^4*e*x^18+1/19*c^4*f*x^19+1/4*b*c^3*e*x^16
```

**Fricas [A] (verification not implemented)**

none

Time = 0.26 (sec) , antiderivative size = 418, normalized size of antiderivative = 1.00

$$\begin{aligned}
& \int (a + bx^2 + cx^4)^3 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx \\
&= \frac{1}{19} c^4 f x^{19} + \frac{1}{18} c^4 e x^{18} + \frac{1}{4} b c^3 e x^{16} + \frac{1}{17} (c^4 d + 4 b c^3 f) x^{17} + \frac{1}{7} (3 b^2 c^2 + 2 a c^3) e x^{14} \\
&+ \frac{2}{15} (2 b c^3 d + (3 b^2 c^2 + 2 a c^3) f) x^{15} + \frac{1}{3} (b^3 c + 3 a b c^2) e x^{12} \\
&+ \frac{2}{13} ((3 b^2 c^2 + 2 a c^3) d + 2 (b^3 c + 3 a b c^2) f) x^{13} + \frac{1}{10} (b^4 + 12 a b^2 c + 6 a^2 c^2) e x^{10} \\
&+ \frac{1}{11} (4 (b^3 c + 3 a b c^2) d + (b^4 + 12 a b^2 c + 6 a^2 c^2) f) x^{11} + \frac{1}{2} (a b^3 + 3 a^2 b c) e x^8 \\
&+ \frac{1}{9} ((b^4 + 12 a b^2 c + 6 a^2 c^2) d + 4 (a b^3 + 3 a^2 b c) f) x^9 + a^3 b e x^4 \\
&+ \frac{1}{3} (3 a^2 b^2 + 2 a^3 c) e x^6 + \frac{2}{7} (2 (a b^3 + 3 a^2 b c) d + (3 a^2 b^2 + 2 a^3 c) f) x^7 \\
&+ \frac{1}{2} a^4 e x^2 + a^4 d x + \frac{2}{5} (2 a^3 b f + (3 a^2 b^2 + 2 a^3 c) d) x^5 + \frac{1}{3} (4 a^3 b d + a^4 f) x^3
\end{aligned}$$

[In] integrate((c\*x^4+b\*x^2+a)^3\*(a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6),x, algorithm="fricas")

[Out] 1/19\*c^4\*f\*x^19 + 1/18\*c^4\*e\*x^18 + 1/4\*b\*c^3\*e\*x^16 + 1/17\*(c^4\*d + 4\*b\*c^3\*f)\*x^17 + 1/7\*(3\*b^2\*c^2 + 2\*a\*c^3)\*e\*x^14 + 2/15\*(2\*b\*c^3\*d + (3\*b^2\*c^2 + 2\*a\*c^3)\*f)\*x^15 + 1/3\*(b^3\*c + 3\*a\*b\*c^2)\*e\*x^12 + 2/13\*((3\*b^2\*c^2 + 2\*a\*c^3)\*d + 2\*(b^3\*c + 3\*a\*b\*c^2)\*f)\*x^13 + 1/10\*(b^4 + 12\*a\*b^2\*c + 6\*a^2\*c^2)\*e\*x^10 + 1/11\*(4\*(b^3\*c + 3\*a\*b\*c^2)\*d + (b^4 + 12\*a\*b^2\*c + 6\*a^2\*c^2)\*f)\*x^11 + 1/2\*(a\*b^3 + 3\*a^2\*b\*c)\*e\*x^8 + 1/9\*((b^4 + 12\*a\*b^2\*c + 6\*a^2\*c^2)\*d + 4\*(a\*b^3 + 3\*a^2\*b\*c)\*f)\*x^9 + a^3\*b\*e\*x^4 + 1/3\*(3\*a^2\*b^2 + 2\*a^3\*c)\*e\*x^6 + 2/7\*(2\*(a\*b^3 + 3\*a^2\*b\*c)\*d + (3\*a^2\*b^2 + 2\*a^3\*c)\*f)\*x^7 + 1/2\*a^4\*e\*x^2 + a^4\*d\*x + 2/5\*(2\*a^3\*b\*f + (3\*a^2\*b^2 + 2\*a^3\*c)\*d)\*x^5 + 1/3\*(4\*a^3\*b\*d + a^4\*f)\*x^3

## Sympy [A] (verification not implemented)

Time = 0.05 (sec) , antiderivative size = 503, normalized size of antiderivative = 1.21

$$\begin{aligned}
 & \int (a + bx^2 + cx^4)^3 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx \\
 &= a^4 dx + \frac{a^4 ex^2}{2} + a^3 bex^4 + \frac{bc^3 ex^{16}}{4} + \frac{c^4 ex^{18}}{18} + \frac{c^4 fx^{19}}{19} + x^{17} \cdot \left( \frac{4bc^3 f}{17} + \frac{c^4 d}{17} \right) \\
 &+ x^{15} \cdot \left( \frac{4ac^3 f}{15} + \frac{2b^2 c^2 f}{5} + \frac{4bc^3 d}{15} \right) + x^{14} \cdot \left( \frac{2ac^3 e}{7} + \frac{3b^2 c^2 e}{7} \right) + x^{13} \\
 &\cdot \left( \frac{12abc^2 f}{13} + \frac{4ac^3 d}{13} + \frac{4b^3 cf}{13} + \frac{6b^2 c^2 d}{13} \right) + x^{12} \left( abc^2 e + \frac{b^3 ce}{3} \right) \\
 &+ x^{11} \cdot \left( \frac{6a^2 c^2 f}{11} + \frac{12ab^2 cf}{11} + \frac{12abc^2 d}{11} + \frac{b^4 f}{11} + \frac{4b^3 cd}{11} \right) + x^{10} \\
 &\cdot \left( \frac{3a^2 c^2 e}{5} + \frac{6ab^2 ce}{5} + \frac{b^4 e}{10} \right) + x^9 \cdot \left( \frac{4a^2 bc f}{3} + \frac{2a^2 c^2 d}{3} + \frac{4ab^3 f}{9} + \frac{4ab^2 cd}{3} + \frac{b^4 d}{9} \right) \\
 &+ x^8 \cdot \left( \frac{3a^2 bce}{2} + \frac{ab^3 e}{2} \right) + x^7 \cdot \left( \frac{4a^3 cf}{7} + \frac{6a^2 b^2 f}{7} + \frac{12a^2 bcd}{7} + \frac{4ab^3 d}{7} \right) + x^6 \\
 &\cdot \left( \frac{2a^3 ce}{3} + a^2 b^2 e \right) + x^5 \cdot \left( \frac{4a^3 bf}{5} + \frac{4a^3 cd}{5} + \frac{6a^2 b^2 d}{5} \right) + x^3 \left( \frac{a^4 f}{3} + \frac{4a^3 bd}{3} \right)
 \end{aligned}$$

[In] integrate((c\*x\*\*4+b\*x\*\*2+a)\*\*3\*(a\*d+a\*e\*x+(a\*f+b\*d)\*x\*\*2+b\*e\*x\*\*3+(b\*f+c\*d)\*x\*\*4+c\*e\*x\*\*5+c\*f\*x\*\*6),x)

[Out] a\*\*4\*d\*x + a\*\*4\*e\*x\*\*2/2 + a\*\*3\*b\*e\*x\*\*4 + b\*c\*\*3\*e\*x\*\*16/4 + c\*\*4\*e\*x\*\*18/18 + c\*\*4\*f\*x\*\*19/19 + x\*\*17\*(4\*b\*c\*\*3\*f/17 + c\*\*4\*d/17) + x\*\*15\*(4\*a\*c\*\*3\*f/15 + 2\*b\*\*2\*c\*\*2\*f/5 + 4\*b\*c\*\*3\*d/15) + x\*\*14\*(2\*a\*c\*\*3\*e/7 + 3\*b\*\*2\*c\*\*2\*e/7) + x\*\*13\*(12\*a\*b\*c\*\*2\*f/13 + 4\*a\*c\*\*3\*d/13 + 4\*b\*\*3\*c\*f/13 + 6\*b\*\*2\*c\*\*2\*d/13) + x\*\*12\*(a\*b\*c\*\*2\*e + b\*\*3\*c\*e/3) + x\*\*11\*(6\*a\*\*2\*c\*\*2\*f/11 + 12\*a\*b\*\*2\*c\*f/11 + 12\*a\*b\*c\*\*2\*d/11 + b\*\*4\*f/11 + 4\*b\*\*3\*c\*d/11) + x\*\*10\*(3\*a\*\*2\*c\*\*2\*e/5 + 6\*a\*b\*\*2\*c\*e/5 + b\*\*4\*e/10) + x\*\*9\*(4\*a\*\*2\*b\*c\*f/3 + 2\*a\*\*2\*c\*\*2\*d/3 + 4\*a\*b\*\*3\*f/9 + 4\*a\*b\*\*2\*c\*d/3 + b\*\*4\*d/9) + x\*\*8\*(3\*a\*\*2\*b\*c\*e/2 + a\*b\*\*3\*e/2) + x\*\*7\*(4\*a\*\*3\*c\*f/7 + 6\*a\*\*2\*b\*\*2\*f/7 + 12\*a\*\*2\*b\*c\*d/7 + 4\*a\*b\*\*3\*d/7) + x\*\*6\*(2\*a\*\*3\*c\*e/3 + a\*\*2\*b\*\*2\*e) + x\*\*5\*(4\*a\*\*3\*b\*f/5 + 4\*a\*\*3\*c\*d/5 + 6\*a\*\*2\*b\*\*2\*d/5) + x\*\*3\*(a\*\*4\*f/3 + 4\*a\*\*3\*b\*d/3)

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 418, normalized size of antiderivative = 1.00

$$\begin{aligned}
& \int (a + bx^2 + cx^4)^3 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx \\
&= \frac{1}{19} c^4 f x^{19} + \frac{1}{18} c^4 e x^{18} + \frac{1}{4} b c^3 e x^{16} + \frac{1}{17} (c^4 d + 4 b c^3 f) x^{17} + \frac{1}{7} (3 b^2 c^2 + 2 a c^3) e x^{14} \\
&+ \frac{2}{15} (2 b c^3 d + (3 b^2 c^2 + 2 a c^3) f) x^{15} + \frac{1}{3} (b^3 c + 3 a b c^2) e x^{12} \\
&+ \frac{2}{13} ((3 b^2 c^2 + 2 a c^3) d + 2 (b^3 c + 3 a b c^2) f) x^{13} + \frac{1}{10} (b^4 + 12 a b^2 c + 6 a^2 c^2) e x^{10} \\
&+ \frac{1}{11} (4 (b^3 c + 3 a b c^2) d + (b^4 + 12 a b^2 c + 6 a^2 c^2) f) x^{11} + \frac{1}{2} (a b^3 + 3 a^2 b c) e x^8 \\
&+ \frac{1}{9} ((b^4 + 12 a b^2 c + 6 a^2 c^2) d + 4 (a b^3 + 3 a^2 b c) f) x^9 + a^3 b e x^4 \\
&+ \frac{1}{3} (3 a^2 b^2 + 2 a^3 c) e x^6 + \frac{2}{7} (2 (a b^3 + 3 a^2 b c) d + (3 a^2 b^2 + 2 a^3 c) f) x^7 \\
&+ \frac{1}{2} a^4 e x^2 + a^4 d x + \frac{2}{5} (2 a^3 b f + (3 a^2 b^2 + 2 a^3 c) d) x^5 + \frac{1}{3} (4 a^3 b d + a^4 f) x^3
\end{aligned}$$

[In] integrate((c\*x^4+b\*x^2+a)^3\*(a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6),x, algorithm="maxima")

[Out] 1/19\*c^4\*f\*x^19 + 1/18\*c^4\*e\*x^18 + 1/4\*b\*c^3\*e\*x^16 + 1/17\*(c^4\*d + 4\*b\*c^3\*f)\*x^17 + 1/7\*(3\*b^2\*c^2 + 2\*a\*c^3)\*e\*x^14 + 2/15\*(2\*b\*c^3\*d + (3\*b^2\*c^2 + 2\*a\*c^3)\*f)\*x^15 + 1/3\*(b^3\*c + 3\*a\*b\*c^2)\*e\*x^12 + 2/13\*((3\*b^2\*c^2 + 2\*a\*c^3)\*d + 2\*(b^3\*c + 3\*a\*b\*c^2)\*f)\*x^13 + 1/10\*(b^4 + 12\*a\*b^2\*c + 6\*a^2\*c^2)\*e\*x^10 + 1/11\*(4\*(b^3\*c + 3\*a\*b\*c^2)\*d + (b^4 + 12\*a\*b^2\*c + 6\*a^2\*c^2)\*f)\*x^11 + 1/2\*(a\*b^3 + 3\*a^2\*b\*c)\*e\*x^8 + 1/9\*((b^4 + 12\*a\*b^2\*c + 6\*a^2\*c^2)\*d + 4\*(a\*b^3 + 3\*a^2\*b\*c)\*f)\*x^9 + a^3\*b\*e\*x^4 + 1/3\*(3\*a^2\*b^2 + 2\*a^3\*c)\*e\*x^6 + 2/7\*(2\*(a\*b^3 + 3\*a^2\*b\*c)\*d + (3\*a^2\*b^2 + 2\*a^3\*c)\*f)\*x^7 + 1/2\*a^4\*e\*x^2 + a^4\*d\*x + 2/5\*(2\*a^3\*b\*f + (3\*a^2\*b^2 + 2\*a^3\*c)\*d)\*x^5 + 1/3\*(4\*a^3\*b\*d + a^4\*f)\*x^3

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 463, normalized size of antiderivative = 1.11

$$\begin{aligned}
 & \int (a + bx^2 + cx^4)^3 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx \\
 &= \frac{1}{19} c^4 f x^{19} + \frac{1}{18} c^4 e x^{18} + \frac{1}{17} c^4 d x^{17} + \frac{4}{17} b c^3 f x^{17} + \frac{1}{4} b c^3 e x^{16} + \frac{4}{15} b c^3 d x^{15} \\
 &+ \frac{2}{5} b^2 c^2 f x^{15} + \frac{4}{15} a c^3 f x^{15} + \frac{3}{7} b^2 c^2 e x^{14} + \frac{2}{7} a c^3 e x^{14} + \frac{6}{13} b^2 c^2 d x^{13} + \frac{4}{13} a c^3 d x^{13} \\
 &+ \frac{4}{13} b^3 c f x^{13} + \frac{12}{13} a b c^2 f x^{13} + \frac{1}{3} b^3 c e x^{12} + a b c^2 e x^{12} + \frac{4}{11} b^3 c d x^{11} + \frac{12}{11} a b c^2 d x^{11} \\
 &+ \frac{1}{11} b^4 f x^{11} + \frac{12}{11} a b^2 c f x^{11} + \frac{6}{11} a^2 c^2 f x^{11} + \frac{1}{10} b^4 e x^{10} + \frac{6}{5} a b^2 c e x^{10} + \frac{3}{5} a^2 c^2 e x^{10} \\
 &+ \frac{1}{9} b^4 d x^9 + \frac{4}{3} a b^2 c d x^9 + \frac{2}{3} a^2 c^2 d x^9 + \frac{4}{9} a b^3 f x^9 + \frac{4}{3} a^2 b c f x^9 + \frac{1}{2} a b^3 e x^8 + \frac{3}{2} a^2 b c e x^8 \\
 &+ \frac{4}{7} a b^3 d x^7 + \frac{12}{7} a^2 b c d x^7 + \frac{6}{7} a^2 b^2 f x^7 + \frac{4}{7} a^3 c f x^7 + a^2 b^2 e x^6 + \frac{2}{3} a^3 c e x^6 + \frac{6}{5} a^2 b^2 d x^5 \\
 &+ \frac{4}{5} a^3 c d x^5 + \frac{4}{5} a^3 b f x^5 + a^3 b e x^4 + \frac{4}{3} a^3 b d x^3 + \frac{1}{3} a^4 f x^3 + \frac{1}{2} a^4 e x^2 + a^4 d x
 \end{aligned}$$

[In] integrate((c\*x^4+b\*x^2+a)^3\*(a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6),x, algorithm="giac")

[Out] 1/19\*c^4\*f\*x^19 + 1/18\*c^4\*e\*x^18 + 1/17\*c^4\*d\*x^17 + 4/17\*b\*c^3\*f\*x^17 + 1/4\*b\*c^3\*e\*x^16 + 4/15\*b\*c^3\*d\*x^15 + 2/5\*b^2\*c^2\*f\*x^15 + 4/15\*a\*c^3\*f\*x^15 + 3/7\*b^2\*c^2\*e\*x^14 + 2/7\*a\*c^3\*e\*x^14 + 6/13\*b^2\*c^2\*d\*x^13 + 4/13\*a\*c^3\*d\*x^13 + 4/13\*b^3\*c\*f\*x^13 + 12/13\*a\*b\*c^2\*f\*x^13 + 1/3\*b^3\*c\*e\*x^12 + a\*b\*c^2\*e\*x^12 + 4/11\*b^3\*c\*d\*x^11 + 12/11\*a\*b\*c^2\*d\*x^11 + 1/11\*b^4\*f\*x^11 + 12/11\*a\*b^2\*c\*f\*x^11 + 6/11\*a^2\*c^2\*f\*x^11 + 1/10\*b^4\*e\*x^10 + 6/5\*a\*b^2\*c\*e\*x^10 + 3/5\*a^2\*c^2\*e\*x^10 + 1/9\*b^4\*d\*x^9 + 4/3\*a\*b^2\*c\*d\*x^9 + 2/3\*a^2\*c^2\*d\*x^9 + 4/9\*a\*b^3\*f\*x^9 + 4/3\*a^2\*b\*c\*f\*x^9 + 1/2\*a\*b^3\*e\*x^8 + 3/2\*a^2\*b\*c\*e\*x^8 + 4/7\*a\*b^3\*d\*x^7 + 12/7\*a^2\*b\*c\*d\*x^7 + 6/7\*a^2\*b^2\*f\*x^7 + 4/7\*a^3\*c\*f\*x^7 + a^2\*b^2\*e\*x^6 + 2/3\*a^3\*c\*e\*x^6 + 6/5\*a^2\*b^2\*d\*x^5 + 4/5\*a^3\*c\*d\*x^5 + 4/5\*a^3\*b\*f\*x^5 + a^3\*b\*e\*x^4 + 4/3\*a^3\*b\*d\*x^3 + 1/3\*a^4\*f\*x^3 + 1/2\*a^4\*e\*x^2 + a^4\*d\*x



**Mupad [B] (verification not implemented)**

Time = 0.30 (sec) , antiderivative size = 398, normalized size of antiderivative = 0.96

$$\begin{aligned}
& \int (a + bx^2 + cx^4)^3 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx \\
&= x^3 \left( \frac{fa^4}{3} + \frac{4bda^3}{3} \right) + x^{17} \left( \frac{dc^4}{17} + \frac{4bfc^3}{17} \right) \\
&+ x^5 \left( \frac{4fa^3b}{5} + \frac{4cda^3}{5} + \frac{6da^2b^2}{5} \right) + x^{15} \left( \frac{2fb^2c^2}{5} + \frac{4dbbc^3}{15} + \frac{4afc^3}{15} \right) \\
&+ x^9 \left( \frac{4fa^2bc}{3} + \frac{2da^2c^2}{3} + \frac{4fab^3}{9} + \frac{4dab^2c}{3} + \frac{db^4}{9} \right) \\
&+ x^{11} \left( \frac{6fa^2c^2}{11} + \frac{12fab^2c}{11} + \frac{12dabc^2}{11} + \frac{fb^4}{11} + \frac{4db^3c}{11} \right) \\
&+ x^7 \left( \frac{4cfa^3}{7} + \frac{6fa^2b^2}{7} + \frac{12cda^2b}{7} + \frac{4dab^3}{7} \right) \\
&+ x^{13} \left( \frac{4fb^3c}{13} + \frac{6db^2c^2}{13} + \frac{12afb^2c}{13} + \frac{4adc^3}{13} \right) + \frac{a^4ex^2}{2} + \frac{c^4ex^{18}}{18} + \frac{c^4fx^{19}}{19} \\
&+ \frac{ex^{10}(6a^2c^2 + 12ab^2c + b^4)}{10} + a^4dx + \frac{a^2ex^6(3b^2 + 2ac)}{3} + \frac{c^2ex^{14}(3b^2 + 2ac)}{7} \\
&+ a^3bex^4 + \frac{bc^3ex^{16}}{4} + \frac{abex^8(b^2 + 3ac)}{2} + \frac{bcex^{12}(b^2 + 3ac)}{3}
\end{aligned}$$

[In] int((a + b\*x^2 + c\*x^4)^3\*(a\*d + x^2\*(b\*d + a\*f) + x^4\*(c\*d + b\*f) + a\*e\*x + b\*e\*x^3 + c\*e\*x^5 + c\*f\*x^6),x)

[Out] x^3\*((a^4\*f)/3 + (4\*a^3\*b\*d)/3) + x^17\*((c^4\*d)/17 + (4\*b\*c^3\*f)/17) + x^5\*((6\*a^2\*b^2\*d)/5 + (4\*a^3\*c\*d)/5 + (4\*a^3\*b\*f)/5) + x^15\*((2\*b^2\*c^2\*f)/5 + (4\*b\*c^3\*d)/15 + (4\*a\*c^3\*f)/15) + x^9\*((b^4\*d)/9 + (2\*a^2\*c^2\*d)/3 + (4\*a\*b^3\*f)/9 + (4\*a\*b^2\*c\*d)/3 + (4\*a^2\*b\*c\*f)/3) + x^11\*((b^4\*f)/11 + (6\*a^2\*c^2\*f)/11 + (4\*b^3\*c\*d)/11 + (12\*a\*b\*c^2\*d)/11 + (12\*a\*b^2\*c\*f)/11) + x^7\*((6\*a^2\*b^2\*f)/7 + (4\*a\*b^3\*d)/7 + (4\*a^3\*c\*f)/7 + (12\*a^2\*b\*c\*d)/7) + x^13\*((6\*b^2\*c^2\*d)/13 + (4\*a\*c^3\*d)/13 + (4\*b^3\*c\*f)/13 + (12\*a\*b\*c^2\*f)/13) + (a^4\*e\*x^2)/2 + (c^4\*e\*x^18)/18 + (c^4\*f\*x^19)/19 + (e\*x^10\*(b^4 + 6\*a^2\*c^2 + 12\*a\*b^2\*c))/10 + a^4\*d\*x + (a^2\*e\*x^6\*(2\*a\*c + 3\*b^2))/3 + (c^2\*e\*x^14\*(2\*a\*c + 3\*b^2))/7 + a^3\*b\*e\*x^4 + (b\*c^3\*e\*x^16)/4 + (a\*b\*e\*x^8\*(3\*a\*c + b^2))/2 + (b\*c\*e\*x^12\*(3\*a\*c + b^2))/3

### 3.61 $\int (a + bx^2 + cx^4)^2 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$

Optimal result	898
Rubi [A] (verified)	898
Mathematica [A] (verified)	900
Maple [A] (verified)	900
Fricas [A] (verification not implemented)	901
Sympy [A] (verification not implemented)	901
Maxima [A] (verification not implemented)	902
Giac [A] (verification not implemented)	903
Mupad [B] (verification not implemented)	903

#### Optimal result

Integrand size = 63, antiderivative size = 259

$$\int (a + bx^2 + cx^4)^2 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$$

$$= a^3 dx + \frac{1}{2}a^3 ex^2 + \frac{1}{3}a^2(3bd + af)x^3 + \frac{3}{4}a^2 bex^4 + \frac{3}{5}a(b^2d + acd + abf)x^5$$

$$+ \frac{1}{2}a(b^2 + ac)ex^6 + \frac{1}{7}(b^3d + 6abcd + 3ab^2f + 3a^2cf)x^7 + \frac{1}{8}b(b^2 + 6ac)ex^8$$

$$+ \frac{1}{9}(3b^2cd + 3ac^2d + b^3f + 6abcf)x^9 + \frac{3}{10}c(b^2 + ac)ex^{10}$$

$$+ \frac{3}{11}c(bcd + b^2f + acf)x^{11} + \frac{1}{4}bc^2ex^{12} + \frac{1}{13}c^2(cd + 3bf)x^{13} + \frac{1}{14}c^3ex^{14} + \frac{1}{15}c^3fx^{15}$$

[Out] a^3\*d\*x+1/2\*a^3\*e\*x^2+1/3\*a^2\*(a\*f+3\*b\*d)\*x^3+3/4\*a^2\*b\*e\*x^4+3/5\*a\*(a\*b\*f+a\*c\*d+b^2\*d)\*x^5+1/2\*a\*(a\*c+b^2)\*e\*x^6+1/7\*(3\*a^2\*c\*f+3\*a\*b^2\*f+6\*a\*b\*c\*d+b^3\*d)\*x^7+1/8\*b\*(6\*a\*c+b^2)\*e\*x^8+1/9\*(6\*a\*b\*c\*f+3\*a\*c^2\*d+b^3\*f+3\*b^2\*c\*d)\*x^9+3/10\*c\*(a\*c+b^2)\*e\*x^10+3/11\*c\*(a\*c\*f+b^2\*f+b\*c\*d)\*x^11+1/4\*b\*c^2\*e\*x^12+1/13\*c^2\*(3\*b\*f+c\*d)\*x^13+1/14\*c^3\*e\*x^14+1/15\*c^3\*f\*x^15

#### Rubi [A] (verified)

Time = 0.22 (sec) , antiderivative size = 259, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.016$ , Rules used

= {1685}

$$\int (a + bx^2 + cx^4)^2 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$$

$$= a^3 dx + \frac{1}{2} a^3 ex^2 + \frac{1}{7} x^7 (3a^2 cf + 3ab^2 f + 6abcd + b^3 d) + \frac{1}{3} a^2 x^3 (af + 3bd) + \frac{3}{4} a^2 bex^4$$

$$+ \frac{3}{11} cx^{11} (acf + b^2 f + bcd) + \frac{3}{5} ax^5 (abf + acd + b^2 d) + \frac{3}{10} cex^{10} (ac + b^2)$$

$$+ \frac{1}{8} bex^8 (6ac + b^2) + \frac{1}{2} aex^6 (ac + b^2) + \frac{1}{9} x^9 (6abc f + 3ac^2 d + b^3 f + 3b^2 cd)$$

$$+ \frac{1}{13} c^2 x^{13} (3bf + cd) + \frac{1}{4} bc^2 ex^{12} + \frac{1}{14} c^3 ex^{14} + \frac{1}{15} c^3 fx^{15}$$

[In] Int[(a + b\*x^2 + c\*x^4)^2\*(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6),x]

[Out] a^3\*d\*x + (a^3\*e\*x^2)/2 + (a^2\*(3\*b\*d + a\*f)\*x^3)/3 + (3\*a^2\*b\*e\*x^4)/4 + (3\*a\*(b^2\*d + a\*c\*d + a\*b\*f)\*x^5)/5 + (a\*(b^2 + a\*c)\*e\*x^6)/2 + ((b^3\*d + 6\*a\*b\*c\*d + 3\*a\*b^2\*f + 3\*a^2\*c\*f)\*x^7)/7 + (b\*(b^2 + 6\*a\*c)\*e\*x^8)/8 + ((3\*b^2\*c\*d + 3\*a\*c^2\*d + b^3\*f + 6\*a\*b\*c\*f)\*x^9)/9 + (3\*c\*(b^2 + a\*c)\*e\*x^10)/10 + (3\*c\*(b\*c\*d + b^2\*f + a\*c\*f)\*x^11)/11 + (b\*c^2\*e\*x^12)/4 + (c^2\*(c\*d + 3\*b\*f)\*x^13)/13 + (c^3\*e\*x^14)/14 + (c^3\*f\*x^15)/15

Rule 1685

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] :> Int[ExpandIntegrand[Pq\*(a + b\*x^2 + c\*x^4)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, 0]

Rubi steps

$$\text{integral} = \int (a^3 d + a^3 ex + a^2(3bd + af)x^2 + 3a^2 bex^3 + 3a(b^2 d + acd + abf) x^4$$

$$+ 3a(b^2 + ac) ex^5 + (b^3 d + 6abcd + 3ab^2 f + 3a^2 cf) x^6 + b(b^2 + 6ac) ex^7$$

$$+ (3b^2 cd + 3ac^2 d + b^3 f + 6abc f) x^8 + 3c(b^2 + ac) ex^9 + 3c(bcd + b^2 f + acf) x^{10}$$

$$+ 3bc^2 ex^{11} + c^2(cd + 3bf)x^{12} + c^3 ex^{13} + c^3 fx^{14}) dx$$

$$= a^3 dx + \frac{1}{2} a^3 ex^2 + \frac{1}{3} a^2 (3bd + af)x^3 + \frac{3}{4} a^2 bex^4 + \frac{3}{5} a(b^2 d + acd + abf) x^5$$

$$+ \frac{1}{2} a(b^2 + ac) ex^6 + \frac{1}{7} (b^3 d + 6abcd + 3ab^2 f + 3a^2 cf) x^7 + \frac{1}{8} b(b^2 + 6ac) ex^8$$

$$+ \frac{1}{9} (3b^2 cd + 3ac^2 d + b^3 f + 6abc f) x^9 + \frac{3}{10} c(b^2 + ac) ex^{10}$$

$$+ \frac{3}{11} c(bcd + b^2 f + acf) x^{11} + \frac{1}{4} bc^2 ex^{12} + \frac{1}{13} c^2 (cd + 3bf)x^{13} + \frac{1}{14} c^3 ex^{14} + \frac{1}{15} c^3 fx^{15}$$



$$/3*a*c^2*d+1/9*b^3*f+1/3*b^2*c*d)*x^9+a^3*d*x+1/2*a^3*e*x^2+1/14*c^3*e*x^14+1/15*c^3*f*x^15+3/4*a^2*b*e*x^4+1/4*b*c^2*e*x^12$$

### Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 251, normalized size of antiderivative = 0.97

$$\begin{aligned} & \int (a + bx^2 + cx^4)^2 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx \\ &= \frac{1}{15} c^3 f x^{15} + \frac{1}{14} c^3 e x^{14} + \frac{1}{4} b c^2 e x^{12} + \frac{1}{13} (c^3 d + 3 b c^2 f) x^{13} \\ &+ \frac{3}{10} (b^2 c + a c^2) e x^{10} + \frac{3}{11} (b c^2 d + (b^2 c + a c^2) f) x^{11} \\ &+ \frac{1}{8} (b^3 + 6 a b c) e x^8 + \frac{1}{9} (3 (b^2 c + a c^2) d + (b^3 + 6 a b c) f) x^9 \\ &+ \frac{3}{4} a^2 b e x^4 + \frac{1}{2} (a b^2 + a^2 c) e x^6 + \frac{1}{7} ((b^3 + 6 a b c) d + 3 (a b^2 + a^2 c) f) x^7 \\ &+ \frac{1}{2} a^3 e x^2 + \frac{3}{5} (a^2 b f + (a b^2 + a^2 c) d) x^5 + a^3 d x + \frac{1}{3} (3 a^2 b d + a^3 f) x^3 \end{aligned}$$

[In] integrate((c\*x^4+b\*x^2+a)^2\*(a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6),x, algorithm="fricas")

[Out] 1/15\*c^3\*f\*x^15 + 1/14\*c^3\*e\*x^14 + 1/4\*b\*c^2\*e\*x^12 + 1/13\*(c^3\*d + 3\*b\*c^2\*f)\*x^13 + 3/10\*(b^2\*c + a\*c^2)\*e\*x^10 + 3/11\*(b\*c^2\*d + (b^2\*c + a\*c^2)\*f)\*x^11 + 1/8\*(b^3 + 6\*a\*b\*c)\*e\*x^8 + 1/9\*(3\*(b^2\*c + a\*c^2)\*d + (b^3 + 6\*a\*b\*c)\*f)\*x^9 + 3/4\*a^2\*b\*e\*x^4 + 1/2\*(a\*b^2 + a^2\*c)\*e\*x^6 + 1/7\*((b^3 + 6\*a\*b\*c)\*d + 3\*(a\*b^2 + a^2\*c)\*f)\*x^7 + 1/2\*a^3\*e\*x^2 + 3/5\*(a^2\*b\*f + (a\*b^2 + a^2\*c)\*d)\*x^5 + a^3\*d\*x + 1/3\*(3\*a^2\*b\*d + a^3\*f)\*x^3

### Sympy [A] (verification not implemented)

Time = 0.04 (sec) , antiderivative size = 309, normalized size of antiderivative = 1.19

$$\begin{aligned} & \int (a + bx^2 + cx^4)^2 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx \\ &= a^3 dx + \frac{a^3 e x^2}{2} + \frac{3 a^2 b e x^4}{4} + \frac{b c^2 e x^{12}}{4} + \frac{c^3 e x^{14}}{14} + \frac{c^3 f x^{15}}{15} + x^{13} \cdot \left( \frac{3 b c^2 f}{13} + \frac{c^3 d}{13} \right) + x^{11} \\ &\cdot \left( \frac{3 a c^2 f}{11} + \frac{3 b^2 c f}{11} + \frac{3 b c^2 d}{11} \right) + x^{10} \cdot \left( \frac{3 a c^2 e}{10} + \frac{3 b^2 c e}{10} \right) + x^9 \cdot \left( \frac{2 a b c f}{3} + \frac{a c^2 d}{3} + \frac{b^3 f}{9} + \frac{b^2 c d}{3} \right) \\ &+ x^8 \cdot \left( \frac{3 a b c e}{4} + \frac{b^3 e}{8} \right) + x^7 \cdot \left( \frac{3 a^2 c f}{7} + \frac{3 a b^2 f}{7} + \frac{6 a b c d}{7} + \frac{b^3 d}{7} \right) \\ &+ x^6 \left( \frac{a^2 c e}{2} + \frac{a b^2 e}{2} \right) + x^5 \cdot \left( \frac{3 a^2 b f}{5} + \frac{3 a^2 c d}{5} + \frac{3 a b^2 d}{5} \right) + x^3 \left( \frac{a^3 f}{3} + a^2 b d \right) \end{aligned}$$

[In] integrate((c\*x\*\*4+b\*x\*\*2+a)\*\*2\*(a\*d+a\*e\*x+(a\*f+b\*d)\*x\*\*2+b\*e\*x\*\*3+(b\*f+c\*d)\*x\*\*4+c\*e\*x\*\*5+c\*f\*x\*\*6),x)

[Out] a\*\*3\*d\*x + a\*\*3\*e\*x\*\*2/2 + 3\*a\*\*2\*b\*e\*x\*\*4/4 + b\*c\*\*2\*e\*x\*\*12/4 + c\*\*3\*e\*x\*\*14/14 + c\*\*3\*f\*x\*\*15/15 + x\*\*13\*(3\*b\*c\*\*2\*f/13 + c\*\*3\*d/13) + x\*\*11\*(3\*a\*c\*\*2\*f/11 + 3\*b\*\*2\*c\*f/11 + 3\*b\*c\*\*2\*d/11) + x\*\*10\*(3\*a\*c\*\*2\*e/10 + 3\*b\*\*2\*c\*e/10) + x\*\*9\*(2\*a\*b\*c\*f/3 + a\*c\*\*2\*d/3 + b\*\*3\*f/9 + b\*\*2\*c\*d/3) + x\*\*8\*(3\*a\*b\*c\*e/4 + b\*\*3\*e/8) + x\*\*7\*(3\*a\*\*2\*c\*f/7 + 3\*a\*b\*\*2\*f/7 + 6\*a\*b\*c\*d/7 + b\*\*3\*d/7) + x\*\*6\*(a\*\*2\*c\*e/2 + a\*b\*\*2\*e/2) + x\*\*5\*(3\*a\*\*2\*b\*f/5 + 3\*a\*\*2\*c\*d/5 + 3\*a\*b\*\*2\*d/5) + x\*\*3\*(a\*\*3\*f/3 + a\*\*2\*b\*d)

## Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 251, normalized size of antiderivative = 0.97

$$\int (a + bx^2 + cx^4)^2 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$$

$$= \frac{1}{15} c^3 f x^{15} + \frac{1}{14} c^3 e x^{14} + \frac{1}{4} b c^2 e x^{12} + \frac{1}{13} (c^3 d + 3 b c^2 f) x^{13}$$

$$+ \frac{3}{10} (b^2 c + a c^2) e x^{10} + \frac{3}{11} (b c^2 d + (b^2 c + a c^2) f) x^{11}$$

$$+ \frac{1}{8} (b^3 + 6 a b c) e x^8 + \frac{1}{9} (3 (b^2 c + a c^2) d + (b^3 + 6 a b c) f) x^9$$

$$+ \frac{3}{4} a^2 b e x^4 + \frac{1}{2} (a b^2 + a^2 c) e x^6 + \frac{1}{7} ((b^3 + 6 a b c) d + 3 (a b^2 + a^2 c) f) x^7$$

$$+ \frac{1}{2} a^3 e x^2 + \frac{3}{5} (a^2 b f + (a b^2 + a^2 c) d) x^5 + a^3 d x + \frac{1}{3} (3 a^2 b d + a^3 f) x^3$$

[In] integrate((c\*x^4+b\*x^2+a)^2\*(a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6),x, algorithm="maxima")

[Out] 1/15\*c^3\*f\*x^15 + 1/14\*c^3\*e\*x^14 + 1/4\*b\*c^2\*e\*x^12 + 1/13\*(c^3\*d + 3\*b\*c^2\*f)\*x^13 + 3/10\*(b^2\*c + a\*c^2)\*e\*x^10 + 3/11\*(b\*c^2\*d + (b^2\*c + a\*c^2)\*f)\*x^11 + 1/8\*(b^3 + 6\*a\*b\*c)\*e\*x^8 + 1/9\*(3\*(b^2\*c + a\*c^2)\*d + (b^3 + 6\*a\*b\*c)\*f)\*x^9 + 3/4\*a^2\*b\*e\*x^4 + 1/2\*(a\*b^2 + a^2\*c)\*e\*x^6 + 1/7\*((b^3 + 6\*a\*b\*c)\*d + 3\*(a\*b^2 + a^2\*c)\*f)\*x^7 + 1/2\*a^3\*e\*x^2 + 3/5\*(a^2\*b\*f + (a\*b^2 + a^2\*c)\*d)\*x^5 + a^3\*d\*x + 1/3\*(3\*a^2\*b\*d + a^3\*f)\*x^3

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 285, normalized size of antiderivative = 1.10

$$\int (a + bx^2 + cx^4)^2 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$$

$$= \frac{1}{15} c^3 fx^{15} + \frac{1}{14} c^3 ex^{14} + \frac{1}{13} c^3 dx^{13} + \frac{3}{13} bc^2 fx^{13} + \frac{1}{4} bc^2 ex^{12} + \frac{3}{11} bc^2 dx^{11} + \frac{3}{11} b^2 cfx^{11}$$

$$+ \frac{3}{11} ac^2 fx^{11} + \frac{3}{10} b^2 cex^{10} + \frac{3}{10} ac^2 ex^{10} + \frac{1}{3} b^2 cdx^9 + \frac{1}{3} ac^2 dx^9 + \frac{1}{9} b^3 fx^9 + \frac{2}{3} abcfx^9$$

$$+ \frac{1}{8} b^3 ex^8 + \frac{3}{4} abcex^8 + \frac{1}{7} b^3 dx^7 + \frac{6}{7} abcdx^7 + \frac{3}{7} ab^2 fx^7 + \frac{3}{7} a^2 cfx^7 + \frac{1}{2} ab^2 ex^6 + \frac{1}{2} a^2 cex^6$$

$$+ \frac{3}{5} ab^2 dx^5 + \frac{3}{5} a^2 cdx^5 + \frac{3}{5} a^2 bfx^5 + \frac{3}{4} a^2 bex^4 + a^2 bdx^3 + \frac{1}{3} a^3 fx^3 + \frac{1}{2} a^3 ex^2 + a^3 dx$$

[In] integrate((c\*x^4+b\*x^2+a)^2\*(a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6),x, algorithm="giac")

[Out] 1/15\*c^3\*f\*x^15 + 1/14\*c^3\*e\*x^14 + 1/13\*c^3\*d\*x^13 + 3/13\*b\*c^2\*f\*x^13 + 1/4\*b\*c^2\*e\*x^12 + 3/11\*b\*c^2\*d\*x^11 + 3/11\*b^2\*c\*f\*x^11 + 3/11\*a\*c^2\*f\*x^11 + 3/10\*b^2\*c\*e\*x^10 + 3/10\*a\*c^2\*e\*x^10 + 1/3\*b^2\*c\*d\*x^9 + 1/3\*a\*c^2\*d\*x^9 + 1/9\*b^3\*f\*x^9 + 2/3\*a\*b\*c\*f\*x^9 + 1/8\*b^3\*e\*x^8 + 3/4\*a\*b\*c\*e\*x^8 + 1/7\*b^3\*d\*x^7 + 6/7\*a\*b\*c\*d\*x^7 + 3/7\*a\*b^2\*f\*x^7 + 3/7\*a^2\*c\*f\*x^7 + 1/2\*a\*b^2\*e\*x^6 + 1/2\*a^2\*c\*e\*x^6 + 3/5\*a\*b^2\*d\*x^5 + 3/5\*a^2\*c\*d\*x^5 + 3/5\*a^2\*b\*f\*x^5 + 3/4\*a^2\*b\*e\*x^4 + a^2\*b\*d\*x^3 + 1/3\*a^3\*f\*x^3 + 1/2\*a^3\*e\*x^2 + a^3\*d\*x

**Mupad [B] (verification not implemented)**

Time = 8.11 (sec) , antiderivative size = 246, normalized size of antiderivative = 0.95

$$\int (a + bx^2 + cx^4)^2 (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$$

$$= x^3 \left( \frac{fa^3}{3} + bda^2 \right) + x^{13} \left( \frac{dc^3}{13} + \frac{3bfc^2}{13} \right) + x^5 \left( \frac{3fa^2b}{5} + \frac{3cda^2}{5} + \frac{3dab^2}{5} \right)$$

$$+ x^{11} \left( \frac{3fb^2c}{11} + \frac{3dbc^2}{11} + \frac{3afc^2}{11} \right) + x^7 \left( \frac{3cfa^2}{7} + \frac{3fab^2}{7} + \frac{6cdab}{7} + \frac{db^3}{7} \right)$$

$$+ x^9 \left( \frac{fb^3}{9} + \frac{db^2c}{3} + \frac{2afbc}{3} + \frac{adc^2}{3} \right) + \frac{a^3ex^2}{2} + \frac{c^3ex^{14}}{14} + \frac{c^3fx^{15}}{15} + a^3dx$$

$$+ \frac{aex^6(b^2+ac)}{2} + \frac{bex^8(b^2+6ac)}{8} + \frac{3cex^{10}(b^2+ac)}{10} + \frac{3a^2bex^4}{4} + \frac{bc^2ex^{12}}{4}$$

[In] int((a + b\*x^2 + c\*x^4)^2\*(a\*d + x^2\*(b\*d + a\*f) + x^4\*(c\*d + b\*f) + a\*e\*x + b\*e\*x^3 + c\*e\*x^5 + c\*f\*x^6),x)

```
[Out] x^3*((a^3*f)/3 + a^2*b*d) + x^13*((c^3*d)/13 + (3*b*c^2*f)/13) + x^5*((3*a*
b^2*d)/5 + (3*a^2*c*d)/5 + (3*a^2*b*f)/5) + x^11*((3*b*c^2*d)/11 + (3*a*c^2
*f)/11 + (3*b^2*c*f)/11) + x^7*((b^3*d)/7 + (3*a*b^2*f)/7 + (3*a^2*c*f)/7 +
(6*a*b*c*d)/7) + x^9*((b^3*f)/9 + (a*c^2*d)/3 + (b^2*c*d)/3 + (2*a*b*c*f)/
3) + (a^3*e*x^2)/2 + (c^3*e*x^14)/14 + (c^3*f*x^15)/15 + a^3*d*x + (a*e*x^6
*(a*c + b^2))/2 + (b*e*x^8*(6*a*c + b^2))/8 + (3*c*e*x^10*(a*c + b^2))/10 +
(3*a^2*b*e*x^4)/4 + (b*c^2*e*x^12)/4
```



### 3.62 $\int (a + bx^2 + cx^4) (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$

Optimal result	905
Rubi [A] (verified)	905
Mathematica [A] (verified)	906
Maple [A] (verified)	907
Fricas [A] (verification not implemented)	907
Sympy [A] (verification not implemented)	908
Maxima [A] (verification not implemented)	908
Giac [A] (verification not implemented)	909
Mupad [B] (verification not implemented)	909

#### Optimal result

Integrand size = 61, antiderivative size = 154

$$\int (a + bx^2 + cx^4) (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$$

$$= a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{3} a(2bd + af)x^3 + \frac{1}{2} abex^4 + \frac{1}{5} (b^2 d + 2acd + 2abf) x^5 + \frac{1}{6} (b^2 + 2ac) ex^6$$

$$+ \frac{1}{7} (2bcd + b^2 f + 2acf) x^7 + \frac{1}{4} bce x^8 + \frac{1}{9} c(cd + 2bf)x^9 + \frac{1}{10} c^2 ex^{10} + \frac{1}{11} c^2 fx^{11}$$

[Out] a^2\*d\*x+1/2\*a^2\*e\*x^2+1/3\*a\*(a\*f+2\*b\*d)\*x^3+1/2\*a\*b\*e\*x^4+1/5\*(2\*a\*b\*f+2\*a\*c\*d+b^2\*d)\*x^5+1/6\*(2\*a\*c+b^2)\*e\*x^6+1/7\*(2\*a\*c\*f+b^2\*f+2\*b\*c\*d)\*x^7+1/4\*b\*c\*e\*x^8+1/9\*c\*(2\*b\*f+c\*d)\*x^9+1/10\*c^2\*e\*x^10+1/11\*c^2\*f\*x^11

#### Rubi [A] (verified)

Time = 0.10 (sec) , antiderivative size = 154, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.016$ , Rules used = {1685}

$$\int (a + bx^2 + cx^4) (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$$

$$= a^2 dx + \frac{1}{2} a^2 ex^2 + \frac{1}{7} x^7 (2acf + b^2 f + 2bcd) + \frac{1}{5} x^5 (2abf + 2acd + b^2 d) + \frac{1}{6} ex^6 (2ac + b^2)$$

$$+ \frac{1}{3} ax^3 (af + 2bd) + \frac{1}{2} abex^4 + \frac{1}{9} cx^9 (2bf + cd) + \frac{1}{4} bce x^8 + \frac{1}{10} c^2 ex^{10} + \frac{1}{11} c^2 fx^{11}$$

[In] Int[(a + b\*x^2 + c\*x^4)\*(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6),x]

[Out] a^2\*d\*x + (a^2\*e\*x^2)/2 + (a\*(2\*b\*d + a\*f)\*x^3)/3 + (a\*b\*e\*x^4)/2 + ((b^2\*d + 2\*a\*c\*d + 2\*a\*b\*f)\*x^5)/5 + ((b^2 + 2\*a\*c)\*e\*x^6)/6 + ((2\*b\*c\*d + b^2\*f

$$+ 2*a*c*f)*x^7)/7 + (b*c*e*x^8)/4 + (c*(c*d + 2*b*f)*x^9)/9 + (c^2*e*x^10)/10 + (c^2*f*x^11)/11$$

Rule 1685

Int[(Pq\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_.), x\_Symbol] :> Int[ExpandIntegrand[Pq\*(a + b\*x^2 + c\*x^4)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, 0]

Rubi steps

$$\begin{aligned} \text{integral} &= \int (a^2d + a^2ex + a(2bd + af)x^2 + 2abex^3 + (b^2d + 2acd + 2abf)x^4 + (b^2 + 2ac)ex^5 \\ &\quad + (2bcd + b^2f + 2acf)x^6 + 2bcex^7 + c(cd + 2bf)x^8 + c^2ex^9 + c^2fx^{10}) dx \\ &= a^2dx + \frac{1}{2}a^2ex^2 + \frac{1}{3}a(2bd + af)x^3 + \frac{1}{2}abex^4 + \frac{1}{5}(b^2d + 2acd + 2abf)x^5 + \frac{1}{6}(b^2 + 2ac)ex^6 \\ &\quad + \frac{1}{7}(2bcd + b^2f + 2acf)x^7 + \frac{1}{4}bcex^8 + \frac{1}{9}c(cd + 2bf)x^9 + \frac{1}{10}c^2ex^{10} + \frac{1}{11}c^2fx^{11} \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.03 (sec) , antiderivative size = 154, normalized size of antiderivative = 1.00

$$\begin{aligned} &\int (a + bx^2 + cx^4)(ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx \\ &= a^2dx + \frac{1}{2}a^2ex^2 + \frac{1}{3}a(2bd + af)x^3 + \frac{1}{2}abex^4 + \frac{1}{5}(b^2d + 2acd + 2abf)x^5 + \frac{1}{6}(b^2 + 2ac)ex^6 \\ &\quad + \frac{1}{7}(2bcd + b^2f + 2acf)x^7 + \frac{1}{4}bcex^8 + \frac{1}{9}c(cd + 2bf)x^9 + \frac{1}{10}c^2ex^{10} + \frac{1}{11}c^2fx^{11} \end{aligned}$$

[In] Integrate[(a + b\*x^2 + c\*x^4)\*(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6),x]

[Out] a^2\*d\*x + (a^2\*e\*x^2)/2 + (a\*(2\*b\*d + a\*f)\*x^3)/3 + (a\*b\*e\*x^4)/2 + ((b^2\*d + 2\*a\*c\*d + 2\*a\*b\*f)\*x^5)/5 + ((b^2 + 2\*a\*c)\*e\*x^6)/6 + ((2\*b\*c\*d + b^2\*f + 2\*a\*c\*f)\*x^7)/7 + (b\*c\*e\*x^8)/4 + (c\*(c\*d + 2\*b\*f)\*x^9)/9 + (c^2\*e\*x^10)/10 + (c^2\*f\*x^11)/11

**Maple [A] (verified)**

Time = 0.13 (sec) , antiderivative size = 141, normalized size of antiderivative = 0.92

method	result
norman	$\frac{c^2 f x^{11}}{11} + \frac{c^2 e x^{10}}{10} + \left(\frac{2}{9} f b c + \frac{1}{9} c^2 d\right) x^9 + \frac{b c e x^8}{4} + \left(\frac{2}{7} a c f + \frac{1}{7} b^2 f + \frac{2}{7} b c d\right) x^7 + \left(\frac{1}{3} a c e + \frac{1}{6} b^2 e\right) x^6 -$
risch	$\frac{1}{11} c^2 f x^{11} + \frac{1}{10} c^2 e x^{10} + \frac{2}{9} x^9 f b c + \frac{1}{9} c^2 d x^9 + \frac{1}{4} b c e x^8 + \frac{2}{7} x^7 a c f + \frac{1}{7} x^7 b^2 f + \frac{2}{7} x^7 b c d + \frac{1}{3} x^6 a c e$
parallelrisch	$\frac{1}{11} c^2 f x^{11} + \frac{1}{10} c^2 e x^{10} + \frac{2}{9} x^9 f b c + \frac{1}{9} c^2 d x^9 + \frac{1}{4} b c e x^8 + \frac{2}{7} x^7 a c f + \frac{1}{7} x^7 b^2 f + \frac{2}{7} x^7 b c d + \frac{1}{3} x^6 a c e$
gospers	$\frac{x(1260c^2fx^{10}+1386c^2ex^9+3080x^8fbc+1540x^8c^2d+3465bce x^7+3960x^6acf+1980x^6b^2f+3960x^6bcd+4620x^5ace+2310x^5b^2e)}{13860}$
default	$\frac{c^2 f x^{11}}{11} + \frac{c^2 e x^{10}}{10} + \frac{(f b c+c(b f+c d)) x^9}{9} + \frac{b c e x^8}{4} + \frac{(a c f+b(b f+c d)+c(a f+b d)) x^7}{7} + \frac{(2 a c e+b^2 e) x^6}{6} + \frac{(a(b f+c d)+b^2 d) x^5}{5} + \frac{1}{2} a^2 e x^4 + \frac{1}{3} (2 a b d+a^2 f) x^3$

```
[In] int((c*x^4+b*x^2+a)*(d*a+a*e*x+(a*f+b*d)*x^2+e*x^3*b+(b*f+c*d)*x^4+c*e*x^5+c*f*x^6),x,method=_RETURNVERBOSE)
```

```
[Out] 1/11*c^2*f*x^11+1/10*c^2*e*x^10+(2/9*f*b*c+1/9*c^2*d)*x^9+1/4*b*c*e*x^8+(2/7*a*c*f+1/7*b^2*f+2/7*b*c*d)*x^7+(1/3*a*c*e+1/6*b^2*e)*x^6+(2/5*a*b*f+2/5*a*c*d+1/5*b^2*d)*x^5+1/2*a*b*e*x^4+(1/3*f*a^2+2/3*d*a*b)*x^3+1/2*a^2*e*x^2+a^2*d*x
```

**Fricas [A] (verification not implemented)**

none

Time = 0.28 (sec) , antiderivative size = 138, normalized size of antiderivative = 0.90

$$\int (a + b x^2 + c x^4) (a d + a e x + (b d + a f) x^2 + b e x^3 + (c d + b f) x^4 + c e x^5 + c f x^6) dx$$

$$= \frac{1}{11} c^2 f x^{11} + \frac{1}{10} c^2 e x^{10} + \frac{1}{4} b c e x^8 + \frac{1}{9} (c^2 d + 2 b c f) x^9$$

$$+ \frac{1}{6} (b^2 + 2 a c) e x^6 + \frac{1}{7} (2 b c d + (b^2 + 2 a c) f) x^7 + \frac{1}{2} a b e x^4$$

$$+ \frac{1}{5} (2 a b f + (b^2 + 2 a c) d) x^5 + \frac{1}{2} a^2 e x^2 + a^2 d x + \frac{1}{3} (2 a b d + a^2 f) x^3$$

```
[In] integrate((c*x^4+b*x^2+a)*(a*d+a*e*x+(a*f+b*d)*x^2+b*e*x^3+(b*f+c*d)*x^4+c*e*x^5+c*f*x^6),x, algorithm="fricas")
```

```
[Out] 1/11*c^2*f*x^11 + 1/10*c^2*e*x^10 + 1/4*b*c*e*x^8 + 1/9*(c^2*d + 2*b*c*f)*x^9 + 1/6*(b^2 + 2*a*c)*e*x^6 + 1/7*(2*b*c*d + (b^2 + 2*a*c)*f)*x^7 + 1/2*a*b*e*x^4 + 1/5*(2*a*b*f + (b^2 + 2*a*c)*d)*x^5 + 1/2*a^2*e*x^2 + a^2*d*x + 1/3*(2*a*b*d + a^2*f)*x^3
```

**Sympy [A] (verification not implemented)**

Time = 0.03 (sec) , antiderivative size = 165, normalized size of antiderivative = 1.07

$$\int (a + bx^2 + cx^4) (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$$

$$= a^2dx + \frac{a^2ex^2}{2} + \frac{abex^4}{2} + \frac{bce x^8}{4} + \frac{c^2ex^{10}}{10} + \frac{c^2fx^{11}}{11} + x^9 \cdot \left( \frac{2bcf}{9} + \frac{c^2d}{9} \right) + x^7$$

$$\cdot \left( \frac{2acf}{7} + \frac{b^2f}{7} + \frac{2bcd}{7} \right) + x^6 \left( \frac{ace}{3} + \frac{b^2e}{6} \right) + x^5 \cdot \left( \frac{2abf}{5} + \frac{2acd}{5} + \frac{b^2d}{5} \right) + x^3 \left( \frac{a^2f}{3} + \frac{2abd}{3} \right)$$

[In] integrate((c\*x\*\*4+b\*x\*\*2+a)\*(a\*d+a\*e\*x+(a\*f+b\*d)\*x\*\*2+b\*e\*x\*\*3+(b\*f+c\*d)\*x\*\*4+c\*e\*x\*\*5+c\*f\*x\*\*6),x)

[Out] a\*\*2\*d\*x + a\*\*2\*e\*x\*\*2/2 + a\*b\*e\*x\*\*4/2 + b\*c\*e\*x\*\*8/4 + c\*\*2\*e\*x\*\*10/10 + c\*\*2\*f\*x\*\*11/11 + x\*\*9\*(2\*b\*c\*f/9 + c\*\*2\*d/9) + x\*\*7\*(2\*a\*c\*f/7 + b\*\*2\*f/7 + 2\*b\*c\*d/7) + x\*\*6\*(a\*c\*e/3 + b\*\*2\*e/6) + x\*\*5\*(2\*a\*b\*f/5 + 2\*a\*c\*d/5 + b\*\*2\*d/5) + x\*\*3\*(a\*\*2\*f/3 + 2\*a\*b\*d/3)

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 138, normalized size of antiderivative = 0.90

$$\int (a + bx^2 + cx^4) (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx$$

$$= \frac{1}{11} c^2 f x^{11} + \frac{1}{10} c^2 e x^{10} + \frac{1}{4} b c e x^8 + \frac{1}{9} (c^2 d + 2 b c f) x^9$$

$$+ \frac{1}{6} (b^2 + 2 a c) e x^6 + \frac{1}{7} (2 b c d + (b^2 + 2 a c) f) x^7 + \frac{1}{2} a b e x^4$$

$$+ \frac{1}{5} (2 a b f + (b^2 + 2 a c) d) x^5 + \frac{1}{2} a^2 e x^2 + a^2 d x + \frac{1}{3} (2 a b d + a^2 f) x^3$$

[In] integrate((c\*x^4+b\*x^2+a)\*(a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6),x, algorithm="maxima")

[Out] 1/11\*c^2\*f\*x^11 + 1/10\*c^2\*e\*x^10 + 1/4\*b\*c\*e\*x^8 + 1/9\*(c^2\*d + 2\*b\*c\*f)\*x^9 + 1/6\*(b^2 + 2\*a\*c)\*e\*x^6 + 1/7\*(2\*b\*c\*d + (b^2 + 2\*a\*c)\*f)\*x^7 + 1/2\*a\*b\*e\*x^4 + 1/5\*(2\*a\*b\*f + (b^2 + 2\*a\*c)\*d)\*x^5 + 1/2\*a^2\*e\*x^2 + a^2\*d\*x + 1/3\*(2\*a\*b\*d + a^2\*f)\*x^3

**Giac [A] (verification not implemented)**

none

Time = 0.39 (sec) , antiderivative size = 151, normalized size of antiderivative = 0.98

$$\int (a + bx^2 + cx^4) (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx = \frac{1}{11} c^2 f x^{11} + \frac{1}{10} c^2 e x^{10} + \frac{1}{9} c^2 d x^9 + \frac{2}{9} b c f x^9 + \frac{1}{4} b c e x^8 + \frac{2}{7} b c d x^7 + \frac{1}{7} b^2 f x^7 + \frac{2}{7} a c f x^7 + \frac{1}{6} b^2 e x^6 + \frac{1}{3} a c e x^6 + \frac{1}{5} b^2 d x^5 + \frac{2}{5} a c d x^5 + \frac{2}{5} a b f x^5 + \frac{1}{2} a b e x^4 + \frac{2}{3} a b d x^3 + \frac{1}{3} a^2 f x^3 + \frac{1}{2} a^2 e x^2 + a^2 d x$$

[In] integrate((c\*x^4+b\*x^2+a)\*(a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6),x, algorithm="giac")

[Out] 1/11\*c^2\*f\*x^11 + 1/10\*c^2\*e\*x^10 + 1/9\*c^2\*d\*x^9 + 2/9\*b\*c\*f\*x^9 + 1/4\*b\*c\*e\*x^8 + 2/7\*b\*c\*d\*x^7 + 1/7\*b^2\*f\*x^7 + 2/7\*a\*c\*f\*x^7 + 1/6\*b^2\*e\*x^6 + 1/3\*a\*c\*e\*x^6 + 1/5\*b^2\*d\*x^5 + 2/5\*a\*c\*d\*x^5 + 2/5\*a\*b\*f\*x^5 + 1/2\*a\*b\*e\*x^4 + 2/3\*a\*b\*d\*x^3 + 1/3\*a^2\*f\*x^3 + 1/2\*a^2\*e\*x^2 + a^2\*d\*x

**Mupad [B] (verification not implemented)**

Time = 0.07 (sec) , antiderivative size = 138, normalized size of antiderivative = 0.90

$$\int (a + bx^2 + cx^4) (ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6) dx = x^5 \left( \frac{db^2}{5} + \frac{2afb}{5} + \frac{2acd}{5} \right) + x^7 \left( \frac{fb^2}{7} + \frac{2cdb}{7} + \frac{2acf}{7} \right) + x^3 \left( \frac{fa^2}{3} + \frac{2bda}{3} \right) + x^9 \left( \frac{dc^2}{9} + \frac{2bfc}{9} \right) + \frac{a^2ex^2}{2} + \frac{c^2ex^{10}}{10} + \frac{c^2fx^{11}}{11} + \frac{ex^6(b^2 + 2ac)}{6} + a^2dx + \frac{abex^4}{2} + \frac{bcex^8}{4}$$

[In] int((a + b\*x^2 + c\*x^4)\*(a\*d + x^2\*(b\*d + a\*f) + x^4\*(c\*d + b\*f) + a\*e\*x + b\*e\*x^3 + c\*e\*x^5 + c\*f\*x^6),x)

[Out] x^5\*((b^2\*d)/5 + (2\*a\*c\*d)/5 + (2\*a\*b\*f)/5) + x^7\*((b^2\*f)/7 + (2\*b\*c\*d)/7 + (2\*a\*c\*f)/7) + x^3\*((a^2\*f)/3 + (2\*a\*b\*d)/3) + x^9\*((c^2\*d)/9 + (2\*b\*c\*f)/9) + (a^2\*e\*x^2)/2 + (c^2\*e\*x^10)/10 + (c^2\*f\*x^11)/11 + (e\*x^6\*(2\*a\*c + b^2))/6 + a^2\*d\*x + (a\*b\*e\*x^4)/2 + (b\*c\*e\*x^8)/4

$$3.63 \quad \int \frac{ad+aux+(bd+af)x^2+bex^3+(cd+bf)x^4+cex^5+cfx^6}{a+bx^2+cx^4} dx$$

Optimal result . . . . .	910
Rubi [A] (verified) . . . . .	910
Mathematica [A] (verified) . . . . .	911
Maple [A] (verified) . . . . .	911
Fricas [A] (verification not implemented) . . . . .	911
Sympy [A] (verification not implemented) . . . . .	912
Maxima [A] (verification not implemented) . . . . .	912
Giac [A] (verification not implemented) . . . . .	912
Mupad [B] (verification not implemented) . . . . .	913

### Optimal result

Integrand size = 63, antiderivative size = 20

$$\int \frac{ad + aux + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{a + bx^2 + cx^4} dx = dx + \frac{ex^2}{2} + \frac{fx^3}{3}$$

[Out] d\*x+1/2\*e\*x^2+1/3\*f\*x^3

### Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.016$ , Rules used = {1600}

$$\int \frac{ad + aux + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{a + bx^2 + cx^4} dx = dx + \frac{ex^2}{2} + \frac{fx^3}{3}$$

[In] Int[(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6)/(a + b\*x^2 + c\*x^4),x]

[Out] d\*x + (e\*x^2)/2 + (f\*x^3)/3

Rule 1600

Int[(u\_.)\*(Px\_)^(p\_.)\*(Qx\_)^(q\_.), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rubi steps

$$\begin{aligned} \text{integral} &= \int (d + ex + fx^2) dx \\ &= dx + \frac{ex^2}{2} + \frac{fx^3}{3} \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.00 (sec) , antiderivative size = 20, normalized size of antiderivative = 1.00

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{a + bx^2 + cx^4} dx = dx + \frac{ex^2}{2} + \frac{fx^3}{3}$$

[In] Integrate[(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6)/(a + b\*x^2 + c\*x^4),x]

[Out] d\*x + (e\*x^2)/2 + (f\*x^3)/3

**Maple [A] (verified)**

Time = 0.02 (sec) , antiderivative size = 17, normalized size of antiderivative = 0.85

method	result	size
default	$dx + \frac{1}{2}ex^2 + \frac{1}{3}fx^3$	17
norman	$dx + \frac{1}{2}ex^2 + \frac{1}{3}fx^3$	17
risch	$dx + \frac{1}{2}ex^2 + \frac{1}{3}fx^3$	17
parallelrisch	$dx + \frac{1}{2}ex^2 + \frac{1}{3}fx^3$	17
parts	$dx + \frac{1}{2}ex^2 + \frac{1}{3}fx^3$	17
gospers	$\frac{x(2fx^2+3ex+6d)}{6}$	18

[In] int((d\*a+a\*e\*x+(a\*f+b\*d)\*x^2+e\*x^3+b\*(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6)/(c\*x^4+b\*x^2+a),x,method=\_RETURNVERBOSE)

[Out] d\*x+1/2\*e\*x^2+1/3\*f\*x^3

**Fricas [A] (verification not implemented)**

none

Time = 0.26 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.80

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{a + bx^2 + cx^4} dx = \frac{1}{3}fx^3 + \frac{1}{2}ex^2 + dx$$

[In] integrate((a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6)/(c\*x^4+b\*x^2+a),x, algorithm="fricas")

[Out] 1/3\*f\*x^3 + 1/2\*e\*x^2 + d\*x

**Sympy [A] (verification not implemented)**

Time = 0.03 (sec) , antiderivative size = 15, normalized size of antiderivative = 0.75

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{a + bx^2 + cx^4} dx = dx + \frac{ex^2}{2} + \frac{fx^3}{3}$$

[In] integrate((a\*d+a\*e\*x+(a\*f+b\*d)\*x\*\*2+b\*e\*x\*\*3+(b\*f+c\*d)\*x\*\*4+c\*e\*x\*\*5+c\*f\*x\*\*6)/(c\*x\*\*4+b\*x\*\*2+a),x)

[Out] d\*x + e\*x\*\*2/2 + f\*x\*\*3/3

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.80

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{a + bx^2 + cx^4} dx = \frac{1}{3}fx^3 + \frac{1}{2}ex^2 + dx$$

[In] integrate((a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6)/(c\*x^4+b\*x^2+a),x, algorithm="maxima")

[Out] 1/3\*f\*x^3 + 1/2\*e\*x^2 + d\*x

**Giac [A] (verification not implemented)**

none

Time = 0.62 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.80

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{a + bx^2 + cx^4} dx = \frac{1}{3}fx^3 + \frac{1}{2}ex^2 + dx$$

[In] integrate((a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6)/(c\*x^4+b\*x^2+a),x, algorithm="giac")

[Out] 1/3\*f\*x^3 + 1/2\*e\*x^2 + d\*x



**Mupad [B] (verification not implemented)**

Time = 0.02 (sec) , antiderivative size = 16, normalized size of antiderivative = 0.80

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cf x^6}{a + bx^2 + cx^4} dx = \frac{f x^3}{3} + \frac{e x^2}{2} + d x$$

[In] int((a\*d + x^2\*(b\*d + a\*f) + x^4\*(c\*d + b\*f) + a\*e\*x + b\*e\*x^3 + c\*e\*x^5 + c\*f\*x^6)/(a + b\*x^2 + c\*x^4),x)

[Out] d\*x + (e\*x^2)/2 + (f\*x^3)/3

$$3.64 \quad \int \frac{ad+aux+(bd+af)x^2+bx^3+(cd+bf)x^4+cex^5+cfx^6}{(a+bx^2+cx^4)^2} dx$$

Optimal result	914
Rubi [A] (verified)	914
Mathematica [A] (verified)	917
Maple [C] (verified)	918
Fricas [C] (verification not implemented)	918
Sympy [F(-1)]	919
Maxima [F]	919
Giac [B] (verification not implemented)	919
Mupad [B] (verification not implemented)	920

### Optimal result

Integrand size = 63, antiderivative size = 211

$$\int \frac{ad + aux + (bd + af)x^2 + bx^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^2} dx$$

$$= \frac{\left(f + \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\left(f - \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b+\sqrt{b^2-4ac}}} - \frac{e \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}}$$

[Out]  $-e \operatorname{arctanh}\left(\frac{2cx^2+b}{(-4ac+b^2)^{1/2}}\right) / (-4ac+b^2)^{1/2} + 1/2 \operatorname{arctan}\left(x \sqrt{2} / \sqrt{b - (-4ac+b^2)^{1/2}}\right) * c^{1/2} / (b - (-4ac+b^2)^{1/2})^{1/2} * (f + (-bf+2cd) / (-4ac+b^2)^{1/2}) * 2^{1/2} / c^{1/2} / (b - (-4ac+b^2)^{1/2})^{1/2} + 1/2 \operatorname{arctan}\left(x \sqrt{2} / \sqrt{b + (-4ac+b^2)^{1/2}}\right) * c^{1/2} / (b + (-4ac+b^2)^{1/2})^{1/2} * (f + (bf-2cd) / (-4ac+b^2)^{1/2}) * 2^{1/2} / c^{1/2} / (b + (-4ac+b^2)^{1/2})^{1/2}$

### Rubi [A] (verified)

Time = 0.20 (sec) , antiderivative size = 211, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.127$ , Rules used

= {1600, 1687, 1180, 211, 12, 1121, 632, 212}

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^2} dx$$

$$= \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)\left(\frac{2cd-bf}{\sqrt{b^2-4ac}} + f\right)}{\sqrt{2}\sqrt{c}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right)\left(f - \frac{2cd-bf}{\sqrt{b^2-4ac}}\right)}{\sqrt{2}\sqrt{c}\sqrt{\sqrt{b^2-4ac}+b}} - \frac{e\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}}$$

[In] Int[(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6)/(a + b\*x^2 + c\*x^4)^2,x]

[Out] ((f + (2\*c\*d - b\*f)/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]])/(Sqrt[2]\*Sqrt[c]\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + ((f - (2\*c\*d - b\*f)/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]])/(Sqrt[2]\*Sqrt[c]\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) - (e\*ArcTanh[(b + 2\*c\*x^2)/Sqrt[b^2 - 4\*a\*c]])/Sqrt[b^2 - 4\*a\*c]

#### Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

#### Rule 211

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

#### Rule 212

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

#### Rule 632

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-1), x\_Symbol] := Dist[-2, Subst[Int[1/Simp[b^2 - 4\*a\*c - x^2, x], x], x, b + 2\*c\*x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

#### Rule 1121

Int[(x\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_.), x\_Symbol] := Dist[1/2, Subst[Int[(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]

## Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

## Rule 1600

```
Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px
, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] &&
EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

## Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

## Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d + ex + fx^2}{a + bx^2 + cx^4} dx \\
&= \int \frac{ex}{a + bx^2 + cx^4} dx + \int \frac{d + fx^2}{a + bx^2 + cx^4} dx \\
&= e \int \frac{x}{a + bx^2 + cx^4} dx + \frac{1}{2} \left( f - \frac{2cd - bf}{\sqrt{b^2 - 4ac}} \right) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx \\
&\quad + \frac{1}{2} \left( f + \frac{2cd - bf}{\sqrt{b^2 - 4ac}} \right) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx \\
&= \frac{\left( f + \frac{2cd - bf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{\sqrt{2}\sqrt{c}\sqrt{b - \sqrt{b^2 - 4ac}}} + \frac{\left( f - \frac{2cd - bf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{\sqrt{2}\sqrt{c}\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{a + bx + cx^2} dx, x, x^2 \right) \\
&= \frac{\left( f + \frac{2cd - bf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{\sqrt{2}\sqrt{c}\sqrt{b - \sqrt{b^2 - 4ac}}} + \frac{\left( f - \frac{2cd - bf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{\sqrt{2}\sqrt{c}\sqrt{b + \sqrt{b^2 - 4ac}}} \\
&\quad - e \text{Subst} \left( \int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2 \right)
\end{aligned}$$

$$= \frac{\left(f + \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\left(f - \frac{2cd-bf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{\sqrt{2}\sqrt{c}\sqrt{b+\sqrt{b^2-4ac}}} - \frac{e \tanh^{-1}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{\sqrt{b^2-4ac}}$$

### Mathematica [A] (verified)

Time = 0.14 (sec) , antiderivative size = 234, normalized size of antiderivative = 1.11

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^2} dx$$

$$= \frac{\sqrt{2}(2cd + (-b + \sqrt{b^2 - 4ac})f) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{\sqrt{c}\sqrt{b - \sqrt{b^2 - 4ac}}} + \frac{\sqrt{2}(-2cd + (b + \sqrt{b^2 - 4ac})f) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{\sqrt{c}\sqrt{b + \sqrt{b^2 - 4ac}}} + \frac{e \log(-b + \sqrt{b^2 - 4ac})}{2\sqrt{b^2 - 4ac}}$$

[In] Integrate[(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6)/(a + b\*x^2 + c\*x^4)^2,x]

[Out] ((Sqrt[2]\*(2\*c\*d + (-b + Sqrt[b^2 - 4\*a\*c])\*f)\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]]])/(Sqrt[c]\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + (Sqrt[2]\*(-2\*c\*d + (b + Sqrt[b^2 - 4\*a\*c])\*f)\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]]])/(Sqrt[c]\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) + e\*Log[-b + Sqrt[b^2 - 4\*a\*c] - 2\*c\*x^2] - e\*Log[b + Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2])/(2\*Sqrt[b^2 - 4\*a\*c])

**Maple [C] (verified)**

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.06 (sec) , antiderivative size = 48, normalized size of antiderivative = 0.23

method	result
risch	$\frac{\sum_{-R=\text{RootOf}(cZ^4+Z^2b+a)} \left( \frac{(-R^2 f + R e + d) \ln(x - R)}{2cR^3 + Rb} \right)}{2}$
default	$4c \frac{\sqrt{-4ac+b^2} \left( -\frac{e \ln(2cx^2 + \sqrt{-4ac+b^2} + b)}{2} + \frac{(f\sqrt{-4ac+b^2} + bf - 2cd)\sqrt{2} \arctan\left(\frac{cx\sqrt{2}}{\sqrt{(b+\sqrt{-4ac+b^2})c}}\right)}{2\sqrt{(b+\sqrt{-4ac+b^2})c}} \right)}{4c(4ac-b^2)} - \frac{\sqrt{-4ac+b^2} \left( \frac{e \ln(-2cx^2 + \sqrt{-4ac+b^2} + b)}{2} + \frac{(f\sqrt{-4ac+b^2} - bf - 2cd)\sqrt{2} \arctan\left(\frac{cx\sqrt{2}}{\sqrt{(b+\sqrt{-4ac+b^2})c}}\right)}{2\sqrt{(b+\sqrt{-4ac+b^2})c}} \right)}{4c(4ac-b^2)}$

```
[In] int((d*a+a*e*x+(a*f+b*d)*x^2+e*x^3*b+(b*f+c*d)*x^4+c*e*x^5+c*f*x^6)/(c*x^4+b*x^2+a)^2,x,method=_RETURNVERBOSE)
```

```
[Out] 1/2*sum((-R^2*f+R*e+d)/(2*_R^3*c+_R*b)*ln(x-_R),_R=RootOf(_Z^4*c+_Z^2*b+a))
```

**Fricas [C] (verification not implemented)**

Result contains complex when optimal does not.

Time = 18.53 (sec) , antiderivative size = 723401, normalized size of antiderivative = 3428.44

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

```
[In] integrate((a*d+a*e*x+(a*f+b*d)*x^2+b*e*x^3+(b*f+c*d)*x^4+c*e*x^5+c*f*x^6)/(c*x^4+b*x^2+a)^2,x, algorithm="fricas")
```

```
[Out] Too large to include
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^2} dx = \text{Timed out}$$

```
[In] integrate((a*d+a*e*x+(a*f+b*d)*x**2+b*e*x**3+(b*f+c*d)*x**4+c*e*x**5+c*f*x**6)/(c*x**4+b*x**2+a)**2,x)
```

```
[Out] Timed out
```

**Maxima [F]**

$$\begin{aligned} & \int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^2} dx \\ &= \int \frac{cfx^6 + cex^5 + bex^3 + (cd + bf)x^4 + aex + (bd + af)x^2 + ad}{(cx^4 + bx^2 + a)^2} dx \end{aligned}$$

```
[In] integrate((a*d+a*e*x+(a*f+b*d)*x^2+b*e*x^3+(b*f+c*d)*x^4+c*e*x^5+c*f*x^6)/(c*x^4+b*x^2+a)^2,x, algorithm="maxima")
```

```
[Out] integrate((c*f*x^6 + c*e*x^5 + b*e*x^3 + (c*d + b*f)*x^4 + a*e*x + (b*d + a*f)*x^2 + a*d)/(c*x^4 + b*x^2 + a)^2, x)
```

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 1616 vs. 2(173) = 346.

Time = 1.23 (sec) , antiderivative size = 1616, normalized size of antiderivative = 7.66

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

```
[In] integrate((a*d+a*e*x+(a*f+b*d)*x^2+b*e*x^3+(b*f+c*d)*x^4+c*e*x^5+c*f*x^6)/(c*x^4+b*x^2+a)^2,x, algorithm="giac")
```

```
[Out] -1/2*(b^2*c^2 - 4*a*c^3 - 2*b*c^3 + c^4)*sqrt(b^2 - 4*a*c)*e*log(x^2 + 1/2*(b + sqrt(b^2 - 4*a*c))/c)/((b^4 - 8*a*b^2*c - 2*b^3*c + 16*a^2*c^2 + 8*a*b*c^2 + b^2*c^2 - 4*a*c^3)*c^2) - 1/2*(b^2*c^2 - 4*a*c^3 - 2*b*c^3 + c^4)*sqrt(b^2 - 4*a*c)*e*log(x^2 + 1/2*(b - sqrt(b^2 - 4*a*c))/c)/((b^4 - 8*a*b^2*c - 2*b^3*c + 16*a^2*c^2 + 8*a*b*c^2 + b^2*c^2 - 4*a*c^3)*c^2) + 1/4*((sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^4 - 8*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*b^2*c - 2*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b^3*c - 2*b^4*
```

```

c + 16*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a^2*c^2 + 8*sqrt(2)*sqrt(b*c
+ sqrt(b^2 - 4*a*c))*a*b*c^2 + sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b
^2*c^2 + 16*a*b^2*c^2 - 2*b^3*c^2 - 4*sqrt(2)*sqrt(b*c + sqrt(b^2 - 4*a*c))*
c)*a*c^3 - 32*a^2*c^3 + 8*a*b*c^3 + sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sq
rt(b^2 - 4*a*c))*b^3 - 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 -
4*a*c))*a*b*c - 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*
c)*b^2*c + sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*b*c^2
+ 2*(b^2 - 4*a*c)*b^2*c - 8*(b^2 - 4*a*c)*a*c^2 + 2*(b^2 - 4*a*c)*b*c^2)*d
+ 2*(2*a*b^2*c^2 - 8*a^2*c^3 - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^
2 - 4*a*c))*a*b^2 + 4*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a
*c))*a^2*c + 2*sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*
a*b*c - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c + sqrt(b^2 - 4*a*c))*a*c^2 - 2
*(b^2 - 4*a*c)*a*c^2)*f)*arctan(2*sqrt(1/2)*x/sqrt((b + sqrt(b^2 - 4*a*c))/
c))/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^
2 - 4*a^2*c^3)*abs(c)) + 1/4*((sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^4
- 8*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*b^2*c - 2*sqrt(2)*sqrt(b*c -
sqrt(b^2 - 4*a*c))*b^3*c + 2*b^4*c + 16*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a
*c))*a^2*c^2 + 8*sqrt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*b*c^2 + sqrt(2
)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^2*c^2 - 16*a*b^2*c^2 - 2*b^3*c^2 - 4*sq
rt(2)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*c^3 + 32*a^2*c^3 + 8*a*b*c^3 + sqrt
(2)*sqrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^3 - 4*sqrt(2)*sqrt(
b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*b*c - 2*sqrt(2)*sqrt(b^2 - 4
*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*b^2*c + sqrt(2)*sqrt(b^2 - 4*a*c)*sq
rt(b*c - sqrt(b^2 - 4*a*c))*b*c^2 - 2*(b^2 - 4*a*c)*b^2*c + 8*(b^2 - 4*a*c
)*a*c^2 + 2*(b^2 - 4*a*c)*b*c^2)*d + 2*(2*a*b^2*c^2 - 8*a^2*c^3 - sqrt(2)*s
qrt(b^2 - 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*b^2 + 4*sqrt(2)*sqrt(b^2
- 4*a*c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a^2*c + 2*sqrt(2)*sqrt(b^2 - 4*a*
c)*sqrt(b*c - sqrt(b^2 - 4*a*c))*a*b*c - sqrt(2)*sqrt(b^2 - 4*a*c)*sqrt(b
*c - sqrt(b^2 - 4*a*c))*a*c^2 - 2*(b^2 - 4*a*c)*a*c^2)*f)*arctan(2*sqrt(1
/2)*x/sqrt((b - sqrt(b^2 - 4*a*c))/c))/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c +
16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*abs(c))

```

## Mupad [B] (verification not implemented)

Time = 0.64 (sec) , antiderivative size = 3942, normalized size of antiderivative = 18.68

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^2} dx = \text{Too large to display}$$

```
[In] int((a*d + x^2*(b*d + a*f) + x^4*(c*d + b*f) + a*e*x + b*e*x^3 + c*e*x^5 +
c*f*x^6)/(a + b*x^2 + c*x^4)^2,x)
```

```
[Out] symsum(log(c^2*d*e^2 - c^2*d^2*f + c^2*e^3*x - a*c*f^3 - 8*root(16*a*b^4*c*
z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 + 64*a^2*c
^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2*d^2*z^2 +
```





$$\begin{aligned}
&^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)*b*c^2*e^2*x - 2*\text{root}( \\
&16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 \\
&+ 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2 \\
&*d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2* \\
&c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
&e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f \\
&^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)*b^2*c*f^2*x - 4*\text{root}( \\
&16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 \\
&+ 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2 \\
&*d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2* \\
&c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
&e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f \\
&^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)^2*b^2*c^2*e*x + 4*\text{roo} \\
&t(16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z \\
&^2 + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c \\
&^2*d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2* \\
&c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
&e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2 \\
&*f^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)*b*c^2*d*e - 8*\text{root}( \\
&16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3*z^4 - 16*a*b^2*c*d*f*z^2 \\
&+ 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b^2*c*e^2*z^2 - 16*a*b*c^2 \\
&*d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + 4*a*b^3*f^2*z^2 + 16*a^2* \\
&c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16*a*c^2*d^2*e*z - 4*a*c*d* \\
&e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 + b*c*d^2*e^2 + a*b*e^2*f \\
&^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, k)*a*c^2*e*f + b*c*e*f^2 \\
&*x - 2*c^2*d*e*f*x + 4*\text{root}(16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3* \\
&c^3*z^4 - 16*a*b^2*c*d*f*z^2 + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8* \\
&a*b^2*c*e^2*z^2 - 16*a*b*c^2*d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 \\
&+ 4*a*b^3*f^2*z^2 + 16*a^2*c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - \\
&16*a*c^2*d^2*e*z - 4*a*c*d*e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f \\
&^3 + b*c*d^2*e^2 + a*b*e^2*f^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, \\
&z, k)*b*c^2*d*f*x)*\text{root}(16*a*b^4*c*z^4 - 128*a^2*b^2*c^2*z^4 + 256*a^3*c^3 \\
&*z^4 - 16*a*b^2*c*d*f*z^2 + 64*a^2*c^2*d*f*z^2 - 16*a^2*b*c*f^2*z^2 - 8*a*b \\
&^2*c*e^2*z^2 - 16*a*b*c^2*d^2*z^2 + 32*a^2*c^2*e^2*z^2 + 4*b^3*c*d^2*z^2 + \\
&4*a*b^3*f^2*z^2 + 16*a^2*c*e*f^2*z + 4*b^2*c*d^2*e*z - 4*a*b^2*e*f^2*z - 16 \\
&*a*c^2*d^2*e*z - 4*a*c*d*e^2*f + 2*a*c*d^2*f^2 - 2*b*c*d^3*f - 2*a*b*d*f^3 \\
&+ b*c*d^2*e^2 + a*b*e^2*f^2 + a*c*e^4 + b^2*d^2*f^2 + c^2*d^4 + a^2*f^4, z, \\
&k), k, 1, 4)
\end{aligned}$$

$$3.65 \quad \int \frac{ad+aux+(bd+af)x^2+beu^3+(cd+bf)x^4+ceu^5+cfu^6}{(a+bx^2+cu^4)^3} dx$$

Optimal result	923
Rubi [A] (verified)	924
Mathematica [A] (verified)	927
Maple [C] (verified)	928
Fricas [F(-1)]	928
Sympy [F(-1)]	929
Maxima [F]	929
Giac [B] (verification not implemented)	929
Mupad [B] (verification not implemented)	932

### Optimal result

Integrand size = 63, antiderivative size = 368

$$\begin{aligned} & \int \frac{ad + aux + (bd + af)x^2 + beu^3 + (cd + bf)x^4 + ceu^5 + cfu^6}{(a + bx^2 + cu^4)^3} dx \\ &= -\frac{e(b + 2cu^2)}{2(b^2 - 4ac)(a + bx^2 + cu^4)} + \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cu^4)} \\ &+ \frac{\sqrt{c}\left(bd - 2af + \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\ &+ \frac{\sqrt{c}\left(bd - 2af - \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}}\right) \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}}\right)}{2\sqrt{2}a(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} + \frac{2ce \operatorname{arctanh}\left(\frac{b + 2cu^2}{\sqrt{b^2 - 4ac}}\right)}{(b^2 - 4ac)^{3/2}} \end{aligned}$$

[Out]  $-1/2*e*(2*c*x^2+b)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)+1/2*x*(b^2*d-2*a*c*d-a*b*f+c*(-2*a*f+b*d)*x^2)/a/(-4*a*c+b^2)/(c*x^4+b*x^2+a)+2*c*e*\operatorname{arctanh}\left(\frac{2*c*x^2+b}{(-4*a*c+b^2)^{1/2}}\right)/(-4*a*c+b^2)^{3/2}+1/4*\operatorname{arctan}\left(\frac{x^2^{1/2}*c^{1/2}}{(b-(-4*a*c+b^2)^{1/2})^{1/2}}\right)*c^{1/2}*(b*d-2*a*f+(4*a*b*f-12*a*c*d+b^2*d)/(-4*a*c+b^2)^{1/2})/a/(-4*a*c+b^2)*2^{1/2}/(b-(-4*a*c+b^2)^{1/2})^{1/2}+1/4*\operatorname{arctan}\left(\frac{x^2^{1/2}*c^{1/2}}{(b+(-4*a*c+b^2)^{1/2})^{1/2}}\right)*c^{1/2}*(b*d-2*a*f+(-4*a*b*f+12*a*c*d-b^2*d)/(-4*a*c+b^2)^{1/2})/a/(-4*a*c+b^2)*2^{1/2}/(b+(-4*a*c+b^2)^{1/2})^{1/2}$

**Rubi [A] (verified)**

Time = 0.56 (sec) , antiderivative size = 368, normalized size of antiderivative = 1.00, number of steps used = 11, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.159$ , Rules used = {1600, 1687, 1192, 1180, 211, 12, 1121, 628, 632, 212}

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^3} dx$$

$$= \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) \left(\frac{4abf-12acd+b^2d}{\sqrt{b^2-4ac}} - 2af + bd\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} + \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{\sqrt{b^2-4ac}+b}}\right) \left(-\frac{4abf-12acd+b^2d}{\sqrt{b^2-4ac}} - 2af + bd\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{\sqrt{b^2-4ac}+b}} + \frac{2ce \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{3/2}}$$

$$+ \frac{x(cx^2(bd-2af) - abf - 2acd + b^2d)}{2a(b^2-4ac)(a+bx^2+cx^4)} - \frac{e(b+2cx^2)}{2(b^2-4ac)(a+bx^2+cx^4)}$$

[In] Int[(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6)/(a + b\*x^2 + c\*x^4)^3,x]

[Out] -1/2\*(e\*(b + 2\*c\*x^2))/((b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + (x\*(b^2\*d - 2\*a\*c\*d - a\*b\*f + c\*(b\*d - 2\*a\*f)\*x^2))/((2\*a\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + (Sqrt[c]\*(b\*d - 2\*a\*f + (b^2\*d - 12\*a\*c\*d + 4\*a\*b\*f)/Sqrt[b^2 - 4\*a\*c]))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]])/(2\*Sqrt[2]\*a\*(b^2 - 4\*a\*c)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + (Sqrt[c]\*(b\*d - 2\*a\*f - (b^2\*d - 12\*a\*c\*d + 4\*a\*b\*f)/Sqrt[b^2 - 4\*a\*c]))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]])/(2\*Sqrt[2]\*a\*(b^2 - 4\*a\*c)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) + (2\*c\*e\*ArcTanh[(b + 2\*c\*x^2)/Sqrt[b^2 - 4\*a\*c]])/(b^2 - 4\*a\*c)^(3/2)

Rule 12

Int[(a\_)\*(u\_), x\_Symbol] := Dist[a, Int[u, x], x] /; FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

Rule 211

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(Rt[a/b, 2]/a)\*ArcTan[x/Rt[a/b, 2]], x] /; FreeQ[{a, b}, x] && PosQ[a/b]

Rule 212

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

Rule 628

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_), x_Symbol] := Simp[(b + 2*c*x)
*((a + b*x + c*x^2)^(p + 1)/((p + 1)*(b^2 - 4*a*c))), x] - Dist[2*c*((2*p +
3)/((p + 1)*(b^2 - 4*a*c))), Int[(a + b*x + c*x^2)^(p + 1), x], x] /; Free
Q[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && LtQ[p, -1] && NeQ[p, -3/2] && Int
egerQ[4*p]
```

### Rule 632

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(-1), x_Symbol] := Dist[-2, Subst[I
nt[1/Simp[b^2 - 4*a*c - x^2, x], x], x, b + 2*c*x], x] /; FreeQ[{a, b, c},
x] && NeQ[b^2 - 4*a*c, 0]
```

### Rule 1121

```
Int[(x_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol] := Dist[1/2,
Subst[Int[(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]
```

### Rule 1180

```
Int[((d_) + (e_.)*(x_)^2)/((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4), x_Symbol] :
> With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[e/2 + (2*c*d - b*e)/(2*q), Int[1/(b/2
- q/2 + c*x^2), x], x] + Dist[e/2 - (2*c*d - b*e)/(2*q), Int[1/(b/2 + q/2
+ c*x^2), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && Ne
Q[c*d^2 - a*e^2, 0] && PosQ[b^2 - 4*a*c]
```

### Rule 1192

```
Int[((d_) + (e_.)*(x_)^2)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symb
ol] := Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 +
c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2
- 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

### Rule 1600

```
Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px
, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] &&
EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
```

1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]  
 && !PolyQ[Pq, x^2]

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^2} dx \\
 &= \int \frac{ex}{(a + bx^2 + cx^4)^2} dx + \int \frac{d + fx^2}{(a + bx^2 + cx^4)^2} dx \\
 &= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
 &\quad - \frac{\int \frac{-b^2d + 6acd - abf - c(bd - 2af)x^2}{a + bx^2 + cx^4} dx}{2a(b^2 - 4ac)} + e \int \frac{x}{(a + bx^2 + cx^4)^2} dx \\
 &= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{(a + bx + cx^2)^2} dx, x, x^2 \right) \\
 &\quad + \frac{\left( c \left( bd - 2af - \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \right) \int \frac{1}{\frac{b}{2} + \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)} \\
 &\quad + \frac{\left( c \left( bd - 2af + \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \right) \int \frac{1}{\frac{b}{2} - \frac{1}{2}\sqrt{b^2 - 4ac} + cx^2} dx}{4a(b^2 - 4ac)} \\
 &= -\frac{e(b + 2cx^2)}{2(b^2 - 4ac)(a + bx^2 + cx^4)} + \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
 &\quad + \frac{\sqrt{c} \left( bd - 2af + \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
 &\quad + \frac{\sqrt{c} \left( bd - 2af - \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
 &\quad - \frac{(ce) \text{Subst} \left( \int \frac{1}{a + bx + cx^2} dx, x, x^2 \right)}{b^2 - 4ac} \\
 &= -\frac{e(b + 2cx^2)}{2(b^2 - 4ac)(a + bx^2 + cx^4)} + \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{2a(b^2 - 4ac)(a + bx^2 + cx^4)} \\
 &\quad + \frac{\sqrt{c} \left( bd - 2af + \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b - \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)\sqrt{b - \sqrt{b^2 - 4ac}}} \\
 &\quad + \frac{\sqrt{c} \left( bd - 2af - \frac{b^2d - 12acd + 4abf}{\sqrt{b^2 - 4ac}} \right) \tan^{-1} \left( \frac{\sqrt{2}\sqrt{cx}}{\sqrt{b + \sqrt{b^2 - 4ac}}} \right)}{2\sqrt{2}a(b^2 - 4ac)\sqrt{b + \sqrt{b^2 - 4ac}}} \\
 &\quad + \frac{(2ce) \text{Subst} \left( \int \frac{1}{b^2 - 4ac - x^2} dx, x, b + 2cx^2 \right)}{b^2 - 4ac}
 \end{aligned}$$

$$\begin{aligned}
&= -\frac{e(b+2cx^2)}{2(b^2-4ac)(a+bx^2+cx^4)} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{2a(b^2-4ac)(a+bx^2+cx^4)} \\
&\quad + \frac{\sqrt{c}\left(bd-2af+\frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}}\right)\tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b-\sqrt{b^2-4ac}}} \\
&\quad + \frac{\sqrt{c}\left(bd-2af-\frac{b^2d-12acd+4abf}{\sqrt{b^2-4ac}}\right)\tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{2\sqrt{2}a(b^2-4ac)\sqrt{b+\sqrt{b^2-4ac}}} + \frac{2ce\tanh^{-1}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{3/2}}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.74 (sec) , antiderivative size = 398, normalized size of antiderivative = 1.08

$$\begin{aligned}
&\int \frac{ad+aux+(bd+af)x^2+bex^3+(cd+bf)x^4+cex^5+cfx^6}{(a+bx^2+cx^4)^3} dx \\
&= \frac{1}{4} \left( \frac{2ab(e+fx)-2bdx(b+cx^2)+4acx(d+x(e+fx))}{a(-b^2+4ac)(a+bx^2+cx^4)} \right. \\
&\quad + \frac{\sqrt{2}\sqrt{c}(b^2d+b(\sqrt{b^2-4acd}+4af)-2a(6cd+\sqrt{b^2-4ac}f))\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{a(b^2-4ac)^{3/2}\sqrt{b-\sqrt{b^2-4ac}}} \\
&\quad + \frac{\sqrt{2}\sqrt{c}(-b^2d+12acd+b\sqrt{b^2-4acd}-4abf-2a\sqrt{b^2-4ac}f)\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{a(b^2-4ac)^{3/2}\sqrt{b+\sqrt{b^2-4ac}}} \\
&\quad \left. - \frac{4ce\log(-b+\sqrt{b^2-4ac}-2cx^2)}{(b^2-4ac)^{3/2}} + \frac{4ce\log(b+\sqrt{b^2-4ac}+2cx^2)}{(b^2-4ac)^{3/2}} \right)
\end{aligned}$$

[In] Integrate[(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6)/(a + b\*x^2 + c\*x^4)^3,x]

[Out] ((2\*a\*b\*(e + f\*x) - 2\*b\*d\*x\*(b + c\*x^2) + 4\*a\*c\*x\*(d + x\*(e + f\*x)))/(a\*(-b^2 + 4\*a\*c)\*(a + b\*x^2 + c\*x^4)) + (Sqrt[2]\*Sqrt[c]\*(b^2\*d + b\*(Sqrt[b^2 - 4\*a\*c]\*d + 4\*a\*f) - 2\*a\*(6\*c\*d + Sqrt[b^2 - 4\*a\*c]\*f))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]])/(a\*(b^2 - 4\*a\*c)^(3/2)\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + (Sqrt[2]\*Sqrt[c]\*(-b^2\*d) + 12\*a\*c\*d + b\*Sqrt[b^2 - 4\*a\*c]\*d - 4\*a\*b\*f - 2\*a\*Sqrt[b^2 - 4\*a\*c]\*f)\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]])/(a\*(b^2 - 4\*a\*c)^(3/2)\*Sqrt[b + Sqrt[b^2 - 4\*a\*c]]) - (4\*c\*e\*Log[-b + Sqrt[b^2 - 4\*a\*c] - 2\*c\*x^2])/(b^2 - 4\*a\*c)^(3/2) + (4\*c\*e\*Log[b + Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2])/(b^2 - 4\*a\*c)^(3/2))/4

## Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.24 (sec) , antiderivative size = 232, normalized size of antiderivative = 0.63

method	result
risch	$\frac{\frac{c(2af-bd)x^3}{2a(4ac-b^2)} + \frac{cx^2e}{4ac-b^2} + \frac{(abf+2acd-b^2d)x}{2a(4ac-b^2)} + \frac{be}{8ac-2b^2}}{cx^4+bx^2+a} + \frac{\left( \sum_{R=\text{RootOf}(cZ^4+Z^2b+a)} \left( \frac{c(2af-bd)R^2}{a(4ac-b^2)} + \frac{4ceR}{4ac-b^2} - \frac{abf-6acd+b^2d}{a(4ac-b^2)} \right) \right)}{2cR^3+Rb}$
default	$16c^2 \left( \frac{-\frac{(-4acd\sqrt{-4ac+b^2}+b^2d\sqrt{-4ac+b^2}+8a^2cf-2ab^2f-4abcd+b^3d)x}{16ac} - \frac{e(4ac-b^2)}{8c}}{x^2+\frac{b}{2c}-\frac{\sqrt{-4ac+b^2}}{2c}} + \frac{2ae\sqrt{-4ac+b^2} \ln(-2cx^2+\sqrt{-4ac+b^2}-b)}{4c(4ac-b^2)^2} \right)$

[In] int((d\*a+a\*e\*x+(a\*f+b\*d)\*x^2+e\*x^3\*b+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6)/(c\*x^4+b\*x^2+a)^3,x,method=\_RETURNVERBOSE)

[Out] (1/2\*c\*(2\*a\*f-b\*d)/a/(4\*a\*c-b^2)\*x^3+c/(4\*a\*c-b^2)\*x^2\*e+1/2\*(a\*b\*f+2\*a\*c\*d-b^2\*d)/a/(4\*a\*c-b^2)\*x+1/2/(4\*a\*c-b^2)\*b\*e)/(c\*x^4+b\*x^2+a)+1/4\*sum((c\*(2\*a\*f-b\*d)/a/(4\*a\*c-b^2)\*\_R^2+4\*c/(4\*a\*c-b^2)\*e\*\_R-(a\*b\*f-6\*a\*c\*d+b^2\*d)/a/(4\*a\*c-b^2))/(2\*\_R^3\*c+\_R\*b)\*ln(x-\_R),\_R=RootOf(\_Z^4\*c+\_Z^2\*b+a))

## Fricas [F(-1)]

Timed out.

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

[In] integrate((a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6)/(c\*x^4+b\*x^2+a)^3,x, algorithm="fricas")

[Out] Timed out



**Sympy [F(-1)]**

Timed out.

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^3} dx = \text{Timed out}$$

[In] integrate((a\*d+a\*e\*x+(a\*f+b\*d)\*x\*\*2+b\*e\*x\*\*3+(b\*f+c\*d)\*x\*\*4+c\*e\*x\*\*5+c\*f\*x\*\*6)/(c\*x\*\*4+b\*x\*\*2+a)\*\*3,x)

[Out] Timed out

**Maxima [F]**

$$\begin{aligned} & \int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^3} dx \\ &= \int \frac{cfx^6 + cex^5 + bex^3 + (cd + bf)x^4 + aex + (bd + af)x^2 + ad}{(cx^4 + bx^2 + a)^3} dx \end{aligned}$$

[In] integrate((a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6)/(c\*x^4+b\*x^2+a)^3,x, algorithm="maxima")

[Out]  $-1/2*(2*a*c*e*x^2 - (b*c*d - 2*a*c*f)*x^3 + a*b*e + (a*b*f - (b^2 - 2*a*c)*d)*x)/((a*b^2*c - 4*a^2*c^2)*x^4 + a^2*b^2 - 4*a^3*c + (a*b^3 - 4*a^2*b*c)*x^2) - 1/2*integrate((4*a*c*e*x - a*b*f - (b*c*d - 2*a*c*f)*x^2 - (b^2 - 6*a*c)*d)/(c*x^4 + b*x^2 + a), x)/(a*b^2 - 4*a^2*c)$

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 5159 vs.  $2(320) = 640$ .

Time = 2.82 (sec) , antiderivative size = 5159, normalized size of antiderivative = 14.02

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

[In] integrate((a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6)/(c\*x^4+b\*x^2+a)^3,x, algorithm="giac")

[Out]  $1/2*(b*c*d*x^3 - 2*a*c*f*x^3 - 2*a*c*e*x^2 + b^2*d*x - 2*a*c*d*x - a*b*f*x - a*b*e)/((c*x^4 + b*x^2 + a)*(a*b^2 - 4*a^2*c)) - 1/16*((2*b^3*c^2 - 8*a*b*c^3 - \sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*b^3 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*a*b*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}}*b^2*c - \sqrt{2}*\sqrt{b^2 -$

$$\begin{aligned}
& 4*a*c)*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c}*b*c^2 - 2*(b^2 - 4*a*c)*b*c^2)*(a*b \\
& ^2 - 4*a^2*c)^2*d - 2*(2*a*b^2*c^2 - 8*a^2*c^3 - \sqrt{2}*\sqrt{b^2 - 4*a*c}* \\
& \sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a*b^2 + 4*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b* \\
& c + \sqrt{b^2 - 4*a*c}*c)*a^2*c + 2*\sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{ \\
& t(b^2 - 4*a*c)*c})*a*b*c - \sqrt{2}*\sqrt{b^2 - 4*a*c}*\sqrt{b*c + \sqrt{b^2 - 4 \\
& *a*c}*c)*a*c^2 - 2*(b^2 - 4*a*c)*a*c^2)*(a*b^2 - 4*a^2*c)^2*f - 2*(\sqrt{2})* \\
& \sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a*b^6 - 14*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4* \\
& a*c}*c)*a^2*b^4*c - 2*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a*b^5*c - 2*a \\
& *b^6*c + 64*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^3*b^2*c^2 + 20*\sqrt{2} \\
& )*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^2*b^3*c^2 + \sqrt{2}*\sqrt{b*c + \sqrt{b^2 - \\
& - 4*a*c}*c})*a*b^4*c^2 + 28*a^2*b^4*c^2 - 96*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - \\
& 4*a*c}*c})*a^4*c^3 - 48*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^3*b*c^3 - \\
& 10*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^2*b^2*c^3 - 128*a^3*b^2*c^3 + \\
& 24*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^3*c^4 + 192*a^4*c^4 + 2*(b^2 - \\
& 4*a*c)*a*b^4*c - 20*(b^2 - 4*a*c)*a^2*b^2*c^2 + 48*(b^2 - 4*a*c)*a^3*c^3)* \\
& d*\text{abs}(a*b^2 - 4*a^2*c) - 2*(\sqrt{2})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^2*b^5 \\
& - 8*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^3*b^3*c - 2*\sqrt{2}*\sqrt{b*c \\
& + \sqrt{b^2 - 4*a*c}*c})*a^2*b^4*c - 2*a^2*b^5*c + 16*\sqrt{2}*\sqrt{b*c + \sqrt{ \\
& t(b^2 - 4*a*c)*c})*a^4*b*c^2 + 8*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^3 \\
& *b^2*c^2 + \sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^2*b^3*c^2 + 16*a^3*b^3 \\
& *c^2 - 4*\sqrt{2}*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^3*b*c^3 - 32*a^4*b*c^3 + \\
& 2*(b^2 - 4*a*c)*a^2*b^3*c - 8*(b^2 - 4*a*c)*a^3*b*c^2)*f*\text{abs}(a*b^2 - 4*a^2 \\
& *c) + (2*a^2*b^7*c^2 - 40*a^3*b^5*c^3 + 224*a^4*b^3*c^4 - 384*a^5*b*c^5 - \sqrt{ \\
& 2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^2*b^7 + 20*\sqrt{2} \\
& )*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^3*b^5*c + 2*\sqrt{2})* \\
& \sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^2*b^6*c - 112*\sqrt{2})*\sqrt{ \\
& 2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^4*b^3*c^2 - 32*\sqrt{2})*\sqrt{ \\
& 2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^3*b^4*c^2 - \sqrt{2})*\sqrt{ \\
& 2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^2*b^5*c^2 + 192*\sqrt{2})*\sqrt{ \\
& 2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^5*b*c^3 + 96*\sqrt{2})*\sqrt{ \\
& 2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^4*b^2*c^3 + 16*\sqrt{2})*\sqrt{ \\
& 2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^3*b^3*c^3 - 48*\sqrt{2})*\sqrt{ \\
& 2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^4*b*c^4 - 2*(b^2 - 4*a*c)*a^ \\
& 2*b^5*c^2 + 32*(b^2 - 4*a*c)*a^3*b^3*c^3 - 96*(b^2 - 4*a*c)*a^4*b*c^4)*d + \\
& 4*(2*a^3*b^6*c^2 - 16*a^4*b^4*c^3 + 32*a^5*b^2*c^4 - \sqrt{2})*\sqrt{b^2 - 4*a \\
& *c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^3*b^6 + 8*\sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{ \\
& 2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^4*b^4*c + 2*\sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{ \\
& 2}*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \sqrt{b^2 - 4*a*c}*c})*a^3*b^5*c - 16*\sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{b \\
& *c + \sqrt{b^2 - 4*a*c}*c})*a^5*b^2*c^2 - 8*\sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{b* \\
& c + \sqrt{b^2 - 4*a*c}*c})*a^4*b^3*c^2 - \sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \\
& \sqrt{b^2 - 4*a*c}*c})*a^3*b^4*c^2 + 4*\sqrt{2})*\sqrt{b^2 - 4*a*c})*\sqrt{b*c + \\
& \sqrt{b^2 - 4*a*c}*c})*a^4*b^2*c^3 - 2*(b^2 - 4*a*c)*a^3*b^4*c^2 + 8*(b^2 - 4 \\
& *a*c)*a^4*b^2*c^3)*f)*\arctan(2*\sqrt{1/2})*x/\sqrt{((a*b^3 - 4*a^2*b*c + \sqrt{ \\
& (a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2)))/(a*b^2 \\
& *c - 4*a^2*c^2)))/((a^3*b^6 - 12*a^4*b^4*c - 2*a^3*b^5*c + 48*a^5*b^2*c^2 +
\end{aligned}$$



$$\begin{aligned} &^2 - 4*a*c)*c)*a^3*b^4*c^2 + 4*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c - \text{sqrt}(b^2 - 4*a*c)*c)*a^4*b^2*c^3 - 2*(b^2 - 4*a*c)*a^3*b^4*c^2 + 8*(b^2 - 4*a*c)*a^4*b^2*c^3)*f)*\text{arctan}(2*\text{sqrt}(1/2)*x/\text{sqrt}((a*b^3 - 4*a^2*b*c - \text{sqrt}((a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2))))/(a*b^2*c - 4*a^2*c^2)))/((a^3*b^6 - 12*a^4*b^4*c - 2*a^3*b^5*c + 48*a^5*b^2*c^2 + 16*a^4*b^3*c^2 + a^3*b^4*c^2 - 64*a^6*c^3 - 32*a^5*b*c^3 - 8*a^4*b^2*c^3 + 16*a^5*c^4)*\text{abs}(a*b^2 - 4*a^2*c)*\text{abs}(c)) - 1/4*((b^3*c^2 - 4*a*b*c^3 - 2*b^2*c^3 + b*c^4 + (b^2*c^2 - 4*a*c^3 - 2*b*c^3 + c^4)*\text{sqrt}(b^2 - 4*a*c))*e*\text{abs}(a*b^2 - 4*a^2*c) - (a*b^5*c^2 - 8*a^2*b^3*c^3 - 2*a*b^4*c^3 + 16*a^3*b*c^4 + 8*a^2*b^2*c^4 + a*b^3*c^4 - 4*a^2*b*c^5 - (a*b^4*c^2 - 4*a^2*b^2*c^3 - 2*a*b^3*c^3 + a*b^2*c^4)*\text{sqrt}(b^2 - 4*a*c))*e)*\log(x^2 + 1/2*(a*b^3 - 4*a^2*b*c + \text{sqrt}((a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2))))/(a*b^2*c - 4*a^2*c^2))/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2*\text{abs}(a*b^2 - 4*a^2*c)) - 1/4*((b^3*c^2 - 4*a*b*c^3 - 2*b^2*c^3 + b*c^4 - (b^2*c^2 - 4*a*c^3 - 2*b*c^3 + c^4)*\text{sqrt}(b^2 - 4*a*c))*e*\text{abs}(a*b^2 - 4*a^2*c) - (a*b^5*c^2 - 8*a^2*b^3*c^3 - 2*a*b^4*c^3 + 16*a^3*b*c^4 + 8*a^2*b^2*c^4 + a*b^3*c^4 - 4*a^2*b*c^5 - (a*b^4*c^2 - 4*a^2*b^2*c^3 - 2*a*b^3*c^3 + a*b^2*c^4)*\text{sqrt}(b^2 - 4*a*c))*e)*\log(x^2 + 1/2*(a*b^3 - 4*a^2*b*c - \text{sqrt}((a*b^3 - 4*a^2*b*c)^2 - 4*(a^2*b^2 - 4*a^3*c)*(a*b^2*c - 4*a^2*c^2))))/(a*b^2*c - 4*a^2*c^2))/((a*b^4 - 8*a^2*b^2*c - 2*a*b^3*c + 16*a^3*c^2 + 8*a^2*b*c^2 + a*b^2*c^2 - 4*a^2*c^3)*c^2*\text{abs}(a*b^2 - 4*a^2*c)) \end{aligned}$$

## Mupad [B] (verification not implemented)

Time = 8.62 (sec) , antiderivative size = 4707, normalized size of antiderivative = 12.79

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^3} dx = \text{Too large to display}$$

[In] int((a\*d + x^2\*(b\*d + a\*f) + x^4\*(c\*d + b\*f) + a\*e\*x + b\*e\*x^3 + c\*e\*x^5 + c\*f\*x^6)/(a + b\*x^2 + c\*x^4)^3,x)

[Out] symsum(log((5\*b^3\*c^4\*d^3 + 8\*a^3\*c^4\*f^3 - 96\*a^2\*c^5\*d\*e^2 + 72\*a^2\*c^5\*d^2\*f - 3\*b^4\*c^3\*d^2\*f + 6\*a^2\*b^2\*c^3\*f^3 - 36\*a\*b\*c^5\*d^3 + 16\*a\*b^2\*c^4\*d\*e^2 + 18\*a\*b^2\*c^4\*d^2\*f + 3\*a\*b^3\*c^3\*d\*f^2 - 60\*a^2\*b\*c^4\*d\*f^2 + 16\*a^2\*b\*c^4\*e^2\*f)/(8\*(a^2\*b^6 - 64\*a^5\*c^3 - 12\*a^3\*b^4\*c + 48\*a^4\*b^2\*c^2)) - root(1572864\*a^8\*b^2\*c^5\*z^4 - 983040\*a^7\*b^4\*c^4\*z^4 + 327680\*a^6\*b^6\*c^3\*z^4 - 61440\*a^5\*b^8\*c^2\*z^4 + 6144\*a^4\*b^10\*c\*z^4 - 1048576\*a^9\*c^6\*z^4 - 256\*a^3\*b^12\*z^4 + 576\*a^2\*b^8\*c\*d\*f\*z^2 + 24576\*a^5\*b^2\*c^4\*d\*f\*z^2 - 3072\*a^3\*b^6\*c^2\*d\*f\*z^2 + 2048\*a^4\*b^4\*c^3\*d\*f\*z^2 + 12288\*a^6\*b\*c^4\*f^2\*z^2 + 61440\*a^5\*b\*c^5\*d^2\*z^2 - 49152\*a^6\*c^5\*d\*f\*z^2 + 432\*a\*b^9\*c\*d^2\*z^2 - 8192\*a^5\*b^3\*c^3\*f^2\*z^2 + 1536\*a^4\*b^5\*c^2\*f^2\*z^2 + 24576\*a^5\*b^2\*c^4\*e^2\*z^2 - 6144\*a^4\*b^4\*c^3\*e^2\*z^2 + 512\*a^3\*b^6\*c^2\*e^2\*z^2 - 61440\*a^4\*b^3\*c^4\*d^2\*z^2 + 24064\*a^3\*b^5\*c^3\*d^2\*z^2 - 4608\*a^2\*b^7\*c^2\*d^2\*z^2 - 32\*a\*b^10

$$\begin{aligned}
& *d*f*z^2 - 32768*a^6*c^5*e^2*z^2 - 16*a^2*b^9*f^2*z^2 - 16*b^11*d^2*z^2 - 4 \\
& 096*a^4*b*c^4*d*e*f*z + 64*a*b^7*c*d*e*f*z + 3072*a^3*b^3*c^3*d*e*f*z - 768 \\
& *a^2*b^5*c^2*d*e*f*z + 32*a^2*b^6*c*e*f^2*z - 672*a*b^6*c^2*d^2*e*z + 1536* \\
& a^4*b^2*c^3*e*f^2*z - 384*a^3*b^4*c^2*e*f^2*z - 15872*a^3*b^2*c^4*d^2*e*z + \\
& 4992*a^2*b^4*c^3*d^2*e*z - 2048*a^5*c^4*e*f^2*z + 18432*a^4*c^5*d^2*e*z + \\
& 32*b^8*c*d^2*e*z - 32*a*b^4*c^2*d*e^2*f + 192*a^2*b^2*c^3*d*e^2*f - 192*a^3 \\
& *b*c^3*e^2*f^2 + 198*a*b^4*c^2*d^2*f^2 + 144*a^2*b^3*c^2*d*f^3 - 960*a^2*b* \\
& c^4*d^2*e^2 + 240*a*b^3*c^3*d^2*e^2 + 768*a^3*c^4*d*e^2*f + 2016*a^2*b*c^4* \\
& d^3*f - 496*a*b^3*c^3*d^3*f + 224*a^3*b*c^3*d*f^3 - 16*a^2*b^3*c^2*e^2*f^2 \\
& - 960*a^2*b^2*c^3*d^2*f^2 - 18*a*b^5*c*d*f^3 - 288*a^3*c^4*d^2*f^2 - 16*b^5 \\
& *c^2*d^2*e^2 - 24*a^3*b^2*c^2*f^4 + 30*b^5*c^2*d^3*f - 9*b^6*c*d^2*f^2 - 9* \\
& a^2*b^4*c*f^4 + 360*a*b^2*c^4*d^4 - 16*a^4*c^3*f^4 - 256*a^3*c^4*e^4 - 25*b \\
& ^4*c^3*d^4 - 1296*a^2*c^5*d^4, z, k)*((32*a*b^5*c^3*d*e - 512*a^4*c^5*e*f + \\
& 1024*a^3*b*c^5*d*e - 384*a^2*b^3*c^4*d*e + 32*a^2*b^4*c^3*e*f)/(8*(a^2*b^6 \\
& - 64*a^5*c^3 - 12*a^3*b^4*c + 48*a^4*b^2*c^2)) + \text{root}(1572864*a^8*b^2*c^5* \\
& z^4 - 983040*a^7*b^4*c^4*z^4 + 327680*a^6*b^6*c^3*z^4 - 61440*a^5*b^8*c^2*z \\
& ^4 + 6144*a^4*b^10*c*z^4 - 1048576*a^9*c^6*z^4 - 256*a^3*b^12*z^4 + 576*a^2 \\
& *b^8*c*d*f*z^2 + 24576*a^5*b^2*c^4*d*f*z^2 - 3072*a^3*b^6*c^2*d*f*z^2 + 204 \\
& 8*a^4*b^4*c^3*d*f*z^2 + 12288*a^6*b*c^4*f^2*z^2 + 61440*a^5*b*c^5*d^2*z^2 - \\
& 49152*a^6*c^5*d*f*z^2 + 432*a*b^9*c*d^2*z^2 - 8192*a^5*b^3*c^3*f^2*z^2 + 1 \\
& 536*a^4*b^5*c^2*f^2*z^2 + 24576*a^5*b^2*c^4*e^2*z^2 - 6144*a^4*b^4*c^3*e^2* \\
& z^2 + 512*a^3*b^6*c^2*e^2*z^2 - 61440*a^4*b^3*c^4*d^2*z^2 + 24064*a^3*b^5*c \\
& ^3*d^2*z^2 - 4608*a^2*b^7*c^2*d^2*z^2 - 32*a*b^10*d*f*z^2 - 32768*a^6*c^5*e \\
& ^2*z^2 - 16*a^2*b^9*f^2*z^2 - 16*b^11*d^2*z^2 - 4096*a^4*b*c^4*d*e*f*z + 64 \\
& *a*b^7*c*d*e*f*z + 3072*a^3*b^3*c^3*d*e*f*z - 768*a^2*b^5*c^2*d*e*f*z + 32* \\
& a^2*b^6*c*e*f^2*z - 672*a*b^6*c^2*d^2*e*z + 1536*a^4*b^2*c^3*e*f^2*z - 384* \\
& a^3*b^4*c^2*e*f^2*z - 15872*a^3*b^2*c^4*d^2*e*z + 4992*a^2*b^4*c^3*d^2*e*z \\
& - 2048*a^5*c^4*e*f^2*z + 18432*a^4*c^5*d^2*e*z + 32*b^8*c*d^2*e*z - 32*a*b^ \\
& 4*c^2*d*e^2*f + 192*a^2*b^2*c^3*d*e^2*f - 192*a^3*b*c^3*e^2*f^2 + 198*a*b^4 \\
& *c^2*d^2*f^2 + 144*a^2*b^3*c^2*d*f^3 - 960*a^2*b*c^4*d^2*e^2 + 240*a*b^3*c^ \\
& 3*d^2*e^2 + 768*a^3*c^4*d*e^2*f + 2016*a^2*b*c^4*d^3*f - 496*a*b^3*c^3*d^3* \\
& f + 224*a^3*b*c^3*d*f^3 - 16*a^2*b^3*c^2*e^2*f^2 - 960*a^2*b^2*c^3*d^2*f^2 \\
& - 18*a*b^5*c*d*f^3 - 288*a^3*c^4*d^2*f^2 - 16*b^5*c^2*d^2*e^2 - 24*a^3*b^2* \\
& c^2*f^4 + 30*b^5*c^2*d^3*f - 9*b^6*c*d^2*f^2 - 9*a^2*b^4*c*f^4 + 360*a*b^2* \\
& c^4*d^4 - 16*a^4*c^3*f^4 - 256*a^3*c^4*e^4 - 25*b^4*c^3*d^4 - 1296*a^2*c^5* \\
& d^4, z, k)*(x*(1024*a^5*c^6*e - 16*a^2*b^6*c^3*e + 192*a^3*b^4*c^4*e - 768 \\
& *a^4*b^2*c^5*e))/(2*(a^2*b^6 - 64*a^5*c^3 - 12*a^3*b^4*c + 48*a^4*b^2*c^2)) \\
& - (6144*a^5*c^6*d - 288*a^2*b^6*c^3*d + 1920*a^3*b^4*c^4*d - 5632*a^4*b^2* \\
& c^5*d + 16*a^2*b^7*c^2*f - 192*a^3*b^5*c^3*f + 768*a^4*b^3*c^4*f + 16*a*b^8 \\
& *c^2*d - 1024*a^5*b*c^5*f)/(8*(a^2*b^6 - 64*a^5*c^3 - 12*a^3*b^4*c + 48*a^4 \\
& *b^2*c^2)) + (\text{root}(1572864*a^8*b^2*c^5*z^4 - 983040*a^7*b^4*c^4*z^4 + 32768 \\
& 0*a^6*b^6*c^3*z^4 - 61440*a^5*b^8*c^2*z^4 + 6144*a^4*b^10*c*z^4 - 1048576*a \\
& ^9*c^6*z^4 - 256*a^3*b^12*z^4 + 576*a^2*b^8*c*d*f*z^2 + 24576*a^5*b^2*c^4*d \\
& *f*z^2 - 3072*a^3*b^6*c^2*d*f*z^2 + 2048*a^4*b^4*c^3*d*f*z^2 + 12288*a^6*b* \\
& c^4*f^2*z^2 + 61440*a^5*b*c^5*d^2*z^2 - 49152*a^6*c^5*d*f*z^2 + 432*a*b^9*c
\end{aligned}$$

$$\begin{aligned}
& *d^2*z^2 - 8192*a^5*b^3*c^3*f^2*z^2 + 1536*a^4*b^5*c^2*f^2*z^2 + 24576*a^5* \\
& b^2*c^4*e^2*z^2 - 6144*a^4*b^4*c^3*e^2*z^2 + 512*a^3*b^6*c^2*e^2*z^2 - 6144 \\
& 0*a^4*b^3*c^4*d^2*z^2 + 24064*a^3*b^5*c^3*d^2*z^2 - 4608*a^2*b^7*c^2*d^2*z^2 \\
& - 32*a*b^10*d*f*z^2 - 32768*a^6*c^5*e^2*z^2 - 16*a^2*b^9*f^2*z^2 - 16*b^1 \\
& 1*d^2*z^2 - 4096*a^4*b*c^4*d*e*f*z + 64*a*b^7*c*d*e*f*z + 3072*a^3*b^3*c^3* \\
& d*e*f*z - 768*a^2*b^5*c^2*d*e*f*z + 32*a^2*b^6*c*e*f^2*z - 672*a*b^6*c^2*d^ \\
& 2*e*z + 1536*a^4*b^2*c^3*e*f^2*z - 384*a^3*b^4*c^2*e*f^2*z - 15872*a^3*b^2* \\
& c^4*d^2*e*z + 4992*a^2*b^4*c^3*d^2*e*z - 2048*a^5*c^4*e*f^2*z + 18432*a^4*c \\
& ^5*d^2*e*z + 32*b^8*c*d^2*e*z - 32*a*b^4*c^2*d*e^2*f + 192*a^2*b^2*c^3*d*e^ \\
& 2*f - 192*a^3*b*c^3*e^2*f^2 + 198*a*b^4*c^2*d^2*f^2 + 144*a^2*b^3*c^2*d*f^3 \\
& - 960*a^2*b*c^4*d^2*e^2 + 240*a*b^3*c^3*d^2*e^2 + 768*a^3*c^4*d*e^2*f + 20 \\
& 16*a^2*b*c^4*d^3*f - 496*a*b^3*c^3*d^3*f + 224*a^3*b*c^3*d*f^3 - 16*a^2*b^3 \\
& *c^2*e^2*f^2 - 960*a^2*b^2*c^3*d^2*f^2 - 18*a*b^5*c*d*f^3 - 288*a^3*c^4*d^2 \\
& *f^2 - 16*b^5*c^2*d^2*e^2 - 24*a^3*b^2*c^2*f^4 + 30*b^5*c^2*d^3*f - 9*b^6*c \\
& *d^2*f^2 - 9*a^2*b^4*c*f^4 + 360*a*b^2*c^4*d^4 - 16*a^4*c^3*f^4 - 256*a^3*c \\
& ^4*e^4 - 25*b^4*c^3*d^4 - 1296*a^2*c^5*d^4, z, k) * x * (4096*a^6*b*c^6 + 16*a^ \\
& 2*b^9*c^2 - 256*a^3*b^7*c^3 + 1536*a^4*b^5*c^4 - 4096*a^5*b^3*c^5) / (2*(a^2 \\
& *b^6 - 64*a^5*c^3 - 12*a^3*b^4*c + 48*a^4*b^2*c^2)) + (x*(b^6*c^3*d^2 - 28 \\
& 8*a^3*c^6*d^2 + 32*a^4*c^5*f^2 - 18*a*b^4*c^4*d^2 + 64*a^3*b*c^5*e^2 + 128* \\
& a^2*b^2*c^5*d^2 - 16*a^2*b^3*c^4*e^2 + 10*a^2*b^4*c^3*f^2 - 48*a^3*b^2*c^4* \\
& f^2 + 2*a*b^5*c^3*d*f + 160*a^3*b*c^5*d*f - 48*a^2*b^3*c^4*d*f)) / (2*(a^2*b^ \\
& 6 - 64*a^5*c^3 - 12*a^3*b^4*c + 48*a^4*b^2*c^2)) - (x*(16*a^2*c^5*e^3 - b^ \\
& 3*c^4*d^2*e + 12*a*b*c^5*d^2*e - 24*a^2*c^5*d*e*f + 8*a^2*b*c^4*e*f^2 - 2*a \\
& *b^2*c^4*d*e*f)) / (2*(a^2*b^6 - 64*a^5*c^3 - 12*a^3*b^4*c + 48*a^4*b^2*c^2)) \\
& ) * \text{root}(1572864*a^8*b^2*c^5*z^4 - 983040*a^7*b^4*c^4*z^4 + 327680*a^6*b^6*c^ \\
& 3*z^4 - 61440*a^5*b^8*c^2*z^4 + 6144*a^4*b^10*c*z^4 - 1048576*a^9*c^6*z^4 - \\
& 256*a^3*b^12*z^4 + 576*a^2*b^8*c*d*f*z^2 + 24576*a^5*b^2*c^4*d*f*z^2 - 307 \\
& 2*a^3*b^6*c^2*d*f*z^2 + 2048*a^4*b^4*c^3*d*f*z^2 + 12288*a^6*b*c^4*f^2*z^2 \\
& + 61440*a^5*b*c^5*d^2*z^2 - 49152*a^6*c^5*d*f*z^2 + 432*a*b^9*c*d^2*z^2 - 8 \\
& 192*a^5*b^3*c^3*f^2*z^2 + 1536*a^4*b^5*c^2*f^2*z^2 + 24576*a^5*b^2*c^4*e^2* \\
& z^2 - 6144*a^4*b^4*c^3*e^2*z^2 + 512*a^3*b^6*c^2*e^2*z^2 - 61440*a^4*b^3*c^ \\
& 4*d^2*z^2 + 24064*a^3*b^5*c^3*d^2*z^2 - 4608*a^2*b^7*c^2*d^2*z^2 - 32*a*b^1 \\
& 0*d*f*z^2 - 32768*a^6*c^5*e^2*z^2 - 16*a^2*b^9*f^2*z^2 - 16*b^11*d^2*z^2 - \\
& 4096*a^4*b*c^4*d*e*f*z + 64*a*b^7*c*d*e*f*z + 3072*a^3*b^3*c^3*d*e*f*z - 76 \\
& 8*a^2*b^5*c^2*d*e*f*z + 32*a^2*b^6*c*e*f^2*z - 672*a*b^6*c^2*d^2*e*z + 1536 \\
& *a^4*b^2*c^3*e*f^2*z - 384*a^3*b^4*c^2*e*f^2*z - 15872*a^3*b^2*c^4*d^2*e*z \\
& + 4992*a^2*b^4*c^3*d^2*e*z - 2048*a^5*c^4*e*f^2*z + 18432*a^4*c^5*d^2*e*z + \\
& 32*b^8*c*d^2*e*z - 32*a*b^4*c^2*d*e^2*f + 192*a^2*b^2*c^3*d*e^2*f - 192*a^ \\
& 3*b*c^3*e^2*f^2 + 198*a*b^4*c^2*d^2*f^2 + 144*a^2*b^3*c^2*d*f^3 - 960*a^2*b \\
& *c^4*d^2*e^2 + 240*a*b^3*c^3*d^2*e^2 + 768*a^3*c^4*d*e^2*f + 2016*a^2*b*c^4 \\
& *d^3*f - 496*a*b^3*c^3*d^3*f + 224*a^3*b*c^3*d*f^3 - 16*a^2*b^3*c^2*e^2*f^2 \\
& - 960*a^2*b^2*c^3*d^2*f^2 - 18*a*b^5*c*d*f^3 - 288*a^3*c^4*d^2*f^2 - 16*b^ \\
& 5*c^2*d^2*e^2 - 24*a^3*b^2*c^2*f^4 + 30*b^5*c^2*d^3*f - 9*b^6*c*d^2*f^2 - 9 \\
& *a^2*b^4*c*f^4 + 360*a*b^2*c^4*d^4 - 16*a^4*c^3*f^4 - 256*a^3*c^4*e^4 - 25* \\
& b^4*c^3*d^4 - 1296*a^2*c^5*d^4, z, k), k, 1, 4) + ((b*e)/(2*(4*a*c - b^2))
\end{aligned}$$

$$+ (c*e*x^2)/(4*a*c - b^2) + (x*(2*a*c*d - b^2*d + a*b*f))/(2*a*(4*a*c - b^2)) - (c*x^3*(b*d - 2*a*f))/(2*a*(4*a*c - b^2))/(a + b*x^2 + c*x^4)$$

$$3.66 \quad \int \frac{ad+aux+(bd+af)x^2+bx^3+(cd+bf)x^4+cx^5+cfx^6}{(a+bx^2+cx^4)^4} dx$$

Optimal result	936
Rubi [A] (verified)	937
Mathematica [A] (verified)	941
Maple [C] (verified)	942
Fricas [F(-1)]	943
Sympy [F(-1)]	943
Maxima [F]	943
Giac [B] (verification not implemented)	944
Mupad [B] (verification not implemented)	947

### Optimal result

Integrand size = 63, antiderivative size = 621

$$\begin{aligned} & \int \frac{ad+aux+(bd+af)x^2+bx^3+(cd+bf)x^4+cx^5+cfx^6}{(a+bx^2+cx^4)^4} dx \\ &= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} \\ &+ \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} \\ &+ \frac{x(3b^4d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\ &+ \frac{\sqrt{c}(3b^4d+b^3(3\sqrt{b^2-4acd}+af)-4abc(6\sqrt{b^2-4acd}+13af)-ab^2(30cd-\sqrt{b^2-4ac}f)+4a^2c(42cd-3b^2d-2abf+20a^2cf))}{8\sqrt{2}a^2(b^2-4ac)^{5/2}\sqrt{b-\sqrt{b^2-4ac}}} \\ &+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf-\frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right)\arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b+\sqrt{b^2-4ac}}} \\ &- \frac{6c^2e\operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}} \end{aligned}$$

[Out]  $-1/4*e*(2*c*x^2+b)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^2+1/4*x*(b^2*d-2*a*c*d-a*b*f+c*(-2*a*f+b*d)*x^2)/a/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^2+3/2*c*e*(2*c*x^2+b)/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)+1/8*x*(3*b^4*d-25*a*b^2*c*d+28*a^2*c^2*d+a*b^3*f+8*a^2*b*c*f+c*(20*a^2*c*f+a*b^2*f-24*a*b*c*d+3*b^3*d)*x^2)/a^2/(-4*a*c+b^2)^2/(c*x^4+b*x^2+a)-6*c^2*e*\operatorname{arctanh}((2*c*x^2+b)/(-4*a*c+b^2)^{(1/2)})/(-4*a*c+b^2)^{(5/2)}+1/16*\operatorname{arctan}(x^2^{(1/2)}*c^{(1/2)})/(b-(-4*a*c+b^2)^{(1/2)})^{(1/2)}*c^{(1/2)}*(3*b^4*d+b^3*(a*f+3*d*(-4*a*c+b^2)^{(1/2)})-4*a*b*c*(13*a*f+6*d*(-4$



$$a*c+b^2)^{(1/2)}-a*b^2*(30*c*d-f*(-4*a*c+b^2)^{(1/2}))+4*a^2*c*(42*c*d+5*f*(-4*a*c+b^2)^{(1/2}))/a^2/(-4*a*c+b^2)^{(5/2)}*2^{(1/2)}/(b-(-4*a*c+b^2)^{(1/2}))^{(1/2)}+1/16*\arctan(x^2^{(1/2)}*c^{(1/2)}/(b+(-4*a*c+b^2)^{(1/2}))^{(1/2)})*c^{(1/2)}*(3*b^3*d-24*a*b*c*d+a*b^2*f+20*a^2*c*f+(52*a^2*b*c*f-168*a^2*c^2*d-a*b^3*f+30*a*b^2*c*d-3*b^4*d)/(-4*a*c+b^2)^{(1/2}))/a^2/(-4*a*c+b^2)^2*2^{(1/2)}/(b+(-4*a*c+b^2)^{(1/2}))^{(1/2)}$$

## Rubi [A] (verified)

Time = 2.64 (sec) , antiderivative size = 621, normalized size of antiderivative = 1.00, number of steps used = 13, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.159$ , Rules used = {1600, 1687, 1192, 1180, 211, 12, 1121, 628, 632, 212}

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^4} dx$$

$$= \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b^2-4ac+b}}\right) \left(-\frac{52a^2bcf+168a^2c^2d+ab^3f-30ab^2cd+3b^4d}{\sqrt{b^2-4ac}} + 20a^2cf + ab^2f - 24abcd + 3b^3d\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{\sqrt{b^2-4ac}+b}}$$

$$+ \frac{\sqrt{c} \arctan\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right) (4a^2c(5f\sqrt{b^2-4ac} + 42cd) - ab^2(30cd - f\sqrt{b^2-4ac}) - 4abc(6d\sqrt{b^2-4ac} + 3b^3d))}{8\sqrt{2}a^2(b^2-4ac)^{5/2}\sqrt{b-\sqrt{b^2-4ac}}}$$

$$+ \frac{x(cx^2(20a^2cf + ab^2f - 24abcd + 3b^3d) + 8a^2bcf + 28a^2c^2d + ab^3f - 25ab^2cd + 3b^4d)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)}$$

$$- \frac{6c^2e \operatorname{arctanh}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}} + \frac{x(cx^2(bd-2af) - abf - 2acd + b^2d)}{4a(b^2-4ac)(a+bx^2+cx^4)^2}$$

$$+ \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} - \frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2}$$

[In] Int[(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6)/(a + b\*x^2 + c\*x^4)^4,x]

[Out] -1/4\*(e\*(b + 2\*c\*x^2))/((b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)^2) + (x\*(b^2\*d - 2\*a\*c\*d - a\*b\*f + c\*(b\*d - 2\*a\*f)\*x^2))/(4\*a\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)^2) + (3\*c\*e\*(b + 2\*c\*x^2))/(2\*(b^2 - 4\*a\*c)^2\*(a + b\*x^2 + c\*x^4)) + (x\*(3\*b^4\*d - 25\*a\*b^2\*c\*d + 28\*a^2\*c^2\*d + a\*b^3\*f + 8\*a^2\*b\*c\*f + c\*(3\*b^3\*d - 24\*a\*b\*c\*d + a\*b^2\*f + 20\*a^2\*c\*f)\*x^2))/(8\*a^2\*(b^2 - 4\*a\*c)^2\*(a + b\*x^2 + c\*x^4)) + (Sqrt[c]\*(3\*b^4\*d + b^3\*(3\*Sqrt[b^2 - 4\*a\*c]\*d + a\*f) - 4\*a\*b\*c\*(6\*Sqrt[b^2 - 4\*a\*c]\*d + 13\*a\*f) - a\*b^2\*(30\*c\*d - Sqrt[b^2 - 4\*a\*c]\*f) + 4\*a^2\*c\*(42\*c\*d + 5\*Sqrt[b^2 - 4\*a\*c]\*f))\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b - Sqrt[b^2 - 4\*a\*c]])/(8\*Sqrt[2]\*a^2\*(b^2 - 4\*a\*c)^{(5/2)}\*Sqrt[b - Sqrt[b^2 - 4\*a\*c]]) + (Sqrt[c]\*(3\*b^3\*d - 24\*a\*b\*c\*d + a\*b^2\*f + 20\*a^2\*c\*f - (3\*b^4\*d - 30\*a\*b^2\*c\*d + 168\*a^2\*c^2\*d + a\*b^3\*f - 52\*a^2\*b\*c\*f)/Sqrt[b^2 - 4\*a\*c])\*ArcTan[(Sqrt[2]\*Sqrt[c]\*x)/Sqrt[b + Sqrt[b^2 - 4\*a\*c]])/(8\*Sqrt[

$2] * a^2 * (b^2 - 4 * a * c)^2 * \text{Sqrt}[b + \text{Sqrt}[b^2 - 4 * a * c]] - (6 * c^2 * e * \text{ArcTanh}[(b + 2 * c * x^2) / \text{Sqrt}[b^2 - 4 * a * c]]) / (b^2 - 4 * a * c)^{(5/2)}$

#### Rule 12

$\text{Int}[(a_*) * (u_*), x\_Symbol] \rightarrow \text{Dist}[a, \text{Int}[u, x], x] /; \text{FreeQ}[a, x] \ \&\& \ !\text{Match}[\text{Q}[u, (b_*) * (v_*)] /; \text{FreeQ}[b, x]]$

#### Rule 211

$\text{Int}[((a_*) + (b_*)) * (x_*)^2)^{-1}, x\_Symbol] \rightarrow \text{Simp}[(\text{Rt}[a/b, 2] / a) * \text{ArcTan}[x / \text{Rt}[a/b, 2]], x] /; \text{FreeQ}[\{a, b\}, x] \ \&\& \ \text{PosQ}[a/b]$

#### Rule 212

$\text{Int}[((a_*) + (b_*)) * (x_*)^2)^{-1}, x\_Symbol] \rightarrow \text{Simp}[(1 / (\text{Rt}[a, 2] * \text{Rt}[-b, 2])) * \text{ArcTanh}[\text{Rt}[-b, 2] * (x / \text{Rt}[a, 2])], x] /; \text{FreeQ}[\{a, b\}, x] \ \&\& \ \text{NegQ}[a/b] \ \&\& \ (\text{Gt}[\text{Q}[a, 0] \ || \ \text{LtQ}[b, 0])]$

#### Rule 628

$\text{Int}(((a_*) + (b_*)) * (x_*) + (c_*) * (x_*)^2)^{(p_*)}, x\_Symbol] \rightarrow \text{Simp}[(b + 2 * c * x) * ((a + b * x + c * x^2)^{(p + 1}) / ((p + 1) * (b^2 - 4 * a * c))), x] - \text{Dist}[2 * c * ((2 * p + 3) / ((p + 1) * (b^2 - 4 * a * c))), \text{Int}[(a + b * x + c * x^2)^{(p + 1)}, x], x] /; \text{FreeQ}[\{a, b, c\}, x] \ \&\& \ \text{NeQ}[b^2 - 4 * a * c, 0] \ \&\& \ \text{LtQ}[p, -1] \ \&\& \ \text{NeQ}[p, -3/2] \ \&\& \ \text{IntegerQ}[4 * p]$

#### Rule 632

$\text{Int}(((a_*) + (b_*)) * (x_*) + (c_*) * (x_*)^2)^{-1}, x\_Symbol] \rightarrow \text{Dist}[-2, \text{Subst}[\text{Int}[1 / \text{Simp}[b^2 - 4 * a * c - x^2, x], x], x, b + 2 * c * x], x] /; \text{FreeQ}[\{a, b, c\}, x] \ \&\& \ \text{NeQ}[b^2 - 4 * a * c, 0]$

#### Rule 1121

$\text{Int}((x_*) * ((a_*) + (b_*) * (x_*)^2 + (c_*) * (x_*)^4)^{(p_*)}, x\_Symbol] \rightarrow \text{Dist}[1/2, \text{Subst}[\text{Int}[(a + b * x + c * x^2)^p, x], x, x^2], x] /; \text{FreeQ}[\{a, b, c, p\}, x]$

#### Rule 1180

$\text{Int}(((d_*) + (e_*) * (x_*)^2) / ((a_*) + (b_*) * (x_*)^2 + (c_*) * (x_*)^4), x\_Symbol] \rightarrow \text{With}[\{q = \text{Rt}[b^2 - 4 * a * c, 2]\}, \text{Dist}[e/2 + (2 * c * d - b * e) / (2 * q), \text{Int}[1 / (b/2 - q/2 + c * x^2), x], x] + \text{Dist}[e/2 - (2 * c * d - b * e) / (2 * q), \text{Int}[1 / (b/2 + q/2 + c * x^2), x], x]] /; \text{FreeQ}[\{a, b, c, d, e\}, x] \ \&\& \ \text{NeQ}[b^2 - 4 * a * c, 0] \ \&\& \ \text{NeQ}[c * d^2 - a * e^2, 0] \ \&\& \ \text{PosQ}[b^2 - 4 * a * c]$

#### Rule 1192

```
Int[((d_) + (e_)*(x_)^2)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol]
:> Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 +
c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2
- 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7
)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a,
b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] &&
LtQ[p, -1] && IntegerQ[2*p]
```

### Rule 1600

```
Int[(u_)*(Px_)^(p_)*(Qx_)^(q_), x_Symbol] :> Int[u*PolynomialQuotient[Px
, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] &&
EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] :> Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

### Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d + ex + fx^2}{(a + bx^2 + cx^4)^3} dx \\
&= \int \frac{ex}{(a + bx^2 + cx^4)^3} dx + \int \frac{d + fx^2}{(a + bx^2 + cx^4)^3} dx \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad - \frac{\int \frac{-3b^2d + 14acd - abf - 5c(bd - 2af)x^2}{(a + bx^2 + cx^4)^2} dx}{4a(b^2 - 4ac)} + e \int \frac{x}{(a + bx^2 + cx^4)^3} dx \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{4a(b^2 - 4ac)(a + bx^2 + cx^4)^2} \\
&\quad + \frac{x(3b^4d - 25ab^2cd + 28a^2c^2d + ab^3f + 8a^2bcf + c(3b^3d - 24abcd + ab^2f + 20a^2cf)x^2)}{8a^2(b^2 - 4ac)^2(a + bx^2 + cx^4)} \\
&\quad + \frac{\int \frac{3b^4d - 27ab^2cd + 84a^2c^2d + ab^3f - 16a^2bcf + c(3b^3d - 24abcd + ab^2f + 20a^2cf)x^2}{a + bx^2 + cx^4} dx}{8a^2(b^2 - 4ac)^2} \\
&\quad + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{(a + bx + cx^2)^3} dx, x, x^2 \right)
\end{aligned}$$

$$\begin{aligned}
&= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} \\
&+ \frac{x(3b^4d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&- \frac{(3ce)\text{Subst}\left(\int \frac{1}{(a+bx+cx^2)^2} dx, x, x^2\right)}{2(b^2-4ac)} \\
&+ \frac{\left(c\left(3b^3d-24abcd+ab^2f+20a^2cf - \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right)\right) \int \frac{1}{\frac{b}{2}+\frac{1}{2}\sqrt{b^2-4ac+cx^2}} dx}{16a^2(b^2-4ac)^2} \\
&+ \frac{\left(c\left(3b^3d-24abcd+ab^2f+20a^2cf + \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right)\right) \int \frac{1}{\frac{b}{2}-\frac{1}{2}\sqrt{b^2-4ac+cx^2}} dx}{16a^2(b^2-4ac)^2} \\
&= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} \\
&+ \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{x(3b^4d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf + \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b-\sqrt{b^2-4ac}}} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf - \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b+\sqrt{b^2-4ac}}} \\
&+ \frac{(3c^2e)\text{Subst}\left(\int \frac{1}{a+bx+cx^2} dx, x, x^2\right)}{(b^2-4ac)^2} \\
&= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} \\
&+ \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{x(3b^4d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf + \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b-\sqrt{b^2-4ac}}} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf - \frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right) \tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b+\sqrt{b^2-4ac}}} \\
&- \frac{(6c^2e)\text{Subst}\left(\int \frac{1}{b^2-4ac-x^2} dx, x, b+2cx^2\right)}{(b^2-4ac)^2}
\end{aligned}$$

$$\begin{aligned}
&= -\frac{e(b+2cx^2)}{4(b^2-4ac)(a+bx^2+cx^4)^2} \\
&+ \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{4a(b^2-4ac)(a+bx^2+cx^4)^2} + \frac{3ce(b+2cx^2)}{2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{x(3b^4d-25ab^2cd+28a^2c^2d+ab^3f+8a^2bcf+c(3b^3d-24abcd+ab^2f+20a^2cf)x^2)}{8a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf+\frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right)\tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b-\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b-\sqrt{b^2-4ac}}} \\
&+ \frac{\sqrt{c}\left(3b^3d-24abcd+ab^2f+20a^2cf-\frac{3b^4d-30ab^2cd+168a^2c^2d+ab^3f-52a^2bcf}{\sqrt{b^2-4ac}}\right)\tan^{-1}\left(\frac{\sqrt{2}\sqrt{cx}}{\sqrt{b+\sqrt{b^2-4ac}}}\right)}{8\sqrt{2}a^2(b^2-4ac)^2\sqrt{b+\sqrt{b^2-4ac}}} \\
&- \frac{6c^2e \tanh^{-1}\left(\frac{b+2cx^2}{\sqrt{b^2-4ac}}\right)}{(b^2-4ac)^{5/2}}
\end{aligned}$$

### Mathematica [A] (verified)

Time = 2.03 (sec) , antiderivative size = 625, normalized size of antiderivative = 1.01

$$\begin{aligned}
&\int \frac{ad+ax+(bd+af)x^2+bx^3+(cd+bf)x^4+cex^5+cfx^6}{(a+bx^2+cx^4)^4} dx \\
&= \frac{1}{16} \left( \frac{4ab(e+fx)-4bdx(b+cx^2)+8acx(d+x(e+fx))}{a(-b^2+4ac)(a+bx^2+cx^4)^2} \right. \\
&+ \frac{6b^3dx(b+cx^2)+2abx(-25bcd+b^2f-24c^2dx^2+bcfx^2)+8a^2c(b(3e+2fx)+cx(7d+6ex+5fx^2))}{a^2(b^2-4ac)^2(a+bx^2+cx^4)} \\
&+ \frac{\sqrt{2}\sqrt{c}(3b^4d+b^3(3\sqrt{b^2-4acd}+af)-4abc(6\sqrt{b^2-4acd}+13af)+ab^2(-30cd+\sqrt{b^2-4ac}f)+4a^2c^2d)}{a^2(b^2-4ac)^{5/2}\sqrt{b-\sqrt{b^2-4ac}}} \\
&+ \frac{\sqrt{2}\sqrt{c}(-3b^4d+b^3(3\sqrt{b^2-4acd}-af)+4abc(-6\sqrt{b^2-4acd}+13af)+ab^2(30cd+\sqrt{b^2-4ac}f)+4a^2c^2d)}{a^2(b^2-4ac)^{5/2}\sqrt{b+\sqrt{b^2-4ac}}} \\
&\left. + \frac{48c^2e \log(-b+\sqrt{b^2-4ac}-2cx^2)}{(b^2-4ac)^{5/2}} - \frac{48c^2e \log(b+\sqrt{b^2-4ac}+2cx^2)}{(b^2-4ac)^{5/2}} \right)
\end{aligned}$$

[In] Integrate[(a\*d + a\*e\*x + (b\*d + a\*f)\*x^2 + b\*e\*x^3 + (c\*d + b\*f)\*x^4 + c\*e\*x^5 + c\*f\*x^6)/(a + b\*x^2 + c\*x^4)^4,x]

[Out] ((4\*a\*b\*(e + f\*x) - 4\*b\*d\*x\*(b + c\*x^2) + 8\*a\*c\*x\*(d + x\*(e + f\*x)))/(a\*(-b^2 + 4\*a\*c)\*(a + b\*x^2 + c\*x^4)^2) + (6\*b^3\*d\*x\*(b + c\*x^2) + 2\*a\*b\*x\*(-25\*b\*c\*d + b^2\*f - 24\*c^2\*d\*x^2 + b\*c\*f\*x^2) + 8\*a^2\*c\*(b\*(3\*e + 2\*f\*x) + c\*x

$$\begin{aligned} & (7*d + 6*e*x + 5*f*x^2)) / (a^2*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4)) + (\text{Sqrt}[2]*\text{Sqrt}[c]*(3*b^4*d + b^3*(3*\text{Sqrt}[b^2 - 4*a*c]*d + a*f) - 4*a*b*c*(6*\text{Sqrt}[b^2 - 4*a*c]*d + 13*a*f) + a*b^2*(-30*c*d + \text{Sqrt}[b^2 - 4*a*c]*f) + 4*a^2*c*(42*c*d + 5*\text{Sqrt}[b^2 - 4*a*c]*f))*\text{ArcTan}[(\text{Sqrt}[2]*\text{Sqrt}[c]*x)/\text{Sqrt}[b - \text{Sqrt}[b^2 - 4*a*c]])] / (a^2*(b^2 - 4*a*c)^{(5/2)}*\text{Sqrt}[b - \text{Sqrt}[b^2 - 4*a*c]]) + (\text{Sqrt}[2]*\text{Sqrt}[c]*(-3*b^4*d + b^3*(3*\text{Sqrt}[b^2 - 4*a*c]*d - a*f) + 4*a*b*c*(-6*\text{Sqrt}[b^2 - 4*a*c]*d + 13*a*f) + a*b^2*(30*c*d + \text{Sqrt}[b^2 - 4*a*c]*f) + 4*a^2*c*(-42*c*d + 5*\text{Sqrt}[b^2 - 4*a*c]*f))*\text{ArcTan}[(\text{Sqrt}[2]*\text{Sqrt}[c]*x)/\text{Sqrt}[b + \text{Sqrt}[b^2 - 4*a*c]])] / (a^2*(b^2 - 4*a*c)^{(5/2)}*\text{Sqrt}[b + \text{Sqrt}[b^2 - 4*a*c]]) + (48*c^2*e*\text{Log}[-b + \text{Sqrt}[b^2 - 4*a*c] - 2*c*x^2]) / (b^2 - 4*a*c)^{(5/2)} - (48*c^2*e*\text{Log}[b + \text{Sqrt}[b^2 - 4*a*c] + 2*c*x^2]) / (b^2 - 4*a*c)^{(5/2)} / 16 \end{aligned}$$

### Maple [C] (verified)

Result contains higher order function than in optimal. Order 9 vs. order 3.

Time = 0.56 (sec) , antiderivative size = 607, normalized size of antiderivative = 0.98

method	result
risch	$\frac{c^2(20a^2cf+ab^2f-24abcd+3b^3d)x^7}{8a^2(16a^2c^2-8ab^2c+b^4)} + \frac{3c^3ex^6}{16a^2c^2-8ab^2c+b^4} + \frac{c(28a^2bcf+28a^2c^2d+2ab^3f-49ab^2cd+6db^4)x^5}{8a^2(16a^2c^2-8ab^2c+b^4)} + \frac{9bc^2ex^4}{2(16a^2c^2-8ab^2c+b^4)} + \frac{(36a^3c^2f)}{(cx^4+bx^2)}$
default	Expression too large to display

[In] `int((d*a+a*e*x+(a*f+b*d)*x^2+e*x^3*b+(b*f+c*d)*x^4+c*e*x^5+c*f*x^6)/(c*x^4+b*x^2+a)^4,x,method=_RETURNVERBOSE)`

[Out]  $(1/8*c^2*(20*a^2*c*f+a*b^2*f-24*a*b*c*d+3*b^3*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*x^7+3*c^3*e/(16*a^2*c^2-8*a*b^2*c+b^4)*x^6+1/8/a^2*c*(28*a^2*b*c*f+28*a^2*c^2*d+2*a*b^3*f-49*a*b^2*c*d+6*b^4*d)/(16*a^2*c^2-8*a*b^2*c+b^4)*x^5+9/2*b*c^2*e/(16*a^2*c^2-8*a*b^2*c+b^4)*x^4+1/8*(36*a^3*c^2*f+5*a^2*b^2*c*f-4*a^2*b*c^2*d+a*b^4*f-20*a*b^3*c*d+3*b^5*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*x^3+(5*a*c+b^2)*c*e/(16*a^2*c^2-8*a*b^2*c+b^4)*x^2+1/8*(16*a^2*b*c*f+44*a^2*c^2*d-a*b^3*f-37*a*b^2*c*d+5*b^4*d)/(16*a^2*c^2-8*a*b^2*c+b^4)/a*x+1/4*b*(10*a*c-b^2)*e/(16*a^2*c^2-8*a*b^2*c+b^4)/(c*x^4+b*x^2+a)^2+1/16*\text{sum}((c*(20*a^2*c*f+a*b^2*f-24*a*b*c*d+3*b^3*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4)*_R^2+48*c^2*e/(16*a^2*c^2-8*a*b^2*c+b^4)*_R-(16*a^2*b*c*f-84*a^2*c^2*d-a*b^3*f+27*a*b^2*c*d-3*b^4*d)/a^2/(16*a^2*c^2-8*a*b^2*c+b^4))/(2*_R^3*c+_R*b)*\text{ln}(x-_R),_R=\text{RootOf}(_Z^4*c+_Z^2*b+a))$

**Fricas [F(-1)]**

Timed out.

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^4} dx = \text{Timed out}$$

```
[In] integrate((a*d+a*e*x+(a*f+b*d)*x^2+b*e*x^3+(b*f+c*d)*x^4+c*e*x^5+c*f*x^6)/(c*x^4+b*x^2+a)^4,x, algorithm="fricas")
```

```
[Out] Timed out
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^4} dx = \text{Timed out}$$

```
[In] integrate((a*d+a*e*x+(a*f+b*d)*x**2+b*e*x**3+(b*f+c*d)*x**4+c*e*x**5+c*f*x**6)/(c*x**4+b*x**2+a)**4,x)
```

```
[Out] Timed out
```

**Maxima [F]**

$$\begin{aligned} & \int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^4} dx \\ &= \int \frac{cfx^6 + cex^5 + bex^3 + (cd + bf)x^4 + aex + (bd + af)x^2 + ad}{(cx^4 + bx^2 + a)^4} dx \end{aligned}$$

```
[In] integrate((a*d+a*e*x+(a*f+b*d)*x^2+b*e*x^3+(b*f+c*d)*x^4+c*e*x^5+c*f*x^6)/(c*x^4+b*x^2+a)^4,x, algorithm="maxima")
```

```
[Out] 1/8*(24*a^2*c^3*e*x^6 + 36*a^2*b*c^2*e*x^4 + (3*(b^3*c^2 - 8*a*b*c^3)*d + (a*b^2*c^2 + 20*a^2*c^3)*f)*x^7 + ((6*b^4*c - 49*a*b^2*c^2 + 28*a^2*c^3)*d + 2*(a*b^3*c + 14*a^2*b*c^2)*f)*x^5 + 8*(a^2*b^2*c + 5*a^3*c^2)*e*x^2 + ((3*b^5 - 20*a*b^3*c - 4*a^2*b*c^2)*d + (a*b^4 + 5*a^2*b^2*c + 36*a^3*c^2)*f)*x^3 - 2*(a^2*b^3 - 10*a^3*b*c)*e + ((5*a*b^4 - 37*a^2*b^2*c + 44*a^3*c^2)*d - (a^2*b^3 - 16*a^3*b*c)*f)*x)/((a^2*b^4*c^2 - 8*a^3*b^2*c^3 + 16*a^4*c^4)*x^8 + a^4*b^4 - 8*a^5*b^2*c + 16*a^6*c^2 + 2*(a^2*b^5*c - 8*a^3*b^3*c^2 + 16*a^4*b*c^3)*x^6 + (a^2*b^6 - 6*a^3*b^4*c + 32*a^5*c^3)*x^4 + 2*(a^3*b^5 - 8*a^4*b^3*c + 16*a^5*b*c^2)*x^2) + 1/8*integrate((48*a^2*c^2*e*x + (3*(b^3*c - 8*a*b*c^2)*d + (a*b^2*c + 20*a^2*c^2)*f)*x^2 + 3*(b^4 - 9*a*b^2*c + 28*a^2*c^2)*d + (a*b^3 - 16*a^2*b*c)*f)/(c*x^4 + b*x^2 + a), x)/(a^2*b^4 - 8*a^3*b^2*c + 16*a^4*c^2)
```

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 5280 vs.  $2(561) = 1122$ .

Time = 1.60 (sec) , antiderivative size = 5280, normalized size of antiderivative = 8.50

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^4} dx = \text{Too large to display}$$

[In] integrate((a\*d+a\*e\*x+(a\*f+b\*d)\*x^2+b\*e\*x^3+(b\*f+c\*d)\*x^4+c\*e\*x^5+c\*f\*x^6)/(c\*x^4+b\*x^2+a)^4,x, algorithm="giac")

[Out] 
$$-3*(b^2*c^4 - 4*a*c^5 - 2*b*c^5 + c^6)*\text{sqrt}(b^2 - 4*a*c)*e*\log(x^2 + 1/2*(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 + \text{sqrt}((a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))/((b^8 - 16*a*b^6*c - 2*b^7*c + 96*a^2*b^4*c^2 + 24*a*b^5*c^2 + b^6*c^2 - 256*a^3*b^2*c^3 - 96*a^2*b^3*c^3 - 12*a*b^4*c^3 + 256*a^4*c^4 + 128*a^3*b*c^4 + 48*a^2*b^2*c^4 - 64*a^3*c^5)*c^2) - 3*(b^2*c^4 - 4*a*c^5 - 2*b*c^5 + c^6)*\text{sqrt}(b^2 - 4*a*c)*e*\log(x^2 + 1/2*(a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2 - \text{sqrt}((a^2*b^5 - 8*a^3*b^3*c + 16*a^4*b*c^2)^2 - 4*(a^3*b^4 - 8*a^4*b^2*c + 16*a^5*c^2)*(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3)))/(a^2*b^4*c - 8*a^3*b^2*c^2 + 16*a^4*c^3))/((b^8 - 16*a*b^6*c - 2*b^7*c + 96*a^2*b^4*c^2 + 24*a*b^5*c^2 + b^6*c^2 - 256*a^3*b^2*c^3 - 96*a^2*b^3*c^3 - 12*a*b^4*c^3 + 256*a^4*c^4 + 128*a^3*b*c^4 + 48*a^2*b^2*c^4 - 64*a^3*c^5)*c^2) + 1/32*(3*(\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*b^8 - 17*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a*b^6*c - 2*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*b^7*c - 2*b^8*c + 116*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^2*b^4*c^2 + 26*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a*b^5*c^2 + \text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*b^6*c^2 + 34*a*b^6*c^2 + 2*b^7*c^2 - 368*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^3*b^2*c^3 - 128*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^2*b^3*c^3 - 13*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a*b^4*c^3 - 232*a^2*b^4*c^3 - 30*a*b^5*c^3 + 448*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^4*c^4 + 224*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^3*b*c^4 + 64*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^2*b^2*c^4 + 736*a^3*b^2*c^4 + 176*a^2*b^3*c^4 - 112*\text{sqrt}(2)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^3*c^5 - 896*a^4*c^5 - 352*a^3*b*c^5 - \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*b^7 + 15*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a*b^5*c + 2*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*b^6*c - 88*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^2*b^3*c^2 - 22*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a*b^4*c^2 - \text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*b^5*c^2 + 176*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^3*b*c^3 + 88*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^2*b^2*c^3 + 11*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a*b^3*c^3 - 44*\text{sqrt}(2)*\text{sqrt}(b^2 - 4*a*c)*\text{sqrt}(b*c + \text{sqrt}(b^2 - 4*a*c))*c)*a^2*b*c^4 + 2*(b^2 - 4*a*c)*b^6*c - 26*(b^2 - 4*a*c)$$



$$\begin{aligned}
& a^2 b^4 c^2 - 2(b^2 - 4ac)b^5 c^2 + 128(b^2 - 4ac)a^2 b^2 c^3 + 22(b^2 - 4ac)a^2 b^3 c^3 - 224(b^2 - 4ac)a^3 c^4 - 88(b^2 - 4ac)a^2 b^3 c^4) d + (\sqrt{2}\sqrt{b^2 - 4ac})^2 (b^2 - 4ac) a^2 b^7 - 24\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^5 c - 2\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^6 c - 2a^2 b^7 c + 144\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^3 b^3 c^2 + 40\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^4 c^2 + \sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^5 c^2 + 48a^2 b^5 c^2 + 2a^2 b^6 c^2 - 256\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^4 b^2 c^3 - 128\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^3 b^2 c^3 - 20\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^3 c^3 - 288a^3 b^3 c^3 - 44a^2 b^4 c^3 + 64\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^3 b^2 c^4 + 512a^4 b^2 c^4 + 64a^3 b^2 c^4 + 320a^4 c^5 - \sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^6 + 22\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^4 c + 2\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^5 c - 32\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^3 b^2 c^2 - 36\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^3 c^2 - \sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^4 c^2 - 160\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^4 c^3 - 80\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^3 b^2 c^3 + 18\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^2 c^3 + 40\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^3 c^4 + 2(b^2 - 4ac) a^2 b^5 c - 40(b^2 - 4ac) a^2 b^3 c^2 - 2(b^2 - 4ac) a^2 b^4 c^2 + 128(b^2 - 4ac) a^3 b^2 c^3 + 36(b^2 - 4ac) a^2 b^2 c^3 + 80(b^2 - 4ac) a^3 c^4) \\
& * f) \arctan\left(\frac{2\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^5 - 8a^3 b^3 c + 16a^4 b^2 c^2 + \sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^4 c - 8a^3 b^2 c^2 + 16a^4 c^3}{(a^2 b^5 - 8a^3 b^3 c + 16a^4 b^2 c^2)^2 - 4(a^3 b^4 - 8a^4 b^2 c + 16a^5 c^2)(a^2 b^4 c - 8a^3 b^2 c^2 + 16a^4 c^3)}\right) \\
& + \frac{1}{32} (3\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^8 - 17\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^6 c - 2\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^7 c + 2b^8 c + 116\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^4 c^2 + 26\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^5 c^2 + \sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^6 c^2 - 34a^2 b^6 c^2 - 2b^7 c^2 - 368\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^3 b^2 c^3 - 128\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^3 c^3 - 13\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^4 c^3 + 232a^2 b^4 c^3 + 30a^2 b^5 c^3 + 448\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^4 c^4 + 224\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^3 b^2 c^4 + 64\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^2 c^4 - 736a^3 b^2 c^4 - 176a^2 b^3 c^4 - 112\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^3 c^5 + 896a^4 c^5 + 352a^3 b^2 c^5 + \sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^7 - 15\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^5 c - 2\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^3 c^2 + 88\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^3 c^2 + 22\sqrt{2}\sqrt{b^2 - 4ac} (b^2 - 4ac) a^2 b^4 c^2)
\end{aligned}$$

$$\begin{aligned}
& + \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} b^5 c^2 - 176 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^2 c^3 - 88 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^2 c^3 - 11 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^3 + 44 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^4 c^2 - 2(b^2 - 4ac) b^6 c + 26(b^2 - 4ac) a b^4 c^2 + 2(b^2 - 4ac) b^5 c^2 - 128(b^2 - 4ac) a^2 b^2 c^3 - 22(b^2 - 4ac) a^2 b^3 c^3 + 224(b^2 - 4ac) a^3 c^4 + 88(b^2 - 4ac) a^2 b^2 c^4) d + (\sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^7 - 24 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^5 c - 2 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^6 c + 2 a^2 b^7 c + 144 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^3 c^2 + 40 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^4 c^2 + \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^5 c^2 - 48 a^2 b^5 c^2 - 2 a^2 b^6 c^2 - 256 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^4 b^2 c^3 - 128 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^2 c^3 - 20 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^3 + 288 a^3 b^3 c^3 + 44 a^2 b^4 c^3 + 64 \sqrt{2} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^2 c^4 - 512 a^4 b^2 c^4 - 64 a^3 b^2 c^4 - 320 a^4 c^5 + \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^6 - 22 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^4 c - 2 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^5 c + 32 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^2 c^2 + 36 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^3 c^2 + \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^4 c^2 + 160 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^4 c^3 + 80 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 b^2 c^3 - 18 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^2 b^2 c^3 - 40 \sqrt{2} \sqrt{b^2 - 4ac} \sqrt{bc - \sqrt{b^2 - 4ac}c} a^3 c^4 - 2(b^2 - 4ac) a^2 b^5 c + 40(b^2 - 4ac) a^2 b^3 c^2 + 2(b^2 - 4ac) a^2 b^4 c^2 - 128(b^2 - 4ac) a^3 b^2 c^3 - 36(b^2 - 4ac) a^2 b^2 c^3 - 80(b^2 - 4ac) a^3 c^4) f) \arctan(2 \sqrt{1/2} x / \sqrt{(a^2 b^5 - 8 a^3 b^3 c + 16 a^4 b^2 c^2 - \sqrt{(a^2 b^5 - 8 a^3 b^3 c + 16 a^4 b^2 c^2)^2 - 4(a^3 b^4 - 8 a^4 b^2 c + 16 a^5 c^2)(a^2 b^4 c - 8 a^3 b^2 c^2 + 16 a^4 c^3)})) / (a^2 b^4 c - 8 a^3 b^2 c^2 + 16 a^4 c^3)) / ((a^3 b^8 - 16 a^4 b^6 c - 2 a^3 b^7 c + 96 a^5 b^4 c^2 + 24 a^4 b^5 c^2 + a^3 b^6 c^2 - 256 a^6 b^2 c^3 - 96 a^5 b^3 c^3 - 12 a^4 b^4 c^3 + 256 a^7 c^4 + 128 a^6 b^2 c^4 + 48 a^5 b^2 c^4 - 64 a^6 c^5) \operatorname{abs}(c)) + 1/8(3 b^3 c^2 d x^7 - 24 a b^2 c^3 d x^7 + a b^2 c^2 f x^7 + 20 a^2 c^3 f x^7 + 24 a^2 c^3 e x^6 + 6 b^4 c d x^5 - 49 a b^2 c^2 d x^5 + 28 a^2 c^3 d x^5 + 2 a b^3 c f x^5 + 28 a^2 b^2 c f x^5 + 36 a^2 b^2 c e x^4 + 3 b^5 d x^3 - 20 a b^3 c d x^3 - 4 a^2 b^2 c d x^3 + a b^4 f x^3 + 5 a^2 b^2 c f x^3 + 36 a^3 c^2 f x^3 + 8 a^2 b^2 c e x^2 + 40 a^3 c^2 e x^2 + 5 a b^4 d x - 37 a^2 b^2 c d x + 44 a^3 c^2 d x - a^2 b^3 f x + 16 a^3 b^2 c f x - 2 a^2 b^3 e + 20 a^3 b^2 c e) / ((a^2 b^4 - 8 a^3 b^2 c + 16 a^4 c^2)(c x^4 + b x^2 + a)^2)
\end{aligned}$$

## Mupad [B] (verification not implemented)

Time = 9.34 (sec) , antiderivative size = 8689, normalized size of antiderivative = 13.99

$$\int \frac{ad + aex + (bd + af)x^2 + bex^3 + (cd + bf)x^4 + cex^5 + cfx^6}{(a + bx^2 + cx^4)^4} dx = \text{Too large to display}$$

[In] int((a\*d + x^2\*(b\*d + a\*f) + x^4\*(c\*d + b\*f) + a\*e\*x + b\*e\*x^3 + c\*e\*x^5 + c\*f\*x^6)/(a + b\*x^2 + c\*x^4)^4,x)

[Out] ((x^2\*(5\*a\*c^2\*e + b^2\*c\*e))/(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c) - (b^3\*e - 10\*a\*b\*c\*e)/(4\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (x^5\*(28\*a^2\*c^3\*d + 6\*b^4\*c\*d + 2\*a\*b^3\*c\*f - 49\*a\*b^2\*c^2\*d + 28\*a^2\*b\*c^2\*f))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (x\*(5\*b^4\*d + 44\*a^2\*c^2\*d - a\*b^3\*f - 37\*a\*b^2\*c\*d + 16\*a^2\*b\*c\*f))/(8\*a\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (3\*c^3\*e\*x^6)/(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c) + (x^3\*(3\*b^5\*d + 36\*a^3\*c^2\*f + a\*b^4\*f - 20\*a\*b^3\*c\*d - 4\*a^2\*b\*c^2\*d + 5\*a^2\*b^2\*c\*f))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (9\*b\*c^2\*e\*x^4)/(2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c)) + (c\*x^7\*(20\*a^2\*c^2\*f + 3\*b^3\*c\*d - 24\*a\*b\*c^2\*d + a\*b^2\*c\*f))/(8\*a^2\*(b^4 + 16\*a^2\*c^2 - 8\*a\*b^2\*c))) / (x^4\*(2\*a\*c + b^2) + a^2 + c^2\*x^8 + 2\*a\*b\*x^2 + 2\*b\*c\*x^6) + symsum(log(root(56371445760\*a^11\*b^8\*c^6\*z^4 - 503316480\*a^8\*b^14\*c^3\*z^4 + 47185920\*a^7\*b^16\*c^2\*z^4 - 171798691840\*a^14\*b^2\*c^9\*z^4 + 193273528320\*a^13\*b^4\*c^8\*z^4 - 128849018880\*a^12\*b^6\*c^7\*z^4 - 16911433728\*a^10\*b^10\*c^5\*z^4 + 3523215360\*a^9\*b^12\*c^4\*z^4 - 2621440\*a^6\*b^18\*c\*z^4 + 68719476736\*a^15\*c^10\*z^4 + 65536\*a^5\*b^20\*z^4 - 73728\*a^2\*b^16\*c\*d\*f\*z^2 - 1321205760\*a^9\*b^2\*c^8\*d\*f\*z^2 + 732168192\*a^7\*b^6\*c^6\*d\*f\*z^2 - 366280704\*a^6\*b^8\*c^5\*d\*f\*z^2 - 330301440\*a^8\*b^4\*c^7\*d\*f\*z^2 + 96583680\*a^5\*b^10\*c^4\*d\*f\*z^2 - 15175680\*a^4\*b^12\*c^3\*d\*f\*z^2 + 1428480\*a^3\*b^14\*c^2\*d\*f\*z^2 - 440401920\*a^10\*b\*c^8\*f^2\*z^2 + 1761607680\*a^10\*c^9\*d\*f\*z^2 - 14080\*a^3\*b^15\*c\*f^2\*z^2 + 6936330240\*a^8\*b^3\*c^8\*d^2\*z^2 + 2464874496\*a^6\*b^7\*c^6\*d^2\*z^2 - 3963617280\*a^9\*b\*c^9\*d^2\*z^2 - 1509949440\*a^9\*b^2\*c^8\*e^2\*z^2 - 5400428544\*a^7\*b^5\*c^7\*d^2\*z^2 - 94464\*a\*b^17\*c\*d^2\*z^2 + 754974720\*a^8\*b^4\*c^7\*e^2\*z^2 - 730054656\*a^5\*b^9\*c^5\*d^2\*z^2 + 477102080\*a^9\*b^3\*c^7\*f^2\*z^2 - 174325760\*a^8\*b^5\*c^6\*f^2\*z^2 - 188743680\*a^7\*b^6\*c^6\*e^2\*z^2 + 146165760\*a^4\*b^11\*c^4\*d^2\*z^2 + 1206656\*a^7\*b^7\*c^5\*f^2\*z^2 + 8929280\*a^6\*b^9\*c^4\*f^2\*z^2 + 23592960\*a^6\*b^8\*c^5\*e^2\*z^2 - 2600960\*a^5\*b^11\*c^3\*f^2\*z^2 + 291840\*a^4\*b^13\*c^2\*f^2\*z^2 - 19860480\*a^3\*b^13\*c^3\*d^2\*z^2 - 1179648\*a^5\*b^10\*c^4\*e^2\*z^2 + 1771776\*a^2\*b^15\*c^2\*d^2\*z^2 + 1536\*a\*b^18\*d\*f\*z^2 + 1207959552\*a^10\*c^9\*e^2\*z^2 + 256\*a^2\*b^17\*f^2\*z^2 + 2304\*b^19\*d^2\*z^2 + 169869312\*a^7\*b\*c^8\*d\*e\*f\*z + 9216\*a\*b^13\*c^2\*d\*e\*f\*z - 221773824\*a^6\*b^3\*c^7\*d\*e\*f\*z + 117964800\*a^5\*b^5\*c^6\*d\*e\*f\*z - 32440320\*a^4\*b^7\*c^5\*d\*e\*f\*z + 4792320\*a^3\*b^9\*c^4\*d\*e\*f\*z - 350208\*a^2\*b^11\*c^3\*d\*e\*f\*z - 428544\*a\*b^12\*c^3\*d^2\*e\*z + 1022754816\*a^6\*b^2\*c^8\*d^2\*e\*z - 642318336\*a^5\*b^4\*c^7\*d^2\*e\*z + 223395840\*a^4\*b^6\*c^6\*d^2\*e\*z - 50724864\*a^7\*b^2\*c^7\*e\*f^2\*z + 26542080\*a^6\*b^4\*c^6\*e\*f^2\*z - 46725120\*a^3\*b^8\*c^5\*d^2\*e\*z - 7127040\*a^5\*b^6\*c^5\*e\*f^2\*z + 1013760\*a^4\*b^8\*c^4\*e\*f^2

$$\begin{aligned}
& *z - 69120*a^3*b^{10}*c^3*e*f^2*z + 1536*a^2*b^{12}*c^2*e*f^2*z + 5930496*a^2*b \\
& ^{10}*c^4*d^2*e*z - 693633024*a^7*c^9*d^2*e*z + 39321600*a^8*c^8*e*f^2*z + 13 \\
& 824*b^{14}*c^2*d^2*e*z + 13824*a*b^8*c^4*d*e^2*f - 7741440*a^4*b^2*c^7*d*e^2* \\
& f + 2903040*a^3*b^4*c^6*d*e^2*f - 387072*a^2*b^6*c^5*d*e^2*f + 37310976*a^3 \\
& *b^3*c^7*d^3*f + 3870720*a^5*b*c^7*e^2*f^2 + 34836480*a^4*b*c^8*d^2*e^2 - 8 \\
& 068032*a^2*b^5*c^6*d^3*f - 5623296*a^4*b^3*c^6*d*f^3 + 1737792*a^3*b^5*c^5* \\
& d*f^3 - 260190*a*b^8*c^4*d^2*f^2 - 211680*a^2*b^7*c^4*d*f^3 - 435456*a*b^7* \\
& c^5*d^2*e^2 - 75188736*a^4*b*c^8*d^3*f - 15482880*a^5*c^8*d*e^2*f - 4262400 \\
& *a^5*b*c^7*d*f^3 + 852768*a*b^7*c^5*d^3*f + 7350*a*b^9*c^3*d*f^3 + 35525376 \\
& *a^4*b^2*c^7*d^2*f^2 + 645120*a^4*b^3*c^6*e^2*f^2 - 80640*a^3*b^5*c^5*e^2*f \\
& ^2 + 2304*a^2*b^7*c^4*e^2*f^2 - 15269184*a^3*b^4*c^6*d^2*f^2 + 2870784*a^2* \\
& b^6*c^5*d^2*f^2 - 17418240*a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c^6*d^2*e^ \\
& 2 + 11025*b^{10}*c^3*d^2*f^2 + 5644800*a^5*c^8*d^2*f^2 + 20736*b^9*c^4*d^2*e^ \\
& 2 + 492800*a^5*b^2*c^6*f^4 + 351456*a^4*b^4*c^5*f^4 - 43120*a^3*b^6*c^4*f^4 \\
& + 1225*a^2*b^8*c^3*f^4 - 27433728*a^3*b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^ \\
& 4 - 39690*b^9*c^4*d^3*f - 734832*a*b^6*c^6*d^4 + 49787136*a^4*c^9*d^4 + 160 \\
& 000*a^6*c^7*f^4 + 5308416*a^5*c^8*e^4 + 35721*b^8*c^5*d^4, z, k)*(root(5637 \\
& 1445760*a^{11}*b^8*c^6*z^4 - 503316480*a^8*b^{14}*c^3*z^4 + 47185920*a^7*b^{16}*c \\
& ^2*z^4 - 171798691840*a^{14}*b^2*c^9*z^4 + 193273528320*a^{13}*b^4*c^8*z^4 - 12 \\
& 8849018880*a^{12}*b^6*c^7*z^4 - 16911433728*a^{10}*b^{10}*c^5*z^4 + 3523215360*a^ \\
& 9*b^{12}*c^4*z^4 - 2621440*a^6*b^{18}*c*z^4 + 68719476736*a^{15}*c^{10}*z^4 + 65536 \\
& *a^5*b^{20}*z^4 - 73728*a^2*b^{16}*c*d*f*z^2 - 1321205760*a^9*b^2*c^8*d*f*z^2 + \\
& 732168192*a^7*b^6*c^6*d*f*z^2 - 366280704*a^6*b^8*c^5*d*f*z^2 - 330301440* \\
& a^8*b^4*c^7*d*f*z^2 + 96583680*a^5*b^{10}*c^4*d*f*z^2 - 15175680*a^4*b^{12}*c^3 \\
& *d*f*z^2 + 1428480*a^3*b^{14}*c^2*d*f*z^2 - 440401920*a^{10}*b*c^8*f^2*z^2 + 17 \\
& 61607680*a^{10}*c^9*d*f*z^2 - 14080*a^3*b^{15}*c*f^2*z^2 + 6936330240*a^8*b^3*c \\
& ^8*d^2*z^2 + 2464874496*a^6*b^7*c^6*d^2*z^2 - 3963617280*a^9*b*c^9*d^2*z^2 \\
& - 1509949440*a^9*b^2*c^8*e^2*z^2 - 5400428544*a^7*b^5*c^7*d^2*z^2 - 94464*a \\
& *b^{17}*c^d^2*z^2 + 754974720*a^8*b^4*c^7*e^2*z^2 - 730054656*a^5*b^9*c^5*d^2 \\
& *z^2 + 477102080*a^9*b^3*c^7*f^2*z^2 - 174325760*a^8*b^5*c^6*f^2*z^2 - 1887 \\
& 43680*a^7*b^6*c^6*e^2*z^2 + 146165760*a^4*b^{11}*c^4*d^2*z^2 + 11206656*a^7*b \\
& ^7*c^5*f^2*z^2 + 8929280*a^6*b^9*c^4*f^2*z^2 + 23592960*a^6*b^8*c^5*e^2*z^2 \\
& - 2600960*a^5*b^{11}*c^3*f^2*z^2 + 291840*a^4*b^{13}*c^2*f^2*z^2 - 19860480*a^ \\
& 3*b^{13}*c^3*d^2*z^2 - 1179648*a^5*b^{10}*c^4*e^2*z^2 + 1771776*a^2*b^{15}*c^2*d^ \\
& 2*z^2 + 1536*a*b^{18}*d*f*z^2 + 1207959552*a^{10}*c^9*e^2*z^2 + 256*a^2*b^{17}*f^ \\
& 2*z^2 + 2304*b^{19}*d^2*z^2 + 169869312*a^7*b*c^8*d*e*f*z + 9216*a*b^{13}*c^2*d \\
& *e*f*z - 221773824*a^6*b^3*c^7*d*e*f*z + 117964800*a^5*b^5*c^6*d*e*f*z - 32 \\
& 440320*a^4*b^7*c^5*d*e*f*z + 4792320*a^3*b^9*c^4*d*e*f*z - 350208*a^2*b^{11}* \\
& c^3*d*e*f*z - 428544*a*b^{12}*c^3*d^2*e*z + 1022754816*a^6*b^2*c^8*d^2*e*z - \\
& 642318336*a^5*b^4*c^7*d^2*e*z + 223395840*a^4*b^6*c^6*d^2*e*z - 50724864*a^ \\
& 7*b^2*c^7*e*f^2*z + 26542080*a^6*b^4*c^6*e*f^2*z - 46725120*a^3*b^8*c^5*d^2 \\
& *e*z - 7127040*a^5*b^6*c^5*e*f^2*z + 1013760*a^4*b^8*c^4*e*f^2*z - 69120*a^ \\
& 3*b^{10}*c^3*e*f^2*z + 1536*a^2*b^{12}*c^2*e*f^2*z + 5930496*a^2*b^{10}*c^4*d^2*e \\
& *z - 693633024*a^7*c^9*d^2*e*z + 39321600*a^8*c^8*e*f^2*z + 13824*b^{14}*c^2* \\
& d^2*e*z + 13824*a*b^8*c^4*d*e^2*f - 7741440*a^4*b^2*c^7*d*e^2*f + 2903040*a
\end{aligned}$$

$$\begin{aligned}
&^3b^4c^6d^2e^2f - 387072a^2b^6c^5d^2e^2f + 37310976a^3b^3c^7d^3f \\
&+ 3870720a^5b^3c^7e^2f^2 + 34836480a^4b^3c^8d^2e^2 - 8068032a^2b^5c^6d^3f \\
&- 5623296a^4b^3c^6d^2f^3 + 1737792a^3b^5c^5d^2f^3 - 260190ab^8c^4d^2f^2 \\
&- 211680a^2b^7c^4d^2f^3 - 435456ab^7c^5d^2e^2 - 75188736a^4b^3c^8d^3f \\
&- 15482880a^5c^8d^2e^2f - 4262400a^5b^3c^7d^3f^3 + 852768ab^7c^5d^3f \\
&+ 7350a^2b^9c^3d^2f^3 + 35525376a^4b^2c^7d^2f^2 + 645120a^4b^3c^6e^2f^2 \\
&- 80640a^3b^5c^5e^2f^2 + 2304a^2b^7c^4e^2f^2 - 15269184a^3b^4c^6d^2f^2 \\
&+ 2870784a^2b^6c^5d^2f^2 - 17418240a^3b^3c^7d^2e^2 + 3919104a^2b^5c^6d^2e^2 \\
&+ 11025b^10c^3d^2f^2 + 5644800a^5c^8d^2f^2 + 20736b^9c^4d^2e^2 + 492800a^5b^2c^6f^4 \\
&+ 351456a^4b^4c^5f^4 - 43120a^3b^6c^4f^4 + 1225a^2b^8c^3f^4 - 27433728a^3b^2c^8d^4 \\
&+ 6446304a^2b^4c^7d^4 - 39690b^9c^4d^3f - 734832ab^6c^6d^4 + 49787136a^4c^9d^4 \\
&+ 160000a^6c^7f^4 + 5308416a^5c^8e^4 + 35721b^8c^5d^4, z, k) \cdot ((768a^2b^14c^2d - 22020096a^9c^9d \\
&- 22272a^3b^12c^3d + 282624a^4b^10c^4d - 2027520a^5b^8c^5d + 8847360a^6b^6c^6d \\
&- 23396352a^7b^4c^7d + 34603008a^8b^2c^8d + 256a^3b^13c^2f - 9216a^4b^11c^3f + 122880a^5b^9c^4f \\
&- 819200a^6b^7c^5f + 2949120a^7b^5c^6f - 5505024a^8b^3c^7f + 4194304a^9b^1c^8f) / (512(a^4b^12 \\
&+ 4096a^10c^6 - 24a^5b^10c + 240a^6b^8c^2 - 1280a^7b^6c^3 + 3840a^8b^4c^4 - 6144a^9b^2c^5)) + \\
&(x(786432a^9c^9e - 768a^4b^10c^4e + 15360a^5b^8c^5e - 122880a^6b^6c^6e + 491520a^7b^4c^7e \\
&- 983040a^8b^2c^8e)) / (32(a^4b^12 + 4096a^10c^6 - 24a^5b^10c + 240a^6b^8c^2 - 1280a^7b^6c^3 \\
&+ 3840a^8b^4c^4 - 6144a^9b^2c^5)) + (\text{root}(56371445760a^11b^8c^6z^4 - 503316480a^8b^14c^3z^4 \\
&+ 47185920a^7b^16c^2z^4 - 171798691840a^14b^2c^9z^4 + 193273528320a^13b^4c^8z^4 \\
&- 128849018880a^12b^6c^7z^4 - 16911433728a^10b^10c^5z^4 + 3523215360a^9b^12c^4z^4 - 2621440a^6b^18c^2z^4 \\
&+ 68719476736a^15c^10z^4 + 65536a^5b^20z^4 - 73728a^2b^16c^2d^2f^2 - 1321205760a^9b^2c^8d^2f^2 \\
&+ 732168192a^7b^6c^6d^2f^2 - 366280704a^6b^8c^5d^2f^2 - 330301440a^8b^4c^7d^2f^2 + 96583680a^5b^10c^4d^2f^2 \\
&- 15175680a^4b^12c^3d^2f^2 + 1428480a^3b^14c^2d^2f^2 - 440401920a^10b^1c^8f^2z^2 + 1761607680a^10c^9d^2f^2z^2 \\
&- 14080a^3b^15c^2f^2z^2 + 6936330240a^8b^3c^8d^2z^2 + 2464874496a^6b^7c^6d^2z^2 - 3963617280a^9b^1c^9d^2z^2 \\
&- 1509949440a^9b^2c^8e^2z^2 - 5400428544a^7b^5c^7d^2z^2 - 94464a^2b^17c^2d^2z^2 + 754974720a^8b^4c^7e^2z^2 \\
&- 730054656a^5b^9c^5d^2z^2 + 477102080a^9b^3c^7f^2z^2 - 174325760a^8b^5c^6f^2z^2 - 188743680a^7b^6c^6e^2z^2 \\
&+ 146165760a^4b^11c^4d^2z^2 + 11206656a^7b^7c^5f^2z^2 + 8929280a^6b^9c^4f^2z^2 + 23592960a^6b^8c^5e^2z^2 \\
&- 2600960a^5b^11c^3f^2z^2 + 291840a^4b^13c^2f^2z^2 - 19860480a^3b^13c^3d^2z^2 - 1179648a^5b^10c^4e^2z^2 \\
&+ 1771776a^2b^15c^2d^2z^2 + 1536a^2b^18d^2f^2z^2 + 1207959552a^10c^9e^2z^2 + 256a^2b^17f^2z^2 \\
&+ 2304b^19d^2z^2 + 169869312a^7b^1c^8d^2e^2f^2z + 9216a^2b^13c^2d^2e^2f^2z - 221773824a^6b^3c^7d^2e^2f^2z \\
&+ 117964800a^5b^5c^6d^2e^2f^2z - 32440320a^4b^7c^5d^2e^2f^2z + 4792320a^3b^9c^4d^2e^2f^2z \\
&- 350208a^2b^11c^3d^2e^2f^2z - 428544a^2b^12c^
\end{aligned}$$

$$\begin{aligned}
& 3*d^2*e*z + 1022754816*a^6*b^2*c^8*d^2*e*z - 642318336*a^5*b^4*c^7*d^2*e*z \\
& + 223395840*a^4*b^6*c^6*d^2*e*z - 50724864*a^7*b^2*c^7*e*f^2*z + 26542080*a \\
& ^6*b^4*c^6*e*f^2*z - 46725120*a^3*b^8*c^5*d^2*e*z - 7127040*a^5*b^6*c^5*e*f \\
& ^2*z + 1013760*a^4*b^8*c^4*e*f^2*z - 69120*a^3*b^10*c^3*e*f^2*z + 1536*a^2* \\
& b^12*c^2*e*f^2*z + 5930496*a^2*b^10*c^4*d^2*e*z - 693633024*a^7*c^9*d^2*e*z \\
& + 39321600*a^8*c^8*e*f^2*z + 13824*b^14*c^2*d^2*e*z + 13824*a*b^8*c^4*d*e^ \\
& 2*f - 7741440*a^4*b^2*c^7*d*e^2*f + 2903040*a^3*b^4*c^6*d*e^2*f - 387072*a^ \\
& 2*b^6*c^5*d*e^2*f + 37310976*a^3*b^3*c^7*d^3*f + 3870720*a^5*b*c^7*e^2*f^2 \\
& + 34836480*a^4*b*c^8*d^2*e^2 - 8068032*a^2*b^5*c^6*d^3*f - 5623296*a^4*b^3* \\
& c^6*d*f^3 + 1737792*a^3*b^5*c^5*d*f^3 - 260190*a*b^8*c^4*d^2*f^2 - 211680*a \\
& ^2*b^7*c^4*d*f^3 - 435456*a*b^7*c^5*d^2*e^2 - 75188736*a^4*b*c^8*d^3*f - 15 \\
& 482880*a^5*c^8*d*e^2*f - 4262400*a^5*b*c^7*d*f^3 + 852768*a*b^7*c^5*d^3*f + \\
& 7350*a*b^9*c^3*d*f^3 + 35525376*a^4*b^2*c^7*d^2*f^2 + 645120*a^4*b^3*c^6*e \\
& ^2*f^2 - 80640*a^3*b^5*c^5*e^2*f^2 + 2304*a^2*b^7*c^4*e^2*f^2 - 15269184*a^ \\
& 3*b^4*c^6*d^2*f^2 + 2870784*a^2*b^6*c^5*d^2*f^2 - 17418240*a^3*b^3*c^7*d^2* \\
& e^2 + 3919104*a^2*b^5*c^6*d^2*e^2 + 11025*b^10*c^3*d^2*f^2 + 5644800*a^5*c^ \\
& 8*d^2*f^2 + 20736*b^9*c^4*d^2*e^2 + 492800*a^5*b^2*c^6*f^4 + 351456*a^4*b^4 \\
& *c^5*f^4 - 43120*a^3*b^6*c^4*f^4 + 1225*a^2*b^8*c^3*f^4 - 27433728*a^3*b^2* \\
& c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 - 39690*b^9*c^4*d^3*f - 734832*a*b^6*c^6* \\
& d^4 + 49787136*a^4*c^9*d^4 + 160000*a^6*c^7*f^4 + 5308416*a^5*c^8*e^4 + 357 \\
& 21*b^8*c^5*d^4, z, k)*x*(4194304*a^11*b*c^9 - 256*a^4*b^15*c^2 + 7168*a^5*b \\
& ^13*c^3 - 86016*a^6*b^11*c^4 + 573440*a^7*b^9*c^5 - 2293760*a^8*b^7*c^6 + 5 \\
& 505024*a^9*b^5*c^7 - 7340032*a^10*b^3*c^8))/(32*(a^4*b^12 + 4096*a^10*c^6 - \\
& 24*a^5*b^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 61 \\
& 44*a^9*b^2*c^5))) + (3244032*a^6*b*c^8*d*e - 983040*a^7*c^8*e*f + 4608*a^2* \\
& b^9*c^4*d*e - 87552*a^3*b^7*c^5*d*e + 681984*a^4*b^5*c^6*d*e - 2433024*a^5* \\
& b^3*c^7*d*e + 1536*a^3*b^8*c^4*e*f - 39936*a^4*b^6*c^5*e*f + 184320*a^5*b^4 \\
& *c^6*e*f + 49152*a^6*b^2*c^7*e*f)/(512*(a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b \\
& ^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^ \\
& 2*c^5)) - (x*(225792*a^6*c^9*d^2 + 9*b^12*c^3*d^2 - 12800*a^7*c^8*f^2 - 252 \\
& *a*b^10*c^4*d^2 - 36864*a^6*b*c^8*e^2 + 3114*a^2*b^8*c^5*d^2 - 21312*a^3*b^ \\
& 6*c^6*d^2 + 88128*a^4*b^4*c^7*d^2 - 211968*a^5*b^2*c^8*d^2 - 2304*a^4*b^5*c \\
& ^6*e^2 + 18432*a^5*b^3*c^7*e^2 + a^2*b^10*c^3*f^2 - 42*a^3*b^8*c^4*f^2 + 17 \\
& 60*a^4*b^6*c^5*f^2 - 13120*a^5*b^4*c^6*f^2 + 29952*a^6*b^2*c^7*f^2 + 6*a*b^ \\
& 11*c^3*d*f - 109056*a^6*b*c^8*d*f - 210*a^2*b^9*c^4*d*f + 2496*a^3*b^7*c^5* \\
& d*f - 18240*a^4*b^5*c^6*d*f + 72192*a^5*b^3*c^7*d*f))/(32*(a^4*b^12 + 4096* \\
& a^10*c^6 - 24*a^5*b^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^ \\
& 4*c^4 - 6144*a^9*b^2*c^5))) - (567*b^7*c^5*d^3 + 8000*a^5*c^7*f^3 - 10368*a \\
& *b^5*c^6*d^3 - 169344*a^3*b*c^8*d^3 - 193536*a^4*c^8*d*e^2 + 141120*a^4*c^8 \\
& *d^2*f - 315*b^8*c^4*d^2*f + 67824*a^2*b^3*c^7*d^3 - 35*a^2*b^6*c^4*f^3 - 8 \\
& 4*a^3*b^4*c^5*f^3 + 12720*a^4*b^2*c^6*f^3 + 6237*a*b^6*c^5*d^2*f - 210*a*b^ \\
& 7*c^4*d*f^2 - 116160*a^4*b*c^7*d*f^2 + 36864*a^4*b*c^7*e^2*f - 6912*a^2*b^4 \\
& *c^6*d*e^2 + 62208*a^3*b^2*c^7*d*e^2 - 42372*a^2*b^4*c^6*d^2*f + 1764*a^2*b \\
& ^5*c^5*d*f^2 + 96048*a^3*b^2*c^7*d^2*f + 4608*a^3*b^3*c^6*d*f^2 - 2304*a^3* \\
& b^3*c^6*e^2*f)/(512*(a^4*b^12 + 4096*a^10*c^6 - 24*a^5*b^10*c + 240*a^6*b^8
\end{aligned}$$

$$\begin{aligned}
& *c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^9*b^2*c^5) + (x*(6912* \\
& a^4*c^8*e^3 - 27*b^7*c^5*d^2*e - 10080*a^4*c^8*d*e*f + 486*a*b^5*c^6*d^2*e \\
& + 12096*a^3*b*c^8*d^2*e + 3120*a^4*b*c^7*e*f^2 - 3672*a^2*b^3*c^7*d^2*e - 3 \\
& *a^2*b^5*c^5*e*f^2 + 96*a^3*b^3*c^6*e*f^2 - 18*a*b^6*c^5*d*e*f + 450*a^2*b^ \\
& 4*c^6*d*e*f - 2448*a^3*b^2*c^7*d*e*f))/(32*(a^4*b^12 + 4096*a^10*c^6 - 24*a \\
& ^5*b^10*c + 240*a^6*b^8*c^2 - 1280*a^7*b^6*c^3 + 3840*a^8*b^4*c^4 - 6144*a^ \\
& 9*b^2*c^5)))*root(56371445760*a^11*b^8*c^6*z^4 - 503316480*a^8*b^14*c^3*z^4 \\
& + 47185920*a^7*b^16*c^2*z^4 - 171798691840*a^14*b^2*c^9*z^4 + 193273528320 \\
& *a^13*b^4*c^8*z^4 - 128849018880*a^12*b^6*c^7*z^4 - 16911433728*a^10*b^10*c \\
& ^5*z^4 + 3523215360*a^9*b^12*c^4*z^4 - 2621440*a^6*b^18*c*z^4 + 68719476736 \\
& *a^15*c^10*z^4 + 65536*a^5*b^20*z^4 - 73728*a^2*b^16*c*d*f*z^2 - 1321205760 \\
& *a^9*b^2*c^8*d*f*z^2 + 732168192*a^7*b^6*c^6*d*f*z^2 - 366280704*a^6*b^8*c^ \\
& 5*d*f*z^2 - 330301440*a^8*b^4*c^7*d*f*z^2 + 96583680*a^5*b^10*c^4*d*f*z^2 - \\
& 15175680*a^4*b^12*c^3*d*f*z^2 + 1428480*a^3*b^14*c^2*d*f*z^2 - 440401920*a \\
& ^10*b*c^8*f^2*z^2 + 1761607680*a^10*c^9*d*f*z^2 - 14080*a^3*b^15*c*f^2*z^2 \\
& + 6936330240*a^8*b^3*c^8*d^2*z^2 + 2464874496*a^6*b^7*c^6*d^2*z^2 - 3963617 \\
& 280*a^9*b*c^9*d^2*z^2 - 1509949440*a^9*b^2*c^8*e^2*z^2 - 5400428544*a^7*b^5 \\
& *c^7*d^2*z^2 - 94464*a*b^17*c*d^2*z^2 + 754974720*a^8*b^4*c^7*e^2*z^2 - 730 \\
& 054656*a^5*b^9*c^5*d^2*z^2 + 477102080*a^9*b^3*c^7*f^2*z^2 - 174325760*a^8* \\
& b^5*c^6*f^2*z^2 - 188743680*a^7*b^6*c^6*e^2*z^2 + 146165760*a^4*b^11*c^4*d^ \\
& 2*z^2 + 11206656*a^7*b^7*c^5*f^2*z^2 + 8929280*a^6*b^9*c^4*f^2*z^2 + 235929 \\
& 60*a^6*b^8*c^5*e^2*z^2 - 2600960*a^5*b^11*c^3*f^2*z^2 + 291840*a^4*b^13*c^2 \\
& *f^2*z^2 - 19860480*a^3*b^13*c^3*d^2*z^2 - 1179648*a^5*b^10*c^4*e^2*z^2 + 1 \\
& 771776*a^2*b^15*c^2*d^2*z^2 + 1536*a*b^18*d*f*z^2 + 1207959552*a^10*c^9*e^2 \\
& *z^2 + 256*a^2*b^17*f^2*z^2 + 2304*b^19*d^2*z^2 + 169869312*a^7*b*c^8*d*e*f \\
& *z + 9216*a*b^13*c^2*d*e*f*z - 221773824*a^6*b^3*c^7*d*e*f*z + 117964800*a^ \\
& 5*b^5*c^6*d*e*f*z - 32440320*a^4*b^7*c^5*d*e*f*z + 4792320*a^3*b^9*c^4*d*e* \\
& f*z - 350208*a^2*b^11*c^3*d*e*f*z - 428544*a*b^12*c^3*d^2*e*z + 1022754816* \\
& a^6*b^2*c^8*d^2*e*z - 642318336*a^5*b^4*c^7*d^2*e*z + 223395840*a^4*b^6*c^6 \\
& *d^2*e*z - 50724864*a^7*b^2*c^7*e*f^2*z + 26542080*a^6*b^4*c^6*e*f^2*z - 46 \\
& 725120*a^3*b^8*c^5*d^2*e*z - 7127040*a^5*b^6*c^5*e*f^2*z + 1013760*a^4*b^8* \\
& c^4*e*f^2*z - 69120*a^3*b^10*c^3*e*f^2*z + 1536*a^2*b^12*c^2*e*f^2*z + 5930 \\
& 496*a^2*b^10*c^4*d^2*e*z - 693633024*a^7*c^9*d^2*e*z + 39321600*a^8*c^8*e*f \\
& ^2*z + 13824*b^14*c^2*d^2*e*z + 13824*a*b^8*c^4*d*e^2*f - 7741440*a^4*b^2*c \\
& ^7*d*e^2*f + 2903040*a^3*b^4*c^6*d*e^2*f - 387072*a^2*b^6*c^5*d*e^2*f + 373 \\
& 10976*a^3*b^3*c^7*d^3*f + 3870720*a^5*b*c^7*e^2*f^2 + 34836480*a^4*b*c^8*d^ \\
& 2*e^2 - 8068032*a^2*b^5*c^6*d^3*f - 5623296*a^4*b^3*c^6*d*f^3 + 1737792*a^3 \\
& *b^5*c^5*d*f^3 - 260190*a*b^8*c^4*d^2*f^2 - 211680*a^2*b^7*c^4*d*f^3 - 4354 \\
& 56*a*b^7*c^5*d^2*e^2 - 75188736*a^4*b*c^8*d^3*f - 15482880*a^5*c^8*d*e^2*f \\
& - 4262400*a^5*b*c^7*d*f^3 + 852768*a*b^7*c^5*d^3*f + 7350*a*b^9*c^3*d*f^3 + \\
& 35525376*a^4*b^2*c^7*d^2*f^2 + 645120*a^4*b^3*c^6*e^2*f^2 - 80640*a^3*b^5* \\
& c^5*e^2*f^2 + 2304*a^2*b^7*c^4*e^2*f^2 - 15269184*a^3*b^4*c^6*d^2*f^2 + 287 \\
& 0784*a^2*b^6*c^5*d^2*f^2 - 17418240*a^3*b^3*c^7*d^2*e^2 + 3919104*a^2*b^5*c \\
& ^6*d^2*e^2 + 11025*b^10*c^3*d^2*f^2 + 5644800*a^5*c^8*d^2*f^2 + 20736*b^9*c \\
& ^4*d^2*e^2 + 492800*a^5*b^2*c^6*f^4 + 351456*a^4*b^4*c^5*f^4 - 43120*a^3*b^
\end{aligned}$$

$$6*c^4*f^4 + 1225*a^2*b^8*c^3*f^4 - 27433728*a^3*b^2*c^8*d^4 + 6446304*a^2*b^4*c^7*d^4 - 39690*b^9*c^4*d^3*f - 734832*a*b^6*c^6*d^4 + 49787136*a^4*c^9*d^4 + 160000*a^6*c^7*f^4 + 5308416*a^5*c^8*e^4 + 35721*b^8*c^5*d^4, z, k), k, 1, 4)$$



$$3.67 \quad \int \frac{2-x-2x^2+x^3}{4-5x^2+x^4} dx$$

Optimal result . . . . .	953
Rubi [A] (verified) . . . . .	953
Mathematica [A] (verified) . . . . .	954
Maple [A] (verified) . . . . .	954
Fricas [A] (verification not implemented) . . . . .	954
Sympy [A] (verification not implemented) . . . . .	955
Maxima [A] (verification not implemented) . . . . .	955
Giac [A] (verification not implemented) . . . . .	955
Mupad [B] (verification not implemented) . . . . .	955

### Optimal result

Integrand size = 26, antiderivative size = 4

$$\int \frac{2-x-2x^2+x^3}{4-5x^2+x^4} dx = \log(2+x)$$

[Out] ln(2+x)

### Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 4, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.077$ , Rules used = {1600, 31}

$$\int \frac{2-x-2x^2+x^3}{4-5x^2+x^4} dx = \log(x+2)$$

[In] Int[(2 - x - 2\*x^2 + x^3)/(4 - 5\*x^2 + x^4), x]

[Out] Log[2 + x]

#### Rule 31

Int[((a\_) + (b\_.)\*(x\_))^(n\_), x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

#### Rule 1600

Int[(u\_.)\*(Px\_)^(p\_.)\*(Qx\_)^(q\_.), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p+q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rubi steps

$$\begin{aligned}\text{integral} &= \int \frac{1}{2+x} dx \\ &= \log(2+x)\end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.00 (sec) , antiderivative size = 4, normalized size of antiderivative = 1.00

$$\int \frac{2-x-2x^2+x^3}{4-5x^2+x^4} dx = \log(2+x)$$

[In] Integrate[(2 - x - 2\*x^2 + x^3)/(4 - 5\*x^2 + x^4), x]

[Out] Log[2 + x]

**Maple [A] (verified)**

Time = 0.02 (sec) , antiderivative size = 5, normalized size of antiderivative = 1.25

method	result	size
default	$\ln(x+2)$	5
norman	$\ln(x+2)$	5
risch	$\ln(x+2)$	5
parallelrisch	$\ln(x+2)$	5

[In] int((x^3-2\*x^2-x+2)/(x^4-5\*x^2+4), x, method=\_RETURNVERBOSE)

[Out] ln(x+2)

**Fricas [A] (verification not implemented)**

none

Time = 0.27 (sec) , antiderivative size = 4, normalized size of antiderivative = 1.00

$$\int \frac{2-x-2x^2+x^3}{4-5x^2+x^4} dx = \log(x+2)$$

[In] integrate((x^3-2\*x^2-x+2)/(x^4-5\*x^2+4), x, algorithm="fricas")

[Out] log(x + 2)

**Sympy [A] (verification not implemented)**

Time = 0.02 (sec) , antiderivative size = 3, normalized size of antiderivative = 0.75

$$\int \frac{2 - x - 2x^2 + x^3}{4 - 5x^2 + x^4} dx = \log(x + 2)$$

[In] integrate((x\*\*3-2\*x\*\*2-x+2)/(x\*\*4-5\*x\*\*2+4),x)

[Out] log(x + 2)

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 4, normalized size of antiderivative = 1.00

$$\int \frac{2 - x - 2x^2 + x^3}{4 - 5x^2 + x^4} dx = \log(x + 2)$$

[In] integrate((x^3-2\*x^2-x+2)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] log(x + 2)

**Giac [A] (verification not implemented)**

none

Time = 0.28 (sec) , antiderivative size = 5, normalized size of antiderivative = 1.25

$$\int \frac{2 - x - 2x^2 + x^3}{4 - 5x^2 + x^4} dx = \log(|x + 2|)$$

[In] integrate((x^3-2\*x^2-x+2)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] log(abs(x + 2))

**Mupad [B] (verification not implemented)**

Time = 0.01 (sec) , antiderivative size = 4, normalized size of antiderivative = 1.00

$$\int \frac{2 - x - 2x^2 + x^3}{4 - 5x^2 + x^4} dx = \ln(x + 2)$$

[In] int(-(x + 2\*x^2 - x^3 - 2)/(x^4 - 5\*x^2 + 4),x)

[Out] log(x + 2)

$$3.68 \quad \int \frac{(d+ex)(2-x-2x^2+x^3)}{4-5x^2+x^4} dx$$

Optimal result	956
Rubi [A] (verified)	956
Mathematica [A] (verified)	957
Maple [A] (verified)	957
Fricas [A] (verification not implemented)	958
Sympy [A] (verification not implemented)	958
Maxima [A] (verification not implemented)	958
Giac [A] (verification not implemented)	958
Mupad [B] (verification not implemented)	959

### Optimal result

Integrand size = 31, antiderivative size = 14

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{4-5x^2+x^4} dx = ex + (d-2e)\log(2+x)$$

[Out] e\*x+(d-2\*e)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.065$ , Rules used = {1600, 45}

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{4-5x^2+x^4} dx = (d-2e)\log(x+2) + ex$$

[In] Int[((d + e\*x)\*(2 - x - 2\*x^2 + x^3))/(4 - 5\*x^2 + x^4), x]

[Out] e\*x + (d - 2\*e)\*Log[2 + x]

#### Rule 45

Int[((a\_.) + (b\_.)\*(x\_))^(m\_.)\*((c\_.) + (d\_.)\*(x\_))^(n\_.), x\_Symbol] :> Int[ExpandIntegrand[(a + b\*x)^m\*(c + d\*x)^n, x] /; FreeQ[{a, b, c, d, n}, x] && NeQ[b\*c - a\*d, 0] && IGtQ[m, 0] && (!IntegerQ[n] || (EqQ[c, 0] && LeQ[7\*m + 4\*n + 4, 0]) || LtQ[9\*m + 5\*(n + 1), 0] || GtQ[m + n + 2, 0])]

#### Rule 1600

Int[(u\_.)\*(Px\_)^(p\_.)\*(Qx\_)^(q\_.), x\_Symbol] :> Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] &&

EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d+ex}{2+x} dx \\ &= \int \left( e + \frac{d-2e}{2+x} \right) dx \\ &= ex + (d-2e) \log(2+x) \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.02 (sec) , antiderivative size = 16, normalized size of antiderivative = 1.14

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{4-5x^2+x^4} dx = e(2+x) + (d-2e) \log(2+x)$$

[In] Integrate[((d + e\*x)\*(2 - x - 2\*x^2 + x^3))/(4 - 5\*x^2 + x^4), x]

[Out] e\*(2 + x) + (d - 2\*e)\*Log[2 + x]

**Maple [A] (verified)**

Time = 0.03 (sec) , antiderivative size = 15, normalized size of antiderivative = 1.07

method	result	size
default	$ex + (d - 2e) \ln(x + 2)$	15
norman	$ex + (d - 2e) \ln(x + 2)$	15
risch	$ex + \ln(x + 2) d - 2 \ln(x + 2) e$	18
parallelrisk	$ex + \ln(x + 2) d - 2 \ln(x + 2) e$	18

[In] int((e\*x+d)\*(x^3-2\*x^2-x+2)/(x^4-5\*x^2+4), x, method=\_RETURNVERBOSE)

[Out] e\*x+(d-2\*e)\*ln(x+2)

**Fricas [A] (verification not implemented)**

none

Time = 0.26 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{4-5x^2+x^4} dx = ex + (d-2e)\log(x+2)$$

[In] integrate((e\*x+d)\*(x^3-2\*x^2-x+2)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out] e\*x + (d - 2\*e)\*log(x + 2)

**Sympy [A] (verification not implemented)**

Time = 0.06 (sec) , antiderivative size = 12, normalized size of antiderivative = 0.86

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{4-5x^2+x^4} dx = ex + (d-2e)\log(x+2)$$

[In] integrate((e\*x+d)\*(x\*\*3-2\*x\*\*2-x+2)/(x\*\*4-5\*x\*\*2+4),x)

[Out] e\*x + (d - 2\*e)\*log(x + 2)

**Maxima [A] (verification not implemented)**

none

Time = 0.20 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{4-5x^2+x^4} dx = ex + (d-2e)\log(x+2)$$

[In] integrate((e\*x+d)\*(x^3-2\*x^2-x+2)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] e\*x + (d - 2\*e)\*log(x + 2)

**Giac [A] (verification not implemented)**

none

Time = 0.31 (sec) , antiderivative size = 15, normalized size of antiderivative = 1.07

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{4-5x^2+x^4} dx = ex + (d-2e)\log(|x+2|)$$

[In] integrate((e\*x+d)\*(x^3-2\*x^2-x+2)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] e\*x + (d - 2\*e)\*log(abs(x + 2))

**Mupad [B] (verification not implemented)**

Time = 7.86 (sec) , antiderivative size = 14, normalized size of antiderivative = 1.00

$$\int \frac{(d + ex)(2 - x - 2x^2 + x^3)}{4 - 5x^2 + x^4} dx = \ln(x + 2)(d - 2e) + ex$$

[In] int(-((d + e\*x)\*(x + 2\*x^2 - x^3 - 2))/(x^4 - 5\*x^2 + 4),x)

[Out] log(x + 2)\*(d - 2\*e) + e\*x

$$3.69 \quad \int \frac{(d+ex+fx^2)(2-x-2x^2+x^3)}{4-5x^2+x^4} dx$$

Optimal result . . . . .	960
Rubi [A] (verified) . . . . .	960
Mathematica [A] (verified) . . . . .	961
Maple [A] (verified) . . . . .	961
Fricas [A] (verification not implemented) . . . . .	962
Sympy [A] (verification not implemented) . . . . .	962
Maxima [A] (verification not implemented) . . . . .	962
Giac [A] (verification not implemented) . . . . .	963
Mupad [B] (verification not implemented) . . . . .	963

### Optimal result

Integrand size = 36, antiderivative size = 31

$$\int \frac{(d+ex+fx^2)(2-x-2x^2+x^3)}{4-5x^2+x^4} dx = (e-4f)x + \frac{1}{2}f(2+x)^2 + (d-2e+4f)\log(2+x)$$

[Out] (e-4\*f)\*x+1/2\*f\*(2+x)^2+(d-2\*e+4\*f)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 31, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.056$ , Rules used = {1600, 712}

$$\int \frac{(d+ex+fx^2)(2-x-2x^2+x^3)}{4-5x^2+x^4} dx = \log(x+2)(d-2e+4f) + x(e-4f) + \frac{1}{2}f(x+2)^2$$

[In] Int[((d + e\*x + f\*x^2)\*(2 - x - 2\*x^2 + x^3))/(4 - 5\*x^2 + x^4), x]

[Out] (e - 4\*f)\*x + (f\*(2 + x)^2)/2 + (d - 2\*e + 4\*f)\*Log[2 + x]

#### Rule 712

```
Int[((d_.) + (e_.)*(x_))^(m_)*((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_.), x_
Symbol] := Int[ExpandIntegrand[(d + e*x)^m*(a + b*x + c*x^2)^p, x], x] /; F
reeQ[{a, b, c, d, e, m}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e +
a*e^2, 0] && NeQ[2*c*d - b*e, 0] && IntegerQ[p] && (GtQ[p, 0] || (EqQ[a, 0]
&& IntegerQ[m]))
```

#### Rule 1600



```
Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px
, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] &&
EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex + fx^2}{2 + x} dx \\ &= \int \left( e - 4f + \frac{d - 2e + 4f}{2 + x} + f(2 + x) \right) dx \\ &= (e - 4f)x + \frac{1}{2}f(2 + x)^2 + (d - 2e + 4f) \log(2 + x) \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.02 (sec) , antiderivative size = 30, normalized size of antiderivative = 0.97

$$\int \frac{(d + ex + fx^2)(2 - x - 2x^2 + x^3)}{4 - 5x^2 + x^4} dx = \frac{1}{2}(2e + f(-6 + x))(2 + x) + (d - 2e + 4f) \log(2 + x)$$

```
[In] Integrate[((d + e*x + f*x^2)*(2 - x - 2*x^2 + x^3))/(4 - 5*x^2 + x^4), x]
```

```
[Out] ((2*e + f*(-6 + x))*(2 + x))/2 + (d - 2*e + 4*f)*Log[2 + x]
```

**Maple [A] (verified)**

Time = 0.03 (sec) , antiderivative size = 28, normalized size of antiderivative = 0.90

method	result	size
default	$\frac{fx^2}{2} + ex - 2fx + (d - 2e + 4f) \ln(x + 2)$	28
norman	$(e - 2f)x + \frac{fx^2}{2} + (d - 2e + 4f) \ln(x + 2)$	28
risch	$\frac{fx^2}{2} + ex - 2fx + \ln(x + 2) d - 2 \ln(x + 2) e + 4 \ln(x + 2) f$	35
parallelrisch	$\frac{fx^2}{2} + ex - 2fx + \ln(x + 2) d - 2 \ln(x + 2) e + 4 \ln(x + 2) f$	35

```
[In] int((f*x^2+e*x+d)*(x^3-2*x^2-x+2)/(x^4-5*x^2+4), x, method=_RETURNVERBOSE)
```

```
[Out] 1/2*f*x^2+e*x-2*f*x+(d-2*e+4*f)*ln(x+2)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.26 (sec) , antiderivative size = 27, normalized size of antiderivative = 0.87

$$\int \frac{(d + ex + fx^2)(2 - x - 2x^2 + x^3)}{4 - 5x^2 + x^4} dx = \frac{1}{2} fx^2 + (e - 2f)x + (d - 2e + 4f) \log(x + 2)$$

```
[In] integrate((f*x^2+e*x+d)*(x^3-2*x^2-x+2)/(x^4-5*x^2+4),x, algorithm="fricas")
```

```
[Out] 1/2*f*x^2 + (e - 2*f)*x + (d - 2*e + 4*f)*log(x + 2)
```

**Sympy [A] (verification not implemented)**

Time = 0.08 (sec) , antiderivative size = 26, normalized size of antiderivative = 0.84

$$\int \frac{(d + ex + fx^2)(2 - x - 2x^2 + x^3)}{4 - 5x^2 + x^4} dx = \frac{fx^2}{2} + x(e - 2f) + (d - 2e + 4f) \log(x + 2)$$

```
[In] integrate((f*x**2+e*x+d)*(x**3-2*x**2-x+2)/(x**4-5*x**2+4),x)
```

```
[Out] f*x**2/2 + x*(e - 2*f) + (d - 2*e + 4*f)*log(x + 2)
```

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 27, normalized size of antiderivative = 0.87

$$\int \frac{(d + ex + fx^2)(2 - x - 2x^2 + x^3)}{4 - 5x^2 + x^4} dx = \frac{1}{2} fx^2 + (e - 2f)x + (d - 2e + 4f) \log(x + 2)$$

```
[In] integrate((f*x^2+e*x+d)*(x^3-2*x^2-x+2)/(x^4-5*x^2+4),x, algorithm="maxima")
```

```
[Out] 1/2*f*x^2 + (e - 2*f)*x + (d - 2*e + 4*f)*log(x + 2)
```

**Giac [A] (verification not implemented)**

none

Time = 0.31 (sec) , antiderivative size = 28, normalized size of antiderivative = 0.90

$$\int \frac{(d + ex + fx^2)(2 - x - 2x^2 + x^3)}{4 - 5x^2 + x^4} dx = \frac{1}{2} fx^2 + ex - 2fx + (d - 2e + 4f) \log(|x + 2|)$$

[In] integrate((f\*x^2+e\*x+d)\*(x^3-2\*x^2-x+2)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] 1/2\*f\*x^2 + e\*x - 2\*f\*x + (d - 2\*e + 4\*f)\*log(abs(x + 2))

**Mupad [B] (verification not implemented)**

Time = 0.02 (sec) , antiderivative size = 27, normalized size of antiderivative = 0.87

$$\int \frac{(d + ex + fx^2)(2 - x - 2x^2 + x^3)}{4 - 5x^2 + x^4} dx = x(e - 2f) + \frac{fx^2}{2} + \ln(x + 2)(d - 2e + 4f)$$

[In] int(-((d + e\*x + f\*x^2)\*(x + 2\*x^2 - x^3 - 2))/(x^4 - 5\*x^2 + 4),x)

[Out] x\*(e - 2\*f) + (f\*x^2)/2 + log(x + 2)\*(d - 2\*e + 4\*f)

$$3.70 \quad \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx$$

Optimal result	964
Rubi [A] (verified)	964
Mathematica [A] (verified)	965
Maple [A] (verified)	965
Fricas [A] (verification not implemented)	966
Sympy [A] (verification not implemented)	966
Maxima [A] (verification not implemented)	966
Giac [A] (verification not implemented)	967
Mupad [B] (verification not implemented)	967

### Optimal result

Integrand size = 41, antiderivative size = 51

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx$$

$$= (e-4f+12g)x + \frac{1}{2}(f-6g)(2+x)^2 + \frac{1}{3}g(2+x)^3 + (d-2e+4f-8g)\log(2+x)$$

[Out] (e-4\*f+12\*g)\*x+1/2\*(f-6\*g)\*(2+x)^2+1/3\*g\*(2+x)^3+(d-2\*e+4\*f-8\*g)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 51, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.049$ , Rules used = {1600, 1864}

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx$$

$$= \log(x+2)(d-2e+4f-8g) + x(e-4f+12g) + \frac{1}{2}(x+2)^2(f-6g) + \frac{1}{3}g(x+2)^3$$

[In] Int[((2-x-2\*x^2+x^3)\*(d+e\*x+f\*x^2+g\*x^3))/(4-5\*x^2+x^4),x]

[Out] (e-4\*f+12\*g)\*x + ((f-6\*g)\*(2+x)^2)/2 + (g\*(2+x)^3)/3 + (d-2\*e+4\*f-8\*g)\*Log[2+x]

### Rule 1600

```
Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px, Qx, x]^p*Qx^(p+q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

## Rule 1864

```
Int[(Pq_)*((a_) + (b_)*(x_)^(n_.))^(p_.), x_Symbol] := Int[ExpandIntegrand
[Pq*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, n}, x] && PolyQ[Pq, x] && (IGtQ[p
, 0] || EqQ[n, 1])
```

## Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex + fx^2 + gx^3}{2 + x} dx \\ &= \int \left( e - 4f + 12g + \frac{d - 2e + 4f - 8g}{2 + x} + (f - 6g)(2 + x) + g(2 + x)^2 \right) dx \\ &= (e - 4f + 12g)x + \frac{1}{2}(f - 6g)(2 + x)^2 + \frac{1}{3}g(2 + x)^3 + (d - 2e + 4f - 8g) \log(2 + x) \end{aligned}$$

## Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 45, normalized size of antiderivative = 0.88

$$\begin{aligned} &\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3)}{4 - 5x^2 + x^4} dx \\ &= \frac{1}{6}(2 + x)(6e + 3f(-6 + x) + 2g(22 - 5x + x^2)) + (d - 2e + 4f - 8g) \log(2 + x) \end{aligned}$$

```
[In] Integrate[((2 - x - 2*x^2 + x^3)*(d + e*x + f*x^2 + g*x^3))/(4 - 5*x^2 + x^4), x]
```

```
[Out] ((2 + x)*(6*e + 3*f*(-6 + x) + 2*g*(22 - 5*x + x^2)))/6 + (d - 2*e + 4*f - 8*g)*Log[2 + x]
```

## Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 45, normalized size of antiderivative = 0.88

method	result
norman	$\left(\frac{f}{2} - g\right)x^2 + (e - 2f + 4g)x + \frac{gx^3}{3} + (d - 2e + 4f - 8g) \ln(x + 2)$
default	$\frac{gx^3}{3} + \frac{fx^2}{2} - gx^2 + ex - 2fx + 4gx + (d - 2e + 4f - 8g) \ln(x + 2)$
risch	$\frac{gx^3}{3} + \frac{fx^2}{2} - gx^2 + ex - 2fx + 4gx + \ln(x + 2)d - 2 \ln(x + 2)e + 4 \ln(x + 2)f - 8 \ln(x + 2)g$
parallelrisch	$\frac{gx^3}{3} + \frac{fx^2}{2} - gx^2 + ex - 2fx + 4gx + \ln(x + 2)d - 2 \ln(x + 2)e + 4 \ln(x + 2)f - 8 \ln(x + 2)g$

```
[In] int((x^3-2*x^2-x+2)*(g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4), x, method=_RETURNVERBOSE)
```

[Out]  $(1/2*f-g)*x^2+(e-2*f+4*g)*x+1/3*g*x^3+(d-2*e+4*f-8*g)*\ln(x+2)$

### Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 43, normalized size of antiderivative = 0.84

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx$$

$$= \frac{1}{3}gx^3 + \frac{1}{2}(f-2g)x^2 + (e-2f+4g)x + (d-2e+4f-8g)\log(x+2)$$

[In] integrate((x^3-2\*x^2-x+2)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out]  $1/3*g*x^3 + 1/2*(f - 2*g)*x^2 + (e - 2*f + 4*g)*x + (d - 2*e + 4*f - 8*g)*\log(x + 2)$

### Sympy [A] (verification not implemented)

Time = 0.08 (sec) , antiderivative size = 41, normalized size of antiderivative = 0.80

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx$$

$$= \frac{gx^3}{3} + x^2\left(\frac{f}{2} - g\right) + x(e-2f+4g) + (d-2e+4f-8g)\log(x+2)$$

[In] integrate((x\*\*3-2\*x\*\*2-x+2)\*(g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4),x)

[Out]  $g*x**3/3 + x**2*(f/2 - g) + x*(e - 2*f + 4*g) + (d - 2*e + 4*f - 8*g)*\log(x + 2)$

### Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 43, normalized size of antiderivative = 0.84

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx$$

$$= \frac{1}{3}gx^3 + \frac{1}{2}(f-2g)x^2 + (e-2f+4g)x + (d-2e+4f-8g)\log(x+2)$$

[In] integrate((x^3-2\*x^2-x+2)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out]  $1/3*g*x^3 + 1/2*(f - 2*g)*x^2 + (e - 2*f + 4*g)*x + (d - 2*e + 4*f - 8*g)*\log(x + 2)$

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 47, normalized size of antiderivative = 0.92

$$\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3)}{4 - 5x^2 + x^4} dx$$

$$= \frac{1}{3}gx^3 + \frac{1}{2}fx^2 - gx^2 + ex - 2fx + 4gx + (d - 2e + 4f - 8g) \log(|x + 2|)$$

[In] integrate((x^3-2\*x^2-x+2)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] 1/3\*g\*x^3 + 1/2\*f\*x^2 - g\*x^2 + e\*x - 2\*f\*x + 4\*g\*x + (d - 2\*e + 4\*f - 8\*g) \*log(abs(x + 2))

**Mupad [B] (verification not implemented)**

Time = 0.02 (sec) , antiderivative size = 44, normalized size of antiderivative = 0.86

$$\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3)}{4 - 5x^2 + x^4} dx$$

$$= x^2 \left( \frac{f}{2} - g \right) + x(e - 2f + 4g) + \frac{gx^3}{3} + \ln(x + 2)(d - 2e + 4f - 8g)$$

[In] int(-((d + e\*x + f\*x^2 + g\*x^3)\*(x + 2\*x^2 - x^3 - 2))/(x^4 - 5\*x^2 + 4),x)

[Out] x^2\*(f/2 - g) + x\*(e - 2\*f + 4\*g) + (g\*x^3)/3 + log(x + 2)\*(d - 2\*e + 4\*f - 8\*g)

$$3.71 \quad \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx$$

Optimal result	968
Rubi [A] (verified)	968
Mathematica [A] (verified)	969
Maple [A] (verified)	970
Fricas [A] (verification not implemented)	970
Sympy [A] (verification not implemented)	970
Maxima [A] (verification not implemented)	971
Giac [A] (verification not implemented)	971
Mupad [B] (verification not implemented)	972

### Optimal result

Integrand size = 46, antiderivative size = 68

$$\begin{aligned} & \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx \\ &= (e-2f+4g-8h)x + \frac{1}{2}(f-2g+4h)x^2 + \frac{1}{3}(g-2h)x^3 \\ & \quad + \frac{hx^4}{4} + (d-2e+4f-8g+16h)\log(2+x) \end{aligned}$$

[Out] (e-2\*f+4\*g-8\*h)\*x+1/2\*(f-2\*g+4\*h)\*x^2+1/3\*(g-2\*h)\*x^3+1/4\*h\*x^4+(d-2\*e+4\*f-8\*g+16\*h)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.08 (sec) , antiderivative size = 68, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.043$ , Rules used = {1600, 1864}

$$\begin{aligned} & \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx \\ &= \log(x+2)(d-2e+4f-8g+16h) + x(e-2f+4g-8h) \\ & \quad + \frac{1}{2}x^2(f-2g+4h) + \frac{1}{3}x^3(g-2h) + \frac{hx^4}{4} \end{aligned}$$

[In] Int[((2 - x - 2\*x^2 + x^3)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4))/(4 - 5\*x^2 + x^4), x]

[Out] (e - 2\*f + 4\*g - 8\*h)\*x + ((f - 2\*g + 4\*h)\*x^2)/2 + ((g - 2\*h)\*x^3)/3 + (h\*x^4)/4 + (d - 2\*e + 4\*f - 8\*g + 16\*h)\*Log[2 + x]

Rule 1600



```
Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

### Rule 1864

```
Int[(Pq_)*((a_) + (b_.)*(x_)^(n_.))^p, x_Symbol] := Int[ExpandIntegrand[Pq*(a + b*x^n)^p, x] /; FreeQ[{a, b, n}, x] && PolyQ[Pq, x] && (IGtQ[p, 0] || EqQ[n, 1])
```

### Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex + fx^2 + gx^3 + hx^4}{2 + x} dx \\ &= \int \left( e \left( 1 - \frac{2(f - 2g + 4h)}{e} \right) + (f - 2g + 4h)x + (g - 2h)x^2 + hx^3 + \frac{d - 2e + 4f - 8g + 16h}{2 + x} \right) dx \\ &= (e - 2f + 4g - 8h)x + \frac{1}{2}(f - 2g + 4h)x^2 + \frac{1}{3}(g - 2h)x^3 + \frac{hx^4}{4} + (d - 2e + 4f - 8g + 16h)\log(2 + x) \end{aligned}$$

### Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 68, normalized size of antiderivative = 1.00

$$\begin{aligned} &\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4)}{4 - 5x^2 + x^4} dx \\ &= (e - 2f + 4g - 8h)x + \frac{1}{2}(f - 2g + 4h)x^2 + \frac{1}{3}(g - 2h)x^3 \\ &\quad + \frac{hx^4}{4} + (d - 2e + 4f - 8g + 16h)\log(2 + x) \end{aligned}$$

```
[In] Integrate[((2 - x - 2*x^2 + x^3)*(d + e*x + f*x^2 + g*x^3 + h*x^4))/(4 - 5*x^2 + x^4), x]
```

```
[Out] (e - 2*f + 4*g - 8*h)*x + ((f - 2*g + 4*h)*x^2)/2 + ((g - 2*h)*x^3)/3 + (h*x^4)/4 + (d - 2*e + 4*f - 8*g + 16*h)*Log[2 + x]
```

**Maple [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 65, normalized size of antiderivative = 0.96

method	result
norman	$\left(\frac{g}{3} - \frac{2h}{3}\right)x^3 + \left(\frac{f}{2} - g + 2h\right)x^2 + (e - 2f + 4g - 8h)x + \frac{hx^4}{4} + (d - 2e + 4f - 8g + 16h)\ln(x+2)$
default	$\frac{hx^4}{4} + \frac{gx^3}{3} - \frac{2hx^3}{3} + \frac{fx^2}{2} - gx^2 + 2hx^2 + ex - 2fx + 4gx - 8hx + (d - 2e + 4f - 8g + 16h)\ln(x+2)$
risch	$\frac{hx^4}{4} + \frac{gx^3}{3} - \frac{2hx^3}{3} + \frac{fx^2}{2} - gx^2 + 2hx^2 + ex - 2fx + 4gx - 8hx + \ln(x+2)d - 2\ln(x+2)$
parallelrisc	$\frac{hx^4}{4} + \frac{gx^3}{3} - \frac{2hx^3}{3} + \frac{fx^2}{2} - gx^2 + 2hx^2 + ex - 2fx + 4gx - 8hx + \ln(x+2)d - 2\ln(x+2)$

```
[In] int((x^3-2*x^2-x+2)*(h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x,method=_RETURNVERBOSE)
```

```
[Out] (1/3*g-2/3*h)*x^3+(1/2*f-g+2*h)*x^2+(e-2*f+4*g-8*h)*x+1/4*h*x^4+(d-2*e+4*f-8*g+16*h)*ln(x+2)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.24 (sec) , antiderivative size = 62, normalized size of antiderivative = 0.91

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx$$

$$= \frac{1}{4}hx^4 + \frac{1}{3}(g-2h)x^3 + \frac{1}{2}(f-2g+4h)x^2 + (e-2f+4g-8h)x + (d-2e+4f-8g+16h)\log(x+2)$$

```
[In] integrate((x^3-2*x^2-x+2)*(h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="fricas")
```

```
[Out] 1/4*h*x^4 + 1/3*(g - 2*h)*x^3 + 1/2*(f - 2*g + 4*h)*x^2 + (e - 2*f + 4*g - 8*h)*x + (d - 2*e + 4*f - 8*g + 16*h)*log(x + 2)
```

**Sympy [A] (verification not implemented)**

Time = 0.10 (sec) , antiderivative size = 63, normalized size of antiderivative = 0.93

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx$$

$$= \frac{hx^4}{4} + x^3\left(\frac{g}{3} - \frac{2h}{3}\right) + x^2\left(\frac{f}{2} - g + 2h\right) + x(e-2f+4g-8h) + (d-2e+4f-8g+16h)\log(x+2)$$

[In] integrate((x\*\*3-2\*x\*\*2-x+2)\*(h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4),x)

[Out] h\*x\*\*4/4 + x\*\*3\*(g/3 - 2\*h/3) + x\*\*2\*(f/2 - g + 2\*h) + x\*(e - 2\*f + 4\*g - 8\*h) + (d - 2\*e + 4\*f - 8\*g + 16\*h)\*log(x + 2)

## Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 62, normalized size of antiderivative = 0.91

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx$$

$$= \frac{1}{4}hx^4 + \frac{1}{3}(g-2h)x^3 + \frac{1}{2}(f-2g+4h)x^2$$

$$+ (e-2f+4g-8h)x + (d-2e+4f-8g+16h)\log(x+2)$$

[In] integrate((x^3-2\*x^2-x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] 1/4\*h\*x^4 + 1/3\*(g - 2\*h)\*x^3 + 1/2\*(f - 2\*g + 4\*h)\*x^2 + (e - 2\*f + 4\*g - 8\*h)\*x + (d - 2\*e + 4\*f - 8\*g + 16\*h)\*log(x + 2)

## Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 72, normalized size of antiderivative = 1.06

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx$$

$$= \frac{1}{4}hx^4 + \frac{1}{3}gx^3 - \frac{2}{3}hx^3 + \frac{1}{2}fx^2 - gx^2 + 2hx^2 + ex - 2fx$$

$$+ 4gx - 8hx + (d-2e+4f-8g+16h)\log(|x+2|)$$

[In] integrate((x^3-2\*x^2-x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] 1/4\*h\*x^4 + 1/3\*g\*x^3 - 2/3\*h\*x^3 + 1/2\*f\*x^2 - g\*x^2 + 2\*h\*x^2 + e\*x - 2\*f\*x + 4\*g\*x - 8\*h\*x + (d - 2\*e + 4\*f - 8\*g + 16\*h)\*log(abs(x + 2))

**Mupad [B] (verification not implemented)**

Time = 0.02 (sec) , antiderivative size = 64, normalized size of antiderivative = 0.94

$$\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4)}{4 - 5x^2 + x^4} dx$$

$$= x^3 \left( \frac{g}{3} - \frac{2h}{3} \right) + \ln(x + 2) (d - 2e + 4f - 8g + 16h)$$

$$+ \frac{hx^4}{4} + x^2 \left( \frac{f}{2} - g + 2h \right) + x(e - 2f + 4g - 8h)$$

[In] int(-((x + 2\*x^2 - x^3 - 2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4))/(x^4 - 5\*x^2 + 4),x)

[Out] x^3\*(g/3 - (2\*h)/3) + log(x + 2)\*(d - 2\*e + 4\*f - 8\*g + 16\*h) + (h\*x^4)/4 + x^2\*(f/2 - g + 2\*h) + x\*(e - 2\*f + 4\*g - 8\*h)

$$3.72 \quad \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx$$

Optimal result . . . . .	973
Rubi [A] (verified) . . . . .	973
Mathematica [A] (verified) . . . . .	974
Maple [A] (verified) . . . . .	975
Fricas [A] (verification not implemented) . . . . .	975
Sympy [A] (verification not implemented) . . . . .	976
Maxima [A] (verification not implemented) . . . . .	976
Giac [A] (verification not implemented) . . . . .	976
Mupad [B] (verification not implemented) . . . . .	977

### Optimal result

Integrand size = 51, antiderivative size = 92

$$\begin{aligned} & \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx \\ &= (e-2f+4g-8h+16i)x + \frac{1}{2}(f-2g+4h-8i)x^2 + \frac{1}{3}(g-2h+4i)x^3 \\ & \quad + \frac{1}{4}(h-2i)x^4 + \frac{ix^5}{5} + (d-2e+4f-8g+16h-32i)\log(2+x) \end{aligned}$$

[Out] (e-2\*f+4\*g-8\*h+16\*i)\*x+1/2\*(f-2\*g+4\*h-8\*i)\*x^2+1/3\*(g-2\*h+4\*i)\*x^3+1/4\*(h-2\*i)\*x^4+1/5\*i\*x^5+(d-2\*e+4\*f-8\*g+16\*h-32\*i)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 92, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.039$ , Rules used = {1600, 1864}

$$\begin{aligned} & \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx \\ &= \log(x+2)(d-2e+4f-8g+16h-32i) + x(e-2f+4g-8h+16i) \\ & \quad + \frac{1}{2}x^2(f-2g+4h-8i) + \frac{1}{3}x^3(g-2h+4i) + \frac{1}{4}x^4(h-2i) + \frac{ix^5}{5} \end{aligned}$$

[In] Int[((2-x-2\*x^2+x^3)\*(d+e\*x+f\*x^2+g\*x^3+h\*x^4+i\*x^5))/(4-5\*x^2+x^4),x]

[Out] (e-2\*f+4\*g-8\*h+16\*i)\*x + ((f-2\*g+4\*h-8\*i)\*x^2)/2 + ((g-2\*h+4\*i)\*x^3)/3 + ((h-2\*i)\*x^4)/4 + (i\*x^5)/5 + (d-2\*e+4\*f-8\*g+16\*h-32\*i)\*Log[2+x]

Rule 1600

`Int[(u_)*(Px_)^(p_)*(Qx_)^(q_), x_Symbol] := Int[u*PolynomialQuotient[Px, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]`

Rule 1864

`Int[(Pq)*((a_) + (b_)*(x_)^(n_))^(p_), x_Symbol] := Int[ExpandIntegrand[Pq*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, n}, x] && PolyQ[Pq, x] && (IGtQ[p, 0] || EqQ[n, 1])`

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{2 + x} dx \\
 &= \int \left( e \left( 1 - \frac{2(f - 2g + 4h - 8i)}{e} \right) + (f - 2g + 4h - 8i)x + (g - 2h + 4i)x^2 \right. \\
 &\quad \left. + (h - 2i)x^3 + ix^4 + \frac{d - 2e + 4f - 8g + 16h - 32i}{2 + x} \right) dx \\
 &= (e - 2f + 4g - 8h + 16i)x + \frac{1}{2}(f - 2g + 4h - 8i)x^2 + \frac{1}{3}(g - 2h + 4i)x^3 \\
 &\quad + \frac{1}{4}(h - 2i)x^4 + \frac{ix^5}{5} + (d - 2e + 4f - 8g + 16h - 32i) \log(2 + x)
 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 92, normalized size of antiderivative = 1.00

$$\begin{aligned}
 &\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{4 - 5x^2 + x^4} dx \\
 &= (e - 2f + 4g - 8h + 16i)x + \frac{1}{2}(f - 2g + 4h - 8i)x^2 + \frac{1}{3}(g - 2h + 4i)x^3 \\
 &\quad + \frac{1}{4}(h - 2i)x^4 + \frac{ix^5}{5} + (d - 2e + 4f - 8g + 16h - 32i) \log(2 + x)
 \end{aligned}$$

`[In] Integrate[((2 - x - 2*x^2 + x^3)*(d + e*x + f*x^2 + g*x^3 + h*x^4 + i*x^5))/(4 - 5*x^2 + x^4), x]`

`[Out] (e - 2*f + 4*g - 8*h + 16*i)*x + ((f - 2*g + 4*h - 8*i)*x^2)/2 + ((g - 2*h + 4*i)*x^3)/3 + ((h - 2*i)*x^4)/4 + (i*x^5)/5 + (d - 2*e + 4*f - 8*g + 16*h - 32*i)*Log[2 + x]`

**Maple [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 88, normalized size of antiderivative = 0.96

method	result
norman	$(\frac{h}{4} - \frac{i}{2})x^4 + (\frac{g}{3} - \frac{2h}{3} + \frac{4i}{3})x^3 + (\frac{f}{2} - g + 2h - 4i)x^2 + (e - 2f + 4g - 8h + 16i)x + \frac{ix^5}{5} +$
default	$\frac{ix^5}{5} + \frac{hx^4}{4} - \frac{ix^4}{2} + \frac{gx^3}{3} - \frac{2hx^3}{3} + \frac{4ix^3}{3} + \frac{fx^2}{2} - gx^2 + 2hx^2 - 4ix^2 + ex - 2fx + 4gx - 8hx$
risch	$\frac{ix^5}{5} + \frac{hx^4}{4} - \frac{ix^4}{2} + \frac{gx^3}{3} - \frac{2hx^3}{3} + \frac{4ix^3}{3} + \frac{fx^2}{2} - gx^2 + 2hx^2 - 4ix^2 + ex - 2fx + 4gx - 8hx$
parallelrisch	$\frac{ix^5}{5} + \frac{hx^4}{4} - \frac{ix^4}{2} + \frac{gx^3}{3} - \frac{2hx^3}{3} + \frac{4ix^3}{3} + \frac{fx^2}{2} - gx^2 + 2hx^2 - 4ix^2 + ex - 2fx + 4gx - 8hx$

```
[In] int((x^3-2*x^2-x+2)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x,method=
_RETURNVERBOSE)
```

```
[Out] (1/4*h-1/2*i)*x^4+(1/3*g-2/3*h+4/3*i)*x^3+(1/2*f-g+2*h-4*i)*x^2+(e-2*f+4*g-
8*h+16*i)*x+1/5*i*x^5+(d-2*e+4*f-8*g+16*h-32*i)*ln(x+2)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.25 (sec) , antiderivative size = 84, normalized size of antiderivative = 0.91

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx$$

$$= \frac{1}{5}ix^5 + \frac{1}{4}(h-2i)x^4 + \frac{1}{3}(g-2h+4i)x^3 + \frac{1}{2}(f-2g+4h-8i)x^2$$

$$+ (e-2f+4g-8h+16i)x + (d-2e+4f-8g+16h-32i)\log(x+2)$$

```
[In] integrate((x^3-2*x^2-x+2)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x,
algorithm="fricas")
```

```
[Out] 1/5*i*x^5 + 1/4*(h - 2*i)*x^4 + 1/3*(g - 2*h + 4*i)*x^3 + 1/2*(f - 2*g + 4*
h - 8*i)*x^2 + (e - 2*f + 4*g - 8*h + 16*i)*x + (d - 2*e + 4*f - 8*g + 16*h
- 32*i)*log(x + 2)
```

**Sympy [A] (verification not implemented)**

Time = 0.13 (sec) , antiderivative size = 88, normalized size of antiderivative = 0.96

$$\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{4 - 5x^2 + x^4} dx$$

$$= \frac{ix^5}{5} + x^4 \left( \frac{h}{4} - \frac{i}{2} \right) + x^3 \left( \frac{g}{3} - \frac{2h}{3} + \frac{4i}{3} \right) + x^2 \left( \frac{f}{2} - g + 2h - 4i \right) + x(e - 2f + 4g - 8h + 16i) + (d - 2e + 4f - 8g + 16h - 32i) \log(x + 2)$$

[In] integrate((x\*\*3-2\*x\*\*2-x+2)\*(i\*x\*\*5+h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4),x)

[Out] i\*x\*\*5/5 + x\*\*4\*(h/4 - i/2) + x\*\*3\*(g/3 - 2\*h/3 + 4\*i/3) + x\*\*2\*(f/2 - g + 2\*h - 4\*i) + x\*(e - 2\*f + 4\*g - 8\*h + 16\*i) + (d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)\*log(x + 2)

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 84, normalized size of antiderivative = 0.91

$$\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{4 - 5x^2 + x^4} dx$$

$$= \frac{1}{5} ix^5 + \frac{1}{4} (h - 2i)x^4 + \frac{1}{3} (g - 2h + 4i)x^3 + \frac{1}{2} (f - 2g + 4h - 8i)x^2 + (e - 2f + 4g - 8h + 16i)x + (d - 2e + 4f - 8g + 16h - 32i) \log(x + 2)$$

[In] integrate((x^3-2\*x^2-x+2)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] 1/5\*i\*x^5 + 1/4\*(h - 2\*i)\*x^4 + 1/3\*(g - 2\*h + 4\*i)\*x^3 + 1/2\*(f - 2\*g + 4\*h - 8\*i)\*x^2 + (e - 2\*f + 4\*g - 8\*h + 16\*i)\*x + (d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)\*log(x + 2)

**Giac [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 103, normalized size of antiderivative = 1.12

$$\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{4 - 5x^2 + x^4} dx$$

$$= \frac{1}{5} ix^5 + \frac{1}{4} hx^4 - \frac{1}{2} ix^4 + \frac{1}{3} gx^3 - \frac{2}{3} hx^3 + \frac{4}{3} ix^3 + \frac{1}{2} fx^2 - gx^2 + 2hx^2 - 4ix^2 + ex - 2fx + 4gx - 8hx + 16ix + (d - 2e + 4f - 8g + 16h - 32i) \log(|x + 2|)$$



[In] integrate((x^3-2\*x^2-x+2)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x,  
algorithm="giac")

[Out] 1/5\*i\*x^5 + 1/4\*h\*x^4 - 1/2\*i\*x^4 + 1/3\*g\*x^3 - 2/3\*h\*x^3 + 4/3\*i\*x^3 + 1/2  
\*f\*x^2 - g\*x^2 + 2\*h\*x^2 - 4\*i\*x^2 + e\*x - 2\*f\*x + 4\*g\*x - 8\*h\*x + 16\*i\*x +  
(d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)\*log(abs(x + 2))

### Mupad [B] (verification not implemented)

Time = 0.02 (sec) , antiderivative size = 87, normalized size of antiderivative = 0.95

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx$$

$$= x^4 \left( \frac{h}{4} - \frac{i}{2} \right) + \ln(x+2)(d-2e+4f-8g+16h-32i) + \frac{ix^5}{5}$$

$$+ x^2 \left( \frac{f}{2} - g + 2h - 4i \right) + x(e-2f+4g-8h+16i) + x^3 \left( \frac{g}{3} - \frac{2h}{3} + \frac{4i}{3} \right)$$

[In] int(-((x + 2\*x^2 - x^3 - 2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5))/(x^4  
- 5\*x^2 + 4),x)

[Out] x^4\*(h/4 - i/2) + log(x + 2)\*(d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i) + (i\*x^5)/  
5 + x^2\*(f/2 - g + 2\*h - 4\*i) + x\*(e - 2\*f + 4\*g - 8\*h + 16\*i) + x^3\*(g/3 -  
(2\*h)/3 + (4\*i)/3)

### 3.73 $\int \frac{2-3x+x^2}{4-5x^2+x^4} dx$

Optimal result . . . . .	978
Rubi [A] (verified) . . . . .	978
Mathematica [A] (verified) . . . . .	979
Maple [A] (verified) . . . . .	979
Fricas [A] (verification not implemented) . . . . .	980
Sympy [A] (verification not implemented) . . . . .	980
Maxima [A] (verification not implemented) . . . . .	980
Giac [A] (verification not implemented) . . . . .	980
Mupad [B] (verification not implemented) . . . . .	981

#### Optimal result

Integrand size = 21, antiderivative size = 11

$$\int \frac{2-3x+x^2}{4-5x^2+x^4} dx = \log(1+x) - \log(2+x)$$

[Out]  $\ln(1+x) - \ln(2+x)$

#### Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 11, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.143$ , Rules used = {1600, 630, 31}

$$\int \frac{2-3x+x^2}{4-5x^2+x^4} dx = \log(x+1) - \log(x+2)$$

[In] `Int[(2 - 3*x + x^2)/(4 - 5*x^2 + x^4), x]`

[Out] `Log[1 + x] - Log[2 + x]`

#### Rule 31

`Int[((a_) + (b_.)*(x_))^(n_), x_Symbol] := Simp[Log[RemoveContent[a + b*x, x]]/b, x] /; FreeQ[{a, b}, x]`

#### Rule 630

`Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(n_), x_Symbol] := With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[c/q, Int[1/Simp[b/2 - q/2 + c*x, x], x], x] - Dist[c/q, Int[1/Simp[b/2 + q/2 + c*x, x], x], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4*a*c, 0] && PosQ[b^2 - 4*a*c] && PerfectSquareQ[b^2 - 4*a*c]`

Rule 1600

```
Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{1}{2 + 3x + x^2} dx \\ &= \int \frac{1}{1 + x} dx - \int \frac{1}{2 + x} dx \\ &= \log(1 + x) - \log(2 + x) \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.05 (sec) , antiderivative size = 11, normalized size of antiderivative = 1.00

$$\int \frac{2 - 3x + x^2}{4 - 5x^2 + x^4} dx = \log(1 + x) - \log(2 + x)$$

[In] Integrate[(2 - 3\*x + x^2)/(4 - 5\*x^2 + x^4), x]

[Out] Log[1 + x] - Log[2 + x]

**Maple [A] (verified)**

Time = 0.03 (sec) , antiderivative size = 12, normalized size of antiderivative = 1.09

method	result	size
default	$\ln(x + 1) - \ln(x + 2)$	12
norman	$\ln(x + 1) - \ln(x + 2)$	12
risch	$\ln(x + 1) - \ln(x + 2)$	12
parallelrisch	$\ln(x + 1) - \ln(x + 2)$	12

[In] int((x^2-3\*x+2)/(x^4-5\*x^2+4), x, method=\_RETURNVERBOSE)

[Out] ln(x+1)-ln(x+2)

**Fricas [A] (verification not implemented)**

none

Time = 0.25 (sec) , antiderivative size = 11, normalized size of antiderivative = 1.00

$$\int \frac{2 - 3x + x^2}{4 - 5x^2 + x^4} dx = -\log(x + 2) + \log(x + 1)$$

[In] integrate((x^2-3\*x+2)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out] -log(x + 2) + log(x + 1)

**Sympy [A] (verification not implemented)**

Time = 0.04 (sec) , antiderivative size = 8, normalized size of antiderivative = 0.73

$$\int \frac{2 - 3x + x^2}{4 - 5x^2 + x^4} dx = \log(x + 1) - \log(x + 2)$$

[In] integrate((x\*\*2-3\*x+2)/(x\*\*4-5\*x\*\*2+4),x)

[Out] log(x + 1) - log(x + 2)

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 11, normalized size of antiderivative = 1.00

$$\int \frac{2 - 3x + x^2}{4 - 5x^2 + x^4} dx = -\log(x + 2) + \log(x + 1)$$

[In] integrate((x^2-3\*x+2)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] -log(x + 2) + log(x + 1)

**Giac [A] (verification not implemented)**

none

Time = 0.31 (sec) , antiderivative size = 13, normalized size of antiderivative = 1.18

$$\int \frac{2 - 3x + x^2}{4 - 5x^2 + x^4} dx = -\log(|x + 2|) + \log(|x + 1|)$$

[In] integrate((x^2-3\*x+2)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] -log(abs(x + 2)) + log(abs(x + 1))

**Mupad [B] (verification not implemented)**

Time = 0.05 (sec) , antiderivative size = 8, normalized size of antiderivative = 0.73

$$\int \frac{2 - 3x + x^2}{4 - 5x^2 + x^4} dx = -2 \operatorname{atanh}(2x + 3)$$

[In] `int((x^2 - 3*x + 2)/(x^4 - 5*x^2 + 4),x)`

[Out] `-2*atanh(2*x + 3)`

$$3.74 \quad \int \frac{(d+ex)(2-3x+x^2)}{4-5x^2+x^4} dx$$

Optimal result	982
Rubi [A] (verified)	982
Mathematica [A] (verified)	983
Maple [A] (verified)	983
Fricas [A] (verification not implemented)	984
Sympy [A] (verification not implemented)	984
Maxima [A] (verification not implemented)	984
Giac [A] (verification not implemented)	984
Mupad [B] (verification not implemented)	985

### Optimal result

Integrand size = 26, antiderivative size = 22

$$\int \frac{(d+ex)(2-3x+x^2)}{4-5x^2+x^4} dx = (d-e)\log(1+x) - (d-2e)\log(2+x)$$

[Out] (d-e)\*ln(1+x)-(d-2\*e)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 22, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.115$ , Rules used = {1600, 646, 31}

$$\int \frac{(d+ex)(2-3x+x^2)}{4-5x^2+x^4} dx = (d-e)\log(x+1) - (d-2e)\log(x+2)$$

[In] Int[((d + e\*x)\*(2 - 3\*x + x^2))/(4 - 5\*x^2 + x^4), x]

[Out] (d - e)\*Log[1 + x] - (d - 2\*e)\*Log[2 + x]

#### Rule 31

Int[((a\_) + (b\_.)\*(x\_))^(n\_), x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

#### Rule 646

Int[((d\_.) + (e\_.)\*(x\_))/((a\_) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[(c\*d - e\*(b/2 - q/2))/q, Int[1/(b/2 - q/2 + c\*x), x], x] - Dist[(c\*d - e\*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c\*x), x

```
], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && NiceSqrtQ[b^2 - 4*a*c]
```

### Rule 1600

```
Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

### Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex}{2 + 3x + x^2} dx \\ &= -\left( (d - 2e) \int \frac{1}{2 + x} dx \right) + (d - e) \int \frac{1}{1 + x} dx \\ &= (d - e) \log(1 + x) - (d - 2e) \log(2 + x) \end{aligned}$$

### Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 23, normalized size of antiderivative = 1.05

$$\int \frac{(d + ex)(2 - 3x + x^2)}{4 - 5x^2 + x^4} dx = (d - e) \log(1 + x) + (-d + 2e) \log(2 + x)$$

```
[In] Integrate[((d + e*x)*(2 - 3*x + x^2))/(4 - 5*x^2 + x^4), x]
```

```
[Out] (d - e)*Log[1 + x] + (-d + 2*e)*Log[2 + x]
```

### Maple [A] (verified)

Time = 0.04 (sec) , antiderivative size = 24, normalized size of antiderivative = 1.09

method	result	size
default	$(-d + 2e) \ln(x + 2) + (d - e) \ln(x + 1)$	24
norman	$(-d + 2e) \ln(x + 2) + (d - e) \ln(x + 1)$	24
parallelsch	$\ln(x + 1) d - \ln(x + 1) e - \ln(x + 2) d + 2 \ln(x + 2) e$	29
risch	$-\ln(x + 2) d + 2 \ln(x + 2) e + \ln(-x - 1) d - \ln(-x - 1) e$	33

```
[In] int((e*x+d)*(x^2-3*x+2)/(x^4-5*x^2+4), x, method=_RETURNVERBOSE)
```

```
[Out] (-d+2*e)*ln(x+2)+(d-e)*ln(x+1)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.25 (sec) , antiderivative size = 22, normalized size of antiderivative = 1.00

$$\int \frac{(d+ex)(2-3x+x^2)}{4-5x^2+x^4} dx = -(d-2e)\log(x+2) + (d-e)\log(x+1)$$

[In] integrate((e\*x+d)\*(x^2-3\*x+2)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out] -(d - 2\*e)\*log(x + 2) + (d - e)\*log(x + 1)

**Sympy [A] (verification not implemented)**

Time = 0.17 (sec) , antiderivative size = 29, normalized size of antiderivative = 1.32

$$\int \frac{(d+ex)(2-3x+x^2)}{4-5x^2+x^4} dx = (-d+2e)\log\left(x + \frac{4d-6e}{2d-3e}\right) + (d-e)\log(x+1)$$

[In] integrate((e\*x+d)\*(x\*\*2-3\*x+2)/(x\*\*4-5\*x\*\*2+4),x)

[Out] (-d + 2\*e)\*log(x + (4\*d - 6\*e)/(2\*d - 3\*e)) + (d - e)\*log(x + 1)

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 22, normalized size of antiderivative = 1.00

$$\int \frac{(d+ex)(2-3x+x^2)}{4-5x^2+x^4} dx = -(d-2e)\log(x+2) + (d-e)\log(x+1)$$

[In] integrate((e\*x+d)\*(x^2-3\*x+2)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] -(d - 2\*e)\*log(x + 2) + (d - e)\*log(x + 1)

**Giac [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 24, normalized size of antiderivative = 1.09

$$\int \frac{(d+ex)(2-3x+x^2)}{4-5x^2+x^4} dx = -(d-2e)\log(|x+2|) + (d-e)\log(|x+1|)$$

[In] integrate((e\*x+d)\*(x^2-3\*x+2)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] -(d - 2\*e)\*log(abs(x + 2)) + (d - e)\*log(abs(x + 1))



**Mupad [B] (verification not implemented)**

Time = 7.89 (sec) , antiderivative size = 22, normalized size of antiderivative = 1.00

$$\int \frac{(d + ex)(2 - 3x + x^2)}{4 - 5x^2 + x^4} dx = \ln(x + 1)(d - e) - \ln(x + 2)(d - 2e)$$

[In] int(((d + e\*x)\*(x^2 - 3\*x + 2))/(x^4 - 5\*x^2 + 4),x)

[Out] log(x + 1)\*(d - e) - log(x + 2)\*(d - 2\*e)

$$3.75 \quad \int \frac{(2-3x+x^2)(d+ex+fx^2)}{4-5x^2+x^4} dx$$

Optimal result . . . . .	986
Rubi [A] (verified) . . . . .	986
Mathematica [A] (verified) . . . . .	987
Maple [A] (verified) . . . . .	988
Fricas [A] (verification not implemented) . . . . .	988
Sympy [A] (verification not implemented) . . . . .	988
Maxima [A] (verification not implemented) . . . . .	989
Giac [A] (verification not implemented) . . . . .	989
Mupad [B] (verification not implemented) . . . . .	989

### Optimal result

Integrand size = 31, antiderivative size = 29

$$\int \frac{(2-3x+x^2)(d+ex+fx^2)}{4-5x^2+x^4} dx = fx + (d-e+f)\log(1+x) - (d-2e+4f)\log(2+x)$$

[Out] f\*x+(d-e+f)\*ln(1+x)-(d-2\*e+4\*f)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 29, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.129$ , Rules used = {1600, 1671, 646, 31}

$$\int \frac{(2-3x+x^2)(d+ex+fx^2)}{4-5x^2+x^4} dx = \log(x+1)(d-e+f) - \log(x+2)(d-2e+4f) + fx$$

[In] Int[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2))/(4 - 5\*x^2 + x^4), x]

[Out] f\*x + (d - e + f)\*Log[1 + x] - (d - 2\*e + 4\*f)\*Log[2 + x]

#### Rule 31

Int[((a\_) + (b\_.)\*(x\_))^(n\_), x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

#### Rule 646

Int[((d\_.) + (e\_.)\*(x\_))/((a\_) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[(c\*d - e\*(b/2 - q/2))/q, Int[1/(b/2 - q/2 + c\*x), x], x] - Dist[(c\*d - e\*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c\*x), x

], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && NiceSqrtQ[b^2 - 4\*a\*c]

### Rule 1600

Int[(u\_.)\*(Px\_)^(p\_.)\*(Qx\_)^(q\_.), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

### Rule 1671

Int[(Pq\_)\*((a\_) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_.), x\_Symbol] := Int[Expand Integrand[Pq\*(a + b\*x + c\*x^2)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, -2]

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + ex + fx^2}{2 + 3x + x^2} dx \\
 &= \int \left( f + \frac{d - 2f + (e - 3f)x}{2 + 3x + x^2} \right) dx \\
 &= fx + \int \frac{d - 2f + (e - 3f)x}{2 + 3x + x^2} dx \\
 &= fx + (d - e + f) \int \frac{1}{1 + x} dx - (d - 2e + 4f) \int \frac{1}{2 + x} dx \\
 &= fx + (d - e + f) \log(1 + x) - (d - 2e + 4f) \log(2 + x)
 \end{aligned}$$

### Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 30, normalized size of antiderivative = 1.03

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{4 - 5x^2 + x^4} dx = fx + (d - e + f) \log(1 + x) + (-d + 2e - 4f) \log(2 + x)$$

[In] Integrate[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2))/(4 - 5\*x^2 + x^4), x]

[Out] f\*x + (d - e + f)\*Log[1 + x] + (-d + 2\*e - 4\*f)\*Log[2 + x]

**Maple [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 31, normalized size of antiderivative = 1.07

method	result
default	$fx + (-d + 2e - 4f) \ln(x + 2) + (d - e + f) \ln(x + 1)$
norman	$fx + (-d + 2e - 4f) \ln(x + 2) + (d - e + f) \ln(x + 1)$
parallelr risch	$\ln(x + 1) d - \ln(x + 1) e + \ln(x + 1) f - \ln(x + 2) d + 2 \ln(x + 2) e - 4 \ln(x + 2) f + fx$ $fx + \ln(-x - 1) d - \ln(-x - 1) e + \ln(-x - 1) f - \ln(x + 2) d + 2 \ln(x + 2) e - 4 \ln(x + 2) f + fx$

[In] `int((x^2-3*x+2)*(f*x^2+e*x+d)/(x^4-5*x^2+4),x,method=_RETURNVERBOSE)`

[Out] `f*x+(-d+2*e-4*f)*ln(x+2)+(d-e+f)*ln(x+1)`

**Fricas [A] (verification not implemented)**

none

Time = 0.24 (sec) , antiderivative size = 29, normalized size of antiderivative = 1.00

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{4 - 5x^2 + x^4} dx = fx - (d - 2e + 4f) \log(x + 2) + (d - e + f) \log(x + 1)$$

[In] `integrate((x^2-3*x+2)*(f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="fricas")`

[Out] `f*x - (d - 2*e + 4*f)*log(x + 2) + (d - e + f)*log(x + 1)`

**Sympy [A] (verification not implemented)**

Time = 0.30 (sec) , antiderivative size = 44, normalized size of antiderivative = 1.52

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{4 - 5x^2 + x^4} dx = fx + (-d + 2e - 4f) \log\left(x + \frac{4d - 6e + 10f}{2d - 3e + 5f}\right) + (d - e + f) \log(x + 1)$$

[In] `integrate((x**2-3*x+2)*(f*x**2+e*x+d)/(x**4-5*x**2+4),x)`

[Out] `f*x + (-d + 2*e - 4*f)*log(x + (4*d - 6*e + 10*f)/(2*d - 3*e + 5*f)) + (d - e + f)*log(x + 1)`

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 29, normalized size of antiderivative = 1.00

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{4 - 5x^2 + x^4} dx = fx - (d - 2e + 4f) \log(x + 2) + (d - e + f) \log(x + 1)$$

[In] integrate((x^2-3\*x+2)\*(f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] f\*x - (d - 2\*e + 4\*f)\*log(x + 2) + (d - e + f)\*log(x + 1)

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 31, normalized size of antiderivative = 1.07

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{4 - 5x^2 + x^4} dx = fx - (d - 2e + 4f) \log(|x + 2|) + (d - e + f) \log(|x + 1|)$$

[In] integrate((x^2-3\*x+2)\*(f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] f\*x - (d - 2\*e + 4\*f)\*log(abs(x + 2)) + (d - e + f)\*log(abs(x + 1))

**Mupad [B] (verification not implemented)**

Time = 0.04 (sec) , antiderivative size = 29, normalized size of antiderivative = 1.00

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{4 - 5x^2 + x^4} dx = fx + \ln(x + 1)(d - e + f) - \ln(x + 2)(d - 2e + 4f)$$

[In] int(((x^2 - 3\*x + 2)\*(d + e\*x + f\*x^2))/(x^4 - 5\*x^2 + 4),x)

[Out] f\*x + log(x + 1)\*(d - e + f) - log(x + 2)\*(d - 2\*e + 4\*f)

$$3.76 \quad \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx$$

Optimal result . . . . .	990
Rubi [A] (verified) . . . . .	990
Mathematica [A] (verified) . . . . .	991
Maple [A] (verified) . . . . .	992
Fricas [A] (verification not implemented) . . . . .	992
Sympy [A] (verification not implemented) . . . . .	992
Maxima [A] (verification not implemented) . . . . .	993
Giac [A] (verification not implemented) . . . . .	993
Mupad [B] (verification not implemented) . . . . .	993

### Optimal result

Integrand size = 36, antiderivative size = 47

$$\int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx = (f-3g)x + \frac{gx^2}{2} + (d-e+f-g)\log(1+x) \\ - (d-2e+4f-8g)\log(2+x)$$

[Out] (f-3\*g)\*x+1/2\*g\*x^2+(d-e+f-g)\*ln(1+x)-(d-2\*e+4\*f-8\*g)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 47, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.111$ , Rules used = {1600, 1671, 646, 31}

$$\int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx = \log(x+1)(d-e+f-g) \\ - \log(x+2)(d-2e+4f-8g) + x(f-3g) + \frac{gx^2}{2}$$

[In] Int[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2 + g\*x^3))/(4 - 5\*x^2 + x^4), x]

[Out] (f - 3\*g)\*x + (g\*x^2)/2 + (d - e + f - g)\*Log[1 + x] - (d - 2\*e + 4\*f - 8\*g)\*Log[2 + x]

#### Rule 31

Int[((a\_) + (b\_.)\*(x\_))^(n\_), x\_Symbol] :> Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

#### Rule 646

```
Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] := W
ith[{q = Rt[b^2 - 4*a*c, 2]}, Dist[(c*d - e*(b/2 - q/2))/q, Int[1/(b/2 - q/
2 + c*x), x], x] - Dist[(c*d - e*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c*x), x
], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a
*c, 0] && NiceSqrtQ[b^2 - 4*a*c]
```

### Rule 1600

```
Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px
, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] &&
EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

### Rule 1671

```
Int[(Pq_)*((a_) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_.), x_Symbol] := Int[Expand
Integrand[Pq*(a + b*x + c*x^2)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq
, x] && IGtQ[p, -2]
```

### Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d + ex + fx^2 + gx^3}{2 + 3x + x^2} dx \\
&= \int \left( f - 3g + gx + \frac{d - 2f + 6g + (e - 3f + 7g)x}{2 + 3x + x^2} \right) dx \\
&= (f - 3g)x + \frac{gx^2}{2} + \int \frac{d - 2f + 6g + (e - 3f + 7g)x}{2 + 3x + x^2} dx \\
&= (f - 3g)x + \frac{gx^2}{2} - (d - 2e + 4f - 8g) \int \frac{1}{2 + x} dx + (d - e + f - g) \int \frac{1}{1 + x} dx \\
&= (f - 3g)x + \frac{gx^2}{2} + (d - e + f - g) \log(1 + x) - (d - 2e + 4f - 8g) \log(2 + x)
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.07 (sec) , antiderivative size = 44, normalized size of antiderivative = 0.94

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{4 - 5x^2 + x^4} dx = fx + \frac{1}{2}g(-6 + x)x + (d - e + f - g) \log(1 + x) - (d - 2e + 4f - 8g) \log(2 + x)$$

```
[In] Integrate[((2 - 3*x + x^2)*(d + e*x + f*x^2 + g*x^3))/(4 - 5*x^2 + x^4),x]
[Out] f*x + (g*(-6 + x)*x)/2 + (d - e + f - g)*Log[1 + x] - (d - 2*e + 4*f - 8*g)
*Log[2 + x]
```

**Maple [A] (verified)**

Time = 0.05 (sec) , antiderivative size = 47, normalized size of antiderivative = 1.00

method	result
default	$\frac{gx^2}{2} + fx - 3gx + (-d + 2e - 4f + 8g) \ln(x + 2) + (d - e + f - g) \ln(x + 1)$
norman	$(f - 3g)x + \frac{gx^2}{2} + (-d + 2e - 4f + 8g) \ln(x + 2) + (d - e + f - g) \ln(x + 1)$
parallelrisc	$\frac{gx^2}{2} + fx - 3gx + \ln(x + 1)d - \ln(x + 1)e + \ln(x + 1)f - \ln(x + 1)g - \ln(x + 2)d + 2 \ln(x + 2)e - 2 \ln(x + 2)f + 2 \ln(x + 2)g$
risc	$\frac{gx^2}{2} + fx - 3gx + \ln(-x - 1)d - \ln(-x - 1)e + \ln(-x - 1)f - \ln(-x - 1)g - \ln(x + 2)d + 2 \ln(x + 2)e - 2 \ln(x + 2)f + 2 \ln(x + 2)g$

[In] int((x^2-3\*x+2)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x,method=\_RETURNVERBOSE)

[Out] 1/2\*g\*x^2+f\*x-3\*g\*x+(-d+2\*e-4\*f+8\*g)\*ln(x+2)+(d-e+f-g)\*ln(x+1)

**Fricas [A] (verification not implemented)**

none

Time = 0.25 (sec) , antiderivative size = 45, normalized size of antiderivative = 0.96

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{4 - 5x^2 + x^4} dx = \frac{1}{2} gx^2 + (f - 3g)x - (d - 2e + 4f - 8g) \log(x + 2) + (d - e + f - g) \log(x + 1)$$

[In] integrate((x^2-3\*x+2)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out] 1/2\*g\*x^2 + (f - 3\*g)\*x - (d - 2\*e + 4\*f - 8\*g)\*log(x + 2) + (d - e + f - g)\*log(x + 1)

**Sympy [A] (verification not implemented)**

Time = 0.48 (sec) , antiderivative size = 66, normalized size of antiderivative = 1.40

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{4 - 5x^2 + x^4} dx = \frac{gx^2}{2} + x(f - 3g) + (-d + 2e - 4f + 8g) \log\left(x + \frac{4d - 6e + 10f - 18g}{2d - 3e + 5f - 9g}\right) + (d - e + f - g) \log(x + 1)$$

[In] integrate((x\*\*2-3\*x+2)\*(g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4),x)

[Out] g\*x\*\*2/2 + x\*(f - 3\*g) + (-d + 2\*e - 4\*f + 8\*g)\*log(x + (4\*d - 6\*e + 10\*f - 18\*g)/(2\*d - 3\*e + 5\*f - 9\*g)) + (d - e + f - g)\*log(x + 1)



**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 45, normalized size of antiderivative = 0.96

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{4 - 5x^2 + x^4} dx = \frac{1}{2}gx^2 + (f - 3g)x - (d - 2e + 4f - 8g)\log(x + 2) + (d - e + f - g)\log(x + 1)$$

```
[In] integrate((x^2-3*x+2)*(g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="maxima")
```

```
[Out] 1/2*g*x^2 + (f - 3*g)*x - (d - 2*e + 4*f - 8*g)*log(x + 2) + (d - e + f - g)*log(x + 1)
```

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 47, normalized size of antiderivative = 1.00

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{4 - 5x^2 + x^4} dx = \frac{1}{2}gx^2 + fx - 3gx - (d - 2e + 4f - 8g)\log(|x + 2|) + (d - e + f - g)\log(|x + 1|)$$

```
[In] integrate((x^2-3*x+2)*(g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="giac")
```

```
[Out] 1/2*g*x^2 + f*x - 3*g*x - (d - 2*e + 4*f - 8*g)*log(abs(x + 2)) + (d - e + f - g)*log(abs(x + 1))
```

**Mupad [B] (verification not implemented)**

Time = 0.04 (sec) , antiderivative size = 45, normalized size of antiderivative = 0.96

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{4 - 5x^2 + x^4} dx = \ln(x + 1)(d - e + f - g) + x(f - 3g) + \frac{gx^2}{2} - \ln(x + 2)(d - 2e + 4f - 8g)$$

```
[In] int(((x^2 - 3*x + 2)*(d + e*x + f*x^2 + g*x^3))/(x^4 - 5*x^2 + 4),x)
```

```
[Out] log(x + 1)*(d - e + f - g) + x*(f - 3*g) + (g*x^2)/2 - log(x + 2)*(d - 2*e + 4*f - 8*g)
```

$$3.77 \quad \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx$$

Optimal result	994
Rubi [A] (verified)	994
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### Optimal result

Integrand size = 41, antiderivative size = 66

$$\begin{aligned} & \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx \\ &= (f-3g+7h)x + \frac{1}{2}(g-3h)x^2 + \frac{hx^3}{3} + (d-e+f-g+h)\log(1+x) \\ & \quad - (d-2e+4f-8g+16h)\log(2+x) \end{aligned}$$

[Out] (f-3\*g+7\*h)\*x+1/2\*(g-3\*h)\*x^2+1/3\*h\*x^3+(d-e+f-g+h)\*ln(1+x)-(d-2\*e+4\*f-8\*g+16\*h)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 66, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.098$ , Rules used = {1600, 1671, 646, 31}

$$\begin{aligned} & \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx \\ &= \log(x+1)(d-e+f-g+h) - \log(x+2)(d-2e+4f-8g+16h) \\ & \quad + x(f-3g+7h) + \frac{1}{2}x^2(g-3h) + \frac{hx^3}{3} \end{aligned}$$

[In] Int[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4))/(4 - 5\*x^2 + x^4), x]

[Out] (f - 3\*g + 7\*h)\*x + ((g - 3\*h)\*x^2)/2 + (h\*x^3)/3 + (d - e + f - g + h)\*Log[1 + x] - (d - 2\*e + 4\*f - 8\*g + 16\*h)\*Log[2 + x]

Rule 31

Int[((a\_) + (b\_)\*(x\_))^(n\_), x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

### Rule 646

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[(c\*d - e\*(b/2 - q/2))/q, Int[1/(b/2 - q/2 + c\*x), x], x] - Dist[(c\*d - e\*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c\*x), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && NiceSqrtQ[b^2 - 4\*a\*c]

### Rule 1600

Int[(u\_)\*(Px\_)^(p\_)\*(Qx\_)^(q\_), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

### Rule 1671

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(p\_), x\_Symbol] := Int[ExpandIntegrand[Pq\*(a + b\*x + c\*x^2)^p, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, -2]

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + ex + fx^2 + gx^3 + hx^4}{2 + 3x + x^2} dx \\
 &= \int \left( f - 3g + 7h + (g - 3h)x + hx^2 + \frac{d - 2f + 6g - 14h + (e - 3f + 7g - 15h)x}{2 + 3x + x^2} \right) dx \\
 &= (f - 3g + 7h)x + \frac{1}{2}(g - 3h)x^2 + \frac{hx^3}{3} + \int \frac{d - 2f + 6g - 14h + (e - 3f + 7g - 15h)x}{2 + 3x + x^2} dx \\
 &= (f - 3g + 7h)x + \frac{1}{2}(g - 3h)x^2 + \frac{hx^3}{3} + (d - e + f - g + h) \int \frac{1}{1 + x} dx \\
 &\quad - (d - 2e + 4f - 8g + 16h) \int \frac{1}{2 + x} dx \\
 &= (f - 3g + 7h)x + \frac{1}{2}(g - 3h)x^2 + \frac{hx^3}{3} + (d - e + f - g + h) \log(1 + x) \\
 &\quad - (d - 2e + 4f - 8g + 16h) \log(2 + x)
 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 67, normalized size of antiderivative = 1.02

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{4 - 5x^2 + x^4} dx$$

$$= (f - 3g + 7h)x + \frac{1}{2}(g - 3h)x^2 + \frac{hx^3}{3} + (d - e + f - g + h)\log(1 + x)$$

$$+ (-d + 2e - 4f + 8g - 16h)\log(2 + x)$$

```
[In] Integrate[((2 - 3*x + x^2)*(d + e*x + f*x^2 + g*x^3 + h*x^4))/(4 - 5*x^2 + x^4),x]
```

```
[Out] (f - 3*g + 7*h)*x + ((g - 3*h)*x^2)/2 + (h*x^3)/3 + (d - e + f - g + h)*Log[1 + x] + (-d + 2*e - 4*f + 8*g - 16*h)*Log[2 + x]
```

**Maple [A] (verified)**

Time = 0.06 (sec) , antiderivative size = 65, normalized size of antiderivative = 0.98

method	result
norman	$\left(\frac{g}{2} - \frac{3h}{2}\right)x^2 + (f - 3g + 7h)x + \frac{hx^3}{3} + (-d + 2e - 4f + 8g - 16h)\ln(x + 2) + (d - e + f - g + h)\ln(x + 1)$
default	$\frac{hx^3}{3} + \frac{gx^2}{2} - \frac{3hx^2}{2} + fx - 3gx + 7hx + (-d + 2e - 4f + 8g - 16h)\ln(x + 2) + (d - e + f - g + h)\ln(x + 1)$
parallelrisc	$\frac{hx^3}{3} + \frac{gx^2}{2} - \frac{3hx^2}{2} + fx - 3gx + 7hx + \ln(x + 1)d - \ln(x + 1)e + \ln(x + 1)f - \ln(x + 1)g$
risc	$\frac{hx^3}{3} + \frac{gx^2}{2} - \frac{3hx^2}{2} + fx - 3gx + 7hx + \ln(-x - 1)d - \ln(-x - 1)e + \ln(-x - 1)f - \ln(-x - 1)g$

```
[In] int((x^2-3*x+2)*(h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x,method=_RETURNVERBOSE)
```

```
[Out] (1/2*g-3/2*h)*x^2+(f-3*g+7*h)*x+1/3*h*x^3+(-d+2*e-4*f+8*g-16*h)*ln(x+2)+(d-e+f-g+h)*ln(x+1)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.26 (sec) , antiderivative size = 62, normalized size of antiderivative = 0.94

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{4 - 5x^2 + x^4} dx$$

$$= \frac{1}{3}hx^3 + \frac{1}{2}(g - 3h)x^2 + (f - 3g + 7h)x$$

$$- (d - 2e + 4f - 8g + 16h)\log(x + 2) + (d - e + f - g + h)\log(x + 1)$$

[In] integrate((x^2-3\*x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out] 1/3\*h\*x^3 + 1/2\*(g - 3\*h)\*x^2 + (f - 3\*g + 7\*h)\*x - (d - 2\*e + 4\*f - 8\*g + 16\*h)\*log(x + 2) + (d - e + f - g + h)\*log(x + 1)

### Sympy [A] (verification not implemented)

Time = 0.85 (sec) , antiderivative size = 94, normalized size of antiderivative = 1.42

$$\begin{aligned} & \int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{4 - 5x^2 + x^4} dx \\ &= \frac{hx^3}{3} + x^2 \left( \frac{g}{2} - \frac{3h}{2} \right) + x(f - 3g + 7h) \\ & \quad + (-d + 2e - 4f + 8g - 16h) \log \left( x + \frac{4d - 6e + 10f - 18g + 34h}{2d - 3e + 5f - 9g + 17h} \right) \\ & \quad + (d - e + f - g + h) \log(x + 1) \end{aligned}$$

[In] integrate((x\*\*2-3\*x+2)\*(h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4),x)

[Out] h\*x\*\*3/3 + x\*\*2\*(g/2 - 3\*h/2) + x\*(f - 3\*g + 7\*h) + (-d + 2\*e - 4\*f + 8\*g - 16\*h)\*log(x + (4\*d - 6\*e + 10\*f - 18\*g + 34\*h)/(2\*d - 3\*e + 5\*f - 9\*g + 17\*h)) + (d - e + f - g + h)\*log(x + 1)

### Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 62, normalized size of antiderivative = 0.94

$$\begin{aligned} & \int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{4 - 5x^2 + x^4} dx \\ &= \frac{1}{3} hx^3 + \frac{1}{2} (g - 3h)x^2 + (f - 3g + 7h)x \\ & \quad - (d - 2e + 4f - 8g + 16h) \log(x + 2) + (d - e + f - g + h) \log(x + 1) \end{aligned}$$

[In] integrate((x^2-3\*x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] 1/3\*h\*x^3 + 1/2\*(g - 3\*h)\*x^2 + (f - 3\*g + 7\*h)\*x - (d - 2\*e + 4\*f - 8\*g + 16\*h)\*log(x + 2) + (d - e + f - g + h)\*log(x + 1)

**Giac [A] (verification not implemented)**

none

Time = 0.31 (sec) , antiderivative size = 67, normalized size of antiderivative = 1.02

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{4 - 5x^2 + x^4} dx$$

$$= \frac{1}{3}hx^3 + \frac{1}{2}gx^2 - \frac{3}{2}hx^2 + fx - 3gx + 7hx$$

$$- (d - 2e + 4f - 8g + 16h)\log(|x + 2|) + (d - e + f - g + h)\log(|x + 1|)$$

[In] integrate((x^2-3\*x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] 1/3\*h\*x^3 + 1/2\*g\*x^2 - 3/2\*h\*x^2 + f\*x - 3\*g\*x + 7\*h\*x - (d - 2\*e + 4\*f - 8\*g + 16\*h)\*log(abs(x + 2)) + (d - e + f - g + h)\*log(abs(x + 1))

**Mupad [B] (verification not implemented)**

Time = 0.04 (sec) , antiderivative size = 63, normalized size of antiderivative = 0.95

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{4 - 5x^2 + x^4} dx$$

$$= x^2 \left( \frac{g}{2} - \frac{3h}{2} \right) + x(f - 3g + 7h) - \ln(x + 2)(d - 2e + 4f - 8g + 16h)$$

$$+ \frac{hx^3}{3} + \ln(x + 1)(d - e + f - g + h)$$

[In] int(((x^2 - 3\*x + 2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4))/(x^4 - 5\*x^2 + 4),x)

[Out] x^2\*(g/2 - (3\*h)/2) + x\*(f - 3\*g + 7\*h) - log(x + 2)\*(d - 2\*e + 4\*f - 8\*g + 16\*h) + (h\*x^3)/3 + log(x + 1)\*(d - e + f - g + h)

$$3.78 \quad \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx$$

Optimal result	999
Rubi [A] (verified)	999
Mathematica [A] (verified)	1001
Maple [A] (verified)	1001
Fricas [A] (verification not implemented)	1002
Sympy [A] (verification not implemented)	1002
Maxima [A] (verification not implemented)	1003
Giac [A] (verification not implemented)	1003
Mupad [B] (verification not implemented)	1004

### Optimal result

Integrand size = 46, antiderivative size = 90

$$\begin{aligned} & \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx \\ &= (f-3g+7h-15i)x + \frac{1}{2}(g-3h+7i)x^2 + \frac{1}{3}(h-3i)x^3 + \frac{ix^4}{4} \\ & \quad + (d-e+f-g+h-i)\log(1+x) - (d-2e+4f-8g+16h-32i)\log(2+x) \end{aligned}$$

[Out] (f-3\*g+7\*h-15\*i)\*x+1/2\*(g-3\*h+7\*i)\*x^2+1/3\*(h-3\*i)\*x^3+1/4\*i\*x^4+(d-e+f-g+h-i)\*ln(1+x)-(d-2\*e+4\*f-8\*g+16\*h-32\*i)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 90, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 4,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.087$ , Rules used = {1600, 1671, 646, 31}

$$\begin{aligned} & \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx \\ &= \log(x+1)(d-e+f-g+h-i) - \log(x+2)(d-2e+4f-8g+16h-32i) \\ & \quad + x(f-3g+7h-15i) + \frac{1}{2}x^2(g-3h+7i) + \frac{1}{3}x^3(h-3i) + \frac{ix^4}{4} \end{aligned}$$

[In] Int[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5))/(4 - 5\*x^2 + x^4), x]

[Out] (f - 3\*g + 7\*h - 15\*i)\*x + ((g - 3\*h + 7\*i)\*x^2)/2 + ((h - 3\*i)\*x^3)/3 + (i\*x^4)/4 + (d - e + f - g + h - i)\*Log[1 + x] - (d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)\*Log[2 + x]

Rule 31

Int[((a\_) + (b\_)\*(x\_))<sup>(-1)</sup>, x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

Rule 646

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[(c\*d - e\*(b/2 - q/2))/q, Int[1/(b/2 - q/2 + c\*x), x], x] - Dist[(c\*d - e\*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c\*x), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && NiceSqrtQ[b^2 - 4\*a\*c]

Rule 1600

Int[(u\_)\*(Px\_)<sup>(p\_)</sup>\*(Qx\_)<sup>(q\_)</sup>, x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]<sup>p</sup>\*Qx<sup>(p + q)</sup>, x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rule 1671

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)<sup>(p\_)</sup>, x\_Symbol] := Int[ExpandIntegrand[Pq\*(a + b\*x + c\*x^2)<sup>p</sup>, x], x] /; FreeQ[{a, b, c}, x] && PolyQ[Pq, x] && IGtQ[p, -2]

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{2 + 3x + x^2} dx \\
 &= \int \left( f - 3g + 7h - 15i + (g - 3h + 7i)x + (h - 3i)x^2 + ix^3 \right. \\
 &\quad \left. + \frac{d - 2f + 6g - 14h + 30i + (e - 3f + 7g - 15h + 31i)x}{2 + 3x + x^2} \right) dx \\
 &= (f - 3g + 7h - 15i)x + \frac{1}{2}(g - 3h + 7i)x^2 + \frac{1}{3}(h - 3i)x^3 + \frac{ix^4}{4} \\
 &\quad + \int \frac{d - 2f + 6g - 14h + 30i + (e - 3f + 7g - 15h + 31i)x}{2 + 3x + x^2} dx \\
 &= (f - 3g + 7h - 15i)x + \frac{1}{2}(g - 3h + 7i)x^2 + \frac{1}{3}(h - 3i)x^3 + \frac{ix^4}{4} \\
 &\quad - (d - 2e + 4f - 8g + 16h - 32i) \int \frac{1}{2 + x} dx + (d - e + f - g + h - i) \int \frac{1}{1 + x} dx \\
 &= (f - 3g + 7h - 15i)x + \frac{1}{2}(g - 3h + 7i)x^2 + \frac{1}{3}(h - 3i)x^3 + \frac{ix^4}{4} \\
 &\quad + (d - e + f - g + h - i) \log(1 + x) - (d - 2e + 4f - 8g + 16h - 32i) \log(2 + x)
 \end{aligned}$$



**Mathematica [A] (verified)**

Time = 0.03 (sec) , antiderivative size = 91, normalized size of antiderivative = 1.01

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{4 - 5x^2 + x^4} dx$$

$$= (f - 3g + 7h - 15i)x + \frac{1}{2}(g - 3h + 7i)x^2 + \frac{1}{3}(h - 3i)x^3 + \frac{ix^4}{4}$$

$$+ (d - e + f - g + h - i)\log(1 + x) + (-d + 2e - 4f + 8g - 16h + 32i)\log(2 + x)$$

```
[In] Integrate[((2 - 3*x + x^2)*(d + e*x + f*x^2 + g*x^3 + h*x^4 + i*x^5))/(4 - 5*x^2 + x^4),x]
```

```
[Out] (f - 3*g + 7*h - 15*i)*x + ((g - 3*h + 7*i)*x^2)/2 + ((h - 3*i)*x^3)/3 + (i*x^4)/4 + (d - e + f - g + h - i)*Log[1 + x] + (-d + 2*e - 4*f + 8*g - 16*h + 32*i)*Log[2 + x]
```

**Maple [A] (verified)**

Time = 0.06 (sec) , antiderivative size = 88, normalized size of antiderivative = 0.98

method	result
norman	$(\frac{h}{3} - i)x^3 + (\frac{g}{2} - \frac{3h}{2} + \frac{7i}{2})x^2 + (f - 3g + 7h - 15i)x + \frac{ix^4}{4} + (-d + 2e - 4f + 8g - 16h + 32i)\log(2 + x)$
default	$\frac{ix^4}{4} + \frac{hx^3}{3} - ix^3 + \frac{gx^2}{2} - \frac{3hx^2}{2} + \frac{7ix^2}{2} + fx - 3gx + 7hx - 15ix + (-d + 2e - 4f + 8g - 16h + 32i)\log(2 + x)$
parallelrisc	$\frac{ix^4}{4} + \frac{hx^3}{3} - ix^3 + \frac{gx^2}{2} - \frac{3hx^2}{2} + \frac{7ix^2}{2} + fx - 3gx + 7hx - 15ix + \ln(x + 1)d - \ln(x + 1)e$
risc	$\frac{ix^4}{4} + \frac{hx^3}{3} - ix^3 + \frac{gx^2}{2} - \frac{3hx^2}{2} + \frac{7ix^2}{2} + fx - 3gx + 7hx - 15ix + \ln(-x - 1)d - \ln(-x - 1)e$

```
[In] int((x^2-3*x+2)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x,method=_RETURNVERBOSE)
```

```
[Out] (1/3*h-i)*x^3+(1/2*g-3/2*h+7/2*i)*x^2+(f-3*g+7*h-15*i)*x+1/4*i*x^4+(-d+2*e-4*f+8*g-16*h+32*i)*ln(x+2)+(d-e+f-g+h-i)*ln(x+1)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.25 (sec) , antiderivative size = 84, normalized size of antiderivative = 0.93

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{4 - 5x^2 + x^4} dx$$

$$= \frac{1}{4}ix^4 + \frac{1}{3}(h - 3i)x^3 + \frac{1}{2}(g - 3h + 7i)x^2 + (f - 3g + 7h - 15i)x$$

$$- (d - 2e + 4f - 8g + 16h - 32i)\log(x + 2) + (d - e + f - g + h - i)\log(x + 1)$$

[In] integrate((x^2-3\*x+2)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out] 1/4\*i\*x^4 + 1/3\*(h - 3\*i)\*x^3 + 1/2\*(g - 3\*h + 7\*i)\*x^2 + (f - 3\*g + 7\*h - 15\*i)\*x - (d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)\*log(x + 2) + (d - e + f - g + h - i)\*log(x + 1)

**Sympy [A] (verification not implemented)**

Time = 1.39 (sec) , antiderivative size = 122, normalized size of antiderivative = 1.36

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{4 - 5x^2 + x^4} dx$$

$$= \frac{ix^4}{4} + x^3\left(\frac{h}{3} - i\right) + x^2\left(\frac{g}{2} - \frac{3h}{2} + \frac{7i}{2}\right) + x(f - 3g + 7h - 15i)$$

$$+ (-d + 2e - 4f + 8g - 16h + 32i)\log\left(x + \frac{4d - 6e + 10f - 18g + 34h - 66i}{2d - 3e + 5f - 9g + 17h - 33i}\right)$$

$$+ (d - e + f - g + h - i)\log(x + 1)$$

[In] integrate((x\*\*2-3\*x+2)\*(i\*x\*\*5+h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4),x)

[Out] i\*x\*\*4/4 + x\*\*3\*(h/3 - i) + x\*\*2\*(g/2 - 3\*h/2 + 7\*i/2) + x\*(f - 3\*g + 7\*h - 15\*i) + (-d + 2\*e - 4\*f + 8\*g - 16\*h + 32\*i)\*log(x + (4\*d - 6\*e + 10\*f - 18\*g + 34\*h - 66\*i)/(2\*d - 3\*e + 5\*f - 9\*g + 17\*h - 33\*i)) + (d - e + f - g + h - i)\*log(x + 1)

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 84, normalized size of antiderivative = 0.93

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{4 - 5x^2 + x^4} dx$$

$$= \frac{1}{4}ix^4 + \frac{1}{3}(h - 3i)x^3 + \frac{1}{2}(g - 3h + 7i)x^2 + (f - 3g + 7h - 15i)x$$

$$- (d - 2e + 4f - 8g + 16h - 32i)\log(x + 2) + (d - e + f - g + h - i)\log(x + 1)$$

```
[In] integrate((x^2-3*x+2)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="maxima")
```

```
[Out] 1/4*i*x^4 + 1/3*(h - 3*i)*x^3 + 1/2*(g - 3*h + 7*i)*x^2 + (f - 3*g + 7*h - 15*i)*x - (d - 2*e + 4*f - 8*g + 16*h - 32*i)*log(x + 2) + (d - e + f - g + h - i)*log(x + 1)
```

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 95, normalized size of antiderivative = 1.06

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{4 - 5x^2 + x^4} dx$$

$$= \frac{1}{4}ix^4 + \frac{1}{3}hx^3 - ix^3 + \frac{1}{2}gx^2 - \frac{3}{2}hx^2 + \frac{7}{2}ix^2 + fx - 3gx + 7hx - 15ix$$

$$- (d - 2e + 4f - 8g + 16h - 32i)\log(|x + 2|) + (d - e + f - g + h - i)\log(|x + 1|)$$

```
[In] integrate((x^2-3*x+2)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="giac")
```

```
[Out] 1/4*i*x^4 + 1/3*h*x^3 - i*x^3 + 1/2*g*x^2 - 3/2*h*x^2 + 7/2*i*x^2 + f*x - 3*g*x + 7*h*x - 15*i*x - (d - 2*e + 4*f - 8*g + 16*h - 32*i)*log(abs(x + 2)) + (d - e + f - g + h - i)*log(abs(x + 1))
```

**Mupad [B] (verification not implemented)**

Time = 0.05 (sec) , antiderivative size = 86, normalized size of antiderivative = 0.96

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{4 - 5x^2 + x^4} dx$$

$$= x^3 \left( \frac{h}{3} - i \right) - \ln(x + 2) (d - 2e + 4f - 8g + 16h - 32i)$$

$$+ \ln(x + 1) (d - e + f - g + h - i) + \frac{ix^4}{4} + x^2 \left( \frac{g}{2} - \frac{3h}{2} + \frac{7i}{2} \right) + x(f - 3g + 7h - 15i)$$

[In] int(((x^2 - 3\*x + 2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5))/(x^4 - 5\*x^2 + 4),x)

[Out] x^3\*(h/3 - i) - log(x + 2)\*(d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i) + log(x + 1)\*(d - e + f - g + h - i) + (i\*x^4)/4 + x^2\*(g/2 - (3\*h)/2 + (7\*i)/2) + x\*(f - 3\*g + 7\*h - 15\*i)

### 3.79 $\int \frac{2+x}{4-5x^2+x^4} dx$

Optimal result	1005
Rubi [A] (verified)	1005
Mathematica [A] (verified)	1006
Maple [A] (verified)	1006
Fricas [A] (verification not implemented)	1007
Sympy [A] (verification not implemented)	1007
Maxima [A] (verification not implemented)	1007
Giac [A] (verification not implemented)	1007
Mupad [B] (verification not implemented)	1008

#### Optimal result

Integrand size = 16, antiderivative size = 29

$$\int \frac{2+x}{4-5x^2+x^4} dx = -\frac{1}{2} \log(1-x) + \frac{1}{3} \log(2-x) + \frac{1}{6} \log(1+x)$$

[Out]  $-1/2*\ln(1-x)+1/3*\ln(2-x)+1/6*\ln(1+x)$

#### Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 29, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.125$ , Rules used = {1600, 2083}

$$\int \frac{2+x}{4-5x^2+x^4} dx = -\frac{1}{2} \log(1-x) + \frac{1}{3} \log(2-x) + \frac{1}{6} \log(x+1)$$

[In]  $\text{Int}[(2+x)/(4-5*x^2+x^4),x]$

[Out]  $-1/2*\text{Log}[1-x] + \text{Log}[2-x]/3 + \text{Log}[1+x]/6$

#### Rule 1600

$\text{Int}[(u_*)*(P_x)^{(p_*)}*(Q_x)^{(q_*)}, x\_Symbol] \rightarrow \text{Int}[u*\text{PolynomialQuotient}[P_x, Q_x, x]^p*Q_x^{(p+q)}, x] /; \text{FreeQ}[q, x] \ \&\& \ \text{PolyQ}[P_x, x] \ \&\& \ \text{PolyQ}[Q_x, x] \ \&\& \ \text{EqQ}[\text{PolynomialRemainder}[P_x, Q_x, x], 0] \ \&\& \ \text{IntegerQ}[p] \ \&\& \ \text{LtQ}[p*q, 0]$

#### Rule 2083

$\text{Int}[(P_*)^{(p_*)}, x\_Symbol] \rightarrow \text{With}[\{u = \text{Factor}[P]\}, \text{Int}[\text{ExpandIntegrand}[u^p, x], x] /; \text{!SumQ}[\text{NonfreeFactors}[u, x]]] /; \text{PolyQ}[P, x] \ \&\& \ \text{ILtQ}[p, 0]$

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{1}{2-x-2x^2+x^3} dx \\
&= \int \left( \frac{1}{3(-2+x)} - \frac{1}{2(-1+x)} + \frac{1}{6(1+x)} \right) dx \\
&= -\frac{1}{2} \log(1-x) + \frac{1}{3} \log(2-x) + \frac{1}{6} \log(1+x)
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.01 (sec) , antiderivative size = 29, normalized size of antiderivative = 1.00

$$\int \frac{2+x}{4-5x^2+x^4} dx = -\frac{1}{2} \log(1-x) + \frac{1}{3} \log(2-x) + \frac{1}{6} \log(1+x)$$

[In] Integrate[(2 + x)/(4 - 5\*x^2 + x^4),x]

[Out] -1/2\*Log[1 - x] + Log[2 - x]/3 + Log[1 + x]/6

**Maple [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 20, normalized size of antiderivative = 0.69

method	result	size
default	$\frac{\ln(x+1)}{6} - \frac{\ln(x-1)}{2} + \frac{\ln(x-2)}{3}$	20
norman	$\frac{\ln(x+1)}{6} - \frac{\ln(x-1)}{2} + \frac{\ln(x-2)}{3}$	20
risch	$\frac{\ln(x+1)}{6} - \frac{\ln(x-1)}{2} + \frac{\ln(x-2)}{3}$	20
parallelrisch	$\frac{\ln(x+1)}{6} - \frac{\ln(x-1)}{2} + \frac{\ln(x-2)}{3}$	20

[In] int((x+2)/(x^4-5\*x^2+4),x,method=\_RETURNVERBOSE)

[Out] 1/6\*ln(x+1)-1/2\*ln(x-1)+1/3\*ln(x-2)

**Fricas [A] (verification not implemented)**

none

Time = 0.25 (sec) , antiderivative size = 19, normalized size of antiderivative = 0.66

$$\int \frac{2+x}{4-5x^2+x^4} dx = \frac{1}{6} \log(x+1) - \frac{1}{2} \log(x-1) + \frac{1}{3} \log(x-2)$$

[In] integrate((2+x)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out] 1/6\*log(x + 1) - 1/2\*log(x - 1) + 1/3\*log(x - 2)

**Sympy [A] (verification not implemented)**

Time = 0.06 (sec) , antiderivative size = 19, normalized size of antiderivative = 0.66

$$\int \frac{2+x}{4-5x^2+x^4} dx = \frac{\log(x-2)}{3} - \frac{\log(x-1)}{2} + \frac{\log(x+1)}{6}$$

[In] integrate((2+x)/(x\*\*4-5\*x\*\*2+4),x)

[Out] log(x - 2)/3 - log(x - 1)/2 + log(x + 1)/6

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 19, normalized size of antiderivative = 0.66

$$\int \frac{2+x}{4-5x^2+x^4} dx = \frac{1}{6} \log(x+1) - \frac{1}{2} \log(x-1) + \frac{1}{3} \log(x-2)$$

[In] integrate((2+x)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] 1/6\*log(x + 1) - 1/2\*log(x - 1) + 1/3\*log(x - 2)

**Giac [A] (verification not implemented)**

none

Time = 0.28 (sec) , antiderivative size = 22, normalized size of antiderivative = 0.76

$$\int \frac{2+x}{4-5x^2+x^4} dx = \frac{1}{6} \log(|x+1|) - \frac{1}{2} \log(|x-1|) + \frac{1}{3} \log(|x-2|)$$

[In] integrate((2+x)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] 1/6\*log(abs(x + 1)) - 1/2\*log(abs(x - 1)) + 1/3\*log(abs(x - 2))

**Mupad [B] (verification not implemented)**

Time = 0.04 (sec) , antiderivative size = 19, normalized size of antiderivative = 0.66

$$\int \frac{2+x}{4-5x^2+x^4} dx = \frac{\ln(x+1)}{6} - \frac{\ln(x-1)}{2} + \frac{\ln(x-2)}{3}$$

[In] int((x + 2)/(x^4 - 5\*x^2 + 4),x)

[Out] log(x + 1)/6 - log(x - 1)/2 + log(x - 2)/3



### 3.80 $\int \frac{(2+x)(d+ex)}{4-5x^2+x^4} dx$

Optimal result . . . . .	1009
Rubi [A] (verified) . . . . .	1009
Mathematica [A] (verified) . . . . .	1010
Maple [A] (verified) . . . . .	1010
Fricas [A] (verification not implemented) . . . . .	1011
Sympy [B] (verification not implemented) . . . . .	1011
Maxima [A] (verification not implemented) . . . . .	1012
Giac [A] (verification not implemented) . . . . .	1012
Mupad [B] (verification not implemented) . . . . .	1012

#### Optimal result

Integrand size = 21, antiderivative size = 42

$$\int \frac{(2+x)(d+ex)}{4-5x^2+x^4} dx = -\frac{1}{2}(d+e)\log(1-x) + \frac{1}{3}(d+2e)\log(2-x) + \frac{1}{6}(d-e)\log(1+x)$$

[Out]  $-1/2*(d+e)*\ln(1-x)+1/3*(d+2*e)*\ln(2-x)+1/6*(d-e)*\ln(1+x)$

#### Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 42, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.095$ , Rules used = {1600, 2099}

$$\int \frac{(2+x)(d+ex)}{4-5x^2+x^4} dx = -\frac{1}{2}(d+e)\log(1-x) + \frac{1}{3}(d+2e)\log(2-x) + \frac{1}{6}(d-e)\log(x+1)$$

[In]  $\text{Int}[(2+x)*(d+e*x)/(4-5*x^2+x^4),x]$

[Out]  $-1/2*((d+e)*\text{Log}[1-x]) + ((d+2*e)*\text{Log}[2-x])/3 + ((d-e)*\text{Log}[1+x])/6$

#### Rule 1600

$\text{Int}[(u_.)*(P_x)^{(p_.)}*(Q_x)^{(q_.)}, x\_Symbol] \rightarrow \text{Int}[u*PolynomialQuotient[Px, Qx, x]^p*Qx^{(p+q)}, x] /; \text{FreeQ}[q, x] \ \&\& \ \text{PolyQ}[Px, x] \ \&\& \ \text{PolyQ}[Qx, x] \ \&\& \ \text{EqQ}[PolynomialRemainder[Px, Qx, x], 0] \ \&\& \ \text{IntegerQ}[p] \ \&\& \ \text{LtQ}[p*Q, 0]$

#### Rule 2099

$\text{Int}[(P_.)^{(p_.)}*(Q_.)^{(q_.)}, x\_Symbol] \rightarrow \text{With}[\{PP = \text{Factor}[P]\}, \text{Int}[\text{ExpandIntegrand}[PP^p*Q^q, x], x] /; \text{!SumQ}[\text{NonfreeFactors}[PP, x]]] /; \text{FreeQ}[q, x] \ \&\&$

PolyQ[P, x] && PolyQ[Q, x] && IntegerQ[p] && NeQ[P, x]

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex}{2 - x - 2x^2 + x^3} dx \\ &= \int \left( \frac{d + 2e}{3(-2 + x)} + \frac{-d - e}{2(-1 + x)} + \frac{d - e}{6(1 + x)} \right) dx \\ &= -\frac{1}{2}(d + e) \log(1 - x) + \frac{1}{3}(d + 2e) \log(2 - x) + \frac{1}{6}(d - e) \log(1 + x) \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.01 (sec) , antiderivative size = 39, normalized size of antiderivative = 0.93

$$\int \frac{(2 + x)(d + ex)}{4 - 5x^2 + x^4} dx = \frac{1}{6}(-3(d + e) \log(1 - x) + 2(d + 2e) \log(2 - x) + (d - e) \log(1 + x))$$

[In] Integrate[((2 + x)\*(d + e\*x))/(4 - 5\*x^2 + x^4),x]

[Out] (-3\*(d + e)\*Log[1 - x] + 2\*(d + 2\*e)\*Log[2 - x] + (d - e)\*Log[1 + x])/6

**Maple [A] (verified)**

Time = 0.05 (sec) , antiderivative size = 38, normalized size of antiderivative = 0.90

method	result	size
default	$\left(\frac{d}{6} - \frac{e}{6}\right) \ln(x + 1) + \left(-\frac{d}{2} - \frac{e}{2}\right) \ln(x - 1) + \left(\frac{d}{3} + \frac{2e}{3}\right) \ln(x - 2)$	38
norman	$\left(\frac{d}{6} - \frac{e}{6}\right) \ln(x + 1) + \left(-\frac{d}{2} - \frac{e}{2}\right) \ln(x - 1) + \left(\frac{d}{3} + \frac{2e}{3}\right) \ln(x - 2)$	38
parallelrisc	$\frac{\ln(x-2)d}{3} + \frac{2\ln(x-2)e}{3} - \frac{\ln(x-1)d}{2} - \frac{\ln(x-1)e}{2} + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6}$	44
risc	$\frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} - \frac{\ln(1-x)d}{2} - \frac{\ln(1-x)e}{2} + \frac{\ln(2-x)d}{3} + \frac{2\ln(2-x)e}{3}$	52

[In] int((x+2)\*(e\*x+d)/(x^4-5\*x^2+4),x,method=\_RETURNVERBOSE)

[Out] (1/6\*d-1/6\*e)\*ln(x+1)+(-1/2\*d-1/2\*e)\*ln(x-1)+(1/3\*d+2/3\*e)\*ln(x-2)

**Fricas [A] (verification not implemented)**

none

Time = 0.26 (sec) , antiderivative size = 32, normalized size of antiderivative = 0.76

$$\int \frac{(2+x)(d+ex)}{4-5x^2+x^4} dx = \frac{1}{6}(d-e)\log(x+1) - \frac{1}{2}(d+e)\log(x-1) + \frac{1}{3}(d+2e)\log(x-2)$$

[In] integrate((2+x)\*(e\*x+d)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out] 1/6\*(d - e)\*log(x + 1) - 1/2\*(d + e)\*log(x - 1) + 1/3\*(d + 2\*e)\*log(x - 2)

**Sympy [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 304 vs. 2(37) = 74.

Time = 1.11 (sec) , antiderivative size = 304, normalized size of antiderivative = 7.24

$$\int \frac{(2+x)(d+ex)}{4-5x^2+x^4} dx$$

$$= \frac{(d-e)\log\left(x + \frac{26d^3+66d^2e-9d^2(d-e)+78de^2-12de(d-e)-7d(d-e)^2+46e^3+3e^2(d-e)-8e(d-e)^2}{10d^3+69d^2e+102de^2+35e^3}\right)}{6}$$

$$- \frac{(d+e)\log\left(x + \frac{26d^3+66d^2e+27d^2(d+e)+78de^2+36de(d+e)-63d(d+e)^2+46e^3-9e^2(d+e)-72e(d+e)^2}{10d^3+69d^2e+102de^2+35e^3}\right)}{2}$$

$$+ \frac{(d+2e)\log\left(x + \frac{26d^3+66d^2e-18d^2(d+2e)+78de^2-24de(d+2e)-28d(d+2e)^2+46e^3+6e^2(d+2e)-32e(d+2e)^2}{10d^3+69d^2e+102de^2+35e^3}\right)}{3}$$

[In] integrate((2+x)\*(e\*x+d)/(x\*\*4-5\*x\*\*2+4),x)

```
[Out] (d - e)*log(x + (26*d**3 + 66*d**2*e - 9*d**2*(d - e) + 78*d*e**2 - 12*d*e*(d - e) - 7*d*(d - e)**2 + 46*e**3 + 3*e**2*(d - e) - 8*e*(d - e)**2)/(10*d**3 + 69*d**2*e + 102*d*e**2 + 35*e**3))/6 - (d + e)*log(x + (26*d**3 + 66*d**2*e + 27*d**2*(d + e) + 78*d*e**2 + 36*d*e*(d + e) - 63*d*(d + e)**2 + 46*e**3 - 9*e**2*(d + e) - 72*e*(d + e)**2)/(10*d**3 + 69*d**2*e + 102*d*e**2 + 35*e**3))/2 + (d + 2*e)*log(x + (26*d**3 + 66*d**2*e - 18*d**2*(d + 2*e) + 78*d*e**2 - 24*d*e*(d + 2*e) - 28*d*(d + 2*e)**2 + 46*e**3 + 6*e**2*(d + 2*e) - 32*e*(d + 2*e)**2)/(10*d**3 + 69*d**2*e + 102*d*e**2 + 35*e**3))/3
```

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 32, normalized size of antiderivative = 0.76

$$\int \frac{(2+x)(d+ex)}{4-5x^2+x^4} dx = \frac{1}{6}(d-e)\log(x+1) - \frac{1}{2}(d+e)\log(x-1) + \frac{1}{3}(d+2e)\log(x-2)$$

[In] integrate((2+x)\*(e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] 1/6\*(d - e)\*log(x + 1) - 1/2\*(d + e)\*log(x - 1) + 1/3\*(d + 2\*e)\*log(x - 2)

**Giac [A] (verification not implemented)**

none

Time = 0.27 (sec) , antiderivative size = 35, normalized size of antiderivative = 0.83

$$\begin{aligned} & \int \frac{(2+x)(d+ex)}{4-5x^2+x^4} dx \\ &= \frac{1}{6}(d-e)\log(|x+1|) - \frac{1}{2}(d+e)\log(|x-1|) + \frac{1}{3}(d+2e)\log(|x-2|) \end{aligned}$$

[In] integrate((2+x)\*(e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] 1/6\*(d - e)\*log(abs(x + 1)) - 1/2\*(d + e)\*log(abs(x - 1)) + 1/3\*(d + 2\*e)\*log(abs(x - 2))

**Mupad [B] (verification not implemented)**

Time = 7.78 (sec) , antiderivative size = 38, normalized size of antiderivative = 0.90

$$\int \frac{(2+x)(d+ex)}{4-5x^2+x^4} dx = \ln(x-2) \left( \frac{d}{3} + \frac{2e}{3} \right) - \ln(x-1) \left( \frac{d}{2} + \frac{e}{2} \right) + \ln(x+1) \left( \frac{d}{6} - \frac{e}{6} \right)$$

[In] int(((x + 2)\*(d + e\*x))/(x^4 - 5\*x^2 + 4),x)

[Out] log(x - 2)\*(d/3 + (2\*e)/3) - log(x - 1)\*(d/2 + e/2) + log(x + 1)\*(d/6 - e/6)

$$3.81 \quad \int \frac{(2+x)(d+ex+fx^2)}{4-5x^2+x^4} dx$$

Optimal result . . . . .	1013
Rubi [A] (verified) . . . . .	1013
Mathematica [A] (verified) . . . . .	1014
Maple [A] (verified) . . . . .	1014
Fricas [A] (verification not implemented) . . . . .	1015
Sympy [B] (verification not implemented) . . . . .	1015
Maxima [A] (verification not implemented) . . . . .	1016
Giac [A] (verification not implemented) . . . . .	1016
Mupad [B] (verification not implemented) . . . . .	1017

### Optimal result

Integrand size = 26, antiderivative size = 47

$$\int \frac{(2+x)(d+ex+fx^2)}{4-5x^2+x^4} dx = -\frac{1}{2}(d+e+f)\log(1-x) + \frac{1}{3}(d+2e+4f)\log(2-x) + \frac{1}{6}(d-e+f)\log(1+x)$$

[Out] -1/2\*(d+e+f)\*ln(1-x)+1/3\*(d+2\*e+4\*f)\*ln(2-x)+1/6\*(d-e+f)\*ln(1+x)

### Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 47, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.077$ , Rules used = {1600, 2099}

$$\int \frac{(2+x)(d+ex+fx^2)}{4-5x^2+x^4} dx = -\frac{1}{2}\log(1-x)(d+e+f) + \frac{1}{3}\log(2-x)(d+2e+4f) + \frac{1}{6}\log(x+1)(d-e+f)$$

[In] Int[((2 + x)\*(d + e\*x + f\*x^2))/(4 - 5\*x^2 + x^4), x]

[Out] -1/2\*((d + e + f)\*Log[1 - x]) + ((d + 2\*e + 4\*f)\*Log[2 - x])/3 + ((d - e + f)\*Log[1 + x])/6

#### Rule 1600

Int[(u\_)\*(P\_x\_)^(p\_)\*(Q\_x\_)^(q\_), x\_Symbol] :> Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p+q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

## Rule 2099

```
Int[(P_)^(p_)*(Q_)^(q_), x_Symbol] :> With[{PP = Factor[P]}, Int[ExpandIntegrand[PP^p*Q^q, x], x] /; !SumQ[NonfreeFactors[PP, x]] /; FreeQ[q, x] && PolyQ[P, x] && PolyQ[Q, x] && IntegerQ[p] && NeQ[P, x]
```

## Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex + fx^2}{2 - x - 2x^2 + x^3} dx \\ &= \int \left( \frac{d + 2e + 4f}{3(-2 + x)} + \frac{-d - e - f}{2(-1 + x)} + \frac{d - e + f}{6(1 + x)} \right) dx \\ &= -\frac{1}{2}(d + e + f) \log(1 - x) + \frac{1}{3}(d + 2e + 4f) \log(2 - x) + \frac{1}{6}(d - e + f) \log(1 + x) \end{aligned}$$

## Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 44, normalized size of antiderivative = 0.94

$$\int \frac{(2 + x)(d + ex + fx^2)}{4 - 5x^2 + x^4} dx = \frac{1}{6}(-3(d + e + f) \log(1 - x) + 2(d + 2e + 4f) \log(2 - x) + (d - e + f) \log(1 + x))$$

```
[In] Integrate[((2 + x)*(d + e*x + f*x^2))/(4 - 5*x^2 + x^4), x]
```

```
[Out] (-3*(d + e + f)*Log[1 - x] + 2*(d + 2*e + 4*f)*Log[2 - x] + (d - e + f)*Log[1 + x])/6
```

## Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 47, normalized size of antiderivative = 1.00

method	result
default	$\left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6}\right) \ln(x + 1) + \left(-\frac{d}{2} - \frac{e}{2} - \frac{f}{2}\right) \ln(x - 1) + \left(\frac{d}{3} + \frac{2e}{3} + \frac{4f}{3}\right) \ln(x - 2)$
norman	$\left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6}\right) \ln(x + 1) + \left(-\frac{d}{2} - \frac{e}{2} - \frac{f}{2}\right) \ln(x - 1) + \left(\frac{d}{3} + \frac{2e}{3} + \frac{4f}{3}\right) \ln(x - 2)$
parallelrisc	$\frac{\ln(x-2)d}{3} + \frac{2\ln(x-2)e}{3} + \frac{4\ln(x-2)f}{3} - \frac{\ln(x-1)d}{2} - \frac{\ln(x-1)e}{2} - \frac{\ln(x-1)f}{2} + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} + \frac{\ln(x+1)f}{6}$
risc	$\frac{\ln(2-x)d}{3} + \frac{2\ln(2-x)e}{3} + \frac{4\ln(2-x)f}{3} - \frac{\ln(1-x)d}{2} - \frac{\ln(1-x)e}{2} - \frac{\ln(1-x)f}{2} + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} + \frac{\ln(x+1)f}{6}$

```
[In] int((x+2)*(f*x^2+e*x+d)/(x^4-5*x^2+4), x, method=_RETURNVERBOSE)
```

```
[Out] (1/6*d-1/6*e+1/6*f)*ln(x+1)+(-1/2*d-1/2*e-1/2*f)*ln(x-1)+(1/3*d+2/3*e+4/3*f)*ln(x-2)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.25 (sec) , antiderivative size = 37, normalized size of antiderivative = 0.79

$$\int \frac{(2+x)(d+ex+fx^2)}{4-5x^2+x^4} dx = \frac{1}{6}(d-e+f)\log(x+1) - \frac{1}{2}(d+e+f)\log(x-1) + \frac{1}{3}(d+2e+4f)\log(x-2)$$

[In] integrate((2+x)\*(f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="fricas")

[Out] 1/6\*(d - e + f)\*log(x + 1) - 1/2\*(d + e + f)\*log(x - 1) + 1/3\*(d + 2\*e + 4\*f)\*log(x - 2)

**Sympy [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 716 vs. 2(49) = 98.

Time = 7.75 (sec) , antiderivative size = 716, normalized size of antiderivative = 15.23

$$\int \frac{(2+x)(d+ex+fx^2)}{4-5x^2+x^4} dx = \frac{(d-e+f)\log\left(x + \frac{26d^3+66d^2e+132d^2f-9d^2(d-e+f)+78de^2+276def-12de(d-e+f)+222df^2+6df(d-e+f)-7d(d-e+f)^2+46e^3+2}{10d^3+69d^2e+102d^2f+102de^2+318def+246df^2}\right)}{6} - \frac{(d+e+f)\log\left(x + \frac{26d^3+66d^2e+132d^2f+27d^2(d+e+f)+78de^2+276def+36de(d+e+f)+222df^2-18df(d+e+f)-63d(d+e+f)^2+4}{10d^3+69d^2e+102d^2f+102de^2+318def+246df^2}\right)}{2} + \frac{(d+2e+4f)\log\left(x + \frac{26d^3+66d^2e+132d^2f-18d^2(d+2e+4f)+78de^2+276def-24de(d+2e+4f)+222df^2+12df(d+2e+4f)-28d(d+2e+4f)^2+46e^3+2}{10d^3+69d^2e+102d^2f+102de^2+318def+246df^2}\right)}{3}$$

[In] integrate((2+x)\*(f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4),x)

```
[Out] (d - e + f)*log(x + (26*d**3 + 66*d**2*e + 132*d**2*f - 9*d**2*(d - e + f)
+ 78*d*e**2 + 276*d*e*f - 12*d*e*(d - e + f) + 222*d*f**2 + 6*d*f*(d - e +
f) - 7*d*(d - e + f)**2 + 46*e**3 + 204*e**2*f + 3*e**2*(d - e + f) + 282*e
*f**2 + 36*e*f*(d - e + f) - 8*e*(d - e + f)**2 + 116*f**3 + 51*f**2*(d - e
+ f) - 13*f*(d - e + f)**2)/(10*d**3 + 69*d**2*e + 102*d**2*f + 102*d*e**2
+ 318*d*e*f + 246*d*f**2 + 35*e**3 + 174*e**2*f + 285*e*f**2 + 154*f**3))/
6 - (d + e + f)*log(x + (26*d**3 + 66*d**2*e + 132*d**2*f + 27*d**2*(d + e
+ f) + 78*d*e**2 + 276*d*e*f + 36*d*e*(d + e + f) + 222*d*f**2 - 18*d*f*(d
+ e + f) - 63*d*(d + e + f)**2 + 46*e**3 + 204*e**2*f - 9*e**2*(d + e + f)
+ 282*e*f**2 - 108*e*f*(d + e + f) - 72*e*(d + e + f)**2 + 116*f**3 - 153*f
**2*(d + e + f) - 117*f*(d + e + f)**2)/(10*d**3 + 69*d**2*e + 102*d**2*f +
102*d*e**2 + 318*d*e*f + 246*d*f**2 + 35*e**3 + 174*e**2*f + 285*e*f**2 +
```

$$\frac{154f^3}{2} + (d + 2e + 4f) \log(x + (26d^3 + 66d^2e + 132d^2f - 18d^2(d + 2e + 4f) + 78d^2e^2 + 276d^2ef - 24d^2e(d + 2e + 4f) + 222d^2f^2 + 12d^2f(d + 2e + 4f) - 28d^2(d + 2e + 4f)^2 + 46e^3 + 204e^2f + 6e^2(d + 2e + 4f) + 282e^2f^2 + 72e^2f(d + 2e + 4f) - 32e(d + 2e + 4f)^2 + 116f^3 + 102f^2(d + 2e + 4f) - 52f(d + 2e + 4f)^2) / (10d^3 + 69d^2e + 102d^2f + 102d^2e^2 + 318d^2ef + 246d^2f^2 + 35e^3 + 174e^2f + 285e^2f^2 + 154f^3) / 3$$

### Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 37, normalized size of antiderivative = 0.79

$$\int \frac{(2+x)(d+ex+fx^2)}{4-5x^2+x^4} dx = \frac{1}{6}(d-e+f) \log(x+1) - \frac{1}{2}(d+e+f) \log(x-1) + \frac{1}{3}(d+2e+4f) \log(x-2)$$

[In] integrate((2+x)\*(f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] 1/6\*(d - e + f)\*log(x + 1) - 1/2\*(d + e + f)\*log(x - 1) + 1/3\*(d + 2\*e + 4\*f)\*log(x - 2)

### Giac [A] (verification not implemented)

none

Time = 0.31 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.85

$$\int \frac{(2+x)(d+ex+fx^2)}{4-5x^2+x^4} dx = \frac{1}{6}(d-e+f) \log(|x+1|) - \frac{1}{2}(d+e+f) \log(|x-1|) + \frac{1}{3}(d+2e+4f) \log(|x-2|)$$

[In] integrate((2+x)\*(f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] 1/6\*(d - e + f)\*log(abs(x + 1)) - 1/2\*(d + e + f)\*log(abs(x - 1)) + 1/3\*(d + 2\*e + 4\*f)\*log(abs(x - 2))



**Mupad [B] (verification not implemented)**

Time = 0.07 (sec) , antiderivative size = 47, normalized size of antiderivative = 1.00

$$\int \frac{(2+x)(d+ex+fx^2)}{4-5x^2+x^4} dx = \ln(x-2) \left( \frac{d}{3} + \frac{2e}{3} + \frac{4f}{3} \right) \\ - \ln(x-1) \left( \frac{d}{2} + \frac{e}{2} + \frac{f}{2} \right) + \ln(x+1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} \right)$$

[In] int(((x + 2)\*(d + e\*x + f\*x^2))/(x^4 - 5\*x^2 + 4),x)

[Out] log(x - 2)\*(d/3 + (2\*e)/3 + (4\*f)/3) - log(x - 1)\*(d/2 + e/2 + f/2) + log(x + 1)\*(d/6 - e/6 + f/6)

$$3.82 \quad \int \frac{(2+x)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx$$

Optimal result	1018
Rubi [A] (verified)	1018
Mathematica [A] (verified)	1019
Maple [A] (verified)	1019
Fricas [A] (verification not implemented)	1020
Sympy [B] (verification not implemented)	1020
Maxima [A] (verification not implemented)	1021
Giac [A] (verification not implemented)	1022
Mupad [B] (verification not implemented)	1022

### Optimal result

Integrand size = 31, antiderivative size = 57

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx = gx - \frac{1}{2}(d+e+f+g)\log(1-x) \\ + \frac{1}{3}(d+2e+4f+8g)\log(2-x) \\ + \frac{1}{6}(d-e+f-g)\log(1+x)$$

[Out] g\*x-1/2\*(d+e+f+g)\*ln(1-x)+1/3\*(d+2\*e+4\*f+8\*g)\*ln(2-x)+1/6\*(d-e+f-g)\*ln(1+x)

### Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 57, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.065$ , Rules used = {1600, 2099}

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx = -\frac{1}{2}\log(1-x)(d+e+f+g) \\ + \frac{1}{3}\log(2-x)(d+2e+4f+8g) \\ + \frac{1}{6}\log(x+1)(d-e+f-g) + gx$$

[In] Int[((2 + x)\*(d + e\*x + f\*x^2 + g\*x^3))/(4 - 5\*x^2 + x^4), x]

[Out] g\*x - ((d + e + f + g)\*Log[1 - x])/2 + ((d + 2\*e + 4\*f + 8\*g)\*Log[2 - x])/3 + ((d - e + f - g)\*Log[1 + x])/6

Rule 1600

```
Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px
, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] &&
EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

### Rule 2099

```
Int[(P_)^(p_.)*(Q_)^(q_.), x_Symbol] := With[{PP = Factor[P]}, Int[ExpandInt
egrand[PP^p*Q^q, x], x] /; !SumQ[NonfreeFactors[PP, x]]] /; FreeQ[q, x] &&
PolyQ[P, x] && PolyQ[Q, x] && IntegerQ[p] && NeQ[P, x]
```

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + ex + fx^2 + gx^3}{2 - x - 2x^2 + x^3} dx \\
 &= \int \left( g + \frac{d + 2e + 4f + 8g}{3(-2 + x)} + \frac{-d - e - f - g}{2(-1 + x)} + \frac{d - e + f - g}{6(1 + x)} \right) dx \\
 &= gx - \frac{1}{2}(d + e + f + g) \log(1 - x) + \frac{1}{3}(d + 2e + 4f + 8g) \log(2 - x) + \frac{1}{6}(d - e + f - g) \log(1 + x)
 \end{aligned}$$

### Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 55, normalized size of antiderivative = 0.96

$$\begin{aligned}
 \int \frac{(2 + x)(d + ex + fx^2 + gx^3)}{4 - 5x^2 + x^4} dx &= \frac{1}{6}(6gx - 3(d + e + f + g) \log(1 - x) \\
 &\quad + 2(d + 2e + 4f + 8g) \log(2 - x) \\
 &\quad + (d - e + f - g) \log(1 + x))
 \end{aligned}$$

```
[In] Integrate[((2 + x)*(d + e*x + f*x^2 + g*x^3))/(4 - 5*x^2 + x^4), x]
```

```
[Out] (6*g*x - 3*(d + e + f + g)*Log[1 - x] + 2*(d + 2*e + 4*f + 8*g)*Log[2 - x]
+ (d - e + f - g)*Log[1 + x])/6
```

### Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 59, normalized size of antiderivative = 1.04

method	result
default	$gx + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6}\right) \ln(x+1) + \left(-\frac{d}{2} - \frac{e}{2} - \frac{f}{2} - \frac{g}{2}\right) \ln(x-1) + \left(\frac{d}{3} + \frac{2e}{3} + \frac{4f}{3} + \frac{8g}{3}\right) \ln(x-2)$
norman	$gx + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6}\right) \ln(x+1) + \left(-\frac{d}{2} - \frac{e}{2} - \frac{f}{2} - \frac{g}{2}\right) \ln(x-1) + \left(\frac{d}{3} + \frac{2e}{3} + \frac{4f}{3} + \frac{8g}{3}\right) \ln(x-2)$
parallelrisch	$gx + \frac{\ln(x-2)d}{3} + \frac{2\ln(x-2)e}{3} + \frac{4\ln(x-2)f}{3} + \frac{8\ln(x-2)g}{3} - \frac{\ln(x-1)d}{2} - \frac{\ln(x-1)e}{2} - \frac{\ln(x-1)f}{2} - \frac{\ln(x-1)g}{2} + \frac{\ln(2-x)d}{3} + \frac{2\ln(2-x)e}{3} + \frac{4\ln(2-x)f}{3} + \frac{8\ln(2-x)g}{3}$
risch	$gx + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} + \frac{\ln(x+1)f}{6} - \frac{\ln(x+1)g}{6} - \frac{\ln(1-x)d}{2} - \frac{\ln(1-x)e}{2} - \frac{\ln(1-x)f}{2} - \frac{\ln(1-x)g}{2} + \frac{\ln(2-x)d}{3} + \frac{2\ln(2-x)e}{3} + \frac{4\ln(2-x)f}{3} + \frac{8\ln(2-x)g}{3}$

[In] `int((x+2)*(g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x,method=_RETURNVERBOSE)`

[Out] `g*x+(1/6*d-1/6*e+1/6*f-1/6*g)*ln(x+1)+(-1/2*d-1/2*e-1/2*f-1/2*g)*ln(x-1)+(1/3*d+2/3*e+4/3*f+8/3*g)*ln(x-2)`

## Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 47, normalized size of antiderivative = 0.82

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx = gx + \frac{1}{6}(d-e+f-g) \log(x+1) - \frac{1}{2}(d+e+f+g) \log(x-1) + \frac{1}{3}(d+2e+4f+8g) \log(x-2)$$

[In] `integrate((2+x)*(g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="fricas")`

[Out] `g*x + 1/6*(d - e + f - g)*log(x + 1) - 1/2*(d + e + f + g)*log(x - 1) + 1/3*(d + 2*e + 4*f + 8*g)*log(x - 2)`

## Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1389 vs. 2(63) = 126.

Time = 54.94 (sec) , antiderivative size = 1389, normalized size of antiderivative = 24.37

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx = \text{Too large to display}$$

[In] `integrate((2+x)*(g*x**3+f*x**2+e*x+d)/(x**4-5*x**2+4),x)`

[Out] `g*x + (d - e + f - g)*log(x + (26*d**3 + 66*d**2*e + 132*d**2*f + 174*d**2*g - 9*d**2*(d - e + f - g) + 78*d*e**2 + 276*d*e*f + 444*d*e*g - 12*d*e*(d - e + f - g) + 222*d*f**2 + 636*d*f*g + 6*d*f*(d - e + f - g) + 510*d*g**2 + 36*d*g*(d - e + f - g) - 7*d*(d - e + f - g)**2 + 46*e**3 + 204*e**2*f +`

```

390*e**2*g + 3*e**2*(d - e + f - g) + 282*e*f**2 + 984*e*f*g + 36*e*f*(d -
e + f - g) + 930*e*g**2 + 102*e*g*(d - e + f - g) - 8*e*(d - e + f - g)**2
+ 116*f**3 + 534*f**2*g + 51*f**2*(d - e + f - g) + 924*f*g**2 + 228*f*g*(d
- e + f - g) - 13*f*(d - e + f - g)**2 + 586*g**3 + 243*g**2*(d - e + f -
g) - 20*g*(d - e + f - g)**2)/(10*d**3 + 69*d**2*e + 102*d**2*f + 213*d**2*
g + 102*d*e**2 + 318*d*e*f + 564*d*e*g + 246*d*f**2 + 894*d*f*g + 750*d*g**
2 + 35*e**3 + 174*e**2*f + 249*e**2*g + 285*e*f**2 + 852*e*f*g + 537*e*g**2
+ 154*f**3 + 717*f**2*g + 966*f*g**2 + 323*g**3))/6 - (d + e + f + g)*log(
x + (26*d**3 + 66*d**2*e + 132*d**2*f + 174*d**2*g + 27*d**2*(d + e + f + g
) + 78*d*e**2 + 276*d*e*f + 444*d*e*g + 36*d*e*(d + e + f + g) + 222*d*f**2
+ 636*d*f*g - 18*d*f*(d + e + f + g) + 510*d*g**2 - 108*d*g*(d + e + f + g
) - 63*d*(d + e + f + g)**2 + 46*e**3 + 204*e**2*f + 390*e**2*g - 9*e**2*(d
+ e + f + g) + 282*e*f**2 + 984*e*f*g - 108*e*f*(d + e + f + g) + 930*e*g*
**2 - 306*e*g*(d + e + f + g) - 72*e*(d + e + f + g)**2 + 116*f**3 + 534*f**
2*g - 153*f**2*(d + e + f + g) + 924*f*g**2 - 684*f*g*(d + e + f + g) - 117
*f*(d + e + f + g)**2 + 586*g**3 - 729*g**2*(d + e + f + g) - 180*g*(d + e
+ f + g)**2)/(10*d**3 + 69*d**2*e + 102*d**2*f + 213*d**2*g + 102*d*e**2 +
318*d*e*f + 564*d*e*g + 246*d*f**2 + 894*d*f*g + 750*d*g**2 + 35*e**3 + 174
*e**2*f + 249*e**2*g + 285*e*f**2 + 852*e*f*g + 537*e*g**2 + 154*f**3 + 717
*f**2*g + 966*f*g**2 + 323*g**3))/2 + (d + 2*e + 4*f + 8*g)*log(x + (26*d**
3 + 66*d**2*e + 132*d**2*f + 174*d**2*g - 18*d**2*(d + 2*e + 4*f + 8*g) + 7
8*d*e**2 + 276*d*e*f + 444*d*e*g - 24*d*e*(d + 2*e + 4*f + 8*g) + 222*d*f**
2 + 636*d*f*g + 12*d*f*(d + 2*e + 4*f + 8*g) + 510*d*g**2 + 72*d*g*(d + 2*e
+ 4*f + 8*g) - 28*d*(d + 2*e + 4*f + 8*g)**2 + 46*e**3 + 204*e**2*f + 390*
e**2*g + 6*e**2*(d + 2*e + 4*f + 8*g) + 282*e*f**2 + 984*e*f*g + 72*e*f*(d
+ 2*e + 4*f + 8*g) + 930*e*g**2 + 204*e*g*(d + 2*e + 4*f + 8*g) - 32*e*(d +
2*e + 4*f + 8*g)**2 + 116*f**3 + 534*f**2*g + 102*f**2*(d + 2*e + 4*f + 8*
g) + 924*f*g**2 + 456*f*g*(d + 2*e + 4*f + 8*g) - 52*f*(d + 2*e + 4*f + 8*g
)**2 + 586*g**3 + 486*g**2*(d + 2*e + 4*f + 8*g) - 80*g*(d + 2*e + 4*f + 8*
g)**2)/(10*d**3 + 69*d**2*e + 102*d**2*f + 213*d**2*g + 102*d*e**2 + 318*d*
e*f + 564*d*e*g + 246*d*f**2 + 894*d*f*g + 750*d*g**2 + 35*e**3 + 174*e**2*
f + 249*e**2*g + 285*e*f**2 + 852*e*f*g + 537*e*g**2 + 154*f**3 + 717*f**2*
g + 966*f*g**2 + 323*g**3))/3

```

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 47, normalized size of antiderivative = 0.82

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx = gx + \frac{1}{6}(d-e+f-g)\log(x+1) \\
 - \frac{1}{2}(d+e+f+g)\log(x-1) \\
 + \frac{1}{3}(d+2e+4f+8g)\log(x-2)$$

[In] integrate((2+x)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] g\*x + 1/6\*(d - e + f - g)\*log(x + 1) - 1/2\*(d + e + f + g)\*log(x - 1) + 1/3\*(d + 2\*e + 4\*f + 8\*g)\*log(x - 2)

### Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 50, normalized size of antiderivative = 0.88

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx = gx + \frac{1}{6}(d-e+f-g)\log(|x+1|) - \frac{1}{2}(d+e+f+g)\log(|x-1|) + \frac{1}{3}(d+2e+4f+8g)\log(|x-2|)$$

[In] integrate((2+x)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out] g\*x + 1/6\*(d - e + f - g)\*log(abs(x + 1)) - 1/2\*(d + e + f + g)\*log(abs(x - 1)) + 1/3\*(d + 2\*e + 4\*f + 8\*g)\*log(abs(x - 2))

### Mupad [B] (verification not implemented)

Time = 7.87 (sec) , antiderivative size = 59, normalized size of antiderivative = 1.04

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{4-5x^2+x^4} dx = \ln(x+1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} \right) - \ln(x-1) \left( \frac{d}{2} + \frac{e}{2} + \frac{f}{2} + \frac{g}{2} \right) + \ln(x-2) \left( \frac{d}{3} + \frac{2e}{3} + \frac{4f}{3} + \frac{8g}{3} \right) + gx$$

[In] int(((x + 2)\*(d + e\*x + f\*x^2 + g\*x^3))/(x^4 - 5\*x^2 + 4),x)

[Out] log(x + 1)\*(d/6 - e/6 + f/6 - g/6) - log(x - 1)\*(d/2 + e/2 + f/2 + g/2) + log(x - 2)\*(d/3 + (2\*e)/3 + (4\*f)/3 + (8\*g)/3) + g\*x

$$3.83 \quad \int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx$$

Optimal result	1023
Rubi [A] (verified)	1023
Mathematica [A] (verified)	1024
Maple [A] (verified)	1025
Fricas [A] (verification not implemented)	1025
Sympy [F(-1)]	1026
Maxima [A] (verification not implemented)	1026
Giac [A] (verification not implemented)	1026
Mupad [B] (verification not implemented)	1027

### Optimal result

Integrand size = 36, antiderivative size = 74

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx = (g+2h)x + \frac{hx^2}{2} - \frac{1}{2}(d+e+f+g+h)\log(1-x) \\ + \frac{1}{3}(d+2e+4f+8g+16h)\log(2-x) \\ + \frac{1}{6}(d-e+f-g+h)\log(1+x)$$

[Out] (g+2\*h)\*x+1/2\*h\*x^2-1/2\*(d+e+f+g+h)\*ln(1-x)+1/3\*(d+2\*e+4\*f+8\*g+16\*h)\*ln(2-x)+1/6\*(d-e+f-g+h)\*ln(1+x)

### Rubi [A] (verified)

Time = 0.07 (sec) , antiderivative size = 74, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.056$ , Rules used = {1600, 2099}

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx = -\frac{1}{2}\log(1-x)(d+e+f+g+h) \\ + \frac{1}{3}\log(2-x)(d+2e+4f+8g+16h) \\ + \frac{1}{6}\log(x+1)(d-e+f-g+h) + x(g+2h) + \frac{hx^2}{2}$$

[In] Int[((2 + x)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4))/(4 - 5\*x^2 + x^4),x]

[Out] (g + 2\*h)\*x + (h\*x^2)/2 - ((d + e + f + g + h)\*Log[1 - x])/2 + ((d + 2\*e + 4\*f + 8\*g + 16\*h)\*Log[2 - x])/3 + ((d - e + f - g + h)\*Log[1 + x])/6

Rule 1600

```
Int[(u_)*(Px_)^(p_)*(Qx_)^(q_), x_Symbol] := Int[u*PolynomialQuotient[Px
, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] &&
EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

Rule 2099

```
Int[(P_)^(p_)*(Q_)^(q_), x_Symbol] := With[{PP = Factor[P]}, Int[ExpandInt
egrand[PP^p*Q^q, x], x] /; !SumQ[NonfreeFactors[PP, x]]] /; FreeQ[q, x] &&
PolyQ[P, x] && PolyQ[Q, x] && IntegerQ[p] && NeQ[P, x]
```

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex + fx^2 + gx^3 + hx^4}{2 - x - 2x^2 + x^3} dx \\ &= \int \left( g \left( 1 + \frac{2h}{g} \right) + \frac{d + 2e + 4f + 8g + 16h}{3(-2 + x)} + \frac{-d - e - f - g - h}{2(-1 + x)} + hx \right. \\ &\quad \left. + \frac{d - e + f - g + h}{6(1 + x)} \right) dx \\ &= (g + 2h)x + \frac{hx^2}{2} - \frac{1}{2}(d + e + f + g + h) \log(1 - x) \\ &\quad + \frac{1}{3}(d + 2e + 4f + 8g + 16h) \log(2 - x) + \frac{1}{6}(d - e + f - g + h) \log(1 + x) \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.03 (sec) , antiderivative size = 71, normalized size of antiderivative = 0.96

$$\begin{aligned} \int \frac{(2 + x)(d + ex + fx^2 + gx^3 + hx^4)}{4 - 5x^2 + x^4} dx &= \frac{1}{6}(6(g + 2h)x + 3hx^2 \\ &\quad - 3(d + e + f + g + h) \log(1 - x) \\ &\quad + 2(d + 2(e + 2f + 4g + 8h)) \log(2 - x) \\ &\quad + (d - e + f - g + h) \log(1 + x)) \end{aligned}$$

```
[In] Integrate[((2 + x)*(d + e*x + f*x^2 + g*x^3 + h*x^4))/(4 - 5*x^2 + x^4), x]
```

```
[Out] (6*(g + 2*h)*x + 3*h*x^2 - 3*(d + e + f + g + h)*Log[1 - x] + 2*(d + 2*(e +
2*f + 4*g + 8*h))*Log[2 - x] + (d - e + f - g + h)*Log[1 + x])/6
```



**Maple [A] (verified)**

Time = 0.07 (sec) , antiderivative size = 78, normalized size of antiderivative = 1.05

method	result
default	$\frac{hx^2}{2} + gx + 2hx + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6}\right) \ln(x+1) + \left(-\frac{d}{2} - \frac{e}{2} - \frac{f}{2} - \frac{g}{2} - \frac{h}{2}\right) \ln(x-1) + \left(\frac{d}{3}\right)$
norman	$(g+2h)x + \frac{hx^2}{2} + \left(-\frac{d}{2} - \frac{e}{2} - \frac{f}{2} - \frac{g}{2} - \frac{h}{2}\right) \ln(x-1) + \left(\frac{d}{3} + \frac{2e}{3} + \frac{4f}{3} + \frac{8g}{3} + \frac{16h}{3}\right) \ln(x-2)$
parallelrisch	$\frac{hx^2}{2} + gx + 2hx + \frac{\ln(x-2)d}{3} + \frac{2\ln(x-2)e}{3} + \frac{4\ln(x-2)f}{3} + \frac{8\ln(x-2)g}{3} + \frac{16\ln(x-2)h}{3} - \frac{\ln(x-1)d}{2} - \frac{\ln(x-1)}{2}$
risch	$\frac{hx^2}{2} + gx + 2hx + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} + \frac{\ln(x+1)f}{6} - \frac{\ln(x+1)g}{6} + \frac{\ln(x+1)h}{6} + \frac{\ln(2-x)d}{3} + \frac{2\ln(2-x)e}{3} +$

```
[In] int((x+2)*(h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x,method=_RETURNVERBOSE)
```

```
[Out] 1/2*h*x^2+g*x+2*h*x+(1/6*d-1/6*e+1/6*f-1/6*g+1/6*h)*ln(x+1)+(-1/2*d-1/2*e-1/2*f-1/2*g-1/2*h)*ln(x-1)+(1/3*d+2/3*e+4/3*f+8/3*g+16/3*h)*ln(x-2)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.28 (sec) , antiderivative size = 62, normalized size of antiderivative = 0.84

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx = \frac{1}{2}hx^2 + (g+2h)x + \frac{1}{6}(d-e+f-g+h)\log(x+1) - \frac{1}{2}(d+e+f+g+h)\log(x-1) + \frac{1}{3}(d+2e+4f+8g+16h)\log(x-2)$$

```
[In] integrate((2+x)*(h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm="fricas")
```

```
[Out] 1/2*h*x^2 + (g + 2*h)*x + 1/6*(d - e + f - g + h)*log(x + 1) - 1/2*(d + e + f + g + h)*log(x - 1) + 1/3*(d + 2*e + 4*f + 8*g + 16*h)*log(x - 2)
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx = \text{Timed out}$$

[In] integrate((2+x)\*(h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4),x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 62, normalized size of antiderivative = 0.84

$$\begin{aligned} \int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx = & \frac{1}{2}hx^2 + (g+2h)x \\ & + \frac{1}{6}(d-e+f-g+h)\log(x+1) \\ & - \frac{1}{2}(d+e+f+g+h)\log(x-1) \\ & + \frac{1}{3}(d+2e+4f+8g+16h)\log(x-2) \end{aligned}$$

[In] integrate((2+x)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] 1/2\*h\*x^2 + (g + 2\*h)\*x + 1/6\*(d - e + f - g + h)\*log(x + 1) - 1/2\*(d + e + f + g + h)\*log(x - 1) + 1/3\*(d + 2\*e + 4\*f + 8\*g + 16\*h)\*log(x - 2)

**Giac [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 65, normalized size of antiderivative = 0.88

$$\begin{aligned} \int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx = & \frac{1}{2}hx^2 + gx + 2hx \\ & + \frac{1}{6}(d-e+f-g+h)\log(|x+1|) \\ & - \frac{1}{2}(d+e+f+g+h)\log(|x-1|) \\ & + \frac{1}{3}(d+2e+4f+8g+16h)\log(|x-2|) \end{aligned}$$

[In] integrate((2+x)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out]  $\frac{1}{2}hx^2 + gx + 2hx + \frac{1}{6}(d - e + f - g + h)\log(\text{abs}(x + 1)) - \frac{1}{2}(d + e + f + g + h)\log(\text{abs}(x - 1)) + \frac{1}{3}(d + 2e + 4f + 8g + 16h)\log(\text{abs}(x - 2))$

### Mupad [B] (verification not implemented)

Time = 8.03 (sec) , antiderivative size = 78, normalized size of antiderivative = 1.05

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{4-5x^2+x^4} dx = x(g+2h) + \frac{hx^2}{2} - \ln(x-1) \left( \frac{d}{2} + \frac{e}{2} + \frac{f}{2} + \frac{g}{2} + \frac{h}{2} \right) + \ln(x+1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6} \right) + \ln(x-2) \left( \frac{d}{3} + \frac{2e}{3} + \frac{4f}{3} + \frac{8g}{3} + \frac{16h}{3} \right)$$

[In] `int(((x + 2)*(d + e*x + f*x^2 + g*x^3 + h*x^4))/(x^4 - 5*x^2 + 4),x)`

[Out]  $x*(g + 2*h) + (h*x^2)/2 - \log(x - 1)*(d/2 + e/2 + f/2 + g/2 + h/2) + \log(x + 1)*(d/6 - e/6 + f/6 - g/6 + h/6) + \log(x - 2)*(d/3 + (2*e)/3 + (4*f)/3 + (8*g)/3 + (16*h)/3)$

$$3.84 \quad \int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx$$

Optimal result	1028
Rubi [A] (verified)	1028
Mathematica [A] (verified)	1029
Maple [A] (verified)	1030
Fricas [A] (verification not implemented)	1030
Sympy [F(-1)]	1031
Maxima [A] (verification not implemented)	1031
Giac [A] (verification not implemented)	1031
Mupad [B] (verification not implemented)	1032

### Optimal result

Integrand size = 41, antiderivative size = 96

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx$$

$$= (g+2h+5i)x + \frac{1}{2}(h+2i)x^2 + \frac{ix^3}{3} - \frac{1}{2}(d+e+f+g+h+i)\log(1-x)$$

$$+ \frac{1}{3}(d+2e+4f+8g+16h+32i)\log(2-x) + \frac{1}{6}(d-e+f-g+h-i)\log(1+x)$$

[Out] (g+2\*h+5\*i)\*x+1/2\*(h+2\*i)\*x^2+1/3\*i\*x^3-1/2\*(d+e+f+g+h+i)\*ln(1-x)+1/3\*(d+2\*e+4\*f+8\*g+16\*h+32\*i)\*ln(2-x)+1/6\*(d-e+f-g+h-i)\*ln(1+x)

### Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 96, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.049$ , Rules used = {1600, 2099}

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx$$

$$= -\frac{1}{2}\log(1-x)(d+e+f+g+h+i) + \frac{1}{3}\log(2-x)(d+2e+4f+8g+16h+32i)$$

$$+ \frac{1}{6}\log(x+1)(d-e+f-g+h-i) + x(g+2h+5i) + \frac{1}{2}x^2(h+2i) + \frac{ix^3}{3}$$

[In] Int[((2+x)\*(d+e\*x+f\*x^2+g\*x^3+h\*x^4+i\*x^5))/(4-5\*x^2+x^4),x]

[Out]  $(g + 2h + 5i)x + ((h + 2i)x^2)/2 + (ix^3)/3 - ((d + e + f + g + h + i) \cdot \text{Log}[1 - x])/2 + ((d + 2e + 4f + 8g + 16h + 32i) \cdot \text{Log}[2 - x])/3 + ((d - e + f - g + h - i) \cdot \text{Log}[1 + x])/6$

#### Rule 1600

$\text{Int}[(u_*) \cdot (Px_*)^{(p_*)} \cdot (Qx_*)^{(q_*)}, x\_Symbol] \rightarrow \text{Int}[u \cdot \text{PolynomialQuotient}[Px, Qx, x]^p \cdot Qx^{(p+q)}, x] /; \text{FreeQ}[q, x] \ \&\& \ \text{PolyQ}[Px, x] \ \&\& \ \text{PolyQ}[Qx, x] \ \&\& \ \text{EqQ}[\text{PolynomialRemainder}[Px, Qx, x], 0] \ \&\& \ \text{IntegerQ}[p] \ \&\& \ \text{LtQ}[p \cdot q, 0]$

#### Rule 2099

$\text{Int}[(P_*)^{(p_*)} \cdot (Q_*)^{(q_*)}, x\_Symbol] \rightarrow \text{With}[\{PP = \text{Factor}[P]\}, \text{Int}[\text{ExpandIntegrand}[PP^p \cdot Q^q, x], x] /; \text{!SumQ}[\text{NonfreeFactors}[PP, x]]] /; \text{FreeQ}[q, x] \ \&\& \ \text{PolyQ}[P, x] \ \&\& \ \text{PolyQ}[Q, x] \ \&\& \ \text{IntegerQ}[p] \ \&\& \ \text{NeQ}[P, x]$

#### Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{2 - x - 2x^2 + x^3} dx \\ &= \int \left( g \left( 1 + \frac{2h + 5i}{g} \right) + \frac{d + 2e + 4f + 8g + 16h + 32i}{3(-2 + x)} + \frac{-d - e - f - g - h - i}{2(-1 + x)} \right. \\ &\quad \left. + (h + 2i)x + ix^2 + \frac{d - e + f - g + h - i}{6(1 + x)} \right) dx \\ &= (g + 2h + 5i)x + \frac{1}{2}(h + 2i)x^2 + \frac{ix^3}{3} - \frac{1}{2}(d + e + f + g + h + i) \log(1 - x) \\ &\quad + \frac{1}{3}(d + 2e + 4f + 8g + 16h + 32i) \log(2 - x) + \frac{1}{6}(d - e + f - g + h - i) \log(1 + x) \end{aligned}$$

### Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 91, normalized size of antiderivative = 0.95

$$\begin{aligned} &\int \frac{(2 + x)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{4 - 5x^2 + x^4} dx \\ &= \frac{1}{6} (6(g + 2h + 5i)x + 3(h + 2i)x^2 + 2ix^3 - 3(d + e + f + g + h + i) \log(1 - x) \\ &\quad + 2(d + 2e + 4(f + 2g + 4h + 8i)) \log(2 - x) + (d - e + f - g + h - i) \log(1 + x)) \end{aligned}$$

[In]  $\text{Integrate}[(2 + x) \cdot (d + e \cdot x + f \cdot x^2 + g \cdot x^3 + h \cdot x^4 + i \cdot x^5) / (4 - 5 \cdot x^2 + x^4), x]$

[Out]  $(6 \cdot (g + 2 \cdot h + 5 \cdot i) \cdot x + 3 \cdot (h + 2 \cdot i) \cdot x^2 + 2 \cdot i \cdot x^3 - 3 \cdot (d + e + f + g + h + i) \cdot \text{Log}[1 - x] + 2 \cdot (d + 2 \cdot e + 4 \cdot (f + 2 \cdot g + 4 \cdot h + 8 \cdot i)) \cdot \text{Log}[2 - x] + (d - e + f - g + h - i) \cdot \text{Log}[1 + x]) / 6$

**Maple [A] (verified)**

Time = 0.08 (sec) , antiderivative size = 99, normalized size of antiderivative = 1.03

method	result
norman	$(\frac{h}{2} + i)x^2 + (g + 2h + 5i)x + \frac{ix^3}{3} + (-\frac{d}{2} - \frac{e}{2} - \frac{f}{2} - \frac{g}{2} - \frac{h}{2} - \frac{i}{2}) \ln(x - 1) + (\frac{d}{3} + \frac{2e}{3} + \frac{4f}{3} +$
default	$\frac{ix^3}{3} + \frac{hx^2}{2} + ix^2 + gx + 2hx + 5ix + (\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6} - \frac{i}{6}) \ln(x + 1) + (-\frac{d}{2} - \frac{e}{2} - \frac{f}{2} - \frac{g}{2}$
parallelrisch	$gx + ix^2 + \frac{\ln(x-2)d}{3} + \frac{2\ln(x-2)e}{3} - \frac{\ln(x-1)d}{2} - \frac{\ln(x-1)e}{2} + \frac{hx^2}{2} + \frac{ix^3}{3} - \frac{\ln(x+1)i}{6} + \frac{\ln(x+1)f}{6} + 2hx +$
risch	$\frac{ix^3}{3} + \frac{hx^2}{2} + ix^2 + gx + 2hx + 5ix + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} + \frac{\ln(x+1)f}{6} - \frac{\ln(x+1)g}{6} + \frac{\ln(x+1)h}{6} - \frac{\ln(x+1)i}{6}$

```
[In] int((x+2)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x,method=_RETURNVER
BOSE)
```

```
[Out] (1/2*h+i)*x^2+(g+2*h+5*i)*x+1/3*i*x^3+(-1/2*d-1/2*e-1/2*f-1/2*g-1/2*h-1/2*i
)*ln(x-1)+(1/3*d+2/3*e+4/3*f+8/3*g+16/3*h+32/3*i)*ln(x-2)+(1/6*d-1/6*e+1/6*
f-1/6*g+1/6*h-1/6*i)*ln(x+1)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.32 (sec) , antiderivative size = 82, normalized size of antiderivative = 0.85

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx$$

$$= \frac{1}{3}ix^3 + \frac{1}{2}(h+2i)x^2 + (g+2h+5i)x + \frac{1}{6}(d-e+f-g+h-i)\log(x+1)$$

$$- \frac{1}{2}(d+e+f+g+h+i)\log(x-1) + \frac{1}{3}(d+2e+4f+8g+16h+32i)\log(x-2)$$

```
[In] integrate((2+x)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4),x, algorithm=
"fricas")
```

```
[Out] 1/3*i*x^3 + 1/2*(h + 2*i)*x^2 + (g + 2*h + 5*i)*x + 1/6*(d - e + f - g + h
- i)*log(x + 1) - 1/2*(d + e + f + g + h + i)*log(x - 1) + 1/3*(d + 2*e + 4
*f + 8*g + 16*h + 32*i)*log(x - 2)
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx = \text{Timed out}$$

[In] integrate((2+x)\*(i\*x\*\*5+h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4),x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 82, normalized size of antiderivative = 0.85

$$\begin{aligned} & \int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx \\ &= \frac{1}{3}ix^3 + \frac{1}{2}(h+2i)x^2 + (g+2h+5i)x + \frac{1}{6}(d-e+f-g+h-i)\log(x+1) \\ & \quad - \frac{1}{2}(d+e+f+g+h+i)\log(x-1) + \frac{1}{3}(d+2e+4f+8g+16h+32i)\log(x-2) \end{aligned}$$

[In] integrate((2+x)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="maxima")

[Out] 1/3\*i\*x^3 + 1/2\*(h + 2\*i)\*x^2 + (g + 2\*h + 5\*i)\*x + 1/6\*(d - e + f - g + h - i)\*log(x + 1) - 1/2\*(d + e + f + g + h + i)\*log(x - 1) + 1/3\*(d + 2\*e + 4\*f + 8\*g + 16\*h + 32\*i)\*log(x - 2)

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 87, normalized size of antiderivative = 0.91

$$\begin{aligned} & \int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx \\ &= \frac{1}{3}ix^3 + \frac{1}{2}hx^2 + ix^2 + gx + 2hx + 5ix + \frac{1}{6}(d-e+f-g+h-i)\log(|x+1|) \\ & \quad - \frac{1}{2}(d+e+f+g+h+i)\log(|x-1|) \\ & \quad + \frac{1}{3}(d+2e+4f+8g+16h+32i)\log(|x-2|) \end{aligned}$$

[In] integrate((2+x)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4),x, algorithm="giac")

[Out]  $\frac{1}{3}ix^3 + \frac{1}{2}hx^2 + ix^2 + gx + 2hx + 5ix + \frac{1}{6}(d - e + f - g + h - i)\log(\text{abs}(x + 1)) - \frac{1}{2}(d + e + f + g + h + i)\log(\text{abs}(x - 1)) + \frac{1}{3}(d + 2e + 4f + 8g + 16h + 32i)\log(\text{abs}(x - 2))$

### Mupad [B] (verification not implemented)

Time = 7.93 (sec) , antiderivative size = 99, normalized size of antiderivative = 1.03

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{4-5x^2+x^4} dx$$

$$= x(g+2h+5i) + \frac{ix^3}{3} - \ln(x-1) \left( \frac{d}{2} + \frac{e}{2} + \frac{f}{2} + \frac{g}{2} + \frac{h}{2} + \frac{i}{2} \right)$$

$$+ \ln(x+1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6} - \frac{i}{6} \right)$$

$$+ \ln(x-2) \left( \frac{d}{3} + \frac{2e}{3} + \frac{4f}{3} + \frac{8g}{3} + \frac{16h}{3} + \frac{32i}{3} \right) + x^2 \left( \frac{h}{2} + i \right)$$

[In] `int(((x + 2)*(d + e*x + f*x^2 + g*x^3 + h*x^4 + i*x^5))/(x^4 - 5*x^2 + 4),x)`

[Out]  $x*(g + 2*h + 5*i) + (i*x^3)/3 - \log(x - 1)*(d/2 + e/2 + f/2 + g/2 + h/2 + i/2) + \log(x + 1)*(d/6 - e/6 + f/6 - g/6 + h/6 - i/6) + \log(x - 2)*(d/3 + (2*e)/3 + (4*f)/3 + (8*g)/3 + (16*h)/3 + (32*i)/3) + x^2*(h/2 + i)$



$$3.85 \quad \int \frac{2-x-2x^2+x^3}{(4-5x^2+x^4)^2} dx$$

Optimal result	1033
Rubi [A] (verified)	1033
Mathematica [A] (verified)	1034
Maple [A] (verified)	1034
Fricas [A] (verification not implemented)	1035
Sympy [A] (verification not implemented)	1035
Maxima [A] (verification not implemented)	1035
Giac [A] (verification not implemented)	1036
Mupad [B] (verification not implemented)	1036

### Optimal result

Integrand size = 26, antiderivative size = 46

$$\int \frac{2-x-2x^2+x^3}{(4-5x^2+x^4)^2} dx = \frac{1}{12(2+x)} - \frac{1}{18} \log(1-x) + \frac{1}{48} \log(2-x) \\ + \frac{1}{6} \log(1+x) - \frac{19}{144} \log(2+x)$$

[Out] 1/12/(2+x)-1/18\*ln(1-x)+1/48\*ln(2-x)+1/6\*ln(1+x)-19/144\*ln(2+x)

### Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 46, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.077$ , Rules used = {1600, 2099}

$$\int \frac{2-x-2x^2+x^3}{(4-5x^2+x^4)^2} dx = \frac{1}{12(x+2)} - \frac{1}{18} \log(1-x) + \frac{1}{48} \log(2-x) \\ + \frac{1}{6} \log(x+1) - \frac{19}{144} \log(x+2)$$

[In] Int[(2 - x - 2\*x^2 + x^3)/(4 - 5\*x^2 + x^4)^2, x]

[Out] 1/(12\*(2 + x)) - Log[1 - x]/18 + Log[2 - x]/48 + Log[1 + x]/6 - (19\*Log[2 + x])/144

#### Rule 1600

Int[(u\_)\*(Px\_)^(p\_)\*(Qx\_)^(q\_), x\_Symbol] :> Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

## Rule 2099

```
Int[(P_)^(p_)*(Q_)^(q_), x_Symbol] := With[{PP = Factor[P]}, Int[ExpandIntegrand[PP^p*Q^q, x], x] /; !SumQ[NonfreeFactors[PP, x]] /; FreeQ[q, x] && PolyQ[P, x] && PolyQ[Q, x] && IntegerQ[p] && NeQ[P, x]
```

## Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{1}{(2+x)^2(2-x-2x^2+x^3)} dx \\ &= \int \left( \frac{1}{48(-2+x)} - \frac{1}{18(-1+x)} + \frac{1}{6(1+x)} - \frac{1}{12(2+x)^2} - \frac{19}{144(2+x)} \right) dx \\ &= \frac{1}{12(2+x)} - \frac{1}{18} \log(1-x) + \frac{1}{48} \log(2-x) + \frac{1}{6} \log(1+x) - \frac{19}{144} \log(2+x) \end{aligned}$$

## Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 42, normalized size of antiderivative = 0.91

$$\int \frac{2-x-2x^2+x^3}{(4-5x^2+x^4)^2} dx = \frac{1}{144} \left( \frac{12}{2+x} + 24 \log(-1-x) - 8 \log(1-x) + 3 \log(2-x) - 19 \log(2+x) \right)$$

```
[In] Integrate[(2 - x - 2*x^2 + x^3)/(4 - 5*x^2 + x^4)^2, x]
```

```
[Out] (12/(2 + x) + 24*Log[-1 - x] - 8*Log[1 - x] + 3*Log[2 - x] - 19*Log[2 + x])/144
```

## Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 33, normalized size of antiderivative = 0.72

method	result	size
default	$\frac{1}{12x+24} - \frac{19 \ln(x+2)}{144} + \frac{\ln(x+1)}{6} - \frac{\ln(x-1)}{18} + \frac{\ln(x-2)}{48}$	33
risch	$\frac{1}{12x+24} - \frac{19 \ln(x+2)}{144} + \frac{\ln(x+1)}{6} - \frac{\ln(x-1)}{18} + \frac{\ln(x-2)}{48}$	33
norman	$-\frac{\frac{1}{6}x^2 - \frac{1}{12}x + \frac{1}{12}x^3 + \frac{1}{6}}{x^4 - 5x^2 + 4} + \frac{\ln(x-2)}{48} - \frac{\ln(x-1)}{18} + \frac{\ln(x+1)}{6} - \frac{19 \ln(x+2)}{144}$	54
parallelrisch	$\frac{3 \ln(x-2)x - 8 \ln(x-1)x + 24 \ln(x+1)x - 19 \ln(x+2)x + 12 + 6 \ln(x-2) - 16 \ln(x-1) + 48 \ln(x+1) - 38 \ln(x+2)}{144x+288}$	62

```
[In] int((x^3-2*x^2-x+2)/(x^4-5*x^2+4)^2,x,method=_RETURNVERBOSE)
```

[Out]  $1/12/(x+2) - 19/144*\ln(x+2) + 1/6*\ln(x+1) - 1/18*\ln(x-1) + 1/48*\ln(x-2)$

### Fricas [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 45, normalized size of antiderivative = 0.98

$$\int \frac{2 - x - 2x^2 + x^3}{(4 - 5x^2 + x^4)^2} dx = \frac{19(x+2)\log(x+2) - 24(x+2)\log(x+1) + 8(x+2)\log(x-1) - 3(x+2)\log(x-2) - 12}{144(x+2)}$$

[In] `integrate((x^3-2*x^2-x+2)/(x^4-5*x^2+4)^2,x, algorithm="fricas")`

[Out]  $-1/144*(19*(x+2)*\log(x+2) - 24*(x+2)*\log(x+1) + 8*(x+2)*\log(x-1) - 3*(x+2)*\log(x-2) - 12)/(x+2)$

### Sympy [A] (verification not implemented)

Time = 0.14 (sec) , antiderivative size = 34, normalized size of antiderivative = 0.74

$$\int \frac{2 - x - 2x^2 + x^3}{(4 - 5x^2 + x^4)^2} dx = \frac{\log(x-2)}{48} - \frac{\log(x-1)}{18} + \frac{\log(x+1)}{6} - \frac{19\log(x+2)}{144} + \frac{1}{12x+24}$$

[In] `integrate((x**3-2*x**2-x+2)/(x**4-5*x**2+4)**2,x)`

[Out]  $\log(x-2)/48 - \log(x-1)/18 + \log(x+1)/6 - 19*\log(x+2)/144 + 1/(12*x+24)$

### Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 32, normalized size of antiderivative = 0.70

$$\int \frac{2 - x - 2x^2 + x^3}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{12(x+2)} - \frac{19}{144} \log(x+2) + \frac{1}{6} \log(x+1) - \frac{1}{18} \log(x-1) + \frac{1}{48} \log(x-2)$$

[In] `integrate((x^3-2*x^2-x+2)/(x^4-5*x^2+4)^2,x, algorithm="maxima")`

[Out]  $1/12/(x+2) - 19/144*\log(x+2) + 1/6*\log(x+1) - 1/18*\log(x-1) + 1/48*\log(x-2)$

**Giac [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 36, normalized size of antiderivative = 0.78

$$\int \frac{2 - x - 2x^2 + x^3}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{12(x+2)} - \frac{19}{144} \log(|x+2|) + \frac{1}{6} \log(|x+1|) - \frac{1}{18} \log(|x-1|) + \frac{1}{48} \log(|x-2|)$$

[In] integrate((x^3-2\*x^2-x+2)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] 1/12/(x + 2) - 19/144\*log(abs(x + 2)) + 1/6\*log(abs(x + 1)) - 1/18\*log(abs(x - 1)) + 1/48\*log(abs(x - 2))

**Mupad [B] (verification not implemented)**

Time = 0.03 (sec) , antiderivative size = 32, normalized size of antiderivative = 0.70

$$\int \frac{2 - x - 2x^2 + x^3}{(4 - 5x^2 + x^4)^2} dx = \frac{\ln(x+1)}{6} - \frac{\ln(x-1)}{18} + \frac{\ln(x-2)}{48} - \frac{19 \ln(x+2)}{144} + \frac{1}{12(x+2)}$$

[In] int(-(x + 2\*x^2 - x^3 - 2)/(x^4 - 5\*x^2 + 4)^2,x)

[Out] log(x + 1)/6 - log(x - 1)/18 + log(x - 2)/48 - (19\*log(x + 2))/144 + 1/(12\*(x + 2))

$$3.86 \quad \int \frac{(d+ex)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx$$

Optimal result	1037
Rubi [A] (verified)	1037
Mathematica [A] (verified)	1038
Maple [A] (verified)	1038
Fricas [A] (verification not implemented)	1039
Sympy [B] (verification not implemented)	1039
Maxima [A] (verification not implemented)	1040
Giac [A] (verification not implemented)	1041
Mupad [B] (verification not implemented)	1041

### Optimal result

Integrand size = 31, antiderivative size = 71

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx = \frac{d-2e}{12(2+x)} - \frac{1}{18}(d+e)\log(1-x) + \frac{1}{48}(d+2e)\log(2-x) \\ + \frac{1}{6}(d-e)\log(1+x) - \frac{1}{144}(19d-26e)\log(2+x)$$

[Out] 1/12\*(d-2\*e)/(2+x)-1/18\*(d+e)\*ln(1-x)+1/48\*(d+2\*e)\*ln(2-x)+1/6\*(d-e)\*ln(1+x)-1/144\*(19\*d-26\*e)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.12 (sec) , antiderivative size = 71, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.065$ , Rules used = {1600, 6874}

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx = \frac{d-2e}{12(x+2)} - \frac{1}{18}(d+e)\log(1-x) + \frac{1}{48}(d+2e)\log(2-x) \\ + \frac{1}{6}(d-e)\log(x+1) - \frac{1}{144}(19d-26e)\log(x+2)$$

[In] Int[((d + e\*x)\*(2 - x - 2\*x^2 + x^3))/(4 - 5\*x^2 + x^4)^2,x]

[Out] (d - 2\*e)/(12\*(2 + x)) - ((d + e)\*Log[1 - x])/18 + ((d + 2\*e)\*Log[2 - x])/48 + ((d - e)\*Log[1 + x])/6 - ((19\*d - 26\*e)\*Log[2 + x])/144

#### Rule 1600

Int[(u\_.)\*(Px\_)^(p\_.)\*(Qx\_)^(q\_.), x\_Symbol] :> Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p+q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] &&

EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

### Rule 6874

Int[u\_, x\_Symbol] :=> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]  
]

### Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex}{(2 + x)^2 (2 - x - 2x^2 + x^3)} dx \\ &= \int \left( \frac{d + 2e}{48(-2 + x)} + \frac{-d - e}{18(-1 + x)} + \frac{d - e}{6(1 + x)} + \frac{-d + 2e}{12(2 + x)^2} + \frac{-19d + 26e}{144(2 + x)} \right) dx \\ &= \frac{d - 2e}{12(2 + x)} - \frac{1}{18}(d + e) \log(1 - x) + \frac{1}{48}(d + 2e) \log(2 - x) \\ &\quad + \frac{1}{6}(d - e) \log(1 + x) - \frac{1}{144}(19d - 26e) \log(2 + x) \end{aligned}$$

### Mathematica [A] (verified)

Time = 0.03 (sec) , antiderivative size = 66, normalized size of antiderivative = 0.93

$$\int \frac{(d + ex)(2 - x - 2x^2 + x^3)}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{144} \left( \frac{12(d - 2e)}{2 + x} + 24(d - e) \log(-1 - x) \right. \\ \left. - 8(d + e) \log(1 - x) + 3(d + 2e) \log(2 - x) \right. \\ \left. + (-19d + 26e) \log(2 + x) \right)$$

[In] Integrate[((d + e\*x)\*(2 - x - 2\*x^2 + x^3))/(4 - 5\*x^2 + x^4)^2,x]

[Out] ((12\*(d - 2\*e))/(2 + x) + 24\*(d - e)\*Log[-1 - x] - 8\*(d + e)\*Log[1 - x] + 3\*(d + 2\*e)\*Log[2 - x] + (-19\*d + 26\*e)\*Log[2 + x])/144

### Maple [A] (verified)

Time = 0.07 (sec) , antiderivative size = 64, normalized size of antiderivative = 0.90

method	result
default	$\left(-\frac{19d}{144} + \frac{13e}{72}\right) \ln(x+2) - \frac{-\frac{d}{12} + \frac{e}{6}}{x+2} + \left(\frac{d}{6} - \frac{e}{6}\right) \ln(x+1) + \left(-\frac{d}{18} - \frac{e}{18}\right) \ln(x-1) + \left(\frac{d}{48} + \frac{e}{24}\right) \ln(x-2)$
risch	$\frac{d}{12x+24} - \frac{e}{6(x+2)} - \frac{\ln(x-1)d}{18} - \frac{\ln(x-1)e}{18} + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} - \frac{19\ln(-x-2)d}{144} + \frac{13\ln(-x-2)e}{72} + \frac{\ln(2-x)d}{48} - \frac{\ln(2-x)e}{48}$
norman	$\frac{\left(-\frac{d}{12} + \frac{e}{6}\right)x + \left(\frac{d}{12} - \frac{e}{6}\right)x^3 + \left(-\frac{d}{6} + \frac{e}{3}\right)x^2 + \frac{d}{6} - \frac{e}{3}}{x^4 - 5x^2 + 4} + \left(-\frac{19d}{144} + \frac{13e}{72}\right) \ln(x+2) + \left(-\frac{d}{18} - \frac{e}{18}\right) \ln(x-1) + \left(\frac{d}{48} + \frac{e}{24}\right) \ln(x-2)$
parallelrisch	$\frac{3\ln(x-2)xd + 6\ln(x-2)xe - 8\ln(x-1)xd - 8\ln(x-1)xe + 24\ln(x+1)xd - 24\ln(x+1)xe - 19\ln(x+2)xd + 26\ln(x+2)xe + 6\ln(x-2)d + 6\ln(x-2)e}{144x + 288}$

[In] `int((e*x+d)*(x^3-2*x^2-x+2)/(x^4-5*x^2+4)^2,x,method=_RETURNVERBOSE)`

[Out]  $(-19/144*d+13/72*e)*\ln(x+2)-(-1/12*d+1/6*e)/(x+2)+(1/6*d-1/6*e)*\ln(x+1)+(-1/18*d-1/18*e)*\ln(x-1)+(1/48*d+1/24*e)*\ln(x-2)$

## Fricas [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 93, normalized size of antiderivative = 1.31

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx = \frac{((19d-26e)x+38d-52e)\log(x+2)-24((d-e)x+2d-2e)\log(x+1)+8((d+e)x+2d+2e)\log(x-1)-3((d+2e)x+2d+4e)\log(x-2)-12d+24e}{144(x+2)}$$

[In] `integrate((e*x+d)*(x^3-2*x^2-x+2)/(x^4-5*x^2+4)^2,x, algorithm="fricas")`

[Out]  $-1/144*(((19*d - 26*e)*x + 38*d - 52*e)*\log(x + 2) - 24*((d - e)*x + 2*d - 2*e)*\log(x + 1) + 8*((d + e)*x + 2*d + 2*e)*\log(x - 1) - 3*((d + 2*e)*x + 2*d + 4*e)*\log(x - 2) - 12*d + 24*e)/(x + 2)$

## Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1188 vs.  $2(60) = 120$ .

Time = 7.10 (sec) , antiderivative size = 1188, normalized size of antiderivative = 16.73

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx = \text{Too large to display}$$

[In] `integrate((e*x+d)*(x**3-2*x**2-x+2)/(x**4-5*x**2+4)**2,x)`

[Out]  $(d - 2*e)/(12*x + 24) + (d - e)*\log(x + (-1534775*d**6 + 8032360*d**5*e - 984027*d**5*(d - e) - 12991180*d**4*e**2 + 11797266*d**4*e*(d - e) + 3567168*d**4*(d - e)**2 + 1075200*d**3*e**3 - 32721528*d**3*e**2*(d - e) - 8725248*d**3*e*(d - e)**2 - 247104*d**3*(d - e)**3 + 16959280*d**2*e**4 + 38977296$

$$\begin{aligned}
& *d^{**2}e^{**3}(d - e) - 2820096*d^{**2}e^{**2}(d - e)^{**2} - 10357632*d^{**2}e*(d - e) \\
& **3 - 15836800*d*e^{**5} - 21294960*d*e^{**4}(d - e) + 15436800*d*e^{**3}(d - e)^{**2} \\
& + 16277760*d*e^{**2}(d - e)^{**3} + 4283840*e^{**6} + 3876000*e^{**5}(d - e) - 6865 \\
& 920*e^{**4}(d - e)^{**2} - 4078080*e^{**3}(d - e)^{**3})/(801262*d^{**6} - 4662251*d^{**5}* \\
& e + 7296938*d^{**4}e^{**2} + 1388616*d^{**3}e^{**3} - 12447440*d^{**2}e^{**4} + 9990800*d* \\
& e^{**5} - 2380000*e^{**6}))/6 - (d + e)*\log(x + (-1534775*d^{**6} + 8032360*d^{**5}e + \\
& 328009*d^{**5}(d + e) - 12991180*d^{**4}e^{**2} - 3932422*d^{**4}e*(d + e) + 396352 \\
& *d^{**4}(d + e)^{**2} + 1075200*d^{**3}e^{**3} + 10907176*d^{**3}e^{**2}(d + e) - 969472* \\
& d^{**3}e*(d + e)^{**2} + 9152*d^{**3}(d + e)^{**3} + 16959280*d^{**2}e^{**4} - 12992432*d* \\
& **2e^{**3}(d + e) - 313344*d^{**2}e^{**2}(d + e)^{**2} + 383616*d^{**2}e*(d + e)^{**3} - \\
& 15836800*d*e^{**5} + 7098320*d*e^{**4}(d + e) + 1715200*d*e^{**3}(d + e)^{**2} - 6028 \\
& 80*d*e^{**2}(d + e)^{**3} + 4283840*e^{**6} - 1292000*e^{**5}(d + e) - 762880*e^{**4}(d \\
& + e)^{**2} + 151040*e^{**3}(d + e)^{**3})/(801262*d^{**6} - 4662251*d^{**5}e + 7296938* \\
& d^{**4}e^{**2} + 1388616*d^{**3}e^{**3} - 12447440*d^{**2}e^{**4} + 9990800*d*e^{**5} - 23800 \\
& 00*e^{**6}))/18 + (d + 2*e)*\log(x + (-1534775*d^{**6} + 8032360*d^{**5}e - 984027*d \\
& **5(d + 2*e)/8 - 12991180*d^{**4}e^{**2} + 5898633*d^{**4}e*(d + 2*e)/4 + 55737*d \\
& **4(d + 2*e)^{**2} + 1075200*d^{**3}e^{**3} - 4090191*d^{**3}e^{**2}(d + 2*e) - 136332 \\
& *d^{**3}e*(d + 2*e)^{**2} - 3861*d^{**3}(d + 2*e)^{**3}/8 + 16959280*d^{**2}e^{**4} + 4872 \\
& 162*d^{**2}e^{**3}(d + 2*e) - 44064*d^{**2}e^{**2}(d + 2*e)^{**2} - 80919*d^{**2}e*(d + \\
& 2*e)^{**3}/4 - 15836800*d*e^{**5} - 2661870*d*e^{**4}(d + 2*e) + 241200*d*e^{**3}(d + \\
& 2*e)^{**2} + 63585*d*e^{**2}(d + 2*e)^{**3}/2 + 4283840*e^{**6} + 484500*e^{**5}(d + 2* \\
& e) - 107280*e^{**4}(d + 2*e)^{**2} - 7965*e^{**3}(d + 2*e)^{**3})/(801262*d^{**6} - 4662 \\
& 251*d^{**5}e + 7296938*d^{**4}e^{**2} + 1388616*d^{**3}e^{**3} - 12447440*d^{**2}e^{**4} + 9 \\
& 990800*d*e^{**5} - 2380000*e^{**6}))/48 - (19*d - 26*e)*\log(x + (-1534775*d^{**6} + \\
& 8032360*d^{**5}e + 328009*d^{**5}(19*d - 26*e)/8 - 12991180*d^{**4}e^{**2} - 1966211 \\
& *d^{**4}e*(19*d - 26*e)/4 + 6193*d^{**4}(19*d - 26*e)^{**2} + 1075200*d^{**3}e^{**3} + \\
& 1363397*d^{**3}e^{**2}(19*d - 26*e) - 15148*d^{**3}e*(19*d - 26*e)^{**2} + 143*d^{**3} \\
& (19*d - 26*e)^{**3}/8 + 16959280*d^{**2}e^{**4} - 1624054*d^{**2}e^{**3}(19*d - 26*e) - \\
& 4896*d^{**2}e^{**2}(19*d - 26*e)^{**2} + 2997*d^{**2}e*(19*d - 26*e)^{**3}/4 - 1583680 \\
& 0*d*e^{**5} + 887290*d*e^{**4}(19*d - 26*e) + 26800*d*e^{**3}(19*d - 26*e)^{**2} - 23 \\
& 55*d*e^{**2}(19*d - 26*e)^{**3}/2 + 4283840*e^{**6} - 161500*e^{**5}(19*d - 26*e) - 1 \\
& 1920*e^{**4}(19*d - 26*e)^{**2} + 295*e^{**3}(19*d - 26*e)^{**3})/(801262*d^{**6} - 4662 \\
& 251*d^{**5}e + 7296938*d^{**4}e^{**2} + 1388616*d^{**3}e^{**3} - 12447440*d^{**2}e^{**4} + 9 \\
& 990800*d*e^{**5} - 2380000*e^{**6}))/144
\end{aligned}$$

Maxima [A] (verification not implemented)

none



Time = 0.18 (sec) , antiderivative size = 57, normalized size of antiderivative = 0.80

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx = -\frac{1}{144}(19d-26e)\log(x+2) + \frac{1}{6}(d-e)\log(x+1) - \frac{1}{18}(d+e)\log(x-1) + \frac{1}{48}(d+2e)\log(x-2) + \frac{d-2e}{12(x+2)}$$

[In] integrate((e\*x+d)\*(x^3-2\*x^2-x+2)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] -1/144\*(19\*d - 26\*e)\*log(x + 2) + 1/6\*(d - e)\*log(x + 1) - 1/18\*(d + e)\*log(x - 1) + 1/48\*(d + 2\*e)\*log(x - 2) + 1/12\*(d - 2\*e)/(x + 2)

### Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 61, normalized size of antiderivative = 0.86

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx = -\frac{1}{144}(19d-26e)\log(|x+2|) + \frac{1}{6}(d-e)\log(|x+1|) - \frac{1}{18}(d+e)\log(|x-1|) + \frac{1}{48}(d+2e)\log(|x-2|) + \frac{d-2e}{12(x+2)}$$

[In] integrate((e\*x+d)\*(x^3-2\*x^2-x+2)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] -1/144\*(19\*d - 26\*e)\*log(abs(x + 2)) + 1/6\*(d - e)\*log(abs(x + 1)) - 1/18\*(d + e)\*log(abs(x - 1)) + 1/48\*(d + 2\*e)\*log(abs(x - 2)) + 1/12\*(d - 2\*e)/(x + 2)

### Mupad [B] (verification not implemented)

Time = 7.95 (sec) , antiderivative size = 64, normalized size of antiderivative = 0.90

$$\int \frac{(d+ex)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx = \frac{\frac{d}{12} - \frac{e}{6}}{x+2} + \ln(x+1) \left( \frac{d}{6} - \frac{e}{6} \right) - \ln(x-1) \left( \frac{d}{18} + \frac{e}{18} \right) + \ln(x-2) \left( \frac{d}{48} + \frac{e}{24} \right) - \ln(x+2) \left( \frac{19d}{144} - \frac{13e}{72} \right)$$

[In] int(-((d + e\*x)\*(x + 2\*x^2 - x^3 - 2))/(x^4 - 5\*x^2 + 4)^2,x)

[Out] (d/12 - e/6)/(x + 2) + log(x + 1)\*(d/6 - e/6) - log(x - 1)\*(d/18 + e/18) + log(x - 2)\*(d/48 + e/24) - log(x + 2)\*((19\*d)/144 - (13\*e)/72)

$$3.87 \quad \int \frac{(d+ex+fx^2)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx$$

Optimal result	1042
Rubi [A] (verified)	1042
Mathematica [A] (verified)	1043
Maple [A] (verified)	1044
Fricas [A] (verification not implemented)	1044
Sympy [F(-1)]	1045
Maxima [A] (verification not implemented)	1045
Giac [A] (verification not implemented)	1045
Mupad [B] (verification not implemented)	1046

### Optimal result

Integrand size = 36, antiderivative size = 82

$$\int \frac{(d+ex+fx^2)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx = \frac{d-2e+4f}{12(2+x)} - \frac{1}{18}(d+e+f)\log(1-x) + \frac{1}{48}(d+2e+4f)\log(2-x) + \frac{1}{6}(d-e+f)\log(1+x) - \frac{1}{144}(19d-26e+28f)\log(2+x)$$

[Out] 1/12\*(d-2\*e+4\*f)/(2+x)-1/18\*(d+e+f)\*ln(1-x)+1/48\*(d+2\*e+4\*f)\*ln(2-x)+1/6\*(d-e+f)\*ln(1+x)-1/144\*(19\*d-26\*e+28\*f)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.14 (sec) , antiderivative size = 82, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.056$ , Rules used = {1600, 6874}

$$\int \frac{(d+ex+fx^2)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx = \frac{d-2e+4f}{12(x+2)} - \frac{1}{18}\log(1-x)(d+e+f) + \frac{1}{48}\log(2-x)(d+2e+4f) + \frac{1}{6}\log(x+1)(d-e+f) - \frac{1}{144}\log(x+2)(19d-26e+28f)$$

[In] Int[((d + e\*x + f\*x^2)\*(2 - x - 2\*x^2 + x^3))/(4 - 5\*x^2 + x^4)^2,x]

[Out] (d - 2\*e + 4\*f)/(12\*(2 + x)) - ((d + e + f)\*Log[1 - x])/18 + ((d + 2\*e + 4\*f)\*Log[2 - x])/48 + ((d - e + f)\*Log[1 + x])/6 - ((19\*d - 26\*e + 28\*f)\*Log[2 + x])/144

Rule 1600

Int[(u\_.)\*(Px\_)^(p\_.)\*(Qx\_)^(q\_.), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rule 6874

Int[u\_, x\_Symbol] := With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]]

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex + fx^2}{(2 + x)^2 (2 - x - 2x^2 + x^3)} dx \\ &= \int \left( \frac{d + 2e + 4f}{48(-2 + x)} + \frac{-d - e - f}{18(-1 + x)} + \frac{d - e + f}{6(1 + x)} + \frac{-d + 2e - 4f}{12(2 + x)^2} + \frac{-19d + 26e - 28f}{144(2 + x)} \right) dx \\ &= \frac{d - 2e + 4f}{12(2 + x)} - \frac{1}{18}(d + e + f) \log(1 - x) + \frac{1}{48}(d + 2e + 4f) \log(2 - x) \\ &\quad + \frac{1}{6}(d - e + f) \log(1 + x) - \frac{1}{144}(19d - 26e + 28f) \log(2 + x) \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 77, normalized size of antiderivative = 0.94

$$\int \frac{(d + ex + fx^2)(2 - x - 2x^2 + x^3)}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{144} \left( \frac{12(d - 2e + 4f)}{2 + x} + 24(d - e + f) \log(-1 - x) - 8(d + e + f) \log(1 - x) + 3(d + 2e + 4f) \log(2 - x) + (-19d + 26e - 28f) \log(2 + x) \right)$$

[In] Integrate[((d + e\*x + f\*x^2)\*(2 - x - 2\*x^2 + x^3))/(4 - 5\*x^2 + x^4)^2,x]

[Out] ((12\*(d - 2\*e + 4\*f))/(2 + x) + 24\*(d - e + f)\*Log[-1 - x] - 8\*(d + e + f)\*Log[1 - x] + 3\*(d + 2\*e + 4\*f)\*Log[2 - x] + (-19\*d + 26\*e - 28\*f)\*Log[2 + x])/144

**Maple [A] (verified)**

Time = 0.08 (sec) , antiderivative size = 79, normalized size of antiderivative = 0.96

method	result
default	$\left(\frac{13e}{72} - \frac{7f}{36} - \frac{19d}{144}\right) \ln(x+2) - \frac{-\frac{d}{12} + \frac{e}{6} - \frac{f}{3}}{x+2} + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6}\right) \ln(x+1) + \left(-\frac{d}{18} - \frac{e}{18} - \frac{f}{18}\right) \ln(x-1)$
risch	$\frac{d}{12x+24} - \frac{e}{6(x+2)} + \frac{f}{3x+6} + \frac{13 \ln(-x-2)e}{72} - \frac{7 \ln(-x-2)f}{36} - \frac{19 \ln(-x-2)d}{144} + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} + \frac{\ln(x+1)f}{6}$
norman	$\frac{\left(-\frac{d}{12} + \frac{e}{6} - \frac{f}{3}\right)x + \left(\frac{d}{12} - \frac{e}{6} + \frac{f}{3}\right)x^3 + \left(\frac{e}{3} - \frac{2f}{3} - \frac{d}{6}\right)x^2 - \frac{e}{3} + \frac{2f}{3} + \frac{d}{6}}{x^4 - 5x^2 + 4} + \left(-\frac{d}{18} - \frac{e}{18} - \frac{f}{18}\right) \ln(x-1) + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6}\right) \ln$
parallelrisch	$\frac{48f+12d-24e+6 \ln(x-2)d+12 \ln(x-2)e-16 \ln(x-1)d-16 \ln(x-1)e-56 \ln(x+2)f+48 \ln(x+1)f+26 \ln(x+2)xe+6 \ln(x-2)xe-}$

```
[In] int((f*x^2+e*x+d)*(x^3-2*x^2-x+2)/(x^4-5*x^2+4)^2,x,method=_RETURNVERBOSE)
```

```
[Out] (13/72*e-7/36*f-19/144*d)*ln(x+2)-(-1/12*d+1/6*e-1/3*f)/(x+2)+(1/6*d-1/6*e+
1/6*f)*ln(x+1)+(-1/18*d-1/18*e-1/18*f)*ln(x-1)+(1/48*d+1/24*e+1/12*f)*ln(x-
2)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.34 (sec) , antiderivative size = 116, normalized size of antiderivative = 1.41

$$\int \frac{(d+ex+fx^2)(2-x-2x^2+x^3)}{(4-5x^2+x^4)^2} dx =$$

$$\frac{((19d-26e+28f)x+38d-52e+56f)\log(x+2)-24((d-e+f)x+2d-2e+2f)\log(x+1)}{}$$

```
[In] integrate((f*x^2+e*x+d)*(x^3-2*x^2-x+2)/(x^4-5*x^2+4)^2,x, algorithm="fricas")
```

```
[Out] -1/144*(((19*d - 26*e + 28*f)*x + 38*d - 52*e + 56*f)*log(x + 2) - 24*((d -
e + f)*x + 2*d - 2*e + 2*f)*log(x + 1) + 8*((d + e + f)*x + 2*d + 2*e + 2*
f)*log(x - 1) - 3*((d + 2*e + 4*f)*x + 2*d + 4*e + 8*f)*log(x - 2) - 12*d +
24*e - 48*f)/(x + 2)
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{(d + ex + fx^2)(2 - x - 2x^2 + x^3)}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

[In] integrate((f\*x\*\*2+e\*x+d)\*(x\*\*3-2\*x\*\*2-x+2)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 68, normalized size of antiderivative = 0.83

$$\begin{aligned} \int \frac{(d + ex + fx^2)(2 - x - 2x^2 + x^3)}{(4 - 5x^2 + x^4)^2} dx = & -\frac{1}{144} (19d - 26e + 28f) \log(x + 2) \\ & + \frac{1}{6} (d - e + f) \log(x + 1) \\ & - \frac{1}{18} (d + e + f) \log(x - 1) \\ & + \frac{1}{48} (d + 2e + 4f) \log(x - 2) + \frac{d - 2e + 4f}{12(x + 2)} \end{aligned}$$

[In] integrate((f\*x^2+e\*x+d)\*(x^3-2\*x^2-x+2)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] -1/144\*(19\*d - 26\*e + 28\*f)\*log(x + 2) + 1/6\*(d - e + f)\*log(x + 1) - 1/18\*(d + e + f)\*log(x - 1) + 1/48\*(d + 2\*e + 4\*f)\*log(x - 2) + 1/12\*(d - 2\*e + 4\*f)/(x + 2)

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 72, normalized size of antiderivative = 0.88

$$\begin{aligned} \int \frac{(d + ex + fx^2)(2 - x - 2x^2 + x^3)}{(4 - 5x^2 + x^4)^2} dx = & -\frac{1}{144} (19d - 26e + 28f) \log(|x + 2|) \\ & + \frac{1}{6} (d - e + f) \log(|x + 1|) \\ & - \frac{1}{18} (d + e + f) \log(|x - 1|) \\ & + \frac{1}{48} (d + 2e + 4f) \log(|x - 2|) + \frac{d - 2e + 4f}{12(x + 2)} \end{aligned}$$

[In] integrate((f\*x^2+e\*x+d)\*(x^3-2\*x^2-x+2)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] -1/144\*(19\*d - 26\*e + 28\*f)\*log(abs(x + 2)) + 1/6\*(d - e + f)\*log(abs(x + 1)) - 1/18\*(d + e + f)\*log(abs(x - 1)) + 1/48\*(d + 2\*e + 4\*f)\*log(abs(x - 2)) + 1/12\*(d - 2\*e + 4\*f)/(x + 2)

### Mupad [B] (verification not implemented)

Time = 7.90 (sec) , antiderivative size = 79, normalized size of antiderivative = 0.96

$$\int \frac{(d + ex + fx^2)(2 - x - 2x^2 + x^3)}{(4 - 5x^2 + x^4)^2} dx = \frac{\frac{d}{12} - \frac{e}{6} + \frac{f}{3}}{x + 2} + \ln(x + 1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} \right) - \ln(x - 1) \left( \frac{d}{18} + \frac{e}{18} + \frac{f}{18} \right) + \ln(x - 2) \left( \frac{d}{48} + \frac{e}{24} + \frac{f}{12} \right) - \ln(x + 2) \left( \frac{19d}{144} - \frac{13e}{72} + \frac{7f}{36} \right)$$

[In] int(-((d + e\*x + f\*x^2)\*(x + 2\*x^2 - x^3 - 2))/(x^4 - 5\*x^2 + 4)^2,x)

[Out] (d/12 - e/6 + f/3)/(x + 2) + log(x + 1)\*(d/6 - e/6 + f/6) - log(x - 1)\*(d/18 + e/18 + f/18) + log(x - 2)\*(d/48 + e/24 + f/12) - log(x + 2)\*((19\*d)/144 - (13\*e)/72 + (7\*f)/36)

$$3.88 \quad \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx$$

Optimal result . . . . .	1047
Rubi [A] (verified) . . . . .	1047
Mathematica [A] (verified) . . . . .	1048
Maple [A] (verified) . . . . .	1049
Fricas [A] (verification not implemented) . . . . .	1049
Sympy [F(-1)] . . . . .	1050
Maxima [A] (verification not implemented) . . . . .	1050
Giac [A] (verification not implemented) . . . . .	1050
Mupad [B] (verification not implemented) . . . . .	1051

### Optimal result

Integrand size = 41, antiderivative size = 95

$$\begin{aligned} & \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx \\ &= \frac{d-2e+4f-8g}{12(2+x)} - \frac{1}{18}(d+e+f+g)\log(1-x) + \frac{1}{48}(d+2e+4f+8g)\log(2-x) \\ & \quad + \frac{1}{6}(d-e+f-g)\log(1+x) - \frac{1}{144}(19d-26e+28f-8g)\log(2+x) \end{aligned}$$

[Out] 1/12\*(d-2\*e+4\*f-8\*g)/(2+x)-1/18\*(d+e+f+g)\*ln(1-x)+1/48\*(d+2\*e+4\*f+8\*g)\*ln(2-x)+1/6\*(d-e+f-g)\*ln(1+x)-1/144\*(19\*d-26\*e+28\*f-8\*g)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.15 (sec) , antiderivative size = 95, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.049$ , Rules used = {1600, 6874}

$$\begin{aligned} & \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx \\ &= \frac{d-2e+4f-8g}{12(x+2)} - \frac{1}{18}\log(1-x)(d+e+f+g) + \frac{1}{48}\log(2-x)(d+2e+4f+8g) \\ & \quad + \frac{1}{6}\log(x+1)(d-e+f-g) - \frac{1}{144}\log(x+2)(19d-26e+28f-8g) \end{aligned}$$

[In] Int[((2 - x - 2\*x^2 + x^3)\*(d + e\*x + f\*x^2 + g\*x^3))/(4 - 5\*x^2 + x^4)^2,x  
]

[Out]  $(d - 2e + 4f - 8g)/(12(2 + x)) - ((d + e + f + g)*\text{Log}[1 - x])/18 + ((d + 2e + 4f + 8g)*\text{Log}[2 - x])/48 + ((d - e + f - g)*\text{Log}[1 + x])/6 - ((19d - 26e + 28f - 8g)*\text{Log}[2 + x])/144$

Rule 1600

Int[(u\_)\*(Px\_)^(p\_)\*(Qx\_)^(q\_), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rule 6874

Int[u\_, x\_Symbol] := With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]]

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex + fx^2 + gx^3}{(2 + x)^2(2 - x - 2x^2 + x^3)} dx \\ &= \int \left( \frac{d + 2e + 4f + 8g}{48(-2 + x)} + \frac{-d - e - f - g}{18(-1 + x)} + \frac{d - e + f - g}{6(1 + x)} + \frac{-d + 2e - 4f + 8g}{12(2 + x)^2} \right. \\ &\quad \left. + \frac{-19d + 26e - 28f + 8g}{144(2 + x)} \right) dx \\ &= \frac{d - 2e + 4f - 8g}{12(2 + x)} - \frac{1}{18}(d + e + f + g) \log(1 - x) + \frac{1}{48}(d + 2e + 4f + 8g) \log(2 - x) \\ &\quad + \frac{1}{6}(d - e + f - g) \log(1 + x) - \frac{1}{144}(19d - 26e + 28f - 8g) \log(2 + x) \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.95

$$\begin{aligned} &\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx \\ &= \frac{1}{144} \left( \frac{12(d - 2e + 4f - 8g)}{2 + x} + 24(d - e + f - g) \log(-1 - x) - 8(d + e + f + g) \log(1 - x) \right. \\ &\quad \left. + 3(d + 2e + 4f + 8g) \log(2 - x) + (-19d + 26e - 28f + 8g) \log(2 + x) \right) \end{aligned}$$

[In] Integrate[((2 - x - 2\*x^2 + x^3)\*(d + e\*x + f\*x^2 + g\*x^3))/(4 - 5\*x^2 + x^4)^2, x]

[Out]  $((12*(d - 2e + 4f - 8g))/(2 + x) + 24*(d - e + f - g)*\text{Log}[-1 - x] - 8*(d + e + f + g)*\text{Log}[1 - x] + 3*(d + 2e + 4f + 8g)*\text{Log}[2 - x] + (-19*d + 26*e - 28*f + 8*g)*\text{Log}[2 + x])/144$



**Maple [A] (verified)**

Time = 0.08 (sec) , antiderivative size = 94, normalized size of antiderivative = 0.99

method	result
default	$\left(\frac{13e}{72} - \frac{7f}{36} + \frac{g}{18} - \frac{19d}{144}\right) \ln(x+2) - \frac{-\frac{d}{12} + \frac{e}{6} - \frac{f}{3} + \frac{2g}{3}}{x+2} + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6}\right) \ln(x+1) + \left(-\frac{d}{18} - \frac{e}{18} - \frac{f}{18} - \frac{g}{18}\right) \ln(x-1)$
norman	$\frac{\left(-\frac{d}{12} + \frac{e}{6} - \frac{f}{3} + \frac{2g}{3}\right)x + \left(\frac{d}{12} - \frac{e}{6} + \frac{f}{3} - \frac{2g}{3}\right)x^3 + \left(\frac{e}{3} - \frac{2f}{3} + \frac{4g}{3} - \frac{d}{6}\right)x^2 - \frac{e}{3} + \frac{2f}{3} - \frac{4g}{3} + \frac{d}{6}}{x^4 - 5x^2 + 4} + \left(-\frac{d}{18} - \frac{e}{18} - \frac{f}{18} - \frac{g}{18}\right) \ln(x-1)$
risch	$\frac{d}{12x+24} - \frac{e}{6(x+2)} + \frac{f}{3x+6} - \frac{2g}{3(x+2)} + \frac{\ln(x+1)d}{6} - \frac{\ln(x+1)e}{6} + \frac{\ln(x+1)f}{6} - \frac{\ln(x+1)g}{6} - \frac{\ln(x-1)d}{18} - \frac{\ln(x-1)e}{18} + \frac{\ln(x-1)f}{18} - \frac{\ln(x-1)g}{18}$
parallelrisch	$\frac{48f - 96g + 12d - 24e + 6 \ln(x-2)d + 12 \ln(x-2)e - 16 \ln(x-1)d - 16 \ln(x-1)e + 24 \ln(x-2)xg - 8 \ln(x-1)xg - 24 \ln(x+1)xg + 8 \ln(x-2)xg}{x^4 - 5x^2 + 4}$

```
[In] int((x^3-2*x^2-x+2)*(g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x,method=_RETURNVERBOSE)
```

```
[Out] (13/72*e-7/36*f+1/18*g-19/144*d)*ln(x+2)-(-1/12*d+1/6*e-1/3*f+2/3*g)/(x+2)+(1/6*d-1/6*e+1/6*f-1/6*g)*ln(x+1)+(-1/18*d-1/18*e-1/18*f-1/18*g)*ln(x-1)+(1/48*d+1/24*e+1/12*f+1/6*g)*ln(x-2)
```

**Fricas [A] (verification not implemented)**

none

Time = 0.72 (sec) , antiderivative size = 141, normalized size of antiderivative = 1.48

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx =$$

$$\frac{((19d-26e+28f-8g)x+38d-52e+56f-16g)\log(x+2)-24((d-e+f-g)x+2d-2e+2f-2g)\log(x+1)+8((d+e+f+g)x+2d+2e+2f+2g)\log(x-1)-3((d+2e+4f+8g)x+2d+4e+8f+16g)\log(x-2)-12d+24e-48f+96g}{(x+2)^2}$$

```
[In] integrate((x^3-2*x^2-x+2)*(g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x, algorithm="fricas")
```

```
[Out] -1/144*(((19*d - 26*e + 28*f - 8*g)*x + 38*d - 52*e + 56*f - 16*g)*log(x + 2) - 24*((d - e + f - g)*x + 2*d - 2*e + 2*f - 2*g)*log(x + 1) + 8*((d + e + f + g)*x + 2*d + 2*e + 2*f + 2*g)*log(x - 1) - 3*((d + 2*e + 4*f + 8*g)*x + 2*d + 4*e + 8*f + 16*g)*log(x - 2) - 12*d + 24*e - 48*f + 96*g)/(x + 2)
```

**Sympy [F(-1)]**

Timed out.

$$\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

[In] integrate((x\*\*3-2\*x\*\*2-x+2)\*(g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 81, normalized size of antiderivative = 0.85

$$\begin{aligned} & \int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx \\ &= -\frac{1}{144} (19d - 26e + 28f - 8g) \log(x + 2) + \frac{1}{6} (d - e + f - g) \log(x + 1) \\ & \quad - \frac{1}{18} (d + e + f + g) \log(x - 1) + \frac{1}{48} (d + 2e + 4f + 8g) \log(x - 2) + \frac{d - 2e + 4f - 8g}{12(x + 2)} \end{aligned}$$

[In] integrate((x^3-2\*x^2-x+2)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] -1/144\*(19\*d - 26\*e + 28\*f - 8\*g)\*log(x + 2) + 1/6\*(d - e + f - g)\*log(x + 1) - 1/18\*(d + e + f + g)\*log(x - 1) + 1/48\*(d + 2\*e + 4\*f + 8\*g)\*log(x - 2) + 1/12\*(d - 2\*e + 4\*f - 8\*g)/(x + 2)

**Giac [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 85, normalized size of antiderivative = 0.89

$$\begin{aligned} & \int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx \\ &= -\frac{1}{144} (19d - 26e + 28f - 8g) \log(|x + 2|) \\ & \quad + \frac{1}{6} (d - e + f - g) \log(|x + 1|) - \frac{1}{18} (d + e + f + g) \log(|x - 1|) \\ & \quad + \frac{1}{48} (d + 2e + 4f + 8g) \log(|x - 2|) + \frac{d - 2e + 4f - 8g}{12(x + 2)} \end{aligned}$$

[In] integrate((x^3-2\*x^2-x+2)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] -1/144\*(19\*d - 26\*e + 28\*f - 8\*g)\*log(abs(x + 2)) + 1/6\*(d - e + f - g)\*log(abs(x + 1)) - 1/18\*(d + e + f + g)\*log(abs(x - 1)) + 1/48\*(d + 2\*e + 4\*f + 8\*g)\*log(abs(x - 2)) + 1/12\*(d - 2\*e + 4\*f - 8\*g)/(x + 2)

### Mupad [B] (verification not implemented)

Time = 7.94 (sec) , antiderivative size = 94, normalized size of antiderivative = 0.99

$$\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{\frac{d}{12} - \frac{e}{6} + \frac{f}{3} - \frac{2g}{3}}{x + 2} + \ln(x + 1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} \right) - \ln(x - 1) \left( \frac{d}{18} + \frac{e}{18} + \frac{f}{18} + \frac{g}{18} \right)$$

$$+ \ln(x - 2) \left( \frac{d}{48} + \frac{e}{24} + \frac{f}{12} + \frac{g}{6} \right) - \ln(x + 2) \left( \frac{19d}{144} - \frac{13e}{72} + \frac{7f}{36} - \frac{g}{18} \right)$$

[In] int(-((d + e\*x + f\*x^2 + g\*x^3)\*(x + 2\*x^2 - x^3 - 2))/(x^4 - 5\*x^2 + 4)^2, x)

[Out] (d/12 - e/6 + f/3 - (2\*g)/3)/(x + 2) + log(x + 1)\*(d/6 - e/6 + f/6 - g/6) - log(x - 1)\*(d/18 + e/18 + f/18 + g/18) + log(x - 2)\*(d/48 + e/24 + f/12 + g/6) - log(x + 2)\*((19\*d)/144 - (13\*e)/72 + (7\*f)/36 - g/18)

$$3.89 \quad \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx$$

Optimal result	1052
Rubi [A] (verified)	1052
Mathematica [A] (verified)	1053
Maple [A] (verified)	1054
Fricas [A] (verification not implemented)	1054
Sympy [F(-1)]	1055
Maxima [A] (verification not implemented)	1055
Giac [A] (verification not implemented)	1055
Mupad [B] (verification not implemented)	1056

### Optimal result

Integrand size = 46, antiderivative size = 106

$$\begin{aligned} & \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx \\ &= \frac{d-2e+4f-8g+16h}{12(2+x)} - \frac{1}{18}(d+e+f+g+h)\log(1-x) \\ & \quad + \frac{1}{48}(d+2e+4f+8g+16h)\log(2-x) + \frac{1}{6}(d-e+f-g+h)\log(1+x) \\ & \quad - \frac{1}{144}(19d-26e+28f-8g-80h)\log(2+x) \end{aligned}$$

[Out] 1/12\*(d-2\*e+4\*f-8\*g+16\*h)/(2+x)-1/18\*(d+e+f+g+h)\*ln(1-x)+1/48\*(d+2\*e+4\*f+8\*g+16\*h)\*ln(2-x)+1/6\*(d-e+f-g+h)\*ln(1+x)-1/144\*(19\*d-26\*e+28\*f-8\*g-80\*h)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 106, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.043$ , Rules used = {1600, 6874}

$$\begin{aligned} & \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx \\ &= \frac{d-2e+4f-8g+16h}{12(x+2)} - \frac{1}{18}\log(1-x)(d+e+f+g+h) \\ & \quad + \frac{1}{48}\log(2-x)(d+2e+4f+8g+16h) + \frac{1}{6}\log(x+1)(d-e+f-g+h) \\ & \quad - \frac{1}{144}\log(x+2)(19d-26e+28f-8g-80h) \end{aligned}$$

[In] Int[((2 - x - 2\*x^2 + x^3)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4))/(4 - 5\*x^2 + x^4)^2,x]

[Out] (d - 2\*e + 4\*f - 8\*g + 16\*h)/(12\*(2 + x)) - ((d + e + f + g + h)\*Log[1 - x])/18 + ((d + 2\*e + 4\*f + 8\*g + 16\*h)\*Log[2 - x])/48 + ((d - e + f - g + h)\*Log[1 + x])/6 - ((19\*d - 26\*e + 28\*f - 8\*g - 80\*h)\*Log[2 + x])/144

Rule 1600

Int[(u\_.)\*(Px\_)^(p\_.)\*(Qx\_)^(q\_.), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rule 6874

Int[u\_, x\_Symbol] := With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]]

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + ex + fx^2 + gx^3 + hx^4}{(2 + x)^2 (2 - x - 2x^2 + x^3)} dx \\
 &= \int \left( \frac{d + 2e + 4f + 8g + 16h}{48(-2 + x)} + \frac{-d - e - f - g - h}{18(-1 + x)} + \frac{d - e + f - g + h}{6(1 + x)} \right. \\
 &\quad \left. + \frac{-d + 2e - 4f + 8g - 16h}{12(2 + x)^2} + \frac{-19d + 26e - 28f + 8g + 80h}{144(2 + x)} \right) dx \\
 &= \frac{d - 2e + 4f - 8g + 16h}{12(2 + x)} - \frac{1}{18}(d + e + f + g + h) \log(1 - x) \\
 &\quad + \frac{1}{48}(d + 2e + 4f + 8g + 16h) \log(2 - x) + \frac{1}{6}(d - e + f - g + h) \log(1 + x) \\
 &\quad - \frac{1}{144}(19d - 26e + 28f - 8g - 80h) \log(2 + x)
 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 102, normalized size of antiderivative = 0.96

$$\begin{aligned}
 &\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4)}{(4 - 5x^2 + x^4)^2} dx \\
 &= \frac{1}{144} \left( \frac{12(d - 2e + 4f - 8g + 16h)}{2 + x} + 24(d - e + f - g + h) \log(-1 - x) \right. \\
 &\quad - 8(d + e + f + g + h) \log(1 - x) + 3(d + 2(e + 2f + 4g + 8h)) \log(2 - x) \\
 &\quad \left. + (-19d + 26e - 28f + 8g + 80h) \log(2 + x) \right)
 \end{aligned}$$

[In] Integrate[((2 - x - 2\*x^2 + x^3)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4))/(4 - 5\*x^2 + x^4)^2,x]

[Out] ((12\*(d - 2\*e + 4\*f - 8\*g + 16\*h))/(2 + x) + 24\*(d - e + f - g + h)\*Log[-1 - x] - 8\*(d + e + f + g + h)\*Log[1 - x] + 3\*(d + 2\*(e + 2\*f + 4\*g + 8\*h))\*Log[2 - x] + (-19\*d + 26\*e - 28\*f + 8\*g + 80\*h)\*Log[2 + x])/144

## Maple [A] (verified)

Time = 0.10 (sec) , antiderivative size = 109, normalized size of antiderivative = 1.03

method	result
default	$\left(\frac{5h}{9} + \frac{g}{18} - \frac{7f}{36} + \frac{13e}{72} - \frac{19d}{144}\right) \ln(x+2) - \frac{-\frac{d}{12} + \frac{e}{6} - \frac{f}{3} + \frac{2g}{3} - \frac{4h}{3}}{x+2} + \left(\frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6}\right) \ln(x+1) +$
norman	$\frac{\left(-\frac{d}{12} + \frac{e}{6} - \frac{f}{3} + \frac{2g}{3} - \frac{4h}{3}\right)x + \left(\frac{d}{12} - \frac{e}{6} + \frac{f}{3} - \frac{2g}{3} + \frac{4h}{3}\right)x^3 + \left(-\frac{8h}{3} + \frac{4g}{3} - \frac{2f}{3} + \frac{e}{3} - \frac{d}{6}\right)x^2 + \frac{8h}{3} - \frac{4g}{3} + \frac{2f}{3} - \frac{e}{3} + \frac{d}{6}}{x^4 - 5x^2 + 4} + \left(-\frac{d}{18} - \frac{e}{18} - \frac{f}{18}\right)$
risch	$-\frac{\ln(x-1)d}{18} - \frac{\ln(x-1)e}{18} + \frac{\ln(x+1)f}{6} + \frac{\ln(2-x)f}{12} + \frac{5\ln(-x-2)h}{9} + \frac{d}{12x+24} + \frac{\ln(2-x)d}{48} + \frac{\ln(2-x)e}{24} + \frac{\ln(x+1)d}{6}$
parallelrisc	$\frac{48f-96g+12d+192h-24e+48\ln(x-2)hx-8\ln(x-1)hx+24\ln(x+1)hx+80\ln(x+2)hx+6\ln(x-2)d+12\ln(x-2)e-16\ln(x-1)d}{x^4-5x^2+4}$

[In] int((x^3-2\*x^2-x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x,method=\_RET URNVERBOSE)

[Out] (5/9\*h+1/18\*g-7/36\*f+13/72\*e-19/144\*d)\*ln(x+2)-(-1/12\*d+1/6\*e-1/3\*f+2/3\*g-4/3\*h)/(x+2)+(1/6\*d-1/6\*e+1/6\*f-1/6\*g+1/6\*h)\*ln(x+1)+(-1/18\*d-1/18\*e-1/18\*f-1/18\*g-1/18\*h)\*ln(x-1)+(1/48\*d+1/24\*e+1/12\*f+1/6\*g+1/3\*h)\*ln(x-2)

## Fricas [A] (verification not implemented)

none

Time = 3.26 (sec) , antiderivative size = 164, normalized size of antiderivative = 1.55

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx = \frac{((19d-26e+28f-8g-80h)x+38d-52e+56f-16g-160h)\log(x+2)-24((d-e+f-g-h)x+2d-2e+2f-2g+2h)\log(x+1)+8((d+e+f+g+h)x+2d+2e+2f+2g+2h)\log(x-1)-3((d+2e+4f+8g+16h)x+2d+4e+8f+16g+32h)\log(x-2)-12d+24e-48f+96g-192h}{(x+2)^2}$$

[In] integrate((x^3-2\*x^2-x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorith="fricas")

[Out] -1/144\*(((19\*d - 26\*e + 28\*f - 8\*g - 80\*h)\*x + 38\*d - 52\*e + 56\*f - 16\*g - 160\*h)\*log(x + 2) - 24\*((d - e + f - g + h)\*x + 2\*d - 2\*e + 2\*f - 2\*g + 2\*h)\*log(x + 1) + 8\*((d + e + f + g + h)\*x + 2\*d + 2\*e + 2\*f + 2\*g + 2\*h)\*log(x - 1) - 3\*((d + 2\*e + 4\*f + 8\*g + 16\*h)\*x + 2\*d + 4\*e + 8\*f + 16\*g + 32\*h)\*log(x - 2) - 12\*d + 24\*e - 48\*f + 96\*g - 192\*h)/(x + 2)

**Sympy [F(-1)]**

Timed out.

$$\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4)}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

```
[In] integrate((x**3-2*x**2-x+2)*(h*x**4+g*x**3+f*x**2+e*x+d)/(x**4-5*x**2+4)**2, x)
```

```
[Out] Timed out
```

**Maxima [A] (verification not implemented)**

none

Time = 0.18 (sec) , antiderivative size = 92, normalized size of antiderivative = 0.87

$$\begin{aligned} & \int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4)}{(4 - 5x^2 + x^4)^2} dx \\ &= -\frac{1}{144} (19d - 26e + 28f - 8g - 80h) \log(x + 2) \\ & \quad + \frac{1}{6} (d - e + f - g + h) \log(x + 1) - \frac{1}{18} (d + e + f + g + h) \log(x - 1) \\ & \quad + \frac{1}{48} (d + 2e + 4f + 8g + 16h) \log(x - 2) + \frac{d - 2e + 4f - 8g + 16h}{12(x + 2)} \end{aligned}$$

```
[In] integrate((x^3-2*x^2-x+2)*(h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x, algorithm="maxima")
```

```
[Out] -1/144*(19*d - 26*e + 28*f - 8*g - 80*h)*log(x + 2) + 1/6*(d - e + f - g + h)*log(x + 1) - 1/18*(d + e + f + g + h)*log(x - 1) + 1/48*(d + 2*e + 4*f + 8*g + 16*h)*log(x - 2) + 1/12*(d - 2*e + 4*f - 8*g + 16*h)/(x + 2)
```

**Giac [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 96, normalized size of antiderivative = 0.91

$$\begin{aligned} & \int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4)}{(4 - 5x^2 + x^4)^2} dx \\ &= -\frac{1}{144} (19d - 26e + 28f - 8g - 80h) \log(|x + 2|) \\ & \quad + \frac{1}{6} (d - e + f - g + h) \log(|x + 1|) - \frac{1}{18} (d + e + f + g + h) \log(|x - 1|) \\ & \quad + \frac{1}{48} (d + 2e + 4f + 8g + 16h) \log(|x - 2|) + \frac{d - 2e + 4f - 8g + 16h}{12(x + 2)} \end{aligned}$$

[In] integrate((x^3-2\*x^2-x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorith="giac")

[Out] -1/144\*(19\*d - 26\*e + 28\*f - 8\*g - 80\*h)\*log(abs(x + 2)) + 1/6\*(d - e + f - g + h)\*log(abs(x + 1)) - 1/18\*(d + e + f + g + h)\*log(abs(x - 1)) + 1/48\*(d + 2\*e + 4\*f + 8\*g + 16\*h)\*log(abs(x - 2)) + 1/12\*(d - 2\*e + 4\*f - 8\*g + 16\*h)/(x + 2)

### Mupad [B] (verification not implemented)

Time = 8.11 (sec) , antiderivative size = 108, normalized size of antiderivative = 1.02

$$\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4)}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{\frac{d}{12} - \frac{e}{6} + \frac{f}{3} - \frac{2g}{3} + \frac{4h}{3}}{x + 2} + \ln(x + 1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6} \right)$$

$$- \ln(x - 1) \left( \frac{d}{18} + \frac{e}{18} + \frac{f}{18} + \frac{g}{18} + \frac{h}{18} \right) + \ln(x - 2) \left( \frac{d}{48} + \frac{e}{24} + \frac{f}{12} + \frac{g}{6} + \frac{h}{3} \right)$$

$$+ \ln(x + 2) \left( \frac{13e}{72} - \frac{19d}{144} - \frac{7f}{36} + \frac{g}{18} + \frac{5h}{9} \right)$$

[In] int(-((x + 2\*x^2 - x^3 - 2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4))/(x^4 - 5\*x^2 + 4)^2,x)

[Out] (d/12 - e/6 + f/3 - (2\*g)/3 + (4\*h)/3)/(x + 2) + log(x + 1)\*(d/6 - e/6 + f/6 - g/6 + h/6) - log(x - 1)\*(d/18 + e/18 + f/18 + g/18 + h/18) + log(x - 2)\*(d/48 + e/24 + f/12 + g/6 + h/3) + log(x + 2)\*((13\*e)/72 - (19\*d)/144 - (7\*f)/36 + g/18 + (5\*h)/9)



$$3.90 \quad \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx$$

Optimal result . . . . .	1057
Rubi [A] (verified) . . . . .	1057
Mathematica [A] (verified) . . . . .	1058
Maple [A] (verified) . . . . .	1059
Fricas [A] (verification not implemented) . . . . .	1059
Sympy [F(-1)] . . . . .	1060
Maxima [A] (verification not implemented) . . . . .	1060
Giac [A] (verification not implemented) . . . . .	1061
Mupad [B] (verification not implemented) . . . . .	1061

### Optimal result

Integrand size = 51, antiderivative size = 122

$$\begin{aligned} & \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx \\ &= ix + \frac{d-2e+4f-8g+16h-32i}{12(2+x)} - \frac{1}{18}(d+e+f+g+h+i)\log(1-x) \\ & \quad + \frac{1}{48}(d+2e+4f+8g+16h+32i)\log(2-x) + \frac{1}{6}(d-e+f-g+h-i)\log(1+x) \\ & \quad - \frac{1}{144}(19d-26e+28f-8g-80h+352i)\log(2+x) \end{aligned}$$

[Out] i\*x+1/12\*(d-2\*e+4\*f-8\*g+16\*h-32\*i)/(2+x)-1/18\*(d+e+f+g+h+i)\*ln(1-x)+1/48\*(d+2\*e+4\*f+8\*g+16\*h+32\*i)\*ln(2-x)+1/6\*(d-e+f-g+h-i)\*ln(1+x)-1/144\*(19\*d-26\*e+28\*f-8\*g-80\*h+352\*i)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.21 (sec) , antiderivative size = 122, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.039$ , Rules used = {1600, 6874}

$$\begin{aligned} & \int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx \\ &= \frac{d-2e+4f-8g+16h-32i}{12(x+2)} - \frac{1}{18}\log(1-x)(d+e+f+g+h+i) \\ & \quad + \frac{1}{48}\log(2-x)(d+2e+4f+8g+16h+32i) + \frac{1}{6}\log(x+1)(d-e+f-g+h-i) \\ & \quad - \frac{1}{144}\log(x+2)(19d-26e+28f-8g-80h+352i) + ix \end{aligned}$$

[In] Int[((2 - x - 2\*x^2 + x^3)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5))/(4 - 5\*x^2 + x^4)^2,x]

[Out] i\*x + (d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)/(12\*(2 + x)) - ((d + e + f + g + h + i)\*Log[1 - x])/18 + ((d + 2\*e + 4\*f + 8\*g + 16\*h + 32\*i)\*Log[2 - x])/48 + ((d - e + f - g + h - i)\*Log[1 + x])/6 - ((19\*d - 26\*e + 28\*f - 8\*g - 80\*h + 352\*i)\*Log[2 + x])/144

Rule 1600

Int[(u\_)\*(Px\_)^(p\_)\*(Qx\_)^(q\_), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rule 6874

Int[u\_, x\_Symbol] := With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(2 + x)^2(2 - x - 2x^2 + x^3)} dx \\
 &= \int \left( i + \frac{d + 2e + 4f + 8g + 16h + 32i}{48(-2 + x)} + \frac{-d - e - f - g - h - i}{18(-1 + x)} + \frac{d - e + f - g + h - i}{6(1 + x)} \right. \\
 &\quad \left. + \frac{-d + 2e - 4f + 8g - 16h + 32i}{12(2 + x)^2} + \frac{-19d + 26e - 28f + 8g + 80h - 352i}{144(2 + x)} \right) dx \\
 &= ix + \frac{d - 2e + 4f - 8g + 16h - 32i}{12(2 + x)} - \frac{1}{18}(d + e + f + g + h + i) \log(1 - x) \\
 &\quad + \frac{1}{48}(d + 2e + 4f + 8g + 16h + 32i) \log(2 - x) + \frac{1}{6}(d - e + f - g + h - i) \log(1 + x) \\
 &\quad - \frac{1}{144}(19d - 26e + 28f - 8g - 80h + 352i) \log(2 + x)
 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.05 (sec) , antiderivative size = 118, normalized size of antiderivative = 0.97

$$\begin{aligned}
 &\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{(4 - 5x^2 + x^4)^2} dx \\
 &= \frac{1}{144} \left( 144ix + \frac{12(d - 2(e - 2f + 4g - 8h + 16i))}{2 + x} - 8(d + e + f + g + h + i) \log(1 - x) \right. \\
 &\quad \left. + 3(d + 2e + 4(f + 2g + 4h + 8i)) \log(2 - x) + 24(d - e + f - g + h - i) \log(1 + x) \right. \\
 &\quad \left. + (-19d + 26e - 28f + 8g + 80h - 352i) \log(2 + x) \right)
 \end{aligned}$$



+ g + h + i)\*x + 2\*d + 2\*e + 2\*f + 2\*g + 2\*h + 2\*i)\*log(x - 1) + 3\*((d + 2 \*e + 4\*f + 8\*g + 16\*h + 32\*i)\*x + 2\*d + 4\*e + 8\*f + 16\*g + 32\*h + 64\*i)\*log(x - 2) + 12\*d - 24\*e + 48\*f - 96\*g + 192\*h - 384\*i)/(x + 2)

## Sympy [F(-1)]

Timed out.

$$\int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

[In] integrate((x\*\*3-2\*x\*\*2-x+2)\*(i\*x\*\*5+h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] Timed out

## Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 108, normalized size of antiderivative = 0.89

$$\begin{aligned} & \int \frac{(2 - x - 2x^2 + x^3)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{(4 - 5x^2 + x^4)^2} dx \\ &= ix - \frac{1}{144}(19d - 26e + 28f - 8g - 80h + 352i) \log(x + 2) \\ &+ \frac{1}{6}(d - e + f - g + h - i) \log(x + 1) - \frac{1}{18}(d + e + f + g + h + i) \log(x - 1) \\ &+ \frac{1}{48}(d + 2e + 4f + 8g + 16h + 32i) \log(x - 2) + \frac{d - 2e + 4f - 8g + 16h - 32i}{12(x + 2)} \end{aligned}$$

[In] integrate((x^3-2\*x^2-x+2)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] i\*x - 1/144\*(19\*d - 26\*e + 28\*f - 8\*g - 80\*h + 352\*i)\*log(x + 2) + 1/6\*(d - e + f - g + h - i)\*log(x + 1) - 1/18\*(d + e + f + g + h + i)\*log(x - 1) + 1/48\*(d + 2\*e + 4\*f + 8\*g + 16\*h + 32\*i)\*log(x - 2) + 1/12\*(d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)/(x + 2)

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 112, normalized size of antiderivative = 0.92

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx$$

$$= ix - \frac{1}{144} (19d - 26e + 28f - 8g - 80h + 352i) \log(|x+2|)$$

$$+ \frac{1}{6} (d - e + f - g + h - i) \log(|x+1|) - \frac{1}{18} (d + e + f + g + h + i) \log(|x-1|)$$

$$+ \frac{1}{48} (d + 2e + 4f + 8g + 16h + 32i) \log(|x-2|) + \frac{d - 2e + 4f - 8g + 16h - 32i}{12(x+2)}$$

[In] integrate((x^3-2\*x^2-x+2)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x  
, algorithm="giac")

[Out] i\*x - 1/144\*(19\*d - 26\*e + 28\*f - 8\*g - 80\*h + 352\*i)\*log(abs(x + 2)) + 1/6  
\*(d - e + f - g + h - i)\*log(abs(x + 1)) - 1/18\*(d + e + f + g + h + i)\*log  
(abs(x - 1)) + 1/48\*(d + 2\*e + 4\*f + 8\*g + 16\*h + 32\*i)\*log(abs(x - 2)) + 1  
/12\*(d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)/(x + 2)

**Mupad [B] (verification not implemented)**

Time = 8.37 (sec) , antiderivative size = 127, normalized size of antiderivative = 1.04

$$\int \frac{(2-x-2x^2+x^3)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx$$

$$= ix + \frac{\frac{d}{12} - \frac{e}{6} + \frac{f}{3} - \frac{2g}{3} + \frac{4h}{3} - \frac{8i}{3}}{x+2} + \ln(x+1) \left( \frac{d}{6} - \frac{e}{6} + \frac{f}{6} - \frac{g}{6} + \frac{h}{6} - \frac{i}{6} \right)$$

$$+ \ln(x-2) \left( \frac{d}{48} + \frac{e}{24} + \frac{f}{12} + \frac{g}{6} + \frac{h}{3} + \frac{2i}{3} \right) - \ln(x-1) \left( \frac{d}{18} + \frac{e}{18} + \frac{f}{18} + \frac{g}{18} + \frac{h}{18} + \frac{i}{18} \right)$$

$$- \ln(x+2) \left( \frac{19d}{144} - \frac{13e}{72} + \frac{7f}{36} - \frac{g}{18} - \frac{5h}{9} + \frac{22i}{9} \right)$$

[In] int(-((x + 2\*x^2 - x^3 - 2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5))/(x^4  
- 5\*x^2 + 4)^2,x)

[Out] i\*x + (d/12 - e/6 + f/3 - (2\*g)/3 + (4\*h)/3 - (8\*i)/3)/(x + 2) + log(x + 1)  
\*(d/6 - e/6 + f/6 - g/6 + h/6 - i/6) + log(x - 2)\*(d/48 + e/24 + f/12 + g/6  
+ h/3 + (2\*i)/3) - log(x - 1)\*(d/18 + e/18 + f/18 + g/18 + h/18 + i/18) -  
log(x + 2)\*((19\*d)/144 - (13\*e)/72 + (7\*f)/36 - g/18 - (5\*h)/9 + (22\*i)/9)

### 3.91 $\int \frac{2-3x+x^2}{(4-5x^2+x^4)^2} dx$

Optimal result	1062
Rubi [A] (verified)	1062
Mathematica [A] (verified)	1064
Maple [A] (verified)	1064
Fricas [A] (verification not implemented)	1065
Sympy [A] (verification not implemented)	1065
Maxima [A] (verification not implemented)	1065
Giac [A] (verification not implemented)	1066
Mupad [B] (verification not implemented)	1066

#### Optimal result

Integrand size = 21, antiderivative size = 56

$$\int \frac{2-3x+x^2}{(4-5x^2+x^4)^2} dx = -\frac{5+3x}{12(2+3x+x^2)} - \frac{1}{36} \log(1-x) + \frac{1}{144} \log(2-x) \\ - \frac{7}{36} \log(1+x) + \frac{31}{144} \log(2+x)$$

[Out] 1/12\*(-5-3\*x)/(x^2+3\*x+2)-1/36\*ln(1-x)+1/144\*ln(2-x)-7/36\*ln(1+x)+31/144\*ln(2+x)

#### Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 56, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.238$ , Rules used = {1600, 988, 1086, 646, 31}

$$\int \frac{2-3x+x^2}{(4-5x^2+x^4)^2} dx = -\frac{3x+5}{12(x^2+3x+2)} - \frac{1}{36} \log(1-x) + \frac{1}{144} \log(2-x) \\ - \frac{7}{36} \log(x+1) + \frac{31}{144} \log(x+2)$$

[In] Int[(2 - 3\*x + x^2)/(4 - 5\*x^2 + x^4)^2,x]

[Out] -1/12\*(5 + 3\*x)/(2 + 3\*x + x^2) - Log[1 - x]/36 + Log[2 - x]/144 - (7\*Log[1 + x])/36 + (31\*Log[2 + x])/144

#### Rule 31

Int[((a\_) + (b\_.)\*(x\_))^(n\_), x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

Rule 646

```
Int[((d_.) + (e_.)*(x_))/((a_) + (b_.)*(x_) + (c_.)*(x_)^2), x_Symbol] := With[{q = Rt[b^2 - 4*a*c, 2]}, Dist[(c*d - e*(b/2 - q/2))/q, Int[1/(b/2 - q/2 + c*x), x], x] - Dist[(c*d - e*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c*x), x], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a*c, 0] && NiceSqrtQ[b^2 - 4*a*c]
```

Rule 988

```
Int[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^(p_)*((d_.) + (e_.)*(x_) + (f_.)*(x_)^2)^(q_), x_Symbol] := Simp[(2*a*c^2*e - b^2*c*e + b^3*f + b*c*(c*d - 3*a*f) + c*(2*c^2*d + b^2*f - c*(b*e + 2*a*f))*x*(a + b*x + c*x^2)^(p + 1)*((d + e*x + f*x^2)^(q + 1)/((b^2 - 4*a*c)*((c*d - a*f)^2 - (b*d - a*e)*(c*e - b*f)))*(p + 1)), x] - Dist[1/((b^2 - 4*a*c)*((c*d - a*f)^2 - (b*d - a*e)*(c*e - b*f)))*(p + 1), Int[(a + b*x + c*x^2)^(p + 1)*(d + e*x + f*x^2)^q*Simp[2*c*((c*d - a*f)^2 - (b*d - a*e)*(c*e - b*f))*(p + 1) - (2*c^2*d + b^2*f - c*(b*e + 2*a*f))*(a*f*(p + 1) - c*d*(p + 2)) - e*(b^2*c*e - 2*a*c^2*e - b^3*f - b*c*(c*d - 3*a*f))*(p + q + 2) + (2*f*(2*a*c^2*e - b^2*c*e + b^3*f + b*c*(c*d - 3*a*f))*(p + q + 2) - (2*c^2*d + b^2*f - c*(b*e + 2*a*f))*(b*f*(p + 1) - c*e*(2*p + q + 4)))*x + c*f*(2*c^2*d + b^2*f - c*(b*e + 2*a*f))*(2*p + 2*q + 5)*x^2, x], x] /; FreeQ[{a, b, c, d, e, f, q}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[e^2 - 4*d*f, 0] && LtQ[p, -1] && NeQ[(c*d - a*f)^2 - (b*d - a*e)*(c*e - b*f), 0] && !(IntegerQ[p] && ILtQ[q, -1]) && !IGtQ[q, 0]
```

Rule 1086

```
Int[((A_.) + (B_.)*(x_) + (C_.)*(x_)^2)/(((a_) + (b_.)*(x_) + (c_.)*(x_)^2)*((d_) + (e_.)*(x_) + (f_.)*(x_)^2)), x_Symbol] := With[{q = c^2*d^2 - b*c*d*e + a*c*e^2 + b^2*d*f - 2*a*c*d*f - a*b*e*f + a^2*f^2}, Dist[1/q, Int[(A*c^2*d - a*c*C*d - A*b*c*e + a*B*c*e + A*b^2*f - a*b*B*f - a*A*c*f + a^2*C*f + c*(B*c*d - b*C*d - A*c*e + a*C*e + A*b*f - a*B*f)*x)/(a + b*x + c*x^2), x], x] + Dist[1/q, Int[(c*C*d^2 - B*c*d*e + A*c*e^2 + b*B*d*f - A*c*d*f - a*C*d*f - A*b*e*f + a*A*f^2 - f*(B*c*d - b*C*d - A*c*e + a*C*e + A*b*f - a*B*f)*x)/(d + e*x + f*x^2), x], x] /; NeQ[q, 0] /; FreeQ[{a, b, c, d, e, f, A, B, C}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[e^2 - 4*d*f, 0]
```

Rule 1600

```
Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{1}{(2-3x+x^2)(2+3x+x^2)^2} dx \\
&= -\frac{5+3x}{12(2+3x+x^2)} + \frac{1}{72} \int \frac{-18+48x-18x^2}{(2-3x+x^2)(2+3x+x^2)} dx \\
&= -\frac{5+3x}{12(2+3x+x^2)} + \frac{\int \frac{252-108x}{2-3x+x^2} dx}{5184} + \frac{\int \frac{-900+108x}{2+3x+x^2} dx}{5184} \\
&= -\frac{5+3x}{12(2+3x+x^2)} + \frac{1}{144} \int \frac{1}{-2+x} dx \\
&\quad - \frac{1}{36} \int \frac{1}{-1+x} dx - \frac{7}{36} \int \frac{1}{1+x} dx + \frac{31}{144} \int \frac{1}{2+x} dx \\
&= -\frac{5+3x}{12(2+3x+x^2)} - \frac{1}{36} \log(1-x) + \frac{1}{144} \log(2-x) - \frac{7}{36} \log(1+x) + \frac{31}{144} \log(2+x)
\end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.02 (sec) , antiderivative size = 48, normalized size of antiderivative = 0.86

$$\int \frac{2-3x+x^2}{(4-5x^2+x^4)^2} dx = \frac{1}{144} \left( -\frac{12(5+3x)}{2+3x+x^2} - 4 \log(1-x) + \log(2-x) - 28 \log(1+x) + 31 \log(2+x) \right)$$

`[In] Integrate[(2 - 3*x + x^2)/(4 - 5*x^2 + x^4)^2,x]`

```
[Out] ((-12*(5 + 3*x))/(2 + 3*x + x^2) - 4*Log[1 - x] + Log[2 - x] - 28*Log[1 + x] + 31*Log[2 + x])/144
```

**Maple [A] (verified)**

Time = 0.06 (sec) , antiderivative size = 40, normalized size of antiderivative = 0.71

method	result
default	$-\frac{1}{12(x+2)} + \frac{31 \ln(x+2)}{144} - \frac{1}{6(x+1)} - \frac{7 \ln(x+1)}{36} - \frac{\ln(x-1)}{36} + \frac{\ln(x-2)}{144}$
risch	$\frac{-\frac{x}{4} - \frac{5}{12}}{x^2+3x+2} + \frac{\ln(x-2)}{144} - \frac{\ln(x-1)}{36} - \frac{7 \ln(x+1)}{36} + \frac{31 \ln(x+2)}{144}$
norman	$\frac{\frac{1}{3}x^2 + \frac{3}{4}x - \frac{1}{4}x^3 - \frac{5}{6}}{x^4-5x^2+4} + \frac{\ln(x-2)}{144} - \frac{\ln(x-1)}{36} - \frac{7 \ln(x+1)}{36} + \frac{31 \ln(x+2)}{144}$
parallelrisch	$\frac{\ln(x-2)x^2 - 4 \ln(x-1)x^2 - 28 \ln(x+1)x^2 + 31 \ln(x+2)x^2 - 60 + 3 \ln(x-2)x - 12 \ln(x-1)x - 84 \ln(x+1)x + 93 \ln(x+2)x + 2 \ln(x-2) - 144x^2 + 432x + 288}{144x^2 + 432x + 288}$



[In] `int((x^2-3*x+2)/(x^4-5*x^2+4)^2,x,method=_RETURNVERBOSE)`

[Out] `-1/12/(x+2)+31/144*ln(x+2)-1/6/(x+1)-7/36*ln(x+1)-1/36*ln(x-1)+1/144*ln(x-2)`  
`)`

### Fricas [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 72, normalized size of antiderivative = 1.29

$$\int \frac{2 - 3x + x^2}{(4 - 5x^2 + x^4)^2} dx = \frac{31(x^2 + 3x + 2) \log(x + 2) - 28(x^2 + 3x + 2) \log(x + 1) - 4(x^2 + 3x + 2) \log(x - 1) + (x^2 + 3x + 2)}{144(x^2 + 3x + 2)}$$

[In] `integrate((x^2-3*x+2)/(x^4-5*x^2+4)^2,x, algorithm="fricas")`

[Out] `1/144*(31*(x^2 + 3*x + 2)*log(x + 2) - 28*(x^2 + 3*x + 2)*log(x + 1) - 4*(x^2 + 3*x + 2)*log(x - 1) + (x^2 + 3*x + 2)*log(x - 2) - 36*x - 60)/(x^2 + 3*x + 2)`

### Sympy [A] (verification not implemented)

Time = 0.15 (sec) , antiderivative size = 46, normalized size of antiderivative = 0.82

$$\int \frac{2 - 3x + x^2}{(4 - 5x^2 + x^4)^2} dx = \frac{-3x - 5}{12x^2 + 36x + 24} + \frac{\log(x - 2)}{144} - \frac{\log(x - 1)}{36} - \frac{7 \log(x + 1)}{36} + \frac{31 \log(x + 2)}{144}$$

[In] `integrate((x**2-3*x+2)/(x**4-5*x**2+4)**2,x)`

[Out] `(-3*x - 5)/(12*x**2 + 36*x + 24) + log(x - 2)/144 - log(x - 1)/36 - 7*log(x + 1)/36 + 31*log(x + 2)/144`

### Maxima [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 42, normalized size of antiderivative = 0.75

$$\int \frac{2 - 3x + x^2}{(4 - 5x^2 + x^4)^2} dx = -\frac{3x + 5}{12(x^2 + 3x + 2)} + \frac{31}{144} \log(x + 2) - \frac{7}{36} \log(x + 1) - \frac{1}{36} \log(x - 1) + \frac{1}{144} \log(x - 2)$$

[In] integrate((x^2-3\*x+2)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] -1/12\*(3\*x + 5)/(x^2 + 3\*x + 2) + 31/144\*log(x + 2) - 7/36\*log(x + 1) - 1/36\*log(x - 1) + 1/144\*log(x - 2)

### Giac [A] (verification not implemented)

none

Time = 0.31 (sec) , antiderivative size = 46, normalized size of antiderivative = 0.82

$$\int \frac{2 - 3x + x^2}{(4 - 5x^2 + x^4)^2} dx = -\frac{3x + 5}{12(x + 2)(x + 1)} + \frac{31}{144} \log(|x + 2|) - \frac{7}{36} \log(|x + 1|) - \frac{1}{36} \log(|x - 1|) + \frac{1}{144} \log(|x - 2|)$$

[In] integrate((x^2-3\*x+2)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] -1/12\*(3\*x + 5)/((x + 2)\*(x + 1)) + 31/144\*log(abs(x + 2)) - 7/36\*log(abs(x + 1)) - 1/36\*log(abs(x - 1)) + 1/144\*log(abs(x - 2))

### Mupad [B] (verification not implemented)

Time = 0.03 (sec) , antiderivative size = 42, normalized size of antiderivative = 0.75

$$\int \frac{2 - 3x + x^2}{(4 - 5x^2 + x^4)^2} dx = \frac{\ln(x - 2)}{144} - \frac{7 \ln(x + 1)}{36} - \frac{\ln(x - 1)}{36} + \frac{31 \ln(x + 2)}{144} - \frac{\frac{x}{4} + \frac{5}{12}}{x^2 + 3x + 2}$$

[In] int((x^2 - 3\*x + 2)/(x^4 - 5\*x^2 + 4)^2,x)

[Out] log(x - 2)/144 - (7\*log(x + 1))/36 - log(x - 1)/36 + (31\*log(x + 2))/144 - (x/4 + 5/12)/(3\*x + x^2 + 2)

$$3.92 \quad \int \frac{(d+ex)(2-3x+x^2)}{(4-5x^2+x^4)^2} dx$$

Optimal result	1067
Rubi [A] (verified)	1067
Mathematica [A] (verified)	1069
Maple [A] (verified)	1070
Fricas [A] (verification not implemented)	1070
Sympy [B] (verification not implemented)	1071
Maxima [A] (verification not implemented)	1072
Giac [A] (verification not implemented)	1072
Mupad [B] (verification not implemented)	1073

### Optimal result

Integrand size = 26, antiderivative size = 89

$$\begin{aligned} \int \frac{(d+ex)(2-3x+x^2)}{(4-5x^2+x^4)^2} dx = & -\frac{5d-6e+(3d-4e)x}{12(2+3x+x^2)} - \frac{1}{36}(d+e)\log(1-x) \\ & + \frac{1}{144}(d+2e)\log(2-x) - \frac{1}{36}(7d-13e)\log(1+x) \\ & + \frac{1}{144}(31d-50e)\log(2+x) \end{aligned}$$

[Out] 1/12\*(-5\*d+6\*e-(3\*d-4\*e)\*x)/(x^2+3\*x+2)-1/36\*(d+e)\*ln(1-x)+1/144\*(d+2\*e)\*ln(2-x)-1/36\*(7\*d-13\*e)\*ln(1+x)+1/144\*(31\*d-50\*e)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.16 (sec) , antiderivative size = 89, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.192$ , Rules used = {1600, 1030, 1086, 646, 31}

$$\begin{aligned} \int \frac{(d+ex)(2-3x+x^2)}{(4-5x^2+x^4)^2} dx = & -\frac{x(3d-4e)+5d-6e}{12(x^2+3x+2)} - \frac{1}{36}(d+e)\log(1-x) \\ & + \frac{1}{144}(d+2e)\log(2-x) - \frac{1}{36}(7d-13e)\log(x+1) \\ & + \frac{1}{144}(31d-50e)\log(x+2) \end{aligned}$$

[In] Int[((d + e\*x)\*(2 - 3\*x + x^2))/(4 - 5\*x^2 + x^4)^2,x]

[Out] -1/12\*(5\*d - 6\*e + (3\*d - 4\*e)\*x)/(2 + 3\*x + x^2) - ((d + e)\*Log[1 - x])/36 + ((d + 2\*e)\*Log[2 - x])/144 - ((7\*d - 13\*e)\*Log[1 + x])/36 + ((31\*d - 50\*e)\*Log[2 + x])/144

## Rule 31

```
Int[((a_) + (b_)*(x_))^( -1), x_Symbol] := Simp[Log[RemoveContent[a + b*x,
x]]/b, x] /; FreeQ[{a, b}, x]
```

## Rule 646

```
Int[((d_) + (e_)*(x_))/((a_) + (b_)*(x_) + (c_)*(x_)^2), x_Symbol] := W
ith[{q = Rt[b^2 - 4*a*c, 2]}, Dist[(c*d - e*(b/2 - q/2))/q, Int[1/(b/2 - q/
2 + c*x), x], x] - Dist[(c*d - e*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c*x), x
], x]] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2*c*d - b*e, 0] && NeQ[b^2 - 4*a
*c, 0] && NiceSqrtQ[b^2 - 4*a*c]
```

## Rule 1030

```
Int[((g_) + (h_)*(x_))*((a_) + (b_)*(x_) + (c_)*(x_)^2)^(p_)*((d_) + (e
_)*(x_) + (f_)*(x_)^2)^(q_), x_Symbol] := Simp[(a + b*x + c*x^2)^(p + 1)*
((d + e*x + f*x^2)^(q + 1)/((b^2 - 4*a*c)*((c*d - a*f)^2 - (b*d - a*e)*(c*e
- b*f))^(p + 1))*(g*c*(2*a*c*e - b*(c*d + a*f)) + (g*b - a*h)*(2*c^2*d +
b^2*f - c*(b*e + 2*a*f)) + c*(g*(2*c^2*d + b^2*f - c*(b*e + 2*a*f)) - h*(b*
c*d - 2*a*c*e + a*b*f))*x), x] + Dist[1/((b^2 - 4*a*c)*((c*d - a*f)^2 - (b*
d - a*e)*(c*e - b*f))^(p + 1)), Int[(a + b*x + c*x^2)^(p + 1)*(d + e*x + f*
x^2)^q*Simp[(b*h - 2*g*c)*((c*d - a*f)^2 - (b*d - a*e)*(c*e - b*f))^(p + 1)
+ (b^2*(g*f) - b*(h*c*d + g*c*e + a*h*f) + 2*(g*c*(c*d - a*f) - a*((-h)*c*
e)))*(a*f*(p + 1) - c*d*(p + 2)) - e*((g*c)*(2*a*c*e - b*(c*d + a*f)) + (g*
b - a*h)*(2*c^2*d + b^2*f - c*(b*e + 2*a*f)))*(p + q + 2) - (2*f*((g*c)*(2*
a*c*e - b*(c*d + a*f)) + (g*b - a*h)*(2*c^2*d + b^2*f - c*(b*e + 2*a*f)))*
(p + q + 2) - (b^2*g*f - b*(h*c*d + g*c*e + a*h*f) + 2*(g*c*(c*d - a*f) - a*
((-h)*c*e)))*(b*f*(p + 1) - c*e*(2*p + q + 4)))*x - c*f*(b^2*(g*f) - b*(h*c
*d + g*c*e + a*h*f) + 2*(g*c*(c*d - a*f) + a*h*c*e))*(2*p + 2*q + 5)*x^2, x
], x] /; FreeQ[{a, b, c, d, e, f, g, h, q}, x] && NeQ[b^2 - 4*a*c, 0] &
& NeQ[e^2 - 4*d*f, 0] && LtQ[p, -1] && NeQ[(c*d - a*f)^2 - (b*d - a*e)*(c*e
- b*f), 0] && !(IntegerQ[p] && ILtQ[q, -1])
```

## Rule 1086

```
Int[((A_) + (B_)*(x_) + (C_)*(x_)^2)/(((a_) + (b_)*(x_) + (c_)*(x_)^2)
*((d_) + (e_)*(x_) + (f_)*(x_)^2)), x_Symbol] := With[{q = c^2*d^2 - b*c*
d*e + a*c*e^2 + b^2*d*f - 2*a*c*d*f - a*b*e*f + a^2*f^2}, Dist[1/q, Int[(A*
c^2*d - a*c*C*d - A*b*c*e + a*B*c*e + A*b^2*f - a*b*B*f - a*A*c*f + a^2*C*f
+ c*(B*c*d - b*C*d - A*c*e + a*C*e + A*b*f - a*B*f)*x)/(a + b*x + c*x^2),
x], x] + Dist[1/q, Int[(c*C*d^2 - B*c*d*e + A*c*e^2 + b*B*d*f - A*c*d*f - a
*C*d*f - A*b*e*f + a*A*f^2 - f*(B*c*d - b*C*d - A*c*e + a*C*e + A*b*f - a*B
*f)*x)/(d + e*x + f*x^2), x], x] /; NeQ[q, 0]] /; FreeQ[{a, b, c, d, e, f,
A, B, C}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[e^2 - 4*d*f, 0]
```

## Rule 1600

`Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]`

## Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + ex}{(2 - 3x + x^2)(2 + 3x + x^2)^2} dx \\
 &= -\frac{5d - 6e + (3d - 4e)x}{12(2 + 3x + x^2)} - \frac{1}{72} \int \frac{6(3d - 10e) - 24(2d - 3e)x + 6(3d - 4e)x^2}{(2 - 3x + x^2)(2 + 3x + x^2)} dx \\
 &= -\frac{5d - 6e + (3d - 4e)x}{12(2 + 3x + x^2)} - \frac{\int \frac{108(3d - 10e) - 288(2d - 3e) + (-36(3d - 10e) + 72(3d - 4e))x}{2 - 3x + x^2} dx}{5184} \\
 &\quad - \frac{\int \frac{108(3d - 10e) + 288(2d - 3e) - (-36(3d - 10e) + 72(3d - 4e))x}{2 + 3x + x^2} dx}{5184} \\
 &= -\frac{5d - 6e + (3d - 4e)x}{12(2 + 3x + x^2)} - \frac{1}{36}(7d - 13e) \int \frac{1}{1 + x} dx - \frac{1}{144}(-d - 2e) \int \frac{1}{-2 + x} dx \\
 &\quad - \frac{1}{36}(d + e) \int \frac{1}{-1 + x} dx - \frac{1}{144}(-31d + 50e) \int \frac{1}{2 + x} dx \\
 &= -\frac{5d - 6e + (3d - 4e)x}{12(2 + 3x + x^2)} - \frac{1}{36}(d + e) \log(1 - x) + \frac{1}{144}(d + 2e) \log(2 - x) \\
 &\quad - \frac{1}{36}(7d - 13e) \log(1 + x) + \frac{1}{144}(31d - 50e) \log(2 + x)
 \end{aligned}$$

## Mathematica [A] (verified)

Time = 0.04 (sec) , antiderivative size = 80, normalized size of antiderivative = 0.90

$$\int \frac{(d + ex)(2 - 3x + x^2)}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{144} \left( \frac{12(-5d + 6e - 3dx + 4ex)}{2 + 3x + x^2} - 4(d + e) \log(1 - x) \right. \\
 \left. + (d + 2e) \log(2 - x) + 4(-7d + 13e) \log(1 + x) \right. \\
 \left. + (31d - 50e) \log(2 + x) \right)$$

[In] Integrate[((d + e\*x)\*(2 - 3\*x + x^2))/(4 - 5\*x^2 + x^4)^2, x]

[Out] ((12\*(-5\*d + 6\*e - 3\*d\*x + 4\*e\*x))/(2 + 3\*x + x^2) - 4\*(d + e)\*Log[1 - x] + (d + 2\*e)\*Log[2 - x] + 4\*(-7\*d + 13\*e)\*Log[1 + x] + (31\*d - 50\*e)\*Log[2 + x])/144

**Maple [A] (verified)**

Time = 0.07 (sec) , antiderivative size = 78, normalized size of antiderivative = 0.88

method	result
default	$-\frac{\frac{d}{12}-\frac{e}{6}}{x+2} + \left(\frac{31d}{144} - \frac{25e}{72}\right) \ln(x+2) + \left(-\frac{7d}{36} + \frac{13e}{36}\right) \ln(x+1) - \frac{\frac{d}{6}-\frac{e}{6}}{x+1} + \left(-\frac{d}{36} - \frac{e}{36}\right) \ln(x-1) + \left(\frac{d}{144} + \frac{e}{72}\right) \ln(x-2)$
risch	$\frac{\left(-\frac{d}{4} + \frac{e}{3}\right)x - \frac{5d}{12} + \frac{e}{2}}{x^2+3x+2} + \frac{\ln(2-x)d}{144} + \frac{\ln(2-x)e}{72} + \frac{31\ln(x+2)d}{144} - \frac{25\ln(x+2)e}{72} - \frac{\ln(x-1)d}{36} - \frac{\ln(x-1)e}{36} - \frac{7\ln(-x-1)d}{36} - \frac{7\ln(-x-1)e}{36}$
norman	$\frac{\left(-\frac{d}{4} + \frac{e}{3}\right)x^3 + \left(\frac{3d}{4} - \frac{5e}{6}\right)x + \left(\frac{d}{3} - \frac{e}{2}\right)x^2 - \frac{5d}{6} + e}{x^4-5x^2+4} + \left(-\frac{7d}{36} + \frac{13e}{36}\right) \ln(x+1) + \left(-\frac{d}{36} - \frac{e}{36}\right) \ln(x-1) + \left(\frac{d}{144} + \frac{e}{72}\right) \ln(x-2)$
parallelrisc	$-60d+72e-36dx+2\ln(x-2)d+4\ln(x-2)e-8\ln(x-1)d-8\ln(x-1)e-150\ln(x+2)xe+6\ln(x-2)xe-12\ln(x-1)xd-12\ln(x-1)xe$

[In] int((e\*x+d)\*(x^2-3\*x+2)/(x^4-5\*x^2+4)^2,x,method=\_RETURNVERBOSE)

[Out] -(1/12\*d-1/6\*e)/(x+2)+(31/144\*d-25/72\*e)\*ln(x+2)+(-7/36\*d+13/36\*e)\*ln(x+1)-(1/6\*d-1/6\*e)/(x+1)+(-1/36\*d-1/36\*e)\*ln(x-1)+(1/144\*d+1/72\*e)\*ln(x-2)

**Fricas [A] (verification not implemented)**

none

Time = 0.27 (sec) , antiderivative size = 153, normalized size of antiderivative = 1.72

$$\int \frac{(d+ex)(2-3x+x^2)}{(4-5x^2+x^4)^2} dx = \frac{12(3d-4e)x - ((31d-50e)x^2 + 3(31d-50e)x + 62d - 100e) \log(x+2) + 4((7d-13e)x^2 + 3(7d-13e)x + 14d - 26e) \log(x+1) + 4((d+e)x^2 + 3(d+e)x + 2d + 2e) \log(x-1) - ((d+2e)x^2 + 3(d+2e)x + 2d + 4e) \log(x-2) + 60d - 72e}{(4-5x^2+x^4)^2}$$

[In] integrate((e\*x+d)\*(x^2-3\*x+2)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out] -1/144\*(12\*(3\*d - 4\*e)\*x - ((31\*d - 50\*e)\*x^2 + 3\*(31\*d - 50\*e)\*x + 62\*d - 100\*e)\*log(x + 2) + 4\*((7\*d - 13\*e)\*x^2 + 3\*(7\*d - 13\*e)\*x + 14\*d - 26\*e)\*log(x + 1) + 4\*((d + e)\*x^2 + 3\*(d + e)\*x + 2\*d + 2\*e)\*log(x - 1) - ((d + 2\*e)\*x^2 + 3\*(d + 2\*e)\*x + 2\*d + 4\*e)\*log(x - 2) + 60\*d - 72\*e)/(x^2 + 3\*x + 2)

## Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1255 vs. 2(80) = 160.

Time = 6.98 (sec) , antiderivative size = 1255, normalized size of antiderivative = 14.10

$$\int \frac{(d + ex)(2 - 3x + x^2)}{(4 - 5x^2 + x^4)^2} dx = \text{Too large to display}$$

[In] integrate((e\*x+d)\*(x\*\*2-3\*x+2)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out]  $-(d + e) \log(x + (-24383100d^{**6} + 187408066d^{**5}e + 10439775d^{**5}(d + e) - 511591980d^{**4}e^{**2} - 94132290d^{**4}e(d + e) + 667200d^{**4}(d + e)^{**2} + 469491120d^{**3}e^{**3} + 333672552d^{**3}e^{**2}(d + e) - 2703328d^{**3}e(d + e)^{**2} - 198000d^{**3}(d + e)^{**3} + 322778400d^{**2}e^{**4} - 582497712d^{**2}e^{**3}(d + e) + 1752768d^{**2}e^{**2}(d + e)^{**2} + 1107552d^{**2}e(d + e)^{**3} - 863493856d^{**2}e^{**5} + 500776560d^{**2}e^{**4}(d + e) + 4226944d^{**2}e^{**3}(d + e)^{**2} - 1880640d^{**2}e^{**2}(d + e)^{**3} + 429000000e^{**6} - 169242912e^{**5}(d + e) - 4538112e^{**4}(d + e)^{**2} + 964224e^{**3}(d + e)^{**3}) / (13474125d^{**6} - 102860175d^{**5}e + 274190390d^{**4}e^{**2} - 224142072d^{**3}e^{**3} - 245084096d^{**2}e^{**4} + 535797456d^{**2}e^{**5} - 256183200e^{**6}) / 36 + (d + 2e) \log(x + (-24383100d^{**6} + 187408066d^{**5}e - 10439775d^{**5}(d + 2e) / 4 - 511591980d^{**4}e^{**2} + 47066145d^{**4}e(d + 2e) / 2 + 41700d^{**4}(d + 2e)^{**2} + 469491120d^{**3}e^{**3} - 83418138d^{**3}e^{**2}(d + 2e) - 168958d^{**3}e(d + 2e)^{**2} + 12375d^{**3}(d + 2e)^{**3} / 4 + 322778400d^{**2}e^{**4} + 145624428d^{**2}e^{**3}(d + 2e) + 109548d^{**2}e^{**2}(d + 2e)^{**2} - 34611d^{**2}e(d + 2e)^{**3} / 2 - 863493856d^{**2}e^{**5} - 125194140d^{**2}e^{**4}(d + 2e) + 264184d^{**2}e^{**3}(d + 2e)^{**2} + 29385d^{**2}e^{**2}(d + 2e)^{**3} + 429000000e^{**6} + 42310728e^{**5}(d + 2e) - 283632e^{**4}(d + 2e)^{**2} - 15066e^{**3}(d + 2e)^{**3}) / (13474125d^{**6} - 102860175d^{**5}e + 274190390d^{**4}e^{**2} - 224142072d^{**3}e^{**3} - 245084096d^{**2}e^{**4} + 535797456d^{**2}e^{**5} - 256183200e^{**6}) / 144 - (7*d - 13*e) \log(x + (-24383100d^{**6} + 187408066d^{**5}e + 10439775d^{**5}(7*d - 13*e) - 511591980d^{**4}e^{**2} - 94132290d^{**4}e(7*d - 13*e) + 667200d^{**4}(7*d - 13*e)^{**2} + 469491120d^{**3}e^{**3} + 333672552d^{**3}e^{**2}(7*d - 13*e) - 2703328d^{**3}e(7*d - 13*e)^{**2} - 198000d^{**3}(7*d - 13*e)^{**3} + 322778400d^{**2}e^{**4} - 582497712d^{**2}e^{**3}(7*d - 13*e) + 1752768d^{**2}e^{**2}(7*d - 13*e)^{**2} + 1107552d^{**2}e(7*d - 13*e)^{**3} - 863493856d^{**2}e^{**5} + 500776560d^{**2}e^{**4}(7*d - 13*e) + 4226944d^{**2}e^{**3}(7*d - 13*e)^{**2} - 1880640d^{**2}e^{**2}(7*d - 13*e)^{**3} + 429000000e^{**6} - 169242912e^{**5}(7*d - 13*e) - 4538112e^{**4}(7*d - 13*e)^{**2} + 964224e^{**3}(7*d - 13*e)^{**3}) / (13474125d^{**6} - 102860175d^{**5}e + 274190390d^{**4}e^{**2} - 224142072d^{**3}e^{**3} - 245084096d^{**2}e^{**4} + 535797456d^{**2}e^{**5} - 256183200e^{**6}) / 36 + (31*d - 50*e) \log(x + (-24383100d^{**6} + 187408066d^{**5}e - 10439775d^{**5}(31*d - 50*e) / 4 - 511591980d^{**4}e^{**2} + 47066145d^{**4}e(31*d - 50*e) / 2 + 41700d^{**4}(31*d - 50*e)^{**2} + 469491120d^{**3}e^{**3} - 83418138d^{**3}e^{**2}(31*d - 50*e) - 168958d^{**3}e(31*d - 50*e)^{**2} + 12375d^{**3}(31*d - 50*e)^{**3} / 4 + 322778400d^{**2}e^{**4} + 145624428d^{**2}e^{**3}(31*d - 50*e) + 109548d^{**2}e^{**2}(31*d - 50*e)^{**2} - 34611d^{**2}e($

$$31*d - 50*e)^{**3}/2 - 863493856*d*e^{**5} - 125194140*d*e^{**4}*(31*d - 50*e) + 264$$

$$184*d*e^{**3}*(31*d - 50*e)^{**2} + 29385*d*e^{**2}*(31*d - 50*e)^{**3} + 429000000*e^{**6}$$

$$+ 42310728*e^{**5}*(31*d - 50*e) - 283632*e^{**4}*(31*d - 50*e)^{**2} - 15066*e^{**3}$$

$$*(31*d - 50*e)^{**3})/(13474125*d^{**6} - 102860175*d^{**5}*e + 274190390*d^{**4}*e^{**2}$$

$$- 224142072*d^{**3}*e^{**3} - 245084096*d^{**2}*e^{**4} + 535797456*d*e^{**5} - 256183200*$$

$$e^{**6}))/144 + (-5*d + 6*e + x*(-3*d + 4*e))/(12*x^{**2} + 36*x + 24)$$

## Maxima [A] (verification not implemented)

none

Time = 0.20 (sec) , antiderivative size = 75, normalized size of antiderivative = 0.84

$$\int \frac{(d + ex)(2 - 3x + x^2)}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{144} (31d - 50e) \log(x + 2)$$

$$- \frac{1}{36} (7d - 13e) \log(x + 1) - \frac{1}{36} (d + e) \log(x - 1)$$

$$+ \frac{1}{144} (d + 2e) \log(x - 2) - \frac{(3d - 4e)x + 5d - 6e}{12(x^2 + 3x + 2)}$$

[In] integrate((e\*x+d)\*(x^2-3\*x+2)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] 1/144\*(31\*d - 50\*e)\*log(x + 2) - 1/36\*(7\*d - 13\*e)\*log(x + 1) - 1/36\*(d + e)\*log(x - 1) + 1/144\*(d + 2\*e)\*log(x - 2) - 1/12\*((3\*d - 4\*e)\*x + 5\*d - 6\*e)/(x^2 + 3\*x + 2)

## Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 79, normalized size of antiderivative = 0.89

$$\int \frac{(d + ex)(2 - 3x + x^2)}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{144} (31d - 50e) \log(|x + 2|)$$

$$- \frac{1}{36} (7d - 13e) \log(|x + 1|) - \frac{1}{36} (d + e) \log(|x - 1|)$$

$$+ \frac{1}{144} (d + 2e) \log(|x - 2|) - \frac{(3d - 4e)x + 5d - 6e}{12(x + 2)(x + 1)}$$

[In] integrate((e\*x+d)\*(x^2-3\*x+2)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] 1/144\*(31\*d - 50\*e)\*log(abs(x + 2)) - 1/36\*(7\*d - 13\*e)\*log(abs(x + 1)) - 1/36\*(d + e)\*log(abs(x - 1)) + 1/144\*(d + 2\*e)\*log(abs(x - 2)) - 1/12\*((3\*d - 4\*e)\*x + 5\*d - 6\*e)/((x + 2)\*(x + 1))



**Mupad [B] (verification not implemented)**

Time = 0.06 (sec) , antiderivative size = 79, normalized size of antiderivative = 0.89

$$\int \frac{(d + ex)(2 - 3x + x^2)}{(4 - 5x^2 + x^4)^2} dx = \ln(x - 2) \left( \frac{d}{144} + \frac{e}{72} \right) - \ln(x - 1) \left( \frac{d}{36} + \frac{e}{36} \right) \\ - \ln(x + 1) \left( \frac{7d}{36} - \frac{13e}{36} \right) - \frac{\frac{5d}{12} - \frac{e}{2} + x \left( \frac{d}{4} - \frac{e}{3} \right)}{x^2 + 3x + 2} \\ + \ln(x + 2) \left( \frac{31d}{144} - \frac{25e}{72} \right)$$

[In] int(((d + e\*x)\*(x^2 - 3\*x + 2))/(x^4 - 5\*x^2 + 4)^2,x)

```
[Out] log(x - 2)*(d/144 + e/72) - log(x - 1)*(d/36 + e/36) - log(x + 1)*((7*d)/36
- (13*e)/36) - ((5*d)/12 - e/2 + x*(d/4 - e/3))/(3*x + x^2 + 2) + log(x +
2)*((31*d)/144 - (25*e)/72)
```

$$3.93 \quad \int \frac{(2-3x+x^2)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx$$

Optimal result	1074
Rubi [A] (verified)	1074
Mathematica [A] (verified)	1077
Maple [A] (verified)	1077
Fricas [B] (verification not implemented)	1078
Sympy [F(-1)]	1078
Maxima [A] (verification not implemented)	1078
Giac [A] (verification not implemented)	1079
Mupad [B] (verification not implemented)	1079

### Optimal result

Integrand size = 31, antiderivative size = 105

$$\int \frac{(2-3x+x^2)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx = -\frac{5d-6e+8f+(3d-4e+6f)x}{12(2+3x+x^2)} - \frac{1}{36}(d+e+f)\log(1-x) + \frac{1}{144}(d+2e+4f)\log(2-x) - \frac{1}{36}(7d-13e+19f)\log(1+x) + \frac{1}{144}(31d-50e+76f)\log(2+x)$$

[Out] 1/12\*(-5\*d+6\*e-8\*f-(3\*d-4\*e+6\*f)\*x)/(x^2+3\*x+2)-1/36\*(d+e+f)\*ln(1-x)+1/144\*(d+2\*e+4\*f)\*ln(2-x)-1/36\*(7\*d-13\*e+19\*f)\*ln(1+x)+1/144\*(31\*d-50\*e+76\*f)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.20 (sec) , antiderivative size = 105, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 5,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.161$ , Rules used = {1600, 1074, 1086, 646, 31}

$$\int \frac{(2-3x+x^2)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx = -\frac{x(3d-4e+6f)+5d-6e+8f}{12(x^2+3x+2)} - \frac{1}{36}\log(1-x)(d+e+f) + \frac{1}{144}\log(2-x)(d+2e+4f) - \frac{1}{36}\log(x+1)(7d-13e+19f) + \frac{1}{144}\log(x+2)(31d-50e+76f)$$

[In] Int[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2))/(4 - 5\*x^2 + x^4)^2,x]

[Out] -1/12\*(5\*d - 6\*e + 8\*f + (3\*d - 4\*e + 6\*f)\*x)/(2 + 3\*x + x^2) - ((d + e + f)\*Log[1 - x])/36 + ((d + 2\*e + 4\*f)\*Log[2 - x])/144 - ((7\*d - 13\*e + 19\*f)\*Log[1 + x])/36 + ((31\*d - 50\*e + 76\*f)\*Log[2 + x])/144

### Rule 31

Int[((a\_) + (b\_)\*(x\_))^-1, x\_Symbol] := Simp[Log[RemoveContent[a + b\*x, x]]/b, x] /; FreeQ[{a, b}, x]

### Rule 646

Int[((d\_) + (e\_)\*(x\_))/((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2), x\_Symbol] := With[{q = Rt[b^2 - 4\*a\*c, 2]}, Dist[(c\*d - e\*(b/2 - q/2))/q, Int[1/(b/2 - q/2 + c\*x), x], x] - Dist[(c\*d - e\*(b/2 + q/2))/q, Int[1/(b/2 + q/2 + c\*x), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && NiceSqrtQ[b^2 - 4\*a\*c]

### Rule 1074

Int[((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)^(p\_)\*((A\_) + (B\_)\*(x\_) + (C\_)\*(x\_)^2)\*((d\_) + (e\_)\*(x\_) + (f\_)\*(x\_)^2)^(q\_), x\_Symbol] := Simp[(a + b\*x + c\*x^2)^(p + 1)\*((d + e\*x + f\*x^2)^(q + 1)/((b^2 - 4\*a\*c)\*((c\*d - a\*f)^2 - (b\*d - a\*e)\*(c\*e - b\*f))^(p + 1)))\*((A\*c - a\*C)\*(2\*a\*c\*e - b\*(c\*d + a\*f)) + (A\*b - a\*B)\*(2\*c^2\*d + b^2\*f - c\*(b\*e + 2\*a\*f)) + c\*(A\*(2\*c^2\*d + b^2\*f - c\*(b\*e + 2\*a\*f)) - B\*(b\*c\*d - 2\*a\*c\*e + a\*b\*f) + C\*(b^2\*d - a\*b\*e - 2\*a\*(c\*d - a\*f)))\*x, x] + Dist[1/((b^2 - 4\*a\*c)\*((c\*d - a\*f)^2 - (b\*d - a\*e)\*(c\*e - b\*f))^(p + 1)), Int[(a + b\*x + c\*x^2)^(p + 1)\*(d + e\*x + f\*x^2)^q\*Simp[(b\*B - 2\*A\*c - 2\*a\*C)\*((c\*d - a\*f)^2 - (b\*d - a\*e)\*(c\*e - b\*f))^(p + 1) + (b^2\*(C\*d + A\*f) - b\*(B\*c\*d + A\*c\*e + a\*C\*e + a\*B\*f) + 2\*(A\*c\*(c\*d - a\*f) - a\*(c\*C\*d - B\*c\*e - a\*C\*f)))\*(a\*f\*(p + 1) - c\*d\*(p + 2)) - e\*((A\*c - a\*C)\*(2\*a\*c\*e - b\*(c\*d + a\*f)) + (A\*b - a\*B)\*(2\*c^2\*d + b^2\*f - c\*(b\*e + 2\*a\*f)))\*(p + q + 2) - (2\*f\*((A\*c - a\*C)\*(2\*a\*c\*e - b\*(c\*d + a\*f)) + (A\*b - a\*B)\*(2\*c^2\*d + b^2\*f - c\*(b\*e + 2\*a\*f)))\*(p + q + 2) - (b^2\*(C\*d + A\*f) - b\*(B\*c\*d + A\*c\*e + a\*C\*e + a\*B\*f) + 2\*(A\*c\*(c\*d - a\*f) - a\*(c\*C\*d - B\*c\*e - a\*C\*f)))\*(b\*f\*(p + 1) - c\*e\*(2\*p + q + 4)))\*x - c\*f\*(b^2\*(C\*d + A\*f) - b\*(B\*c\*d + A\*c\*e + a\*C\*e + a\*B\*f) + 2\*(A\*c\*(c\*d - a\*f) - a\*(c\*C\*d - B\*c\*e - a\*C\*f)))\*(2\*p + 2\*q + 5)\*x^2, x], x] /; FreeQ[{a, b, c, d, e, f, A, B, C, q}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[e^2 - 4\*d\*f, 0] && LtQ[p, -1] && NeQ[(c\*d - a\*f)^2 - (b\*d - a\*e)\*(c\*e - b\*f), 0] && !(IntegerQ[p] && ILtQ[q, -1]) && !IGtQ[q, 0]

### Rule 1086

Int[((A\_) + (B\_)\*(x\_) + (C\_)\*(x\_)^2)/(((a\_) + (b\_)\*(x\_) + (c\_)\*(x\_)^2)\*((d\_) + (e\_)\*(x\_) + (f\_)\*(x\_)^2)), x\_Symbol] := With[{q = c^2\*d^2 - b\*c\*

$d*e + a*c*e^2 + b^2*d*f - 2*a*c*d*f - a*b*e*f + a^2*f^2$ , Dist[1/q, Int[(A\*c^2\*d - a\*c\*C\*d - A\*b\*c\*e + a\*B\*c\*e + A\*b^2\*f - a\*b\*B\*f - a\*A\*c\*f + a^2\*C\*f + c\*(B\*c\*d - b\*C\*d - A\*c\*e + a\*C\*e + A\*b\*f - a\*B\*f)\*x)/(a + b\*x + c\*x^2), x], x] + Dist[1/q, Int[(c\*C\*d^2 - B\*c\*d\*e + A\*c\*e^2 + b\*B\*d\*f - A\*c\*d\*f - a\*C\*d\*f - A\*b\*e\*f + a\*A\*f^2 - f\*(B\*c\*d - b\*C\*d - A\*c\*e + a\*C\*e + A\*b\*f - a\*B\*f)\*x)/(d + e\*x + f\*x^2), x], x] /; NeQ[q, 0]] /; FreeQ[{a, b, c, d, e, f, A, B, C}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[e^2 - 4\*d\*f, 0]

### Rule 1600

Int[(u\_)\*(Px\_)^(p\_)\*(Qx\_)^(q\_), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + ex + fx^2}{(2 - 3x + x^2)(2 + 3x + x^2)^2} dx \\
 &= -\frac{5d - 6e + 8f + (3d - 4e + 6f)x}{12(2 + 3x + x^2)} \\
 &\quad - \frac{1}{72} \int \frac{6(3d - 10e + 12f) - 24(2d - 3e + 5f)x + 6(3d - 4e + 6f)x^2}{(2 - 3x + x^2)(2 + 3x + x^2)} dx \\
 &= -\frac{5d - 6e + 8f + (3d - 4e + 6f)x}{12(2 + 3x + x^2)} \\
 &\quad - \frac{\int \frac{-288(2d - 3e + 5f) + 108(3d - 10e + 12f) + (72(3d - 4e + 6f) - 36(3d - 10e + 12f))x}{2 - 3x + x^2} dx}{5184} \\
 &\quad - \frac{\int \frac{288(2d - 3e + 5f) + 108(3d - 10e + 12f) - (72(3d - 4e + 6f) - 36(3d - 10e + 12f))x}{2 + 3x + x^2} dx}{5184} \\
 &= -\frac{5d - 6e + 8f + (3d - 4e + 6f)x}{12(2 + 3x + x^2)} - \frac{1}{144}(-31d + 50e - 76f) \int \frac{1}{2 + x} dx \\
 &\quad - \frac{1}{144}(-d - 2e - 4f) \int \frac{1}{-2 + x} dx \\
 &\quad - \frac{1}{36}(d + e + f) \int \frac{1}{-1 + x} dx - \frac{1}{36}(7d - 13e + 19f) \int \frac{1}{1 + x} dx \\
 &= -\frac{5d - 6e + 8f + (3d - 4e + 6f)x}{12(2 + 3x + x^2)} - \frac{1}{36}(d + e + f) \log(1 - x) + \frac{1}{144}(d + 2e \\
 &\quad + 4f) \log(2 - x) - \frac{1}{36}(7d - 13e + 19f) \log(1 + x) + \frac{1}{144}(31d - 50e + 76f) \log(2 + x)
 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.05 (sec) , antiderivative size = 97, normalized size of antiderivative = 0.92

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{144} \left( -\frac{12(-6e + 8f - 4ex + 6fx + d(5 + 3x))}{2 + 3x + x^2} - 4(d + e + f) \log(1 - x) + (d + 2e + 4f) \log(2 - x) - 4(7d - 13e + 19f) \log(1 + x) + (31d - 50e + 76f) \log(2 + x) \right)$$

[In] Integrate[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2))/(4 - 5\*x^2 + x^4)^2,x]

[Out] ((-12\*(-6\*e + 8\*f - 4\*e\*x + 6\*f\*x + d\*(5 + 3\*x)))/(2 + 3\*x + x^2) - 4\*(d + e + f)\*Log[1 - x] + (d + 2\*e + 4\*f)\*Log[2 - x] - 4\*(7\*d - 13\*e + 19\*f)\*Log[1 + x] + (31\*d - 50\*e + 76\*f)\*Log[2 + x])/144

**Maple [A] (verified)**

Time = 0.08 (sec) , antiderivative size = 96, normalized size of antiderivative = 0.91

method	result
default	$-\frac{\frac{d}{12} - \frac{e}{6} + \frac{f}{3}}{x+2} + \left(\frac{31d}{144} - \frac{25e}{72} + \frac{19f}{36}\right) \ln(x+2) + \left(-\frac{7d}{36} + \frac{13e}{36} - \frac{19f}{36}\right) \ln(x+1) - \frac{\frac{d}{6} - \frac{e}{6} + \frac{f}{6}}{x+1} + \left(-\frac{d}{36} - \frac{e}{36} + \frac{f}{36}\right) \ln(x-2)$
norman	$\frac{\left(-\frac{d}{4} + \frac{e}{3} - \frac{f}{2}\right)x^3 + \left(\frac{3d}{4} - \frac{5e}{6} + f\right)x + \left(\frac{d}{3} - \frac{e}{2} + \frac{5f}{6}\right)x^2 - \frac{5d}{6} + e - \frac{4f}{3}}{x^4 - 5x^2 + 4} + \left(-\frac{7d}{36} + \frac{13e}{36} - \frac{19f}{36}\right) \ln(x+1) + \left(-\frac{d}{36} - \frac{e}{36} + \frac{f}{36}\right) \ln(x-2)$
risch	$\frac{\left(-\frac{d}{4} + \frac{e}{3} - \frac{f}{2}\right)x - \frac{5d}{12} + \frac{e}{2} - \frac{2f}{3}}{x^2 + 3x + 2} - \frac{\ln(x-1)d}{36} - \frac{\ln(x-1)e}{36} - \frac{\ln(x-1)f}{36} + \frac{31 \ln(x+2)d}{144} - \frac{25 \ln(x+2)e}{72} + \frac{19 \ln(x+2)f}{36} - \frac{7 \ln(x-2)d}{36} - \frac{7 \ln(x-2)e}{36} + \frac{7 \ln(x-2)f}{36}$
parallelrisch	$-\frac{96f - 60d + 72e - 36dx + 2 \ln(x-2)d + 4 \ln(x-2)e - 8 \ln(x-1)d - 8 \ln(x-1)e + 152 \ln(x+2)f - 152 \ln(x+1)f - 150 \ln(x+2)xe + 6 \ln(x-2)xe}{144}$

[In] int((x^2-3\*x+2)\*(f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x,method=\_RETURNVERBOSE)

[Out] -(1/12\*d-1/6\*e+1/3\*f)/(x+2)+(31/144\*d-25/72\*e+19/36\*f)\*ln(x+2)+(-7/36\*d+13/36\*e-19/36\*f)\*ln(x+1)-(1/6\*d-1/6\*e+1/6\*f)/(x+1)+(-1/36\*d-1/36\*e-1/36\*f)\*ln(x-1)+(1/144\*d+1/72\*e+1/36\*f)\*ln(x-2)

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 191 vs. 2(95) = 190.

Time = 0.34 (sec) , antiderivative size = 191, normalized size of antiderivative = 1.82

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{(4 - 5x^2 + x^4)^2} dx = \frac{12(3d - 4e + 6f)x - ((31d - 50e + 76f)x^2 + 3(31d - 50e + 76f)x + 62d - 100e + 152f) \log(x + 2) + 4((7d - 13e + 19f)x^2 + 3(7d - 13e + 19f)x + 14d - 26e + 38f) \log(x + 1) + 4((d + e + f)x^2 + 3(d + e + f)x + 2d + 2e + 2f) \log(x - 1) - ((d + 2e + 4f)x^2 + 3(d + 2e + 4f)x + 2d + 4e + 8f) \log(x - 2) + 60d - 72e + 96f}{(x^2 + 3x + 2)}$$

[In] integrate((x^2-3\*x+2)\*(f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out] -1/144\*(12\*(3\*d - 4\*e + 6\*f)\*x - ((31\*d - 50\*e + 76\*f)\*x^2 + 3\*(31\*d - 50\*e + 76\*f)\*x + 62\*d - 100\*e + 152\*f)\*log(x + 2) + 4\*((7\*d - 13\*e + 19\*f)\*x^2 + 3\*(7\*d - 13\*e + 19\*f)\*x + 14\*d - 26\*e + 38\*f)\*log(x + 1) + 4\*((d + e + f)\*x^2 + 3\*(d + e + f)\*x + 2\*d + 2\*e + 2\*f)\*log(x - 1) - ((d + 2\*e + 4\*f)\*x^2 + 3\*(d + 2\*e + 4\*f)\*x + 2\*d + 4\*e + 8\*f)\*log(x - 2) + 60\*d - 72\*e + 96\*f)/(x^2 + 3\*x + 2)

**Sympy [F(-1)]**

Timed out.

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

[In] integrate((x\*\*2-3\*x+2)\*(f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 91, normalized size of antiderivative = 0.87

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{144} (31d - 50e + 76f) \log(x + 2) - \frac{1}{36} (7d - 13e + 19f) \log(x + 1) - \frac{1}{36} (d + e + f) \log(x - 1) + \frac{1}{144} (d + 2e + 4f) \log(x - 2) - \frac{(3d - 4e + 6f)x + 5d - 6e + 8f}{12(x^2 + 3x + 2)}$$

```
[In] integrate((x^2-3*x+2)*(f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x, algorithm="maxima")
[Out] 1/144*(31*d - 50*e + 76*f)*log(x + 2) - 1/36*(7*d - 13*e + 19*f)*log(x + 1)
- 1/36*(d + e + f)*log(x - 1) + 1/144*(d + 2*e + 4*f)*log(x - 2) - 1/12*((
3*d - 4*e + 6*f)*x + 5*d - 6*e + 8*f)/(x^2 + 3*x + 2)
```

### Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 95, normalized size of antiderivative = 0.90

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{144} (31d - 50e + 76f) \log(|x + 2|) - \frac{1}{36} (7d - 13e + 19f) \log(|x + 1|) - \frac{1}{36} (d + e + f) \log(|x - 1|) + \frac{1}{144} (d + 2e + 4f) \log(|x - 2|) - \frac{(3d - 4e + 6f)x + 5d - 6e + 8f}{12(x + 2)(x + 1)}$$

```
[In] integrate((x^2-3*x+2)*(f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x, algorithm="giac")
[Out] 1/144*(31*d - 50*e + 76*f)*log(abs(x + 2)) - 1/36*(7*d - 13*e + 19*f)*log(a
bs(x + 1)) - 1/36*(d + e + f)*log(abs(x - 1)) + 1/144*(d + 2*e + 4*f)*log(a
bs(x - 2)) - 1/12*((3*d - 4*e + 6*f)*x + 5*d - 6*e + 8*f)/((x + 2)*(x + 1))
```

### Mupad [B] (verification not implemented)

Time = 0.08 (sec) , antiderivative size = 97, normalized size of antiderivative = 0.92

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2)}{(4 - 5x^2 + x^4)^2} dx = \ln(x - 2) \left( \frac{d}{144} + \frac{e}{72} + \frac{f}{36} \right) - \ln(x + 1) \left( \frac{7d}{36} - \frac{13e}{36} + \frac{19f}{36} \right) - \ln(x - 1) \left( \frac{d}{36} + \frac{e}{36} + \frac{f}{36} \right) + \ln(x + 2) \left( \frac{31d}{144} - \frac{25e}{72} + \frac{19f}{36} \right) - \frac{\frac{5d}{12} - \frac{e}{2} + \frac{2f}{3} + x \left( \frac{d}{4} - \frac{e}{3} + \frac{f}{2} \right)}{x^2 + 3x + 2}$$

```
[In] int(((x^2 - 3*x + 2)*(d + e*x + f*x^2))/(x^4 - 5*x^2 + 4)^2,x)
```

```
[Out] log(x - 2)*(d/144 + e/72 + f/36) - log(x + 1)*((7*d)/36 - (13*e)/36 + (19*f)/36) - log(x - 1)*(d/36 + e/36 + f/36) + log(x + 2)*((31*d)/144 - (25*e)/72 + (19*f)/36) - ((5*d)/12 - e/2 + (2*f)/3 + x*(d/4 - e/3 + f/2))/(3*x + x^2 + 2)
```



$$3.94 \quad \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx$$

Optimal result	. . . . .	1081
Rubi [A] (verified)	. . . . .	1081
Mathematica [A] (verified)	. . . . .	1083
Maple [A] (verified)	. . . . .	1083
Fricas [B] (verification not implemented)	. . . . .	1084
Sympy [F(-1)]	. . . . .	1084
Maxima [A] (verification not implemented)	. . . . .	1084
Giac [A] (verification not implemented)	. . . . .	1085
Mupad [B] (verification not implemented)	. . . . .	1085

### Optimal result

Integrand size = 36, antiderivative size = 117

$$\int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx = -\frac{d-e+f-g}{6(1+x)} - \frac{d-2e+4f-8g}{12(2+x)} \\ - \frac{1}{36}(d+e+f+g)\log(1-x) \\ + \frac{1}{144}(d+2e+4f+8g)\log(2-x) \\ - \frac{1}{36}(7d-13e+19f-25g)\log(1+x) \\ + \frac{1}{144}(31d-50e+76f-104g)\log(2+x)$$

[Out] 1/6\*(-d+e-f+g)/(1+x)+1/12\*(-d+2\*e-4\*f+8\*g)/(2+x)-1/36\*(d+e+f+g)\*ln(1-x)+1/144\*(d+2\*e+4\*f+8\*g)\*ln(2-x)-1/36\*(7\*d-13\*e+19\*f-25\*g)\*ln(1+x)+1/144\*(31\*d-50\*e+76\*f-104\*g)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.17 (sec) , antiderivative size = 117, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.056$ , Rules used

= {1600, 6860}

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx = -\frac{d - 2e + 4f - 8g}{12(x + 2)} - \frac{d - e + f - g}{6(x + 1)}$$

$$- \frac{1}{36} \log(1 - x)(d + e + f + g)$$

$$+ \frac{1}{144} \log(2 - x)(d + 2e + 4f + 8g)$$

$$- \frac{1}{36} \log(x + 1)(7d - 13e + 19f - 25g)$$

$$+ \frac{1}{144} \log(x + 2)(31d - 50e + 76f - 104g)$$

[In] Int[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2 + g\*x^3))/(4 - 5\*x^2 + x^4)^2,x]

[Out] -1/6\*(d - e + f - g)/(1 + x) - (d - 2\*e + 4\*f - 8\*g)/(12\*(2 + x)) - ((d + e + f + g)\*Log[1 - x])/36 + ((d + 2\*e + 4\*f + 8\*g)\*Log[2 - x])/144 - ((7\*d - 13\*e + 19\*f - 25\*g)\*Log[1 + x])/36 + ((31\*d - 50\*e + 76\*f - 104\*g)\*Log[2 + x])/144

#### Rule 1600

Int[(u\_)\*(Px\_)^(p\_)\*(Qx\_)^(q\_), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

#### Rule 6860

Int[(u\_)/((a\_.) + (b\_.)\*(x\_)^(n\_.) + (c\_.)\*(x\_)^(n2\_.)), x\_Symbol] := With[{v = RationalFunctionExpand[u/(a + b\*x^n + c\*x^(2\*n)), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b, c}, x] && EqQ[n2, 2\*n] && IGtQ[n, 0]

#### Rubi steps

$$\text{integral} = \int \frac{d + ex + fx^2 + gx^3}{(2 - 3x + x^2)(2 + 3x + x^2)^2} dx$$

$$= \int \left( \frac{d + 2e + 4f + 8g}{144(-2 + x)} + \frac{-d - e - f - g}{36(-1 + x)} + \frac{d - e + f - g}{6(1 + x)^2} \right. \\ \left. + \frac{-7d + 13e - 19f + 25g}{36(1 + x)} + \frac{d - 2e + 4f - 8g}{12(2 + x)^2} + \frac{31d - 50e + 76f - 104g}{144(2 + x)} \right) dx$$

$$= -\frac{d - e + f - g}{6(1 + x)} - \frac{d - 2e + 4f - 8g}{12(2 + x)} - \frac{1}{36}(d + e + f + g) \log(1 - x)$$

$$+ \frac{1}{144}(d + 2e + 4f + 8g) \log(2 - x) - \frac{1}{36}(7d - 13e + 19f - 25g) \log(1 + x)$$

$$+ \frac{1}{144}(31d - 50e + 76f - 104g) \log(2 + x)$$

**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 114, normalized size of antiderivative = 0.97

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{144} \left( \frac{12(-5d + 6e - 8f + 12g - 3dx + 4ex - 6fx + 10gx)}{2 + 3x + x^2} - 4(d + e + f + g) \log(1 - x) + (d + 2e + 4f + 8g) \log(2 - x) + 4(-7d + 13e - 19f + 25g) \log(1 + x) + (31d - 50e + 76f - 104g) \log(2 + x) \right)$$

```
[In] Integrate[((2 - 3*x + x^2)*(d + e*x + f*x^2 + g*x^3))/(4 - 5*x^2 + x^4)^2,x]
```

```
[Out] ((12*(-5*d + 6*e - 8*f + 12*g - 3*d*x + 4*e*x - 6*f*x + 10*g*x))/(2 + 3*x + x^2) - 4*(d + e + f + g)*Log[1 - x] + (d + 2*e + 4*f + 8*g)*Log[2 - x] + 4*(-7*d + 13*e - 19*f + 25*g)*Log[1 + x] + (31*d - 50*e + 76*f - 104*g)*Log[2 + x])/144
```

**Maple [A] (verified)**

Time = 0.10 (sec) , antiderivative size = 114, normalized size of antiderivative = 0.97

method	result
default	$-\frac{\frac{d}{12} - \frac{e}{6} + \frac{f}{3} - \frac{2g}{3}}{x+2} + \left(\frac{31d}{144} - \frac{25e}{72} + \frac{19f}{36} - \frac{13g}{18}\right) \ln(x+2) + \left(-\frac{7d}{36} + \frac{13e}{36} - \frac{19f}{36} + \frac{25g}{36}\right) \ln(x+1) - \frac{d}{6}$
norman	$\frac{\left(-\frac{d}{4} + \frac{e}{3} - \frac{f}{2} + \frac{5g}{6}\right)x^3 + \left(\frac{3d}{4} - \frac{5e}{6} + f - \frac{4g}{3}\right)x + \left(\frac{d}{3} - \frac{e}{2} + \frac{5f}{6} - \frac{3g}{2}\right)x^2 - \frac{5d}{6} + e + 2g - \frac{4f}{3}}{x^4 - 5x^2 + 4} + \left(-\frac{7d}{36} + \frac{13e}{36} - \frac{19f}{36} + \frac{25g}{36}\right) \ln(x)$
risch	$\frac{\left(-\frac{d}{4} + \frac{e}{3} - \frac{f}{2} + \frac{5g}{6}\right)x - \frac{5d}{12} + \frac{e}{2} - \frac{2f}{3} + g}{x^2 + 3x + 2} - \frac{\ln(x-1)d}{36} - \frac{\ln(x-1)e}{36} - \frac{\ln(x-1)f}{36} - \frac{\ln(x-1)g}{36} - \frac{7\ln(-x-1)d}{36} + \frac{13\ln(-x-1)}{36}$
parallelrisch	$-\frac{96f + 144g + 120gx - 60d + 72e - 36dx + 2\ln(x-2)d + 4\ln(x-2)e - 8\ln(x-1)d - 8\ln(x-1)e + 24\ln(x-2)g - 12\ln(x-1)g + 300\ln(x-2)}{144}$

```
[In] int((x^2-3*x+2)*(g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x,method=_RETURNVERBOSE)
```

```
[Out] -(1/12*d-1/6*e+1/3*f-2/3*g)/(x+2)+(31/144*d-25/72*e+19/36*f-13/18*g)*ln(x+2)+(-7/36*d+13/36*e-19/36*f+25/36*g)*ln(x+1)-(1/6*d-1/6*e+1/6*f-1/6*g)/(x+1)+(-1/36*d-1/36*e-1/36*f-1/36*g)*ln(x-1)+(1/144*d+1/72*e+1/36*f+1/18*g)*ln(x-2)
```

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 229 vs. 2(105) = 210.

Time = 0.72 (sec) , antiderivative size = 229, normalized size of antiderivative = 1.96

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx =$$

$$\frac{12(3d - 4e + 6f - 10g)x - ((31d - 50e + 76f - 104g)x^2 + 3(31d - 50e + 76f - 104g)x + 62d - 100e + 152f - 208g)\log(x + 2) + 4((7d - 13e + 19f - 25g)x^2 + 3(7d - 13e + 19f - 25g)x + 14d - 26e + 38f - 50g)\log(x + 1) + 4((d + e + f + g)x^2 + 3(d + e + f + g)x + 2d + 2e + 2f + 2g)\log(x - 1) - ((d + 2e + 4f + 8g)x^2 + 3(d + 2e + 4f + 8g)x + 2d + 4e + 8f + 16g)\log(x - 2) + 60d - 72e + 96f - 144g}{12(x^2 + 3x + 2)}$$

[In] integrate((x^2-3\*x+2)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out] -1/144\*(12\*(3\*d - 4\*e + 6\*f - 10\*g)\*x - ((31\*d - 50\*e + 76\*f - 104\*g)\*x^2 + 3\*(31\*d - 50\*e + 76\*f - 104\*g)\*x + 62\*d - 100\*e + 152\*f - 208\*g)\*log(x + 2) + 4\*((7\*d - 13\*e + 19\*f - 25\*g)\*x^2 + 3\*(7\*d - 13\*e + 19\*f - 25\*g)\*x + 14\*d - 26\*e + 38\*f - 50\*g)\*log(x + 1) + 4\*((d + e + f + g)\*x^2 + 3\*(d + e + f + g)\*x + 2\*d + 2\*e + 2\*f + 2\*g)\*log(x - 1) - ((d + 2\*e + 4\*f + 8\*g)\*x^2 + 3\*(d + 2\*e + 4\*f + 8\*g)\*x + 2\*d + 4\*e + 8\*f + 16\*g)\*log(x - 2) + 60\*d - 72\*e + 96\*f - 144\*g)/(x^2 + 3\*x + 2)

**Sympy [F(-1)]**

Timed out.

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

[In] integrate((x\*\*2-3\*x+2)\*(g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 107, normalized size of antiderivative = 0.91

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{144} (31d - 50e + 76f - 104g) \log(x + 2) - \frac{1}{36} (7d - 13e + 19f - 25g) \log(x + 1)$$

$$- \frac{1}{36} (d + e + f + g) \log(x - 1) + \frac{1}{144} (d + 2e + 4f + 8g) \log(x - 2)$$

$$- \frac{(3d - 4e + 6f - 10g)x + 5d - 6e + 8f - 12g}{12(x^2 + 3x + 2)}$$

[In] integrate((x^2-3\*x+2)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] 1/144\*(31\*d - 50\*e + 76\*f - 104\*g)\*log(x + 2) - 1/36\*(7\*d - 13\*e + 19\*f - 25\*g)\*log(x + 1) - 1/36\*(d + e + f + g)\*log(x - 1) + 1/144\*(d + 2\*e + 4\*f + 8\*g)\*log(x - 2) - 1/12\*((3\*d - 4\*e + 6\*f - 10\*g)\*x + 5\*d - 6\*e + 8\*f - 12\*g)/(x^2 + 3\*x + 2)

## Giac [A] (verification not implemented)

none

Time = 0.30 (sec) , antiderivative size = 111, normalized size of antiderivative = 0.95

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{144} (31d - 50e + 76f - 104g) \log(|x + 2|) - \frac{1}{36} (7d - 13e + 19f - 25g) \log(|x + 1|)$$

$$- \frac{1}{36} (d + e + f + g) \log(|x - 1|) + \frac{1}{144} (d + 2e + 4f + 8g) \log(|x - 2|)$$

$$- \frac{(3d - 4e + 6f - 10g)x + 5d - 6e + 8f - 12g}{12(x + 2)(x + 1)}$$

[In] integrate((x^2-3\*x+2)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] 1/144\*(31\*d - 50\*e + 76\*f - 104\*g)\*log(abs(x + 2)) - 1/36\*(7\*d - 13\*e + 19\*f - 25\*g)\*log(abs(x + 1)) - 1/36\*(d + e + f + g)\*log(abs(x - 1)) + 1/144\*(d + 2\*e + 4\*f + 8\*g)\*log(abs(x - 2)) - 1/12\*((3\*d - 4\*e + 6\*f - 10\*g)\*x + 5\*d - 6\*e + 8\*f - 12\*g)/((x + 2)\*(x + 1))

## Mupad [B] (verification not implemented)

Time = 7.98 (sec) , antiderivative size = 115, normalized size of antiderivative = 0.98

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3)}{(4 - 5x^2 + x^4)^2} dx = \ln(x - 2) \left( \frac{d}{144} + \frac{e}{72} + \frac{f}{36} + \frac{g}{18} \right)$$

$$- \ln(x + 1) \left( \frac{7d}{36} - \frac{13e}{36} + \frac{19f}{36} - \frac{25g}{36} \right)$$

$$- \ln(x - 1) \left( \frac{d}{36} + \frac{e}{36} + \frac{f}{36} + \frac{g}{36} \right)$$

$$+ \ln(x + 2) \left( \frac{31d}{144} - \frac{25e}{72} + \frac{19f}{36} - \frac{13g}{18} \right)$$

$$- \frac{\frac{5d}{12} - \frac{e}{2} + \frac{2f}{3} - g + x \left( \frac{d}{4} - \frac{e}{3} + \frac{f}{2} - \frac{5g}{6} \right)}{x^2 + 3x + 2}$$

```
[In] int(((x^2 - 3*x + 2)*(d + e*x + f*x^2 + g*x^3))/(x^4 - 5*x^2 + 4)^2,x)
```

```
[Out] log(x - 2)*(d/144 + e/72 + f/36 + g/18) - log(x + 1)*((7*d)/36 - (13*e)/36  
+ (19*f)/36 - (25*g)/36) - log(x - 1)*(d/36 + e/36 + f/36 + g/36) + log(x +  
2)*((31*d)/144 - (25*e)/72 + (19*f)/36 - (13*g)/18) - ((5*d)/12 - e/2 + (2  
*f)/3 - g + x*(d/4 - e/3 + f/2 - (5*g)/6))/(3*x + x^2 + 2)
```

$$3.95 \quad \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx$$

Optimal result . . . . .	1087
Rubi [A] (verified) . . . . .	1087
Mathematica [A] (verified) . . . . .	1089
Maple [A] (verified) . . . . .	1089
Fricas [B] (verification not implemented) . . . . .	1090
Sympy [F(-1)] . . . . .	1090
Maxima [A] (verification not implemented) . . . . .	1090
Giac [A] (verification not implemented) . . . . .	1091
Mupad [B] (verification not implemented) . . . . .	1092

### Optimal result

Integrand size = 41, antiderivative size = 131

$$\begin{aligned} & \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx \\ &= -\frac{d-e+f-g+h}{6(1+x)} - \frac{d-2e+4f-8g+16h}{12(2+x)} - \frac{1}{36}(d+e+f+g+h)\log(1-x) \\ & \quad + \frac{1}{144}(d+2e+4f+8g+16h)\log(2-x) - \frac{1}{36}(7d-13e+19f-25g+31h)\log(1+x) \\ & \quad + \frac{1}{144}(31d-50e+76f-104g+112h)\log(2+x) \end{aligned}$$

[Out] 1/6\*(-d+e-f+g-h)/(1+x)+1/12\*(-d+2\*e-4\*f+8\*g-16\*h)/(2+x)-1/36\*(d+e+f+g+h)\*ln(1-x)+1/144\*(d+2\*e+4\*f+8\*g+16\*h)\*ln(2-x)-1/36\*(7\*d-13\*e+19\*f-25\*g+31\*h)\*ln(1+x)+1/144\*(31\*d-50\*e+76\*f-104\*g+112\*h)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.20 (sec) , antiderivative size = 131, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.049$ , Rules used = {1600, 6860}

$$\begin{aligned} & \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx \\ &= -\frac{d-e+f-g+h}{6(x+1)} - \frac{d-2e+4f-8g+16h}{12(x+2)} - \frac{1}{36}\log(1-x)(d+e+f+g+h) \\ & \quad + \frac{1}{144}\log(2-x)(d+2e+4f+8g+16h) - \frac{1}{36}\log(x+1)(7d-13e+19f-25g+31h) \\ & \quad + \frac{1}{144}\log(x+2)(31d-50e+76f-104g+112h) \end{aligned}$$

[In] Int[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4))/(4 - 5\*x^2 + x^4)^2, x]

[Out] -1/6\*(d - e + f - g + h)/(1 + x) - (d - 2\*e + 4\*f - 8\*g + 16\*h)/(12\*(2 + x)) - ((d + e + f + g + h)\*Log[1 - x])/36 + ((d + 2\*e + 4\*f + 8\*g + 16\*h)\*Log[2 - x])/144 - ((7\*d - 13\*e + 19\*f - 25\*g + 31\*h)\*Log[1 + x])/36 + ((31\*d - 50\*e + 76\*f - 104\*g + 112\*h)\*Log[2 + x])/144

Rule 1600

Int[(u\_)\*(Px\_)^(p\_)\*(Qx\_)^(q\_), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rule 6860

Int[(u\_)/((a\_.) + (b\_.)\*(x\_)^(n\_.) + (c\_.)\*(x\_)^(n2\_.)), x\_Symbol] := With[{v = RationalFunctionExpand[u/(a + b\*x^n + c\*x^(2\*n)), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b, c}, x] && EqQ[n2, 2\*n] && IGtQ[n, 0]

Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{d + ex + fx^2 + gx^3 + hx^4}{(2 - 3x + x^2)(2 + 3x + x^2)^2} dx \\
 &= \int \left( \frac{d + 2e + 4f + 8g + 16h}{144(-2 + x)} + \frac{-d - e - f - g - h}{36(-1 + x)} + \frac{d - e + f - g + h}{6(1 + x)^2} \right. \\
 &\quad \left. + \frac{-7d + 13e - 19f + 25g - 31h}{36(1 + x)} + \frac{d - 2e + 4f - 8g + 16h}{12(2 + x)^2} + \frac{31d - 50e + 76f - 104g + 112h}{144(2 + x)} \right) dx \\
 &= -\frac{d - e + f - g + h}{6(1 + x)} - \frac{d - 2e + 4f - 8g + 16h}{12(2 + x)} - \frac{1}{36}(d + e + f + g + h) \log(1 - x) \\
 &\quad + \frac{1}{144}(d + 2e + 4f + 8g + 16h) \log(2 - x) - \frac{1}{36}(7d - 13e + 19f - 25g + 31h) \log(1 + x) \\
 &\quad + \frac{1}{144}(31d - 50e + 76f - 104g + 112h) \log(2 + x)
 \end{aligned}$$



**Mathematica [A] (verified)**

Time = 0.06 (sec) , antiderivative size = 136, normalized size of antiderivative = 1.04

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{144} \left( -\frac{12(d(5 + 3x) + 2(4f - 6g + 10h + 3fx - 5gx + 9hx - e(3 + 2x)))}{2 + 3x + x^2} \right. \\ \left. - 4(d + e + f + g + h) \log(1 - x) + (d + 2(e + 2f + 4g + 8h)) \log(2 - x) \right. \\ \left. - 4(7d - 13e + 19f - 25g + 31h) \log(1 + x) + (31d - 50e + 76f - 104g + 112h) \log(2 + x) \right)$$

[In] Integrate[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4))/(4 - 5\*x^2 + x^4)^2,x]

[Out] ((-12\*(d\*(5 + 3\*x) + 2\*(4\*f - 6\*g + 10\*h + 3\*f\*x - 5\*g\*x + 9\*h\*x - e\*(3 + 2\*x))))/(2 + 3\*x + x^2) - 4\*(d + e + f + g + h)\*Log[1 - x] + (d + 2\*(e + 2\*f + 4\*g + 8\*h))\*Log[2 - x] - 4\*(7\*d - 13\*e + 19\*f - 25\*g + 31\*h)\*Log[1 + x] + (31\*d - 50\*e + 76\*f - 104\*g + 112\*h)\*Log[2 + x])/144

**Maple [A] (verified)**

Time = 0.12 (sec) , antiderivative size = 132, normalized size of antiderivative = 1.01

method	result
default	$-\frac{\frac{d}{12} - \frac{e}{6} + \frac{f}{3} - \frac{2g}{3} + \frac{4h}{3}}{x+2} + \left(\frac{31d}{144} - \frac{25e}{72} + \frac{19f}{36} - \frac{13g}{18} + \frac{7h}{9}\right) \ln(x+2) + \left(-\frac{7d}{36} + \frac{13e}{36} - \frac{19f}{36} + \frac{25g}{36} - \frac{31h}{36}\right)$
norman	$\frac{\left(-\frac{d}{4} + \frac{e}{3} - \frac{f}{2} + \frac{5g}{6} - \frac{3h}{2}\right)x^3 + \left(\frac{3d}{4} - \frac{5e}{6} + f - \frac{4g}{3} + 2h\right)x + \left(\frac{d}{3} - \frac{e}{2} + \frac{5f}{6} - \frac{3g}{2} + \frac{17h}{6}\right)x^2 - \frac{5d}{6} + e + 2g - \frac{10h}{3} - \frac{4f}{3}}{x^4 - 5x^2 + 4} + \left(-\frac{7d}{36} + \frac{13e}{36} - \frac{19f}{36} + \frac{25g}{36} - \frac{31h}{36}\right)$
risch	$\frac{\left(-\frac{d}{4} + \frac{e}{3} - \frac{f}{2} + \frac{5g}{6} - \frac{3h}{2}\right)x - \frac{5d}{12} + \frac{e}{2} - \frac{2f}{3} + g - \frac{5h}{3}}{x^2 + 3x + 2} + \frac{31 \ln(x+2)d}{144} - \frac{25 \ln(x+2)e}{72} + \frac{19 \ln(x+2)f}{36} - \frac{13 \ln(x+2)g}{18} + \frac{7 \ln(x+2)h}{9}$
parallelrisch	$-\frac{96f + 144g + 120gx - 60d - 240h + 72e + 48 \ln(x-2)xh - 12 \ln(x-1)xh - 372 \ln(x+1)xh + 336 \ln(x+2)xh - 36dx + 2 \ln(x-2)d + 4 \ln(x+2)d}{144}$

[In] int((x^2-3\*x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x,method=\_RETURNV ERBOSE)

[Out] -(1/12\*d-1/6\*e+1/3\*f-2/3\*g+4/3\*h)/(x+2)+(31/144\*d-25/72\*e+19/36\*f-13/18\*g+7/9\*h)\*ln(x+2)+(-7/36\*d+13/36\*e-19/36\*f+25/36\*g-31/36\*h)\*ln(x+1)-(1/6\*d-1/6\*e+1/6\*f-1/6\*g+1/6\*h)/(x+1)+(-1/36\*d-1/36\*e-1/36\*f-1/36\*g-1/36\*h)\*ln(x-1)+(1/144\*d+1/72\*e+1/36\*f+1/18\*g+1/9\*h)\*ln(x-2)

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 267 vs. 2(119) = 238.

Time = 3.52 (sec) , antiderivative size = 267, normalized size of antiderivative = 2.04

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{(4 - 5x^2 + x^4)^2} dx =$$


---


$$\frac{12(3d - 4e + 6f - 10g + 18h)x - ((31d - 50e + 76f - 104g + 112h)x^2 + 3(31d - 50e + 76f - 104g + 112h)x + 62d - 100e + 152f - 208g + 224h)\log(x + 2) + 4((7d - 13e + 19f - 25g + 31h)x^2 + 3(7d - 13e + 19f - 25g + 31h)x + 14d - 26e + 38f - 50g + 62h)\log(x + 1) + 4((d + e + f + g + h)x^2 + 3(d + e + f + g + h)x + 2d + 2e + 2f + 2g + 2h)\log(x - 1) - ((d + 2e + 4f + 8g + 16h)x^2 + 3(d + 2e + 4f + 8g + 16h)x + 2d + 4e + 8f + 16g + 32h)\log(x - 2) + 60d - 72e + 96f - 144g + 240h}{12(x^2 + 3x + 2)}$$

[In] integrate((x^2-3\*x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm m="fricas")

[Out] -1/144\*(12\*(3\*d - 4\*e + 6\*f - 10\*g + 18\*h)\*x - ((31\*d - 50\*e + 76\*f - 104\*g + 112\*h)\*x^2 + 3\*(31\*d - 50\*e + 76\*f - 104\*g + 112\*h)\*x + 62\*d - 100\*e + 152\*f - 208\*g + 224\*h)\*log(x + 2) + 4\*((7\*d - 13\*e + 19\*f - 25\*g + 31\*h)\*x^2 + 3\*(7\*d - 13\*e + 19\*f - 25\*g + 31\*h)\*x + 14\*d - 26\*e + 38\*f - 50\*g + 62\*h)\*log(x + 1) + 4\*((d + e + f + g + h)\*x^2 + 3\*(d + e + f + g + h)\*x + 2\*d + 2\*e + 2\*f + 2\*g + 2\*h)\*log(x - 1) - ((d + 2\*e + 4\*f + 8\*g + 16\*h)\*x^2 + 3\*(d + 2\*e + 4\*f + 8\*g + 16\*h)\*x + 2\*d + 4\*e + 8\*f + 16\*g + 32\*h)\*log(x - 2) + 60\*d - 72\*e + 96\*f - 144\*g + 240\*h)/(x^2 + 3\*x + 2)

**Sympy [F(-1)]**

Timed out.

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

[In] integrate((x\*\*2-3\*x+2)\*(h\*x\*\*4+g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 123, normalized size of antiderivative = 0.94

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{144} (31d - 50e + 76f - 104g + 112h) \log(x + 2)$$

$$- \frac{1}{36} (7d - 13e + 19f - 25g + 31h) \log(x + 1)$$

$$- \frac{1}{36} (d + e + f + g + h) \log(x - 1) + \frac{1}{144} (d + 2e + 4f + 8g + 16h) \log(x - 2)$$

$$- \frac{(3d - 4e + 6f - 10g + 18h)x + 5d - 6e + 8f - 12g + 20h}{12(x^2 + 3x + 2)}$$

[In] integrate((x^2-3\*x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm m="maxima")

[Out] 1/144\*(31\*d - 50\*e + 76\*f - 104\*g + 112\*h)\*log(x + 2) - 1/36\*(7\*d - 13\*e + 19\*f - 25\*g + 31\*h)\*log(x + 1) - 1/36\*(d + e + f + g + h)\*log(x - 1) + 1/144\*(d + 2\*e + 4\*f + 8\*g + 16\*h)\*log(x - 2) - 1/12\*((3\*d - 4\*e + 6\*f - 10\*g + 18\*h)\*x + 5\*d - 6\*e + 8\*f - 12\*g + 20\*h)/(x^2 + 3\*x + 2)

## Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 127, normalized size of antiderivative = 0.97

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{144} (31d - 50e + 76f - 104g + 112h) \log(|x + 2|)$$

$$- \frac{1}{36} (7d - 13e + 19f - 25g + 31h) \log(|x + 1|)$$

$$- \frac{1}{36} (d + e + f + g + h) \log(|x - 1|) + \frac{1}{144} (d + 2e + 4f + 8g + 16h) \log(|x - 2|)$$

$$- \frac{(3d - 4e + 6f - 10g + 18h)x + 5d - 6e + 8f - 12g + 20h}{12(x + 2)(x + 1)}$$

[In] integrate((x^2-3\*x+2)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm m="giac")

[Out] 1/144\*(31\*d - 50\*e + 76\*f - 104\*g + 112\*h)\*log(abs(x + 2)) - 1/36\*(7\*d - 13\*e + 19\*f - 25\*g + 31\*h)\*log(abs(x + 1)) - 1/36\*(d + e + f + g + h)\*log(abs(x - 1)) + 1/144\*(d + 2\*e + 4\*f + 8\*g + 16\*h)\*log(abs(x - 2)) - 1/12\*((3\*d - 4\*e + 6\*f - 10\*g + 18\*h)\*x + 5\*d - 6\*e + 8\*f - 12\*g + 20\*h)/((x + 2)\*(x + 1))

**Mupad [B] (verification not implemented)**

Time = 8.24 (sec) , antiderivative size = 133, normalized size of antiderivative = 1.02

$$\begin{aligned}
& \int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4)}{(4 - 5x^2 + x^4)^2} dx \\
&= \ln(x - 2) \left( \frac{d}{144} + \frac{e}{72} + \frac{f}{36} + \frac{g}{18} + \frac{h}{9} \right) - \ln(x - 1) \left( \frac{d}{36} + \frac{e}{36} + \frac{f}{36} + \frac{g}{36} + \frac{h}{36} \right) \\
&\quad - \ln(x + 1) \left( \frac{7d}{36} - \frac{13e}{36} + \frac{19f}{36} - \frac{25g}{36} + \frac{31h}{36} \right) \\
&\quad - \frac{\frac{5d}{12} - \frac{e}{2} + \frac{2f}{3} - g + \frac{5h}{3} + x \left( \frac{d}{4} - \frac{e}{3} + \frac{f}{2} - \frac{5g}{6} + \frac{3h}{2} \right)}{x^2 + 3x + 2} \\
&\quad + \ln(x + 2) \left( \frac{31d}{144} - \frac{25e}{72} + \frac{19f}{36} - \frac{13g}{18} + \frac{7h}{9} \right)
\end{aligned}$$

```
[In] int(((x^2 - 3*x + 2)*(d + e*x + f*x^2 + g*x^3 + h*x^4))/(x^4 - 5*x^2 + 4)^2, x)
```

```
[Out] log(x - 2)*(d/144 + e/72 + f/36 + g/18 + h/9) - log(x - 1)*(d/36 + e/36 + f/36 + g/36 + h/36) - log(x + 1)*((7*d)/36 - (13*e)/36 + (19*f)/36 - (25*g)/36 + (31*h)/36) - ((5*d)/12 - e/2 + (2*f)/3 - g + (5*h)/3 + x*(d/4 - e/3 + f/2 - (5*g)/6 + (3*h)/2))/(3*x + x^2 + 2) + log(x + 2)*((31*d)/144 - (25*e)/72 + (19*f)/36 - (13*g)/18 + (7*h)/9)
```

$$3.96 \quad \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx$$

Optimal result . . . . .	1093
Rubi [A] (verified) . . . . .	1093
Mathematica [A] (verified) . . . . .	1095
Maple [A] (verified) . . . . .	1095
Fricas [B] (verification not implemented) . . . . .	1096
Sympy [F(-1)] . . . . .	1096
Maxima [A] (verification not implemented) . . . . .	1097
Giac [A] (verification not implemented) . . . . .	1097
Mupad [B] (verification not implemented) . . . . .	1098

### Optimal result

Integrand size = 46, antiderivative size = 147

$$\begin{aligned} & \int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx \\ &= -\frac{d-e+f-g+h-i}{6(1+x)} - \frac{d-2e+4f-8g+16h-32i}{12(2+x)} \\ & \quad - \frac{1}{36}(d+e+f+g+h+i)\log(1-x) + \frac{1}{144}(d+2e+4f+8g+16h+32i)\log(2-x) \\ & \quad - \frac{1}{36}(7d-13e+19f-25g+31h-37i)\log(1+x) \\ & \quad + \frac{1}{144}(31d-50e+76f-104g+112h-32i)\log(2+x) \end{aligned}$$

[Out] 1/6\*(-d+e-f+g-h+i)/(1+x)+1/12\*(-d+2\*e-4\*f+8\*g-16\*h+32\*i)/(2+x)-1/36\*(d+e+f+g+h+i)\*ln(1-x)+1/144\*(d+2\*e+4\*f+8\*g+16\*h+32\*i)\*ln(2-x)-1/36\*(7\*d-13\*e+19\*f-25\*g+31\*h-37\*i)\*ln(1+x)+1/144\*(31\*d-50\*e+76\*f-104\*g+112\*h-32\*i)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.21 (sec) , antiderivative size = 147, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.043$ , Rules used

= {1600, 6860}

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{(4 - 5x^2 + x^4)^2} dx$$

$$= -\frac{d - 2e + 4f - 8g + 16h - 32i}{12(x + 2)} - \frac{d - e + f - g + h - i}{6(x + 1)}$$

$$- \frac{1}{36} \log(1 - x)(d + e + f + g + h + i) + \frac{1}{144} \log(2 - x)(d + 2e + 4f + 8g + 16h + 32i)$$

$$- \frac{1}{36} \log(x + 1)(7d - 13e + 19f - 25g + 31h - 37i)$$

$$+ \frac{1}{144} \log(x + 2)(31d - 50e + 76f - 104g + 112h - 32i)$$

[In] Int[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5))/(4 - 5\*x^2 + x^4)^2,x]

[Out] -1/6\*(d - e + f - g + h - i)/(1 + x) - (d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)/(12\*(2 + x)) - ((d + e + f + g + h + i)\*Log[1 - x])/36 + ((d + 2\*e + 4\*f + 8\*g + 16\*h + 32\*i)\*Log[2 - x])/144 - ((7\*d - 13\*e + 19\*f - 25\*g + 31\*h - 37\*i)\*Log[1 + x])/36 + ((31\*d - 50\*e + 76\*f - 104\*g + 112\*h - 32\*i)\*Log[2 + x])/144

#### Rule 1600

Int[(u\_)\*(Px\_)^(p\_)\*(Qx\_)^(q\_), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

#### Rule 6860

Int[(u\_)/((a\_.) + (b\_.)\*(x\_)^(n\_.) + (c\_.)\*(x\_)^(n2\_.)), x\_Symbol] := With[{v = RationalFunctionExpand[u/(a + b\*x^n + c\*x^(2\*n)), x]}, Int[v, x] /; SumQ[v]] /; FreeQ[{a, b, c}, x] && EqQ[n2, 2\*n] && IGtQ[n, 0]

#### Rubi steps

$$\text{integral} = \int \frac{d + ex + fx^2 + gx^3 + hx^4 + ix^5}{(2 - 3x + x^2)(2 + 3x + x^2)^2} dx$$

$$= \int \left( \frac{d + 2e + 4f + 8g + 16h + 32i}{144(-2 + x)} + \frac{-d - e - f - g - h - i}{36(-1 + x)} \right.$$

$$\left. + \frac{d - e + f - g + h - i}{6(1 + x)^2} + \frac{-7d + 13e - 19f + 25g - 31h + 37i}{36(1 + x)} \right.$$

$$\left. + \frac{d - 2e + 4f - 8g + 16h - 32i}{12(2 + x)^2} + \frac{31d - 50e + 76f - 104g + 112h - 32i}{144(2 + x)} \right) dx$$

$$\begin{aligned}
&= -\frac{d-e+f-g+h-i}{6(1+x)} - \frac{d-2e+4f-8g+16h-32i}{12(2+x)} \\
&\quad - \frac{1}{36}(d+e+f+g+h+i)\log(1-x) + \frac{1}{144}(d+2e+4f+8g+16h+32i)\log(2-x) \\
&\quad - \frac{1}{36}(7d-13e+19f-25g+31h-37i)\log(1+x) \\
&\quad + \frac{1}{144}(31d-50e+76f-104g+112h-32i)\log(2+x)
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.06 (sec) , antiderivative size = 153, normalized size of antiderivative = 1.04

$$\begin{aligned}
&\int \frac{(2-3x+x^2)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx \\
&= \frac{1}{144} \left( \frac{12(-d(5+3x)+2(-4f+6g-10h+18i-3fx+5gx-9hx+17ix+e(3+2x)))}{2+3x+x^2} \right. \\
&\quad \left. - 4(d+e+f+g+h+i)\log(1-x) + (d+2e+4(f+2g+4h+8i))\log(2-x) \right. \\
&\quad \left. + 4(-7d+13e-19f+25g-31h+37i)\log(1+x) \right. \\
&\quad \left. + (31d-50e+76f-104g+112h-32i)\log(2+x) \right)
\end{aligned}$$

[In] Integrate[((2 - 3\*x + x^2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5))/(4 - 5\*x^2 + x^4)^2,x]

[Out] ((12\*(-(d\*(5 + 3\*x)) + 2\*(-4\*f + 6\*g - 10\*h + 18\*i - 3\*f\*x + 5\*g\*x - 9\*h\*x + 17\*i\*x + e\*(3 + 2\*x))))/(2 + 3\*x + x^2) - 4\*(d + e + f + g + h + i)\*Log[1 - x] + (d + 2\*e + 4\*(f + 2\*g + 4\*h + 8\*i))\*Log[2 - x] + 4\*(-7\*d + 13\*e - 19\*f + 25\*g - 31\*h + 37\*i)\*Log[1 + x] + (31\*d - 50\*e + 76\*f - 104\*g + 112\*h - 32\*i)\*Log[2 + x])/144

### Maple [A] (verified)

Time = 0.12 (sec) , antiderivative size = 150, normalized size of antiderivative = 1.02

method	result
default	$-\frac{\frac{d}{12} - \frac{e}{6} + \frac{f}{3} - \frac{2g}{3} + \frac{4h}{3} - \frac{8i}{3}}{x+2} + \left(\frac{31d}{144} - \frac{25e}{72} + \frac{19f}{36} - \frac{13g}{18} - \frac{2i}{9} + \frac{7h}{9}\right) \ln(x+2) + \left(-\frac{7d}{36} + \frac{13e}{36} - \frac{19f}{36} + \frac{25g}{36} - \frac{2i}{9} + \frac{7h}{9}\right) \ln(2-x)$
norman	$\left(-\frac{d}{4} + \frac{e}{3} - \frac{f}{2} + \frac{5g}{6} - \frac{3h}{2} + \frac{17i}{6}\right)x^3 + \left(\frac{3d}{4} - \frac{5e}{6} + f - \frac{4g}{3} + 2h - \frac{10i}{3}\right)x + \left(\frac{d}{3} - \frac{e}{2} + \frac{5f}{6} - \frac{3g}{2} + \frac{17h}{6} - \frac{11i}{2}\right)x^2 + 6i - \frac{5d}{6} + e + 2g - \frac{10h}{3} - \frac{4f}{3}$
risch	$\frac{25 \ln(-x-1)g}{36} - \frac{\ln(x-1)d}{36} - \frac{\ln(x-1)e}{36} + \frac{19 \ln(x+2)f}{36} - \frac{31 \ln(-x-1)h}{36} + \frac{\ln(2-x)f}{36} + \frac{\ln(2-x)d}{144} + \frac{\ln(2-x)e}{72} + \frac{31 \ln(x+2)g}{144} - \frac{25 \ln(-x-1)h}{72} + \frac{19 \ln(x+2)i}{72} - \frac{13 \ln(-x-1)h}{72} - \frac{2 \ln(-x-1)i}{9} + \frac{7 \ln(x+2)h}{9}$
parallelrisch	$432i - 96f + 144g - 96 \ln(x+2)xi + 96 \ln(x-2)xi + 120gx - 60d - 240h + 72e + 48 \ln(x-2)xh - 12 \ln(x-1)xh - 372 \ln(x+1)xh + 336 \ln(x+2)xh$

```
[In] int((x^2-3*x+2)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x,method=_R
ETURNVERBOSE)
```

```
[Out] -(1/12*d-1/6*e+1/3*f-2/3*g+4/3*h-8/3*i)/(x+2)+(31/144*d-25/72*e+19/36*f-13/
18*g-2/9*i+7/9*h)*ln(x+2)+(-7/36*d+13/36*e-19/36*f+25/36*g-31/36*h+37/36*i)
*ln(x+1)-(1/6*d-1/6*e+1/6*f-1/6*g+1/6*h-1/6*i)/(x+1)+(-1/36*d-1/36*e-1/36*f
-1/36*g-1/36*h-1/36*i)*ln(x-1)+(1/144*d+1/72*e+1/36*f+1/18*g+1/9*h+2/9*i)*l
n(x-2)
```

## Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 305 vs.  $2(135) = 270$ .

Time = 21.46 (sec) , antiderivative size = 305, normalized size of antiderivative = 2.07

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{(4 - 5x^2 + x^4)^2} dx =$$


---


$$\frac{12(3d - 4e + 6f - 10g + 18h - 34i)x - ((31d - 50e + 76f - 104g + 112h - 32i)x^2 + 3(31d - 50e + 76f - 104g + 112h - 32i)x + 62d - 100e + 152f - 208g + 224h - 64i)\log(x + 2) + 4((7d - 13e + 19f - 25g + 31h - 37i)x^2 + 3(7d - 13e + 19f - 25g + 31h - 37i)x + 14d - 26e + 38f - 50g + 62h - 74i)\log(x + 1) + 4((d + e + f + g + h + i)x^2 + 3(d + e + f + g + h + i)x + 2d + 2e + 2f + 2g + 2h + 2i)\log(x - 1) - ((d + 2e + 4f + 8g + 16h + 32i)x^2 + 3(d + 2e + 4f + 8g + 16h + 32i)x + 2d + 4e + 8f + 16g + 32h + 64i)\log(x - 2) + 60d - 72e + 96f - 144g + 240h - 432i}{(x^2 + 3x + 2)}$$

```
[In] integrate((x^2-3*x+2)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x, al
gorithm="fricas")
```

```
[Out] -1/144*(12*(3*d - 4*e + 6*f - 10*g + 18*h - 34*i)*x - ((31*d - 50*e + 76*f
- 104*g + 112*h - 32*i)*x^2 + 3*(31*d - 50*e + 76*f - 104*g + 112*h - 32*i)
*x + 62*d - 100*e + 152*f - 208*g + 224*h - 64*i)*log(x + 2) + 4*((7*d - 13
*e + 19*f - 25*g + 31*h - 37*i)*x^2 + 3*(7*d - 13*e + 19*f - 25*g + 31*h -
37*i)*x + 14*d - 26*e + 38*f - 50*g + 62*h - 74*i)*log(x + 1) + 4*((d + e +
f + g + h + i)*x^2 + 3*(d + e + f + g + h + i)*x + 2*d + 2*e + 2*f + 2*g +
2*h + 2*i)*log(x - 1) - ((d + 2*e + 4*f + 8*g + 16*h + 32*i)*x^2 + 3*(d +
2*e + 4*f + 8*g + 16*h + 32*i)*x + 2*d + 4*e + 8*f + 16*g + 32*h + 64*i)*lo
g(x - 2) + 60*d - 72*e + 96*f - 144*g + 240*h - 432*i)/(x^2 + 3*x + 2)
```

## Sympy [F(-1)]

Timed out.

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{(4 - 5x^2 + x^4)^2} dx = \text{Timed out}$$

```
[In] integrate((x**2-3*x+2)*(i*x**5+h*x**4+g*x**3+f*x**2+e*x+d)/(x**4-5*x**2+4)*
*2,x)
```

```
[Out] Timed out
```



**Maxima [A] (verification not implemented)**

none

Time = 0.20 (sec) , antiderivative size = 139, normalized size of antiderivative = 0.95

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{144} (31d - 50e + 76f - 104g + 112h - 32i) \log(x + 2)$$

$$- \frac{1}{36} (7d - 13e + 19f - 25g + 31h - 37i) \log(x + 1)$$

$$- \frac{1}{36} (d + e + f + g + h + i) \log(x - 1)$$

$$+ \frac{1}{144} (d + 2e + 4f + 8g + 16h + 32i) \log(x - 2)$$

$$- \frac{(3d - 4e + 6f - 10g + 18h - 34i)x + 5d - 6e + 8f - 12g + 20h - 36i}{12(x^2 + 3x + 2)}$$

[In] integrate((x^2-3\*x+2)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] 1/144\*(31\*d - 50\*e + 76\*f - 104\*g + 112\*h - 32\*i)\*log(x + 2) - 1/36\*(7\*d - 13\*e + 19\*f - 25\*g + 31\*h - 37\*i)\*log(x + 1) - 1/36\*(d + e + f + g + h + i)\*log(x - 1) + 1/144\*(d + 2\*e + 4\*f + 8\*g + 16\*h + 32\*i)\*log(x - 2) - 1/12\*((3\*d - 4\*e + 6\*f - 10\*g + 18\*h - 34\*i)\*x + 5\*d - 6\*e + 8\*f - 12\*g + 20\*h - 36\*i)/(x^2 + 3\*x + 2)

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 143, normalized size of antiderivative = 0.97

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{(4 - 5x^2 + x^4)^2} dx$$

$$= \frac{1}{144} (31d - 50e + 76f - 104g + 112h - 32i) \log(|x + 2|)$$

$$- \frac{1}{36} (7d - 13e + 19f - 25g + 31h - 37i) \log(|x + 1|)$$

$$- \frac{1}{36} (d + e + f + g + h + i) \log(|x - 1|)$$

$$+ \frac{1}{144} (d + 2e + 4f + 8g + 16h + 32i) \log(|x - 2|)$$

$$- \frac{(3d - 4e + 6f - 10g + 18h - 34i)x + 5d - 6e + 8f - 12g + 20h - 36i}{12(x + 2)(x + 1)}$$

[In] integrate((x^2-3\*x+2)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] 1/144\*(31\*d - 50\*e + 76\*f - 104\*g + 112\*h - 32\*i)\*log(abs(x + 2)) - 1/36\*(7\*d - 13\*e + 19\*f - 25\*g + 31\*h - 37\*i)\*log(abs(x + 1)) - 1/36\*(d + e + f + g + h + i)\*log(abs(x - 1)) + 1/144\*(d + 2\*e + 4\*f + 8\*g + 16\*h + 32\*i)\*log(abs(x - 2)) - 1/12\*((3\*d - 4\*e + 6\*f - 10\*g + 18\*h - 34\*i)\*x + 5\*d - 6\*e + 8\*f - 12\*g + 20\*h - 36\*i)/((x + 2)\*(x + 1))

## Mupad [B] (verification not implemented)

Time = 8.67 (sec) , antiderivative size = 151, normalized size of antiderivative = 1.03

$$\int \frac{(2 - 3x + x^2)(d + ex + fx^2 + gx^3 + hx^4 + ix^5)}{(4 - 5x^2 + x^4)^2} dx$$

$$= \ln(x - 2) \left( \frac{d}{144} + \frac{e}{72} + \frac{f}{36} + \frac{g}{18} + \frac{h}{9} + \frac{2i}{9} \right) - \ln(x - 1) \left( \frac{d}{36} + \frac{e}{36} + \frac{f}{36} + \frac{g}{36} + \frac{h}{36} + \frac{i}{36} \right)$$

$$- \ln(x + 1) \left( \frac{7d}{36} - \frac{13e}{36} + \frac{19f}{36} - \frac{25g}{36} + \frac{31h}{36} - \frac{37i}{36} \right)$$

$$+ \ln(x + 2) \left( \frac{31d}{144} - \frac{25e}{72} + \frac{19f}{36} - \frac{13g}{18} + \frac{7h}{9} - \frac{2i}{9} \right)$$

$$- \frac{\frac{5d}{12} - \frac{e}{2} + \frac{2f}{3} - g + \frac{5h}{3} - 3i + x \left( \frac{d}{4} - \frac{e}{3} + \frac{f}{2} - \frac{5g}{6} + \frac{3h}{2} - \frac{17i}{6} \right)}{x^2 + 3x + 2}$$

[In] int(((x^2 - 3\*x + 2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5))/(x^4 - 5\*x^2 + 4)^2,x)

[Out] log(x - 2)\*(d/144 + e/72 + f/36 + g/18 + h/9 + (2\*i)/9) - log(x - 1)\*(d/36 + e/36 + f/36 + g/36 + h/36 + i/36) - log(x + 1)\*((7\*d)/36 - (13\*e)/36 + (19\*f)/36 - (25\*g)/36 + (31\*h)/36 - (37\*i)/36) + log(x + 2)\*((31\*d)/144 - (25\*e)/72 + (19\*f)/36 - (13\*g)/18 + (7\*h)/9 - (2\*i)/9) - ((5\*d)/12 - e/2 + (2\*f)/3 - g + (5\*h)/3 - 3\*i + x\*(d/4 - e/3 + f/2 - (5\*g)/6 + (3\*h)/2 - (17\*i)/6))/(3\*x + x^2 + 2)

### 3.97 $\int \frac{2+x}{(4-5x^2+x^4)^2} dx$

Optimal result	1099
Rubi [A] (verified)	1099
Mathematica [A] (verified)	1100
Maple [A] (verified)	1101
Fricas [B] (verification not implemented)	1101
Sympy [A] (verification not implemented)	1101
Maxima [A] (verification not implemented)	1102
Giac [A] (verification not implemented)	1102
Mupad [B] (verification not implemented)	1102

#### Optimal result

Integrand size = 16, antiderivative size = 68

$$\int \frac{2+x}{(4-5x^2+x^4)^2} dx = \frac{1}{12(1-x)} + \frac{1}{36(2-x)} - \frac{1}{36(1+x)} + \frac{1}{18} \log(1-x) - \frac{35}{432} \log(2-x) + \frac{1}{54} \log(1+x) + \frac{1}{144} \log(2+x)$$

[Out] 1/12/(1-x)+1/36/(2-x)-1/36/(1+x)+1/18\*ln(1-x)-35/432\*ln(2-x)+1/54\*ln(1+x)+1/144\*ln(2+x)

#### Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 68, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.125$ , Rules used = {1600, 2099}

$$\int \frac{2+x}{(4-5x^2+x^4)^2} dx = \frac{1}{12(1-x)} + \frac{1}{36(2-x)} - \frac{1}{36(x+1)} + \frac{1}{18} \log(1-x) - \frac{35}{432} \log(2-x) + \frac{1}{54} \log(x+1) + \frac{1}{144} \log(x+2)$$

[In] Int[(2 + x)/(4 - 5\*x^2 + x^4)^2,x]

[Out] 1/(12\*(1 - x)) + 1/(36\*(2 - x)) - 1/(36\*(1 + x)) + Log[1 - x]/18 - (35\*Log[2 - x])/432 + Log[1 + x]/54 + Log[2 + x]/144

Rule 1600

Int[(u\_.)\*(Px\_)^(p\_.)\*(Qx\_)^(q\_.), x\_Symbol] :> Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] &&

EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

### Rule 2099

Int[(P\_)^(p\_)\*(Q\_)^(q\_.), x\_Symbol] :> With[{PP = Factor[P]}, Int[ExpandIntegrand[PP^p\*Q^q, x], x] /; !SumQ[NonfreeFactors[PP, x]] /; FreeQ[q, x] && PolyQ[P, x] && PolyQ[Q, x] && IntegerQ[p] && NeQ[P, x]

### Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{1}{(2+x)(2-x-2x^2+x^3)^2} dx \\ &= \int \left( \frac{1}{36(-2+x)^2} - \frac{35}{432(-2+x)} + \frac{1}{12(-1+x)^2} + \frac{1}{18(-1+x)} + \frac{1}{36(1+x)^2} \right. \\ &\quad \left. + \frac{1}{54(1+x)} + \frac{1}{144(2+x)} \right) dx \\ &= \frac{1}{12(1-x)} + \frac{1}{36(2-x)} - \frac{1}{36(1+x)} + \frac{1}{18} \log(1-x) \\ &\quad - \frac{35}{432} \log(2-x) + \frac{1}{54} \log(1+x) + \frac{1}{144} \log(2+x) \end{aligned}$$

### Mathematica [A] (verified)

Time = 0.02 (sec) , antiderivative size = 60, normalized size of antiderivative = 0.88

$$\int \frac{2+x}{(4-5x^2+x^4)^2} dx = \frac{1}{432} \left( \frac{12(5+6x-5x^2)}{2-x-2x^2+x^3} + 24 \log(1-x) - 35 \log(2-x) \right. \\ \left. + 8 \log(1+x) + 3 \log(2+x) \right)$$

[In] Integrate[(2 + x)/(4 - 5\*x^2 + x^4)^2,x]

[Out] ((12\*(5 + 6\*x - 5\*x^2))/(2 - x - 2\*x^2 + x^3) + 24\*Log[1 - x] - 35\*Log[2 - x] + 8\*Log[1 + x] + 3\*Log[2 + x])/432

**Maple [A] (verified)**

Time = 0.07 (sec) , antiderivative size = 47, normalized size of antiderivative = 0.69

method	result
default	$\frac{\ln(x+2)}{144} - \frac{1}{36(x+1)} + \frac{\ln(x+1)}{54} - \frac{1}{12(x-1)} + \frac{\ln(x-1)}{18} - \frac{1}{36(x-2)} - \frac{35 \ln(x-2)}{432}$
risch	$\frac{-\frac{5}{36}x^2 + \frac{1}{6}x + \frac{5}{36}}{x^3 - 2x^2 - x + 2} - \frac{35 \ln(x-2)}{432} + \frac{\ln(x-1)}{18} + \frac{\ln(x+1)}{54} + \frac{\ln(x+2)}{144}$
norman	$\frac{-\frac{1}{9}x^2 + \frac{17}{36}x - \frac{5}{36}x^3 + \frac{5}{18}}{x^4 - 5x^2 + 4} - \frac{35 \ln(x-2)}{432} + \frac{\ln(x-1)}{18} + \frac{\ln(x+1)}{54} + \frac{\ln(x+2)}{144}$
parallelrisch	$-\frac{35 \ln(x-2)x^3 - 24 \ln(x-1)x^3 - 8 \ln(x+1)x^3 - 3 \ln(x+2)x^3 - 60 - 70 \ln(x-2)x^2 + 48 \ln(x-1)x^2 + 16 \ln(x+1)x^2 + 6 \ln(x+2)x^2 - 3}{432(x^3 - 2x^2 - x + 2)}$

[In] int((x+2)/(x^4-5\*x^2+4)^2,x,method=\_RETURNVERBOSE)

[Out] 1/144\*ln(x+2)-1/36/(x+1)+1/54\*ln(x+1)-1/12/(x-1)+1/18\*ln(x-1)-1/36/(x-2)-35/432\*ln(x-2)

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 103 vs. 2(50) = 100.

Time = 0.25 (sec) , antiderivative size = 103, normalized size of antiderivative = 1.51

$$\int \frac{2+x}{(4-5x^2+x^4)^2} dx = \frac{60x^2 - 3(x^3 - 2x^2 - x + 2) \log(x+2) - 8(x^3 - 2x^2 - x + 2) \log(x+1) - 24(x^3 - 2x^2 - x + 2) \log(x-1) + 35(x^3 - 2x^2 - x + 2) \log(x-2) - 72x - 60}{432(x^3 - 2x^2 - x + 2)}$$

[In] integrate((2+x)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out] -1/432\*(60\*x^2 - 3\*(x^3 - 2\*x^2 - x + 2)\*log(x + 2) - 8\*(x^3 - 2\*x^2 - x + 2)\*log(x + 1) - 24\*(x^3 - 2\*x^2 - x + 2)\*log(x - 1) + 35\*(x^3 - 2\*x^2 - x + 2)\*log(x - 2) - 72\*x - 60)/(x^3 - 2\*x^2 - x + 2)

**Sympy [A] (verification not implemented)**

Time = 0.16 (sec) , antiderivative size = 53, normalized size of antiderivative = 0.78

$$\int \frac{2+x}{(4-5x^2+x^4)^2} dx = \frac{-5x^2 + 6x + 5}{36x^3 - 72x^2 - 36x + 72} - \frac{35 \log(x-2)}{432} + \frac{\log(x-1)}{18} + \frac{\log(x+1)}{54} + \frac{\log(x+2)}{144}$$

[In] integrate((2+x)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] (-5\*x\*\*2 + 6\*x + 5)/(36\*x\*\*3 - 72\*x\*\*2 - 36\*x + 72) - 35\*log(x - 2)/432 + 1\*log(x - 1)/18 + log(x + 1)/54 + log(x + 2)/144

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 52, normalized size of antiderivative = 0.76

$$\int \frac{2+x}{(4-5x^2+x^4)^2} dx = -\frac{5x^2-6x-5}{36(x^3-2x^2-x+2)} + \frac{1}{144} \log(x+2) \\ + \frac{1}{54} \log(x+1) + \frac{1}{18} \log(x-1) - \frac{35}{432} \log(x-2)$$

[In] integrate((2+x)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] -1/36\*(5\*x^2 - 6\*x - 5)/(x^3 - 2\*x^2 - x + 2) + 1/144\*log(x + 2) + 1/54\*log(x + 1) + 1/18\*log(x - 1) - 35/432\*log(x - 2)

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 56, normalized size of antiderivative = 0.82

$$\int \frac{2+x}{(4-5x^2+x^4)^2} dx = -\frac{5x^2-6x-5}{36(x+1)(x-1)(x-2)} + \frac{1}{144} \log(|x+2|) \\ + \frac{1}{54} \log(|x+1|) + \frac{1}{18} \log(|x-1|) - \frac{35}{432} \log(|x-2|)$$

[In] integrate((2+x)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] -1/36\*(5\*x^2 - 6\*x - 5)/((x + 1)\*(x - 1)\*(x - 2)) + 1/144\*log(abs(x + 2)) + 1/54\*log(abs(x + 1)) + 1/18\*log(abs(x - 1)) - 35/432\*log(abs(x - 2))

**Mupad [B] (verification not implemented)**

Time = 0.03 (sec) , antiderivative size = 52, normalized size of antiderivative = 0.76

$$\int \frac{2+x}{(4-5x^2+x^4)^2} dx = \frac{\ln(x-1)}{18} + \frac{\ln(x+1)}{54} - \frac{35 \ln(x-2)}{432} \\ + \frac{\ln(x+2)}{144} - \frac{-\frac{5x^2}{36} + \frac{x}{6} + \frac{5}{36}}{-x^3 + 2x^2 + x - 2}$$

[In] int((x + 2)/(x^4 - 5\*x^2 + 4)^2,x)

[Out] log(x - 1)/18 + log(x + 1)/54 - (35\*log(x - 2))/432 + log(x + 2)/144 - (x/6 - (5\*x^2)/36 + 5/36)/(x + 2\*x^2 - x^3 - 2)

$$3.98 \quad \int \frac{(2+x)(d+ex)}{(4-5x^2+x^4)^2} dx$$

Optimal result	1103
Rubi [A] (verified)	1103
Mathematica [A] (verified)	1104
Maple [A] (verified)	1105
Fricas [B] (verification not implemented)	1105
Sympy [B] (verification not implemented)	1106
Maxima [A] (verification not implemented)	1107
Giac [A] (verification not implemented)	1107
Mupad [B] (verification not implemented)	1108

### Optimal result

Integrand size = 21, antiderivative size = 105

$$\begin{aligned} \int \frac{(2+x)(d+ex)}{(4-5x^2+x^4)^2} dx &= \frac{d+e}{12(1-x)} + \frac{d+2e}{36(2-x)} - \frac{d-e}{36(1+x)} \\ &+ \frac{1}{36}(2d+5e)\log(1-x) - \frac{1}{432}(35d+58e)\log(2-x) \\ &+ \frac{1}{108}(2d+e)\log(1+x) + \frac{1}{144}(d-2e)\log(2+x) \end{aligned}$$

[Out] 1/12\*(d+e)/(1-x)+1/36\*(d+2\*e)/(2-x)+1/36\*(-d+e)/(1+x)+1/36\*(2\*d+5\*e)\*ln(1-x)-1/432\*(35\*d+58\*e)\*ln(2-x)+1/108\*(2\*d+e)\*ln(1+x)+1/144\*(d-2\*e)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.13 (sec) , antiderivative size = 105, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.095$ , Rules used = {1600, 6874}

$$\begin{aligned} \int \frac{(2+x)(d+ex)}{(4-5x^2+x^4)^2} dx &= -\frac{d-e}{36(x+1)} + \frac{d+e}{12(1-x)} + \frac{d+2e}{36(2-x)} \\ &+ \frac{1}{36}(2d+5e)\log(1-x) - \frac{1}{432}(35d+58e)\log(2-x) \\ &+ \frac{1}{108}(2d+e)\log(x+1) + \frac{1}{144}(d-2e)\log(x+2) \end{aligned}$$

[In] Int[(((2 + x)\*(d + e\*x))/(4 - 5\*x^2 + x^4)^2,x]

[Out] (d + e)/(12\*(1 - x)) + (d + 2\*e)/(36\*(2 - x)) - (d - e)/(36\*(1 + x)) + ((2\*d + 5\*e)\*Log[1 - x])/36 - ((35\*d + 58\*e)\*Log[2 - x])/432 + ((2\*d + e)\*Log[1 + x])/108 + ((d - 2\*e)\*Log[2 + x])/144

Rule 1600

```
Int[(u_.)*(Px_)^(p_.)*(Qx_)^(q_.), x_Symbol] := Int[u*PolynomialQuotient[Px
, Qx, x]^p*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] &&
EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p*q, 0]
```

Rule 6874

```
Int[u_, x_Symbol] := With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]
]
```

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex}{(2 + x)(2 - x - 2x^2 + x^3)^2} dx \\ &= \int \left( \frac{d + 2e}{36(-2 + x)^2} + \frac{-35d - 58e}{432(-2 + x)} + \frac{d + e}{12(-1 + x)^2} + \frac{2d + 5e}{36(-1 + x)} + \frac{d - e}{36(1 + x)^2} \right. \\ &\quad \left. + \frac{2d + e}{108(1 + x)} + \frac{d - 2e}{144(2 + x)} \right) dx \\ &= \frac{d + e}{12(1 - x)} + \frac{d + 2e}{36(2 - x)} - \frac{d - e}{36(1 + x)} + \frac{1}{36}(2d + 5e) \log(1 - x) \\ &\quad - \frac{1}{432}(35d + 58e) \log(2 - x) + \frac{1}{108}(2d + e) \log(1 + x) + \frac{1}{144}(d - 2e) \log(2 + x) \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.06 (sec) , antiderivative size = 97, normalized size of antiderivative = 0.92

$$\int \frac{(2 + x)(d + ex)}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{432} \left( \frac{12(d(5 + 6x - 5x^2) + 2e(5 - 2x^2))}{2 - x - 2x^2 + x^3} + 12(2d + 5e) \log(1 - x) \right. \\ \left. - (35d + 58e) \log(2 - x) + 4(2d + e) \log(1 + x) + 3(d - 2e) \log(2 + x) \right)$$

```
[In] Integrate[((2 + x)*(d + e*x))/(4 - 5*x^2 + x^4)^2,x]
```

```
[Out] ((12*(d*(5 + 6*x - 5*x^2) + 2*e*(5 - 2*x^2)))/(2 - x - 2*x^2 + x^3) + 12*(2
*d + 5*e)*Log[1 - x] - (35*d + 58*e)*Log[2 - x] + 4*(2*d + e)*Log[1 + x] +
3*(d - 2*e)*Log[2 + x])/432
```



**Maple [A] (verified)**

Time = 0.08 (sec) , antiderivative size = 92, normalized size of antiderivative = 0.88

method	result
default	$\left(\frac{d}{144} - \frac{e}{72}\right) \ln(x+2) - \frac{\frac{d}{36} - \frac{e}{36}}{x+1} + \left(\frac{d}{54} + \frac{e}{108}\right) \ln(x+1) - \frac{\frac{d}{12} + \frac{e}{12}}{x-1} + \left(\frac{d}{18} + \frac{5e}{36}\right) \ln(x-1) + \left(-\frac{35}{432}d - \frac{29}{216}e\right) \ln(x-2) + \left(\frac{d}{18} + \frac{5e}{36}\right) \ln(x-1) + \left(-\frac{35}{432}d - \frac{29}{216}e\right) \ln(x-2) + \left(\frac{d}{18} + \frac{5e}{36}\right) \ln(x-1) + \left(-\frac{35}{432}d - \frac{29}{216}e\right) \ln(x-2)$
norman	$\frac{\left(-\frac{5d}{36} - \frac{e}{9}\right)x^3 + \left(\frac{17d}{36} + \frac{5e}{18}\right)x + \left(-\frac{d}{9} - \frac{2e}{9}\right)x^2 + \frac{5d}{18} + \frac{5e}{9}}{x^4 - 5x^2 + 4} + \left(-\frac{35d}{432} - \frac{29e}{216}\right) \ln(x-2) + \left(\frac{d}{18} + \frac{5e}{36}\right) \ln(x-1) + \left(-\frac{35d}{432} - \frac{29e}{216}\right) \ln(x-2) + \left(\frac{d}{18} + \frac{5e}{36}\right) \ln(x-1) + \left(-\frac{35d}{432} - \frac{29e}{216}\right) \ln(x-2) + \left(\frac{d}{18} + \frac{5e}{36}\right) \ln(x-1) + \left(-\frac{35d}{432} - \frac{29e}{216}\right) \ln(x-2)$
risch	$\frac{\left(-\frac{5d}{36} - \frac{e}{9}\right)x^2 + \frac{dx}{6} + \frac{5d}{36} + \frac{5e}{18}}{x^3 - 2x^2 - x + 2} + \frac{\ln(x+2)d}{144} - \frac{\ln(x+2)e}{72} + \frac{\ln(x-1)d}{18} + \frac{5\ln(x-1)e}{36} - \frac{35\ln(2-x)d}{432} - \frac{29\ln(2-x)e}{216} + \frac{\ln(x-2)d}{18} + \frac{5\ln(x-2)e}{36} - \frac{35\ln(x-2)d}{432} - \frac{29\ln(x-2)e}{216}$
parallelrisch	$-\frac{60dx^2 - 60d - 120e - 72dx - 60\ln(x-1)x^3e - 8\ln(x+1)x^3d - 4\ln(x+1)x^3e - 3\ln(x+2)x^3d + 6\ln(x+2)x^3e + 70\ln(x-2)d + 116\ln(x-2)e}{(x^4 - 5x^2 + 4)^2}$

[In] int((x+2)\*(e\*x+d)/(x^4-5\*x^2+4)^2,x,method=\_RETURNVERBOSE)

[Out] (1/144\*d-1/72\*e)\*ln(x+2)-(1/36\*d-1/36\*e)/(x+1)+(1/54\*d+1/108\*e)\*ln(x+1)-(1/12\*d+1/12\*e)/(x-1)+(1/18\*d+5/36\*e)\*ln(x-1)+(-35/432\*d-29/216\*e)\*ln(x-2)-(1/36\*d+1/18\*e)/(x-2)

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 211 vs. 2(87) = 174.

Time = 0.28 (sec) , antiderivative size = 211, normalized size of antiderivative = 2.01

$$\int \frac{(2+x)(d+ex)}{(4-5x^2+x^4)^2} dx = \frac{12(5d+4e)x^2 - 72dx - 3((d-2e)x^3 - 2(d-2e)x^2 - (d-2e)x + 2d - 4e) \log(x+2) - 4((2d+e)x^3 - 2(2d+e)x^2 - (2d+e)x + 4d + 2e) \log(x+1) - 12((2d+5e)x^3 - 2(2d+5e)x^2 - (2d+5e)x + 4d + 10e) \log(x-1) + ((35d+58e)x^3 - 2(35d+58e)x^2 - (35d+58e)x + 70d + 116e) \log(x-2) - 60d - 120e}{(x^4 - 5x^2 + 4)^2}$$

[In] integrate((2+x)\*(e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out] -1/432\*(12\*(5\*d + 4\*e)\*x^2 - 72\*d\*x - 3\*((d - 2\*e)\*x^3 - 2\*(d - 2\*e)\*x^2 - (d - 2\*e)\*x + 2\*d - 4\*e)\*log(x + 2) - 4\*((2\*d + e)\*x^3 - 2\*(2\*d + e)\*x^2 - (2\*d + e)\*x + 4\*d + 2\*e)\*log(x + 1) - 12\*((2\*d + 5\*e)\*x^3 - 2\*(2\*d + 5\*e)\*x^2 - (2\*d + 5\*e)\*x + 4\*d + 10\*e)\*log(x - 1) + ((35\*d + 58\*e)\*x^3 - 2\*(35\*d + 58\*e)\*x^2 - (35\*d + 58\*e)\*x + 70\*d + 116\*e)\*log(x - 2) - 60\*d - 120\*e)/(x^4 - 5\*x^2 - x + 2)

**Sympy [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 1034 vs.  $2(82) = 164$ .

Time = 5.46 (sec) , antiderivative size = 1034, normalized size of antiderivative = 9.85

$$\int \frac{(2+x)(d+ex)}{(4-5x^2+x^4)^2} dx = \text{Too large to display}$$

```
[In] integrate((2+x)*(e*x+d)/(x**4-5*x**2+4)**2,x)
```

```
[Out] (d - 2*e)*log(x + (8710660*d**5 + 91884504*d**4*e - 7579779*d**4*(d - 2*e)/
4 + 364910432*d**3*e**2 - 18128055*d**3*e*(d - 2*e) - 83772*d**3*(d - 2*e)*
*2 + 686697536*d**2*e**3 - 60296868*d**2*e**2*(d - 2*e) - 597816*d**2*e*(d
- 2*e)**2 + 65907*d**2*(d - 2*e)**3/4 + 614357568*d*e**4 - 85949220*d*e**3*
(d - 2*e) - 1500048*d*e**2*(d - 2*e)**2 + 105840*d*e*(d - 2*e)**3 + 2084704
00*e**5 - 45136356*e**4*(d - 2*e) - 1196064*e**3*(d - 2*e)**2 + 128277*e**2
*(d - 2*e)**3)/(3374210*d**5 + 38645295*d**4*e + 170558380*d**3*e**2 + 3620
61760*d**2*e**3 + 370298160*d*e**4 + 146466320*e**5))/144 + (2*d + e)*log(x
+ (8710660*d**5 + 91884504*d**4*e - 2526593*d**4*(2*d + e) + 364910432*d**
3*e**2 - 24170740*d**3*e*(2*d + e) - 148928*d**3*(2*d + e)**2 + 686697536*d
**2*e**3 - 80395824*d**2*e**2*(2*d + e) - 1062784*d**2*e*(2*d + e)**2 + 390
56*d**2*(2*d + e)**3 + 614357568*d*e**4 - 114598960*d*e**3*(2*d + e) - 2666
752*d*e**2*(2*d + e)**2 + 250880*d*e*(2*d + e)**3 + 208470400*e**5 - 601818
08*e**4*(2*d + e) - 2126336*e**3*(2*d + e)**2 + 304064*e**2*(2*d + e)**3)/(
3374210*d**5 + 38645295*d**4*e + 170558380*d**3*e**2 + 362061760*d**2*e**3
+ 370298160*d*e**4 + 146466320*e**5))/108 + (2*d + 5*e)*log(x + (8710660*d*
*5 + 91884504*d**4*e - 7579779*d**4*(2*d + 5*e) + 364910432*d**3*e**2 - 725
12220*d**3*e*(2*d + 5*e) - 1340352*d**3*(2*d + 5*e)**2 + 686697536*d**2*e**
3 - 241187472*d**2*e**2*(2*d + 5*e) - 9565056*d**2*e*(2*d + 5*e)**2 + 10545
12*d**2*(2*d + 5*e)**3 + 614357568*d*e**4 - 343796880*d*e**3*(2*d + 5*e) -
24000768*d*e**2*(2*d + 5*e)**2 + 6773760*d*e*(2*d + 5*e)**3 + 208470400*e**
5 - 180545424*e**4*(2*d + 5*e) - 19137024*e**3*(2*d + 5*e)**2 + 8209728*e**
2*(2*d + 5*e)**3)/(3374210*d**5 + 38645295*d**4*e + 170558380*d**3*e**2 + 3
62061760*d**2*e**3 + 370298160*d*e**4 + 146466320*e**5))/36 - (35*d + 58*e)
*log(x + (8710660*d**5 + 91884504*d**4*e + 2526593*d**4*(35*d + 58*e)/4 + 3
64910432*d**3*e**2 + 6042685*d**3*e*(35*d + 58*e) - 9308*d**3*(35*d + 58*e)
**2 + 686697536*d**2*e**3 + 20098956*d**2*e**2*(35*d + 58*e) - 66424*d**2*e
*(35*d + 58*e)**2 - 2441*d**2*(35*d + 58*e)**3/4 + 614357568*d*e**4 + 28649
740*d*e**3*(35*d + 58*e) - 166672*d*e**2*(35*d + 58*e)**2 - 3920*d*e*(35*d
+ 58*e)**3 + 208470400*e**5 + 15045452*e**4*(35*d + 58*e) - 132896*e**3*(35
*d + 58*e)**2 - 4751*e**2*(35*d + 58*e)**3)/(3374210*d**5 + 38645295*d**4*e
+ 170558380*d**3*e**2 + 362061760*d**2*e**3 + 370298160*d*e**4 + 146466320
*e**5))/432 + (6*d*x + 5*d + 10*e + x**2*(-5*d - 4*e))/(36*x**3 - 72*x**2 -
36*x + 72)
```

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 88, normalized size of antiderivative = 0.84

$$\int \frac{(2+x)(d+ex)}{(4-5x^2+x^4)^2} dx = \frac{1}{144} (d-2e) \log(x+2) + \frac{1}{108} (2d+e) \log(x+1) \\ + \frac{1}{36} (2d+5e) \log(x-1) - \frac{1}{432} (35d+58e) \log(x-2) \\ - \frac{(5d+4e)x^2 - 6dx - 5d - 10e}{36(x^3 - 2x^2 - x + 2)}$$

[In] integrate((2+x)\*(e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

```
[Out] 1/144*(d - 2*e)*log(x + 2) + 1/108*(2*d + e)*log(x + 1) + 1/36*(2*d + 5*e)*
log(x - 1) - 1/432*(35*d + 58*e)*log(x - 2) - 1/36*((5*d + 4*e)*x^2 - 6*d*x
- 5*d - 10*e)/(x^3 - 2*x^2 - x + 2)
```

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 92, normalized size of antiderivative = 0.88

$$\int \frac{(2+x)(d+ex)}{(4-5x^2+x^4)^2} dx = \frac{1}{144} (d-2e) \log(|x+2|) + \frac{1}{108} (2d+e) \log(|x+1|) \\ + \frac{1}{36} (2d+5e) \log(|x-1|) - \frac{1}{432} (35d+58e) \log(|x-2|) \\ - \frac{(5d+4e)x^2 - 6dx - 5d - 10e}{36(x+1)(x-1)(x-2)}$$

[In] integrate((2+x)\*(e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

```
[Out] 1/144*(d - 2*e)*log(abs(x + 2)) + 1/108*(2*d + e)*log(abs(x + 1)) + 1/36*(2
*d + 5*e)*log(abs(x - 1)) - 1/432*(35*d + 58*e)*log(abs(x - 2)) - 1/36*((5*
d + 4*e)*x^2 - 6*d*x - 5*d - 10*e)/((x + 1)*(x - 1)*(x - 2))
```

**Mupad [B] (verification not implemented)**

Time = 0.06 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.86

$$\int \frac{(2+x)(d+ex)}{(4-5x^2+x^4)^2} dx = \ln(x-1) \left( \frac{d}{18} + \frac{5e}{36} \right) - \frac{\left(-\frac{5d}{36} - \frac{e}{9}\right) x^2 + \frac{dx}{6} + \frac{5d}{36} + \frac{5e}{18}}{-x^3 + 2x^2 + x - 2}$$

$$+ \ln(x+1) \left( \frac{d}{54} + \frac{e}{108} \right) + \ln(x+2) \left( \frac{d}{144} - \frac{e}{72} \right)$$

$$- \ln(x-2) \left( \frac{35d}{432} + \frac{29e}{216} \right)$$

[In] int(((x + 2)\*(d + e\*x))/(x^4 - 5\*x^2 + 4)^2,x)

[Out] log(x - 1)\*(d/18 + (5\*e)/36) - ((5\*d)/36 + (5\*e)/18 - x^2\*((5\*d)/36 + e/9) + (d\*x)/6)/(x + 2\*x^2 - x^3 - 2) + log(x + 1)\*(d/54 + e/108) + log(x + 2)\*(d/144 - e/72) - log(x - 2)\*((35\*d)/432 + (29\*e)/216)

$$3.99 \quad \int \frac{(2+x)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx$$

Optimal result . . . . .	1109
Rubi [A] (verified) . . . . .	1109
Mathematica [A] (verified) . . . . .	1110
Maple [A] (verified) . . . . .	1111
Fricas [B] (verification not implemented) . . . . .	1111
Sympy [F(-1)] . . . . .	1112
Maxima [A] (verification not implemented) . . . . .	1112
Giac [A] (verification not implemented) . . . . .	1112
Mupad [B] (verification not implemented) . . . . .	1113

### Optimal result

Integrand size = 26, antiderivative size = 122

$$\int \frac{(2+x)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx = \frac{d+e+f}{12(1-x)} + \frac{d+2e+4f}{36(2-x)} - \frac{d-e+f}{36(1+x)} \\ + \frac{1}{36}(2d+5e+8f)\log(1-x) \\ - \frac{1}{432}(35d+58e+92f)\log(2-x) \\ + \frac{1}{108}(2d+e-4f)\log(1+x) + \frac{1}{144}(d-2e+4f)\log(2+x)$$

[Out] 1/12\*(d+e+f)/(1-x)+1/36\*(d+2\*e+4\*f)/(2-x)+1/36\*(-d+e-f)/(1+x)+1/36\*(2\*d+5\*e+8\*f)\*ln(1-x)-1/432\*(35\*d+58\*e+92\*f)\*ln(2-x)+1/108\*(2\*d+e-4\*f)\*ln(1+x)+1/144\*(d-2\*e+4\*f)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.15 (sec) , antiderivative size = 122, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.077$ , Rules used = {1600, 6874}

$$\int \frac{(2+x)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx = -\frac{d-e+f}{36(x+1)} + \frac{d+e+f}{12(1-x)} + \frac{d+2e+4f}{36(2-x)} \\ + \frac{1}{36}\log(1-x)(2d+5e+8f) \\ - \frac{1}{432}\log(2-x)(35d+58e+92f) \\ + \frac{1}{108}\log(x+1)(2d+e-4f) + \frac{1}{144}\log(x+2)(d-2e+4f)$$

[In] Int[((2 + x)\*(d + e\*x + f\*x^2))/(4 - 5\*x^2 + x^4)^2,x]

[Out] (d + e + f)/(12\*(1 - x)) + (d + 2\*e + 4\*f)/(36\*(2 - x)) - (d - e + f)/(36\*(1 + x)) + ((2\*d + 5\*e + 8\*f)\*Log[1 - x])/36 - ((35\*d + 58\*e + 92\*f)\*Log[2 - x])/432 + ((2\*d + e - 4\*f)\*Log[1 + x])/108 + ((d - 2\*e + 4\*f)\*Log[2 + x])/144

Rule 1600

Int[(u\_)\*(Px\_)^(p\_)\*(Qx\_)^(q\_), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p + q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rule 6874

Int[u\_, x\_Symbol] := With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]]

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d + ex + fx^2}{(2 + x)(2 - x - 2x^2 + x^3)^2} dx \\ &= \int \left( \frac{d + 2e + 4f}{36(-2 + x)^2} + \frac{-35d - 58e - 92f}{432(-2 + x)} + \frac{d + e + f}{12(-1 + x)^2} + \frac{2d + 5e + 8f}{36(-1 + x)} \right. \\ &\quad \left. + \frac{d - e + f}{36(1 + x)^2} + \frac{2d + e - 4f}{108(1 + x)} + \frac{d - 2e + 4f}{144(2 + x)} \right) dx \\ &= \frac{d + e + f}{12(1 - x)} + \frac{d + 2e + 4f}{36(2 - x)} - \frac{d - e + f}{36(1 + x)} \\ &\quad + \frac{1}{36}(2d + 5e + 8f) \log(1 - x) - \frac{1}{432}(35d + 58e + 92f) \log(2 - x) \\ &\quad + \frac{1}{108}(2d + e - 4f) \log(1 + x) + \frac{1}{144}(d - 2e + 4f) \log(2 + x) \end{aligned}$$

**Mathematica [A] (verified)**

Time = 0.04 (sec) , antiderivative size = 121, normalized size of antiderivative = 0.99

$$\int \frac{(2 + x)(d + ex + fx^2)}{(4 - 5x^2 + x^4)^2} dx = \frac{1}{432} \left( \frac{12(d(5 + 6x - 5x^2) + e(10 - 4x^2) + 2f(4 + 3x - 4x^2))}{2 - x - 2x^2 + x^3} + 12(2d + 5e + 8f) \log(1 - x) - (35d + 58e + 92f) \log(2 - x) + 4(2d + e - 4f) \log(1 + x) + 3(d - 2e + 4f) \log(2 + x) \right)$$

[In] Integrate[((2 + x)\*(d + e\*x + f\*x^2))/(4 - 5\*x^2 + x^4)^2,x]

[Out] ((12\*(d\*(5 + 6\*x - 5\*x^2) + e\*(10 - 4\*x^2) + 2\*f\*(4 + 3\*x - 4\*x^2)))/(2 - x - 2\*x^2 + x^3) + 12\*(2\*d + 5\*e + 8\*f)\*Log[1 - x] - (35\*d + 58\*e + 92\*f)\*Log[2 - x] + 4\*(2\*d + e - 4\*f)\*Log[1 + x] + 3\*(d - 2\*e + 4\*f)\*Log[2 + x])/432

**Maple [A] (verified)**

Time = 0.08 (sec) , antiderivative size = 113, normalized size of antiderivative = 0.93

method	result
default	$\left(\frac{d}{144} - \frac{e}{72} + \frac{f}{36}\right) \ln(x+2) - \frac{\frac{d}{36} - \frac{e}{36} + \frac{f}{36}}{x+1} + \left(\frac{d}{54} + \frac{e}{108} - \frac{f}{27}\right) \ln(x+1) - \frac{\frac{d}{12} + \frac{e}{12} + \frac{f}{12}}{x-1} + \left(\frac{d}{18} + \frac{5e}{36} + \frac{f}{18}\right) \ln(x-2)$
norman	$\frac{\left(-\frac{5d}{36} - \frac{e}{9} - \frac{2f}{9}\right)x^3 + \left(\frac{17d}{36} + \frac{5e}{18} + \frac{5f}{9}\right)x + \left(-\frac{d}{9} - \frac{2e}{9} - \frac{5f}{18}\right)x^2 + \frac{5d}{18} + \frac{5e}{9} + \frac{4f}{9}}{x^4 - 5x^2 + 4} + \left(-\frac{35d}{432} - \frac{29e}{216} - \frac{23f}{108}\right) \ln(x-2) + \left(\frac{d}{18} + \frac{5e}{36} + \frac{f}{18}\right) \ln(x-2)$
risch	$\frac{\left(-\frac{5d}{36} - \frac{e}{9} - \frac{2f}{9}\right)x^2 + \left(\frac{d}{6} + \frac{f}{6}\right)x + \frac{5d}{36} + \frac{5e}{18} + \frac{2f}{9}}{x^3 - 2x^2 - x + 2} + \frac{\ln(x+2)d}{144} - \frac{\ln(x+2)e}{72} + \frac{\ln(x+2)f}{36} - \frac{35 \ln(2-x)d}{432} - \frac{29 \ln(2-x)e}{216} - \frac{23 \ln(2-x)f}{108}$
parallelrisch	$-\frac{-96f + 60d x^2 - 60d - 120e + 96f x^2 - 72dx - 60 \ln(x-1)x^3 e - 8 \ln(x+1)x^3 d - 4 \ln(x+1)x^3 e - 3 \ln(x+2)x^3 d + 6 \ln(x+2)x^3 e + 70d + 116e + 184f}{(x^3 - 2x^2 - x + 2)^2}$

[In] int((x+2)\*(f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x,method=\_RETURNVERBOSE)

[Out] (1/144\*d-1/72\*e+1/36\*f)\*ln(x+2)-(1/36\*d-1/36\*e+1/36\*f)/(x+1)+(1/54\*d+1/108\*e-1/27\*f)\*ln(x+1)-(1/12\*d+1/12\*e+1/12\*f)/(x-1)+(1/18\*d+5/36\*e+2/9\*f)\*ln(x-1)+(-35/432\*d-29/216\*e-23/108\*f)\*ln(x-2)-(1/36\*d+1/18\*e+1/9\*f)/(x-2)

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 267 vs. 2(104) = 208.

Time = 0.36 (sec) , antiderivative size = 267, normalized size of antiderivative = 2.19

$$\int \frac{(2+x)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx = \frac{12(5d+4e+8f)x^2 - 72(d+f)x - 3((d-2e+4f)x^3 - 2(d-2e+4f)x^2 - (d-2e+4f)x + 2)}{(4-5x^2+x^4)^2}$$

[In] integrate((2+x)\*(f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out] -1/432\*(12\*(5\*d + 4\*e + 8\*f)\*x^2 - 72\*(d + f)\*x - 3\*((d - 2\*e + 4\*f)\*x^3 - 2\*(d - 2\*e + 4\*f)\*x^2 - (d - 2\*e + 4\*f)\*x + 2\*d - 4\*e + 8\*f)\*log(x + 2) - 4\*((2\*d + e - 4\*f)\*x^3 - 2\*(2\*d + e - 4\*f)\*x^2 - (2\*d + e - 4\*f)\*x + 4\*d + 2\*e - 8\*f)\*log(x + 1) - 12\*((2\*d + 5\*e + 8\*f)\*x^3 - 2\*(2\*d + 5\*e + 8\*f)\*x^2 - (2\*d + 5\*e + 8\*f)\*x + 4\*d + 10\*e + 16\*f)\*log(x - 1) + ((35\*d + 58\*e + 92\*f)\*x^3 - 2\*(35\*d + 58\*e + 92\*f)\*x^2 - (35\*d + 58\*e + 92\*f)\*x + 70\*d + 116\*e + 184\*f)\*log(x - 2) - 60\*d - 120\*e - 96\*f)/(x^3 - 2\*x^2 - x + 2)

**Sympy [F(-1)]**

Timed out.

$$\int \frac{(2+x)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx = \text{Timed out}$$

[In] integrate((2+x)\*(f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.20 (sec) , antiderivative size = 108, normalized size of antiderivative = 0.89

$$\begin{aligned} \int \frac{(2+x)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx = & \frac{1}{144} (d-2e+4f) \log(x+2) + \frac{1}{108} (2d+e-4f) \log(x+1) \\ & + \frac{1}{36} (2d+5e+8f) \log(x-1) \\ & - \frac{1}{432} (35d+58e+92f) \log(x-2) \\ & - \frac{(5d+4e+8f)x^2 - 6(d+f)x - 5d - 10e - 8f}{36(x^3 - 2x^2 - x + 2)} \end{aligned}$$

[In] integrate((2+x)\*(f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] 1/144\*(d - 2\*e + 4\*f)\*log(x + 2) + 1/108\*(2\*d + e - 4\*f)\*log(x + 1) + 1/36\*(2\*d + 5\*e + 8\*f)\*log(x - 1) - 1/432\*(35\*d + 58\*e + 92\*f)\*log(x - 2) - 1/36\*((5\*d + 4\*e + 8\*f)\*x^2 - 6\*(d + f)\*x - 5\*d - 10\*e - 8\*f)/(x^3 - 2\*x^2 - x + 2)

**Giac [A] (verification not implemented)**

none

Time = 0.28 (sec) , antiderivative size = 112, normalized size of antiderivative = 0.92

$$\begin{aligned} \int \frac{(2+x)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx = & \frac{1}{144} (d-2e+4f) \log(|x+2|) \\ & + \frac{1}{108} (2d+e-4f) \log(|x+1|) \\ & + \frac{1}{36} (2d+5e+8f) \log(|x-1|) \\ & - \frac{1}{432} (35d+58e+92f) \log(|x-2|) \\ & - \frac{(5d+4e+8f)x^2 - 6(d+f)x - 5d - 10e - 8f}{36(x+1)(x-1)(x-2)} \end{aligned}$$



[In] integrate((2+x)\*(f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] 1/144\*(d - 2\*e + 4\*f)\*log(abs(x + 2)) + 1/108\*(2\*d + e - 4\*f)\*log(abs(x + 1)) + 1/36\*(2\*d + 5\*e + 8\*f)\*log(abs(x - 1)) - 1/432\*(35\*d + 58\*e + 92\*f)\*log(abs(x - 2)) - 1/36\*((5\*d + 4\*e + 8\*f)\*x^2 - 6\*(d + f)\*x - 5\*d - 10\*e - 8\*f)/((x + 1)\*(x - 1)\*(x - 2))

### Mupad [B] (verification not implemented)

Time = 7.90 (sec) , antiderivative size = 113, normalized size of antiderivative = 0.93

$$\int \frac{(2+x)(d+ex+fx^2)}{(4-5x^2+x^4)^2} dx = \ln(x-1) \left( \frac{d}{18} + \frac{5e}{36} + \frac{2f}{9} \right) + \ln(x+1) \left( \frac{d}{54} + \frac{e}{108} - \frac{f}{27} \right) + \ln(x+2) \left( \frac{d}{144} - \frac{e}{72} + \frac{f}{36} \right) - \ln(x-2) \left( \frac{35d}{432} + \frac{29e}{216} + \frac{23f}{108} \right) - \frac{\left( -\frac{5d}{36} - \frac{e}{9} - \frac{2f}{9} \right) x^2 + \left( \frac{d}{6} + \frac{f}{6} \right) x + \frac{5d}{36} + \frac{5e}{18} + \frac{2f}{9}}{-x^3 + 2x^2 + x - 2}$$

[In] int(((x + 2)\*(d + e\*x + f\*x^2))/(x^4 - 5\*x^2 + 4)^2,x)

[Out] log(x - 1)\*(d/18 + (5\*e)/36 + (2\*f)/9) + log(x + 1)\*(d/54 + e/108 - f/27) + log(x + 2)\*(d/144 - e/72 + f/36) - log(x - 2)\*((35\*d)/432 + (29\*e)/216 + (23\*f)/108) - ((5\*d)/36 + (5\*e)/18 + (2\*f)/9 + x\*(d/6 + f/6) - x^2\*((5\*d)/36 + e/9 + (2\*f)/9))/(x + 2\*x^2 - x^3 - 2)

$$3.100 \quad \int \frac{(2+x)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx$$

Optimal result	1114
Rubi [A] (verified)	1114
Mathematica [A] (verified)	1116
Maple [A] (verified)	1116
Fricas [B] (verification not implemented)	1117
Sympy [F(-1)]	1117
Maxima [A] (verification not implemented)	1117
Giac [A] (verification not implemented)	1118
Mupad [B] (verification not implemented)	1118

### Optimal result

Integrand size = 31, antiderivative size = 141

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx = \frac{d+e+f+g}{12(1-x)} + \frac{d+2e+4f+8g}{36(2-x)} - \frac{d-e+f-g}{36(1+x)} \\ + \frac{1}{36}(2d+5e+8f+11g)\log(1-x) \\ - \frac{1}{432}(35d+58e+92f+136g)\log(2-x) \\ + \frac{1}{108}(2d+e-4f+7g)\log(1+x) \\ + \frac{1}{144}(d-2e+4f-8g)\log(2+x)$$

[Out] 1/12\*(d+e+f+g)/(1-x)+1/36\*(d+2\*e+4\*f+8\*g)/(2-x)+1/36\*(-d+e-f+g)/(1+x)+1/36\*(2\*d+5\*e+8\*f+11\*g)\*ln(1-x)-1/432\*(35\*d+58\*e+92\*f+136\*g)\*ln(2-x)+1/108\*(2\*d+e-4\*f+7\*g)\*ln(1+x)+1/144\*(d-2\*e+4\*f-8\*g)\*ln(2+x)

### Rubi [A] (verified)

Time = 0.17 (sec) , antiderivative size = 141, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.065$ , Rules used

= {1600, 6874}

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx = -\frac{d-e+f-g}{36(x+1)} + \frac{d+e+f+g}{12(1-x)} + \frac{d+2e+4f+8g}{36(2-x)} \\ + \frac{1}{36} \log(1-x)(2d+5e+8f+11g) \\ - \frac{1}{432} \log(2-x)(35d+58e+92f+136g) \\ + \frac{1}{108} \log(x+1)(2d+e-4f+7g) \\ + \frac{1}{144} \log(x+2)(d-2e+4f-8g)$$

[In] Int[((2 + x)\*(d + e\*x + f\*x^2 + g\*x^3))/(4 - 5\*x^2 + x^4)^2, x]

[Out] (d + e + f + g)/(12\*(1 - x)) + (d + 2\*e + 4\*f + 8\*g)/(36\*(2 - x)) - (d - e + f - g)/(36\*(1 + x)) + ((2\*d + 5\*e + 8\*f + 11\*g)\*Log[1 - x])/36 - ((35\*d + 58\*e + 92\*f + 136\*g)\*Log[2 - x])/432 + ((2\*d + e - 4\*f + 7\*g)\*Log[1 + x])/108 + ((d - 2\*e + 4\*f - 8\*g)\*Log[2 + x])/144

Rule 1600

Int[(u\_.)\*(Px\_)^(p\_.)\*(Qx\_)^(q\_.), x\_Symbol] := Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p+q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rule 6874

Int[u\_, x\_Symbol] := With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]]

Rubi steps

$$\text{integral} = \int \frac{d+ex+fx^2+gx^3}{(2+x)(2-x-2x^2+x^3)^2} dx \\ = \int \left( \frac{d+2e+4f+8g}{36(-2+x)^2} + \frac{-35d-58e-92f-136g}{432(-2+x)} + \frac{d+e+f+g}{12(-1+x)^2} \right. \\ \left. + \frac{2d+5e+8f+11g}{36(-1+x)} + \frac{d-e+f-g}{36(1+x)^2} + \frac{2d+e-4f+7g}{108(1+x)} + \frac{d-2e+4f-8g}{144(2+x)} \right) dx \\ = \frac{d+e+f+g}{12(1-x)} + \frac{d+2e+4f+8g}{36(2-x)} - \frac{d-e+f-g}{36(1+x)} \\ + \frac{1}{36} (2d+5e+8f+11g) \log(1-x) - \frac{1}{432} (35d+58e+92f+136g) \log(2-x) \\ + \frac{1}{108} (2d+e-4f+7g) \log(1+x) + \frac{1}{144} (d-2e+4f-8g) \log(2+x)$$

**Mathematica [A] (verified)**

Time = 0.05 (sec) , antiderivative size = 144, normalized size of antiderivative = 1.02

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx$$

$$= \frac{1}{432} \left( \frac{12(d(5+6x-5x^2)+2(g(8-5x^2)+f(4+3x-4x^2)+e(5-2x^2)))}{2-x-2x^2+x^3} \right. \\ \left. + 12(2d+5e+8f+11g)\log(1-x) - (35d+58e+92f+136g)\log(2-x) \right. \\ \left. + 4(2d+e-4f+7g)\log(1+x) + 3(d-2e+4f-8g)\log(2+x) \right)$$

[In] Integrate[((2+x)\*(d+e\*x+f\*x^2+g\*x^3))/(4-5\*x^2+x^4)^2,x]

```
[Out] ((12*(d*(5+6*x-5*x^2)+2*(g*(8-5*x^2)+f*(4+3*x-4*x^2)+e*(5-2*x^2))))/(2-x-2*x^2+x^3)+12*(2*d+5*e+8*f+11*g)*Log[1-x]-
(35*d+58*e+92*f+136*g)*Log[2-x]+4*(2*d+e-4*f+7*g)*Log[1+x]+3*(d-2*e+4*f-8*g)*Log[2+x])/432
```

**Maple [A] (verified)**

Time = 0.09 (sec) , antiderivative size = 134, normalized size of antiderivative = 0.95

method	result
default	$\left(\frac{d}{144} - \frac{e}{72} + \frac{f}{36} - \frac{g}{18}\right) \ln(x+2) - \frac{\frac{d}{36} - \frac{e}{36} + \frac{f}{36} - \frac{g}{36}}{x+1} + \left(\frac{d}{54} + \frac{e}{108} - \frac{f}{27} + \frac{7g}{108}\right) \ln(x+1) - \frac{\frac{d}{12} + \frac{e}{12} + \frac{f}{12}}{x-1}$
norman	$\frac{\left(-\frac{5d}{36} - \frac{e}{9} - \frac{2f}{9} - \frac{5g}{18}\right)x^3 + \left(\frac{17d}{36} + \frac{5e}{18} + \frac{5f}{9} + \frac{4g}{9}\right)x + \left(-\frac{d}{9} - \frac{2e}{9} - \frac{5f}{18} - \frac{5g}{9}\right)x^2 + \frac{5d}{18} + \frac{5e}{9} + \frac{4f}{9} + \frac{8g}{9}}{x^4 - 5x^2 + 4} + \left(-\frac{35d}{432} - \frac{29e}{216} - \frac{23f}{108} - \frac{17g}{54}\right)$
risch	$\frac{\left(-\frac{5d}{36} - \frac{e}{9} - \frac{2f}{9} - \frac{5g}{18}\right)x^2 + \left(\frac{d}{6} + \frac{f}{6}\right)x + \frac{5d}{36} + \frac{5e}{18} + \frac{2f}{9} + \frac{4g}{9}}{x^3 - 2x^2 - x + 2} + \frac{\ln(x+2)d}{144} - \frac{\ln(x+2)e}{72} + \frac{\ln(x+2)f}{36} - \frac{\ln(x+2)g}{18} + \frac{\ln(-x-1)d}{54} +$
parallelrisch	$-\frac{96f-192g+60d x^2-60d-120e+96f x^2+120g x^2-72dx-60 \ln(x-1)x^3 e-8 \ln(x+1)x^3 d-4 \ln(x+1)x^3 e-3 \ln(x+2)x^3 d+6 \ln(x-1)x^3 e}{432}$

[In] int((x+2)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x,method=\_RETURNVERBOSE)

```
[Out] (1/144*d-1/72*e+1/36*f-1/18*g)*ln(x+2)-(1/36*d-1/36*e+1/36*f-1/36*g)/(x+1)+
(1/54*d+1/108*e-1/27*f+7/108*g)*ln(x+1)-(1/12*d+1/12*e+1/12*f+1/12*g)/(x-1)
+(1/18*d+5/36*e+2/9*f+11/36*g)*ln(x-1)+(-35/432*d-29/216*e-23/108*f-17/54*g)
)*ln(x-2)-(1/36*d+1/18*e+1/9*f+2/9*g)/(x-2)
```

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 321 vs. 2(123) = 246.

Time = 0.78 (sec) , antiderivative size = 321, normalized size of antiderivative = 2.28

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx =$$


---


$$12(5d+4e+8f+10g)x^2 - 72(d+f)x - 3((d-2e+4f-8g)x^3 - 2(d-2e+4f-8g)x^2 - (a$$

[In] integrate((2+x)\*(g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="fricas")

[Out] -1/432\*(12\*(5\*d + 4\*e + 8\*f + 10\*g)\*x^2 - 72\*(d + f)\*x - 3\*((d - 2\*e + 4\*f - 8\*g)\*x^3 - 2\*(d - 2\*e + 4\*f - 8\*g)\*x + 2\*d - 4\*e + 8\*f - 16\*g)\*log(x + 2) - 4\*((2\*d + e - 4\*f + 7\*g)\*x^3 - 2\*(2\*d + e - 4\*f + 7\*g)\*x^2 - (2\*d + e - 4\*f + 7\*g)\*x + 4\*d + 2\*e - 8\*f + 14\*g)\*log(x + 1) - 12\*((2\*d + 5\*e + 8\*f + 11\*g)\*x^3 - 2\*(2\*d + 5\*e + 8\*f + 11\*g)\*x^2 - (2\*d + 5\*e + 8\*f + 11\*g)\*x + 4\*d + 10\*e + 16\*f + 22\*g)\*log(x - 1) + ((35\*d + 58\*e + 92\*f + 136\*g)\*x^3 - 2\*(35\*d + 58\*e + 92\*f + 136\*g)\*x^2 - (35\*d + 58\*e + 92\*f + 136\*g)\*x + 70\*d + 116\*e + 184\*f + 272\*g)\*log(x - 2) - 60\*d - 120\*e - 96\*f - 192\*g)/(x^3 - 2\*x^2 - x + 2)

**Sympy [F(-1)]**

Timed out.

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx = \text{Timed out}$$

[In] integrate((2+x)\*(g\*x\*\*3+f\*x\*\*2+e\*x+d)/(x\*\*4-5\*x\*\*2+4)\*\*2,x)

[Out] Timed out

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 126, normalized size of antiderivative = 0.89

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx$$

$$= \frac{1}{144} (d-2e+4f-8g) \log(x+2) + \frac{1}{108} (2d+e-4f+7g) \log(x+1)$$

$$+ \frac{1}{36} (2d+5e+8f+11g) \log(x-1) - \frac{1}{432} (35d+58e+92f+136g) \log(x-2)$$

$$- \frac{(5d+4e+8f+10g)x^2 - 6(d+f)x - 5d - 10e - 8f - 16g}{36(x^3 - 2x^2 - x + 2)}$$

```
[In] integrate((2+x)*(g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x, algorithm="maxima")
[Out] 1/144*(d - 2*e + 4*f - 8*g)*log(x + 2) + 1/108*(2*d + e - 4*f + 7*g)*log(x
+ 1) + 1/36*(2*d + 5*e + 8*f + 11*g)*log(x - 1) - 1/432*(35*d + 58*e + 92*f
+ 136*g)*log(x - 2) - 1/36*((5*d + 4*e + 8*f + 10*g)*x^2 - 6*(d + f)*x - 5
*d - 10*e - 8*f - 16*g)/(x^3 - 2*x^2 - x + 2)
```

### Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 130, normalized size of antiderivative = 0.92

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx$$

$$= \frac{1}{144} (d - 2e + 4f - 8g) \log(|x + 2|) + \frac{1}{108} (2d + e - 4f + 7g) \log(|x + 1|)$$

$$+ \frac{1}{36} (2d + 5e + 8f + 11g) \log(|x - 1|) - \frac{1}{432} (35d + 58e + 92f + 136g) \log(|x - 2|)$$

$$- \frac{(5d + 4e + 8f + 10g)x^2 - 6(d + f)x - 5d - 10e - 8f - 16g}{36(x + 1)(x - 1)(x - 2)}$$

```
[In] integrate((2+x)*(g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x, algorithm="giac")
```

```
[Out] 1/144*(d - 2*e + 4*f - 8*g)*log(abs(x + 2)) + 1/108*(2*d + e - 4*f + 7*g)*1
og(abs(x + 1)) + 1/36*(2*d + 5*e + 8*f + 11*g)*log(abs(x - 1)) - 1/432*(35*
d + 58*e + 92*f + 136*g)*log(abs(x - 2)) - 1/36*((5*d + 4*e + 8*f + 10*g)*x
^2 - 6*(d + f)*x - 5*d - 10*e - 8*f - 16*g)/((x + 1)*(x - 1)*(x - 2))
```

### Mupad [B] (verification not implemented)

Time = 8.21 (sec) , antiderivative size = 131, normalized size of antiderivative = 0.93

$$\int \frac{(2+x)(d+ex+fx^2+gx^3)}{(4-5x^2+x^4)^2} dx$$

$$= \ln(x - 1) \left( \frac{d}{18} + \frac{5e}{36} + \frac{2f}{9} + \frac{11g}{36} \right) + \ln(x + 2) \left( \frac{d}{144} - \frac{e}{72} + \frac{f}{36} - \frac{g}{18} \right)$$

$$+ \ln(x + 1) \left( \frac{d}{54} + \frac{e}{108} - \frac{f}{27} + \frac{7g}{108} \right) - \ln(x - 2) \left( \frac{35d}{432} + \frac{29e}{216} + \frac{23f}{108} + \frac{17g}{54} \right)$$

$$- \frac{\left( -\frac{5d}{36} - \frac{e}{9} - \frac{2f}{9} - \frac{5g}{18} \right) x^2 + \left( \frac{d}{6} + \frac{f}{6} \right) x + \frac{5d}{36} + \frac{5e}{18} + \frac{2f}{9} + \frac{4g}{9}}{-x^3 + 2x^2 + x - 2}$$

```
[In] int(((x + 2)*(d + e*x + f*x^2 + g*x^3))/(x^4 - 5*x^2 + 4)^2,x)
```

```
[Out] log(x - 1)*(d/18 + (5*e)/36 + (2*f)/9 + (11*g)/36) + log(x + 2)*(d/144 - e/
72 + f/36 - g/18) + log(x + 1)*(d/54 + e/108 - f/27 + (7*g)/108) - log(x -
```

$$2) * ((35*d)/432 + (29*e)/216 + (23*f)/108 + (17*g)/54) - ((5*d)/36 + (5*e)/18 + (2*f)/9 + (4*g)/9 - x^2 * ((5*d)/36 + e/9 + (2*f)/9 + (5*g)/18) + x * (d/6 + f/6)) / (x + 2*x^2 - x^3 - 2)$$

$$3.101 \quad \int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx$$

Optimal result	1120
Rubi [A] (verified)	1121
Mathematica [A] (verified)	1122
Maple [A] (verified)	1122
Fricas [B] (verification not implemented)	1123
Sympy [F(-1)]	1123
Maxima [A] (verification not implemented)	1124
Giac [A] (verification not implemented)	1124
Mupad [B] (verification not implemented)	1125

### Optimal result

Integrand size = 36, antiderivative size = 158

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx = \frac{d+e+f+g+h}{12(1-x)} + \frac{d+2e+4f+8g+16h}{36(2-x)} - \frac{d-e+f-g+h}{36(1+x)} + \frac{1}{36}(2d+5e+8f+11g+14h)\log(1-x) - \frac{1}{432}(35d+58e+92f+136g+176h)\log(2-x) + \frac{1}{108}(2d+e-4f+7g-10h)\log(1+x) + \frac{1}{144}(d-2e+4f-8g+16h)\log(2+x)$$

```
[Out] 1/12*(d+e+f+g+h)/(1-x)+1/36*(d+2*e+4*f+8*g+16*h)/(2-x)+1/36*(-d+e-f+g-h)/(1+x)+1/36*(2*d+5*e+8*f+11*g+14*h)*ln(1-x)-1/432*(35*d+58*e+92*f+136*g+176*h)*ln(2-x)+1/108*(2*d+e-4*f+7*g-10*h)*ln(1+x)+1/144*(d-2*e+4*f-8*g+16*h)*ln(2+x)
```



**Rubi [A] (verified)**

Time = 0.20 (sec) , antiderivative size = 158, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.056$ , Rules used = {1600, 6874}

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx = -\frac{d-e+f-g+h}{36(x+1)} + \frac{d+e+f+g+h}{12(1-x)} + \frac{d+2e+4f+8g+16h}{36(2-x)} + \frac{1}{36} \log(1-x)(2d+5e+8f+11g+14h) - \frac{1}{432} \log(2-x)(35d+58e+92f+136g+176h) + \frac{1}{108} \log(x+1)(2d+e-4f+7g-10h) + \frac{1}{144} \log(x+2)(d-2e+4f-8g+16h)$$

[In] Int[((2 + x)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4))/(4 - 5\*x^2 + x^4)^2,x]

[Out] (d + e + f + g + h)/(12\*(1 - x)) + (d + 2\*e + 4\*f + 8\*g + 16\*h)/(36\*(2 - x)) - (d - e + f - g + h)/(36\*(1 + x)) + ((2\*d + 5\*e + 8\*f + 11\*g + 14\*h)\*Log[1 - x])/36 - ((35\*d + 58\*e + 92\*f + 136\*g + 176\*h)\*Log[2 - x])/432 + ((2\*d + e - 4\*f + 7\*g - 10\*h)\*Log[1 + x])/108 + ((d - 2\*e + 4\*f - 8\*g + 16\*h)\*Log[2 + x])/144

Rule 1600

Int[(u\_)\*(Px\_)^(p\_)\*(Qx\_)^(q\_), x\_Symbol] :> Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p+q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rule 6874

Int[u\_, x\_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]]

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{d+ex+fx^2+gx^3+hx^4}{(2+x)(2-x-2x^2+x^3)^2} dx \\ &= \int \left( \frac{d+2e+4f+8g+16h}{36(-2+x)^2} + \frac{-35d-58e-92f-136g-176h}{432(-2+x)} \right. \\ &\quad \left. + \frac{d+e+f+g+h}{12(-1+x)^2} + \frac{2d+5e+8f+11g+14h}{36(-1+x)} + \frac{d-e+f-g+h}{36(1+x)^2} \right. \\ &\quad \left. + \frac{2d+e-4f+7g-10h}{108(1+x)} + \frac{d-2e+4f-8g+16h}{144(2+x)} \right) dx \end{aligned}$$

$$\begin{aligned}
&= \frac{d+e+f+g+h}{12(1-x)} + \frac{d+2e+4f+8g+16h}{36(2-x)} \\
&\quad - \frac{d-e+f-g+h}{36(1+x)} + \frac{1}{36}(2d+5e+8f+11g+14h)\log(1-x) \\
&\quad - \frac{1}{432}(35d+58e+92f+136g+176h)\log(2-x) \\
&\quad + \frac{1}{108}(2d+e-4f+7g-10h)\log(1+x) + \frac{1}{144}(d-2e+4f-8g+16h)\log(2+x)
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.06 (sec) , antiderivative size = 169, normalized size of antiderivative = 1.07

$$\begin{aligned}
&\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx \\
&= \frac{1}{432} \left( \frac{12(d(5+6x-5x^2)+2(8g+10h+3hx-5gx^2-10hx^2+f(4+3x-4x^2)+e(5-2x^2)))}{2-x-2x^2+x^3} \right. \\
&\quad \left. + 12(2d+5e+8f+11g+14h)\log(1-x) - (35d+58e+92f+136g+176h)\log(2-x) \right. \\
&\quad \left. + 4(2d+e-4f+7g-10h)\log(1+x) + 3(d-2e+4f-8g+16h)\log(2+x) \right)
\end{aligned}$$

[In] Integrate[((2+x)\*(d+e\*x+f\*x^2+g\*x^3+h\*x^4))/(4-5\*x^2+x^4)^2,x  
]

[Out] ((12\*(d\*(5+6\*x-5\*x^2)+2\*(8\*g+10\*h+3\*h\*x-5\*g\*x^2-10\*h\*x^2+f\*(4+3\*x-4\*x^2)+e\*(5-2\*x^2)))/(2-x-2\*x^2+x^3)+12\*(2\*d+5\*e+8\*f+11\*g+14\*h)\*Log[1-x]-(35\*d+58\*e+92\*f+136\*g+176\*h)\*Log[2-x]+4\*(2\*d+e-4\*f+7\*g-10\*h)\*Log[1+x]+3\*(d-2\*e+4\*f-8\*g+16\*h)\*Log[2+x])/432

### Maple [A] (verified)

Time = 0.11 (sec) , antiderivative size = 155, normalized size of antiderivative = 0.98

method	result
default	$\left(\frac{d}{144} - \frac{e}{72} + \frac{f}{36} - \frac{g}{18} + \frac{h}{9}\right) \ln(x+2) - \frac{\frac{d}{36} - \frac{e}{36} + \frac{f}{36} - \frac{g}{36} + \frac{h}{36}}{x+1} + \left(\frac{d}{54} + \frac{e}{108} - \frac{f}{27} + \frac{7g}{108} - \frac{5h}{54}\right) \ln(x+1)$
norman	$\frac{\left(-\frac{5d}{36} - \frac{e}{9} - \frac{2f}{9} - \frac{5g}{18} - \frac{5h}{9}\right)x^3 + \left(\frac{17d}{36} + \frac{5e}{18} + \frac{5f}{9} + \frac{4g}{9} + \frac{8h}{9}\right)x + \left(-\frac{d}{9} - \frac{2e}{9} - \frac{5f}{18} - \frac{5g}{9} - \frac{17h}{18}\right)x^2 + \frac{5d}{18} + \frac{5e}{9} + \frac{10h}{9} + \frac{4f}{9} + \frac{8g}{9}}{x^4 - 5x^2 + 4} + \left(-\frac{35d}{432} - \frac{e}{108} + \frac{f}{36} - \frac{g}{18} + \frac{h}{9}\right) \ln(x+2)$
risch	$\frac{\left(-\frac{5d}{36} - \frac{e}{9} - \frac{2f}{9} - \frac{5g}{18} - \frac{5h}{9}\right)x^2 + \left(\frac{h}{6} + \frac{f}{6} + \frac{d}{6}\right)x + \frac{5d}{36} + \frac{5e}{18} + \frac{2f}{9} + \frac{4g}{9} + \frac{5h}{9}}{x^3 - 2x^2 - x + 2} + \frac{\ln(x+2)d}{144} - \frac{\ln(x+2)e}{72} + \frac{\ln(x+2)f}{36} - \frac{\ln(x+2)g}{18} + \frac{\ln(x+2)h}{9}$
parallelrisc	$-\frac{96f-192g+60dx^2-60d-240h-120e+96f}{x^2-2x+2} - 176 \ln(x-2)xh + 168 \ln(x-1)xh - 40 \ln(x+1)xh + 48 \ln(x+2)xh + 120g x^2 - 72d x - 120e x - 120h x - 120g x^2 - 72d x - 120e x - 120h x$

```
[In] int((x+2)*(h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x,method=_RETURNVERBOSE)
```

```
[Out] (1/144*d-1/72*e+1/36*f-1/18*g+1/9*h)*ln(x+2)-(1/36*d-1/36*e+1/36*f-1/36*g+1/36*h)/(x+1)+(1/54*d+1/108*e-1/27*f+7/108*g-5/54*h)*ln(x+1)-(1/12*d+1/12*e+1/12*f+1/12*g+1/12*h)/(x-1)+(1/18*d+5/36*e+2/9*f+11/36*g+7/18*h)*ln(x-1)+(-35/432*d-29/216*e-23/108*f-17/54*g-11/27*h)*ln(x-2)-(1/36*d+1/18*e+1/9*f+2/9*g+4/9*h)/(x-2)
```

## Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 376 vs.  $2(140) = 280$ .

Time = 3.63 (sec) , antiderivative size = 376, normalized size of antiderivative = 2.38

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx =$$

$$\frac{12(5d+4e+8f+10g+20h)x^2 - 72(d+f+h)x - 3((d-2e+4f-8g+16h)x^3 - 2(d-2e-4f+8g-16h)x^2 - (d-2e+4f-8g+16h)x + 2d-4e+8f-16g+32h)\log(x+2) - 4((2d+e-4f+7g-10h)x^3 - 2(2d+e-4f+7g-10h)x^2 - (2d+e-4f+7g-10h)x + 4d+2e-8f+14g-20h)\log(x+1) - 12((2d+5e+8f+11g+14h)x^3 - 2(2d+5e+8f+11g+14h)x^2 - (2d+5e+8f+11g+14h)x + 4d+10e+16f+22g+28h)\log(x-1) + ((35d+58e+92f+136g+176h)x^3 - 2(35d+58e+92f+136g+176h)x^2 - (35d+58e+92f+136g+176h)x + 70d+116e+184f+272g+352h)\log(x-2) - 60d - 120e - 96f - 192g - 240h}{(x^3 - 2x^2 - x + 2)}$$

```
[In] integrate((2+x)*(h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x, algorithm="fricas")
```

```
[Out] -1/432*(12*(5*d + 4*e + 8*f + 10*g + 20*h)*x^2 - 72*(d + f + h)*x - 3*((d - 2*e + 4*f - 8*g + 16*h)*x^3 - 2*(d - 2*e + 4*f - 8*g + 16*h)*x^2 - (d - 2*e + 4*f - 8*g + 16*h)*x + 2*d - 4*e + 8*f - 16*g + 32*h)*log(x + 2) - 4*((2*d + e - 4*f + 7*g - 10*h)*x^3 - 2*(2*d + e - 4*f + 7*g - 10*h)*x^2 - (2*d + e - 4*f + 7*g - 10*h)*x + 4*d + 2*e - 8*f + 14*g - 20*h)*log(x + 1) - 12*((2*d + 5*e + 8*f + 11*g + 14*h)*x^3 - 2*(2*d + 5*e + 8*f + 11*g + 14*h)*x^2 - (2*d + 5*e + 8*f + 11*g + 14*h)*x + 4*d + 10*e + 16*f + 22*g + 28*h)*log(x - 1) + ((35*d + 58*e + 92*f + 136*g + 176*h)*x^3 - 2*(35*d + 58*e + 92*f + 136*g + 176*h)*x^2 - (35*d + 58*e + 92*f + 136*g + 176*h)*x + 70*d + 116*e + 184*f + 272*g + 352*h)*log(x - 2) - 60*d - 120*e - 96*f - 192*g - 240*h)/(x^3 - 2*x^2 - x + 2)
```

## Sympy [F(-1)]

Timed out.

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx = \text{Timed out}$$

```
[In] integrate((2+x)*(h*x**4+g*x**3+f*x**2+e*x+d)/(x**4-5*x**2+4)**2,x)
```

```
[Out] Timed out
```

**Maxima [A] (verification not implemented)**

none

Time = 0.19 (sec) , antiderivative size = 145, normalized size of antiderivative = 0.92

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx$$

$$= \frac{1}{144} (d-2e+4f-8g+16h) \log(x+2) + \frac{1}{108} (2d+e-4f+7g-10h) \log(x+1)$$

$$+ \frac{1}{36} (2d+5e+8f+11g+14h) \log(x-1)$$

$$- \frac{1}{432} (35d+58e+92f+136g+176h) \log(x-2)$$

$$- \frac{(5d+4e+8f+10g+20h)x^2 - 6(d+f+h)x - 5d - 10e - 8f - 16g - 20h}{36(x^3 - 2x^2 - x + 2)}$$

[In] integrate((2+x)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="maxima")

[Out] 1/144\*(d - 2\*e + 4\*f - 8\*g + 16\*h)\*log(x + 2) + 1/108\*(2\*d + e - 4\*f + 7\*g - 10\*h)\*log(x + 1) + 1/36\*(2\*d + 5\*e + 8\*f + 11\*g + 14\*h)\*log(x - 1) - 1/432\*(35\*d + 58\*e + 92\*f + 136\*g + 176\*h)\*log(x - 2) - 1/36\*((5\*d + 4\*e + 8\*f + 10\*g + 20\*h)\*x^2 - 6\*(d + f + h)\*x - 5\*d - 10\*e - 8\*f - 16\*g - 20\*h)/(x^3 - 2\*x^2 - x + 2)

**Giac [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 149, normalized size of antiderivative = 0.94

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx$$

$$= \frac{1}{144} (d-2e+4f-8g+16h) \log(|x+2|)$$

$$+ \frac{1}{108} (2d+e-4f+7g-10h) \log(|x+1|)$$

$$+ \frac{1}{36} (2d+5e+8f+11g+14h) \log(|x-1|)$$

$$- \frac{1}{432} (35d+58e+92f+136g+176h) \log(|x-2|)$$

$$- \frac{(5d+4e+8f+10g+20h)x^2 - 6(d+f+h)x - 5d - 10e - 8f - 16g - 20h}{36(x+1)(x-1)(x-2)}$$

[In] integrate((2+x)\*(h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out]  $\frac{1}{144}(d - 2e + 4f - 8g + 16h)\log(\text{abs}(x + 2)) + \frac{1}{108}(2d + e - 4f + 7g - 10h)\log(\text{abs}(x + 1)) + \frac{1}{36}(2d + 5e + 8f + 11g + 14h)\log(\text{abs}(x - 1)) - \frac{1}{432}(35d + 58e + 92f + 136g + 176h)\log(\text{abs}(x - 2)) - \frac{1}{3}6*((5*d + 4*e + 8*f + 10*g + 20*h)*x^2 - 6*(d + f + h)*x - 5*d - 10*e - 8*f - 16*g - 20*h)/((x + 1)*(x - 1)*(x - 2))$

### Mupad [B] (verification not implemented)

Time = 8.43 (sec) , antiderivative size = 152, normalized size of antiderivative = 0.96

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4)}{(4-5x^2+x^4)^2} dx$$

$$= \ln(x-1) \left( \frac{d}{18} + \frac{5e}{36} + \frac{2f}{9} + \frac{11g}{36} + \frac{7h}{18} \right) - \frac{\left( -\frac{5d}{36} - \frac{e}{9} - \frac{2f}{9} - \frac{5g}{18} - \frac{5h}{9} \right) x^2 + \left( \frac{d}{6} + \frac{f}{6} + \frac{h}{6} \right) x + \frac{5d}{36} + \frac{5e}{18} + \frac{2f}{9} + \frac{4g}{9} + \frac{5h}{9}}{-x^3 + 2x^2 + x - 2}$$

$$+ \ln(x+2) \left( \frac{d}{144} - \frac{e}{72} + \frac{f}{36} - \frac{g}{18} + \frac{h}{9} \right) + \ln(x+1) \left( \frac{d}{54} + \frac{e}{108} - \frac{f}{27} + \frac{7g}{108} - \frac{5h}{54} \right) - \ln(x-2) \left( \frac{35d}{432} + \frac{29e}{216} + \frac{23f}{108} + \frac{17g}{54} + \frac{11h}{27} \right)$$

[In]  $\text{int}(((x + 2)*(d + e*x + f*x^2 + g*x^3 + h*x^4))/(x^4 - 5*x^2 + 4)^2, x)$

[Out]  $\log(x - 1)*(d/18 + (5*e)/36 + (2*f)/9 + (11*g)/36 + (7*h)/18) - ((5*d)/36 + (5*e)/18 + (2*f)/9 + (4*g)/9 + (5*h)/9 - x^2*((5*d)/36 + e/9 + (2*f)/9 + (5*g)/18 + (5*h)/9) + x*(d/6 + f/6 + h/6))/(x + 2*x^2 - x^3 - 2) + \log(x + 2)*(d/144 - e/72 + f/36 - g/18 + h/9) + \log(x + 1)*(d/54 + e/108 - f/27 + (7*g)/108 - (5*h)/54) - \log(x - 2)*((35*d)/432 + (29*e)/216 + (23*f)/108 + (17*g)/54 + (11*h)/27)$

$$3.102 \quad \int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx$$

Optimal result	1126
Rubi [A] (verified)	1126
Mathematica [A] (verified)	1128
Maple [A] (verified)	1128
Fricas [B] (verification not implemented)	1129
Sympy [F(-1)]	1130
Maxima [A] (verification not implemented)	1130
Giac [A] (verification not implemented)	1131
Mupad [B] (verification not implemented)	1131

### Optimal result

Integrand size = 41, antiderivative size = 177

$$\begin{aligned} & \int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx \\ &= \frac{d+e+f+g+h+i}{12(1-x)} + \frac{d+2e+4f+8g+16h+32i}{36(2-x)} \\ & \quad - \frac{d-e+f-g+h-i}{36(1+x)} + \frac{1}{36}(2d+5e+8f+11g+14h+17i)\log(1-x) \\ & \quad - \frac{1}{432}(35d+58e+92f+136g+176h+160i)\log(2-x) \\ & \quad + \frac{1}{108}(2d+e-4f+7g-10h+13i)\log(1+x) + \frac{1}{144}(d-2e+4f-8g+16h-32i)\log(2+x) \end{aligned}$$

```
[Out] 1/12*(d+e+f+g+h+i)/(1-x)+1/36*(d+2*e+4*f+8*g+16*h+32*i)/(2-x)+1/36*(-d+e-f+g-h+i)/(1+x)+1/36*(2*d+5*e+8*f+11*g+14*h+17*i)*ln(1-x)-1/432*(35*d+58*e+92*f+136*g+176*h+160*i)*ln(2-x)+1/108*(2*d+e-4*f+7*g-10*h+13*i)*ln(1+x)+1/144*(d-2*e+4*f-8*g+16*h-32*i)*ln(2+x)
```

### Rubi [A] (verified)

Time = 0.23 (sec) , antiderivative size = 177, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.049$ , Rules used

= {1600, 6874}

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx$$

$$= -\frac{d-e+f-g+h-i}{36(x+1)} + \frac{d+e+f+g+h+i}{12(1-x)} + \frac{d+2e+4f+8g+16h+32i}{36(2-x)}$$

$$+ \frac{1}{36} \log(1-x)(2d+5e+8f+11g+14h+17i)$$

$$- \frac{1}{432} \log(2-x)(35d+58e+92f+136g+176h+160i)$$

$$+ \frac{1}{108} \log(x+1)(2d+e-4f+7g-10h+13i) + \frac{1}{144} \log(x+2)(d-2e+4f-8g+16h-32i)$$

[In] Int[((2 + x)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5))/(4 - 5\*x^2 + x^4)^2, x]

[Out] (d + e + f + g + h + i)/(12\*(1 - x)) + (d + 2\*e + 4\*f + 8\*g + 16\*h + 32\*i)/(36\*(2 - x)) - (d - e + f - g + h - i)/(36\*(1 + x)) + ((2\*d + 5\*e + 8\*f + 11\*g + 14\*h + 17\*i)\*Log[1 - x])/36 - ((35\*d + 58\*e + 92\*f + 136\*g + 176\*h + 160\*i)\*Log[2 - x])/432 + ((2\*d + e - 4\*f + 7\*g - 10\*h + 13\*i)\*Log[1 + x])/108 + ((d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)\*Log[2 + x])/144

Rule 1600

Int[(u\_)\*(Px\_)^(p\_)\*(Qx\_)^(q\_), x\_Symbol] :> Int[u\*PolynomialQuotient[Px, Qx, x]^p\*Qx^(p+q), x] /; FreeQ[q, x] && PolyQ[Px, x] && PolyQ[Qx, x] && EqQ[PolynomialRemainder[Px, Qx, x], 0] && IntegerQ[p] && LtQ[p\*q, 0]

Rule 6874

Int[u\_, x\_Symbol] :> With[{v = ExpandIntegrand[u, x]}, Int[v, x] /; SumQ[v]]

Rubi steps

$$\text{integral} = \int \frac{d+ex+fx^2+gx^3+hx^4+ix^5}{(2+x)(2-x-2x^2+x^3)^2} dx$$

$$= \int \left( \frac{d+2e+4f+8g+16h+32i}{36(-2+x)^2} + \frac{-35d-58e-92f-136g-176h-160i}{432(-2+x)} \right.$$

$$+ \frac{d+e+f+g+h+i}{12(-1+x)^2} + \frac{2d+5e+8f+11g+14h+17i}{36(-1+x)}$$

$$+ \frac{d-e+f-g+h-i}{36(1+x)^2} + \frac{2d+e-4f+7g-10h+13i}{108(1+x)}$$

$$\left. + \frac{d-2e+4f-8g+16h-32i}{144(2+x)} \right) dx$$

$$\begin{aligned}
&= \frac{d+e+f+g+h+i}{12(1-x)} + \frac{d+2e+4f+8g+16h+32i}{36(2-x)} \\
&\quad - \frac{d-e+f-g+h-i}{36(1+x)} + \frac{1}{36}(2d+5e+8f+11g+14h+17i)\log(1-x) \\
&\quad - \frac{1}{432}(35d+58e+92f+136g+176h+160i)\log(2-x) \\
&\quad + \frac{1}{108}(2d+e-4f+7g-10h+13i)\log(1+x) \\
&\quad + \frac{1}{144}(d-2e+4f-8g+16h-32i)\log(2+x)
\end{aligned}$$

### Mathematica [A] (verified)

Time = 0.07 (sec) , antiderivative size = 195, normalized size of antiderivative = 1.10

$$\begin{aligned}
&\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx \\
&= \frac{5d+10e+8f+16g+20h+40i+6dx+6fx+6hx-5dx^2-4ex^2-8fx^2-10gx^2-20hx^2-34ix^2}{36(2-x-2x^2+x^3)} \\
&\quad + \frac{1}{36}(2d+5e+8f+11g+14h+17i)\log(1-x) \\
&\quad + \frac{1}{432}(-35d-58e-92f-136g-176h-160i)\log(2-x) \\
&\quad + \frac{1}{108}(2d+e-4f+7g-10h+13i)\log(1+x) + \frac{1}{144}(d-2e+4f-8g+16h-32i)\log(2+x)
\end{aligned}$$

[In] Integrate[((2+x)\*(d+e\*x+f\*x^2+g\*x^3+h\*x^4+i\*x^5))/(4-5\*x^2+x^4)^2,x]

[Out] (5\*d+10\*e+8\*f+16\*g+20\*h+40\*i+6\*d\*x+6\*f\*x+6\*h\*x-5\*d\*x^2-4\*e\*x^2-8\*f\*x^2-10\*g\*x^2-20\*h\*x^2-34\*i\*x^2)/(36\*(2-x-2\*x^2+x^3)) + ((2\*d+5\*e+8\*f+11\*g+14\*h+17\*i)\*Log[1-x])/36 + ((-35\*d-58\*e-92\*f-136\*g-176\*h-160\*i)\*Log[2-x])/432 + ((2\*d+e-4\*f+7\*g-10\*h+13\*i)\*Log[1+x])/108 + ((d-2\*e+4\*f-8\*g+16\*h-32\*i)\*Log[2+x])/144

### Maple [A] (verified)

Time = 0.13 (sec) , antiderivative size = 176, normalized size of antiderivative = 0.99



method	result
default	$\left(\frac{d}{144} - \frac{e}{72} + \frac{f}{36} - \frac{g}{18} + \frac{h}{9} - \frac{2i}{9}\right) \ln(x+2) - \frac{\frac{d}{36} - \frac{e}{36} + \frac{f}{36} - \frac{g}{36} + \frac{h}{36} - \frac{i}{36}}{x+1} + \left(\frac{d}{54} + \frac{e}{108} - \frac{f}{27} + \frac{7g}{108} - \frac{5h}{54} - \frac{3i}{54}\right) \ln(x-1)$
norman	$\left(-\frac{5d}{36} - \frac{e}{9} - \frac{2f}{9} - \frac{5g}{18} - \frac{5h}{9} - \frac{17i}{18}\right)x^3 + \left(\frac{17d}{36} + \frac{5e}{18} + \frac{5f}{9} + \frac{4g}{9} + \frac{8h}{9} + \frac{10i}{9}\right)x + \left(-\frac{d}{9} - \frac{2e}{9} - \frac{5f}{18} - \frac{5g}{9} - \frac{17h}{18} - \frac{17i}{9}\right)x^2 + \frac{5d}{18} + \frac{5e}{9} + \frac{10h}{9} + \frac{20i}{9} + \frac{4g}{9}$ $\frac{7 \ln(-x-1)g}{108} + \frac{\ln(x-1)d}{18} + \frac{5 \ln(x-1)e}{36} + \frac{\ln(x+2)f}{36} - \frac{5 \ln(-x-1)h}{54} - \frac{23 \ln(2-x)f}{108} - \frac{35 \ln(2-x)d}{432} - \frac{29 \ln(2-x)e}{216}$
risch	
parallelrisch	Expression too large to display

[In] int((x+2)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x,method=\_RETURNV  
ERBOSE)

[Out] (1/144\*d-1/72\*e+1/36\*f-1/18\*g+1/9\*h-2/9\*i)\*ln(x+2)-(1/36\*d-1/36\*e+1/36\*f-1/  
36\*g+1/36\*h-1/36\*i)/(x+1)+(1/54\*d+1/108\*e-1/27\*f+7/108\*g-5/54\*h+13/108\*i)\*l  
n(x+1)-(1/12\*d+1/12\*e+1/12\*f+1/12\*g+1/12\*h+1/12\*i)/(x-1)+(1/18\*d+5/36\*e+2/9  
\*f+11/36\*g+7/18\*h+17/36\*i)\*ln(x-1)+(-35/432\*d-29/216\*e-23/108\*f-17/54\*g-11/  
27\*h-10/27\*i)\*ln(x-2)-(1/36\*d+1/18\*e+1/9\*f+2/9\*g+4/9\*h+8/9\*i)/(x-2)

### Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 430 vs. 2(159) = 318.

Time = 20.84 (sec) , antiderivative size = 430, normalized size of antiderivative = 2.43

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx =$$


---


$$\frac{12(5d+4e+8f+10g+20h+34i)x^2 - 72(d+f+h)x - 3((d-2e+4f-8g+16h-32i)x^3$$

[In] integrate((2+x)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm  
m="fricas")

[Out] -1/432\*(12\*(5\*d + 4\*e + 8\*f + 10\*g + 20\*h + 34\*i)\*x^2 - 72\*(d + f + h)\*x -  
3\*((d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i))\*x^3 - 2\*(d - 2\*e + 4\*f - 8\*g + 16\*h  
- 32\*i)\*x^2 - (d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)\*x + 2\*d - 4\*e + 8\*f - 16\*  
g + 32\*h - 64\*i)\*log(x + 2) - 4\*((2\*d + e - 4\*f + 7\*g - 10\*h + 13\*i)\*x^3 -  
2\*(2\*d + e - 4\*f + 7\*g - 10\*h + 13\*i)\*x^2 - (2\*d + e - 4\*f + 7\*g - 10\*h + 1  
3\*i)\*x + 4\*d + 2\*e - 8\*f + 14\*g - 20\*h + 26\*i)\*log(x + 1) - 12\*((2\*d + 5\*e  
+ 8\*f + 11\*g + 14\*h + 17\*i)\*x^3 - 2\*(2\*d + 5\*e + 8\*f + 11\*g + 14\*h + 17\*i)\*  
x^2 - (2\*d + 5\*e + 8\*f + 11\*g + 14\*h + 17\*i)\*x + 4\*d + 10\*e + 16\*f + 22\*g +  
28\*h + 34\*i)\*log(x - 1) + ((35\*d + 58\*e + 92\*f + 136\*g + 176\*h + 160\*i)\*x^  
3 - 2\*(35\*d + 58\*e + 92\*f + 136\*g + 176\*h + 160\*i)\*x^2 - (35\*d + 58\*e + 92\*  
f + 136\*g + 176\*h + 160\*i)\*x + 70\*d + 116\*e + 184\*f + 272\*g + 352\*h + 320\*i  
) \* log(x - 2) - 60\*d - 120\*e - 96\*f - 192\*g - 240\*h - 480\*i)/(x^3 - 2\*x^2 -  
x + 2)

**Sympy [F(-1)]**

Timed out.

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx = \text{Timed out}$$

```
[In] integrate((2+x)*(i*x**5+h*x**4+g*x**3+f*x**2+e*x+d)/(x**4-5*x**2+4)**2,x)
```

```
[Out] Timed out
```

**Maxima [A] (verification not implemented)**

none

Time = 0.20 (sec) , antiderivative size = 163, normalized size of antiderivative = 0.92

$$\begin{aligned} & \int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx \\ &= \frac{1}{144} (d-2e+4f-8g+16h-32i) \log(x+2) \\ & \quad + \frac{1}{108} (2d+e-4f+7g-10h+13i) \log(x+1) \\ & \quad + \frac{1}{36} (2d+5e+8f+11g+14h+17i) \log(x-1) \\ & \quad - \frac{1}{432} (35d+58e+92f+136g+176h+160i) \log(x-2) \\ & \quad - \frac{(5d+4e+8f+10g+20h+34i)x^2 - 6(d+f+h)x - 5d - 10e - 8f - 16g - 20h - 40i}{36(x^3 - 2x^2 - x + 2)} \end{aligned}$$

```
[In] integrate((2+x)*(i*x^5+h*x^4+g*x^3+f*x^2+e*x+d)/(x^4-5*x^2+4)^2,x, algorithm="maxima")
```

```
[Out] 1/144*(d - 2*e + 4*f - 8*g + 16*h - 32*i)*log(x + 2) + 1/108*(2*d + e - 4*f + 7*g - 10*h + 13*i)*log(x + 1) + 1/36*(2*d + 5*e + 8*f + 11*g + 14*h + 17*i)*log(x - 1) - 1/432*(35*d + 58*e + 92*f + 136*g + 176*h + 160*i)*log(x - 2) - 1/36*((5*d + 4*e + 8*f + 10*g + 20*h + 34*i)*x^2 - 6*(d + f + h)*x - 5*d - 10*e - 8*f - 16*g - 20*h - 40*i)/(x^3 - 2*x^2 - x + 2)
```

**Giac [A] (verification not implemented)**

none

Time = 0.30 (sec) , antiderivative size = 167, normalized size of antiderivative = 0.94

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx$$

$$= \frac{1}{144} (d-2e+4f-8g+16h-32i) \log(|x+2|)$$

$$+ \frac{1}{108} (2d+e-4f+7g-10h+13i) \log(|x+1|)$$

$$+ \frac{1}{36} (2d+5e+8f+11g+14h+17i) \log(|x-1|)$$

$$- \frac{1}{432} (35d+58e+92f+136g+176h+160i) \log(|x-2|)$$

$$- \frac{(5d+4e+8f+10g+20h+34i)x^2 - 6(d+f+h)x - 5d - 10e - 8f - 16g - 20h - 40i}{36(x+1)(x-1)(x-2)}$$

[In] integrate((2+x)\*(i\*x^5+h\*x^4+g\*x^3+f\*x^2+e\*x+d)/(x^4-5\*x^2+4)^2,x, algorithm="giac")

[Out] 1/144\*(d - 2\*e + 4\*f - 8\*g + 16\*h - 32\*i)\*log(abs(x + 2)) + 1/108\*(2\*d + e - 4\*f + 7\*g - 10\*h + 13\*i)\*log(abs(x + 1)) + 1/36\*(2\*d + 5\*e + 8\*f + 11\*g + 14\*h + 17\*i)\*log(abs(x - 1)) - 1/432\*(35\*d + 58\*e + 92\*f + 136\*g + 176\*h + 160\*i)\*log(abs(x - 2)) - 1/36\*((5\*d + 4\*e + 8\*f + 10\*g + 20\*h + 34\*i)\*x^2 - 6\*(d + f + h)\*x - 5\*d - 10\*e - 8\*f - 16\*g - 20\*h - 40\*i)/((x + 1)\*(x - 1)\*(x - 2))

**Mupad [B] (verification not implemented)**

Time = 8.69 (sec) , antiderivative size = 170, normalized size of antiderivative = 0.96

$$\int \frac{(2+x)(d+ex+fx^2+gx^3+hx^4+ix^5)}{(4-5x^2+x^4)^2} dx$$

$$= \ln(x-1) \left( \frac{d}{18} + \frac{5e}{36} + \frac{2f}{9} + \frac{11g}{36} + \frac{7h}{18} + \frac{17i}{36} \right) + \ln(x+2) \left( \frac{d}{144} - \frac{e}{72} + \frac{f}{36} - \frac{g}{18} + \frac{h}{9} - \frac{2i}{9} \right)$$

$$+ \ln(x+1) \left( \frac{d}{54} + \frac{e}{108} - \frac{f}{27} + \frac{7g}{108} - \frac{5h}{54} + \frac{13i}{108} \right)$$

$$- \ln(x-2) \left( \frac{35d}{432} + \frac{29e}{216} + \frac{23f}{108} + \frac{17g}{54} + \frac{11h}{27} + \frac{10i}{27} \right)$$

$$- \frac{\left( -\frac{5d}{36} - \frac{e}{9} - \frac{2f}{9} - \frac{5g}{18} - \frac{5h}{9} - \frac{17i}{18} \right) x^2 + \left( \frac{d}{6} + \frac{f}{6} + \frac{h}{6} \right) x + \frac{5d}{36} + \frac{5e}{18} + \frac{2f}{9} + \frac{4g}{9} + \frac{5h}{9} + \frac{10i}{9}}{-x^3 + 2x^2 + x - 2}$$

[In] int(((x + 2)\*(d + e\*x + f\*x^2 + g\*x^3 + h\*x^4 + i\*x^5))/(x^4 - 5\*x^2 + 4)^2, x)

```
[Out] log(x - 1)*(d/18 + (5*e)/36 + (2*f)/9 + (11*g)/36 + (7*h)/18 + (17*i)/36) +
log(x + 2)*(d/144 - e/72 + f/36 - g/18 + h/9 - (2*i)/9) + log(x + 1)*(d/54
+ e/108 - f/27 + (7*g)/108 - (5*h)/54 + (13*i)/108) - log(x - 2)*((35*d)/4
32 + (29*e)/216 + (23*f)/108 + (17*g)/54 + (11*h)/27 + (10*i)/27) - ((5*d)/
36 + (5*e)/18 + (2*f)/9 + (4*g)/9 + (5*h)/9 + (10*i)/9 - x^2*((5*d)/36 + e/
9 + (2*f)/9 + (5*g)/18 + (5*h)/9 + (17*i)/18) + x*(d/6 + f/6 + h/6))/(x + 2
*x^2 - x^3 - 2)
```

### 3.103 $\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^{3/2} dx$

Optimal result	1133
Rubi [A] (verified)	1134
Mathematica [C] (verified)	1139
Maple [A] (verified)	1141
Fricas [A] (verification not implemented)	1142
Sympy [F]	1143
Maxima [F]	1143
Giac [F]	1143
Mupad [F(-1)]	1143

#### Optimal result

Integrand size = 32, antiderivative size = 717

$$\begin{aligned}
 & \int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^{3/2} dx = \\
 & \frac{(18b^3cd - 144abc^2d - 8b^4f + 57ab^2cf - 84a^2c^2f) x \sqrt{a + bx^2 + cx^4}}{315c^{5/2} (\sqrt{a} + \sqrt{cx^2})} \\
 & - \frac{3(b^2 - 4ac) (2ce - bg) (b + 2cx^2) \sqrt{a + bx^2 + cx^4}}{256c^3} \\
 & + \frac{x(9b^2cd + 90ac^2d - 4b^3f + 9abcf + 3c(9bcd - 4b^2f + 14acf) x^2) \sqrt{a + bx^2 + cx^4}}{315c^2} \\
 & + \frac{(2ce - bg) (b + 2cx^2) (a + bx^2 + cx^4)^{3/2}}{32c^2} + \frac{x(3(3cd + bf) + 7cfx^2) (a + bx^2 + cx^4)^{3/2}}{63c} \\
 & + \frac{g(a + bx^2 + cx^4)^{5/2}}{10c} + \frac{3(b^2 - 4ac)^2 (2ce - bg) \operatorname{arctanh}\left(\frac{b+2cx^2}{2\sqrt{c}\sqrt{a+bx^2+cx^4}}\right)}{512c^{7/2}} \\
 & + \frac{\sqrt[4]{a}(18b^3cd - 144abc^2d - 8b^4f + 57ab^2cf - 84a^2c^2f) (\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}} E\left(2 \arctan\left(\frac{\sqrt[4]{cx}}{\sqrt{a}}\right) \middle| \frac{1}{4}\right)}{315c^{11/4} \sqrt{a + bx^2 + cx^4}} \\
 & + \frac{\sqrt[4]{a}(18b^3cd - 144abc^2d - 8b^4f + 57ab^2cf - 84a^2c^2f + \sqrt{a}\sqrt{c}(9b^2cd - 180ac^2d - 4b^3f + 24abcf)) (\sqrt{a} + \sqrt{cx^2})}{630c^{11/4} \sqrt{a + bx^2 + cx^4}}
 \end{aligned}$$

```

[Out] 1/32*(-b*g+2*c*e)*(2*c*x^2+b)*(c*x^4+b*x^2+a)^(3/2)/c^2+1/63*x*(7*c*f*x^2+3
*b*f+9*c*d)*(c*x^4+b*x^2+a)^(3/2)/c+1/10*g*(c*x^4+b*x^2+a)^(5/2)/c+3/512*(-
4*a*c+b^2)^2*(-b*g+2*c*e)*arctanh(1/2*(2*c*x^2+b)/c^(1/2)/(c*x^4+b*x^2+a)^(
1/2))/c^(7/2)-3/256*(-4*a*c+b^2)*(-b*g+2*c*e)*(2*c*x^2+b)*(c*x^4+b*x^2+a)^(
1/2)/c^3+1/315*x*(9*b^2*c*d+90*a*c^2*d-4*b^3*f+9*a*b*c*f+3*c*(14*a*c*f-4*b^
2*f+9*b*c*d)*x^2)*(c*x^4+b*x^2+a)^(1/2)/c^2-1/315*(-84*a^2*c^2*f+57*a*b^2*c

```

$$\begin{aligned} & *f-144*a*b*c^2*d-8*b^4*f+18*b^3*c*d)*x*(c*x^4+b*x^2+a)^{(1/2)}/c^{(5/2)}/(a^{(1/2)}+x^2*c^{(1/2)})+1/315*a^{(1/4)}*(-84*a^2*c^2*f+57*a*b^2*c*f-144*a*b*c^2*d-8*b^4*f+18*b^3*c*d)*(\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)}))^{(1/2)})/\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)}))*\text{EllipticE}(\sin(2*\arctan(c^{(1/4)}*x/a^{(1/4)})),1/2*(2-b/a^{(1/2)}/c^{(1/2)})^{(1/2)})*(a^{(1/2)}+x^2*c^{(1/2)})*((c*x^4+b*x^2+a)/(a^{(1/2)}+x^2*c^{(1/2)})^{(1/2)})/c^{(11/4)}/(c*x^4+b*x^2+a)^{(1/2)}-1/630*a^{(1/4)}*(\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)}))^{(1/2)})/\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)}))*\text{EllipticF}(\sin(2*\arctan(c^{(1/4)}*x/a^{(1/4)})),1/2*(2-b/a^{(1/2)}/c^{(1/2)})^{(1/2)})*(a^{(1/2)}+x^2*c^{(1/2)})*(18*b^3*c*d-144*a*b*c^2*d-8*b^4*f+57*a*b^2*c*f-84*a^2*c^2*f+(24*a*b*c*f-180*a*c^2*d-4*b^3*f+9*b^2*c*d)*a^{(1/2)}*c^{(1/2)})*((c*x^4+b*x^2+a)/(a^{(1/2)}+x^2*c^{(1/2)})^{(1/2)})/c^{(11/4)}/(c*x^4+b*x^2+a)^{(1/2)} \end{aligned}$$

### Rubi [A] (verified)

Time = 0.39 (sec) , antiderivative size = 717, normalized size of antiderivative = 1.00, number of steps used = 12, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.312$ , Rules used = {1687, 1190, 1211, 1117, 1209, 1261, 654, 626, 635, 212}

$$\begin{aligned} & \int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^{3/2} dx = \\ & \frac{\sqrt{a}(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}} (-84a^2c^2f + 57ab^2cf + \sqrt{a}\sqrt{c}(24abcf - 180ac^2d - 4b^3f + 9b^2cd) - 144abc^2d)}{630c^{11/4}\sqrt{a + bx^2 + cx^4}} \\ & + \frac{\sqrt{a}(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}} (-84a^2c^2f + 57ab^2cf - 144abc^2d - 8b^4f + 18b^3cd) E\left(2 \arctan\left(\frac{\sqrt[4]{cx^2}}{\sqrt{a}}\right) \middle| \frac{1}{4}\right)}{315c^{11/4}\sqrt{a + bx^2 + cx^4}} \\ & - \frac{x\sqrt{a + bx^2 + cx^4}(-84a^2c^2f + 57ab^2cf - 144abc^2d - 8b^4f + 18b^3cd)}{315c^{5/2}(\sqrt{a} + \sqrt{cx^2})} \\ & + \frac{3(b^2 - 4ac)^2(2ce - bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{2\sqrt{c}\sqrt{a+bx^2+cx^4}}\right)}{512c^{7/2}} \\ & - \frac{3(b^2 - 4ac)(b + 2cx^2)\sqrt{a + bx^2 + cx^4}(2ce - bg)}{256c^3} \\ & + \frac{x\sqrt{a + bx^2 + cx^4}(3cx^2(14acf - 4b^2f + 9bcd) + 9abcf + 90ac^2d - 4b^3f + 9b^2cd)}{315c^2} \\ & + \frac{(b + 2cx^2)(a + bx^2 + cx^4)^{3/2}(2ce - bg)}{32c^2} \\ & + \frac{x(a + bx^2 + cx^4)^{3/2}(3(bf + 3cd) + 7cfx^2)}{63c} + \frac{g(a + bx^2 + cx^4)^{5/2}}{10c} \end{aligned}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)\*(a + b\*x^2 + c\*x^4)^(3/2),x]

[Out] -1/315\*((18\*b^3\*c\*d - 144\*a\*b\*c^2\*d - 8\*b^4\*f + 57\*a\*b^2\*c\*f - 84\*a^2\*c^2\*f)\*x\*Sqrt[a + b\*x^2 + c\*x^4])/(c^(5/2)\*(Sqrt[a] + Sqrt[c]\*x^2)) - (3\*(b^2 -

$$4*a*c)*(2*c*e - b*g)*(b + 2*c*x^2)*\text{Sqrt}[a + b*x^2 + c*x^4]/(256*c^3) + (x*(9*b^2*c*d + 90*a*c^2*d - 4*b^3*f + 9*a*b*c*f + 3*c*(9*b*c*d - 4*b^2*f + 14*a*c*f)*x^2)*\text{Sqrt}[a + b*x^2 + c*x^4]/(315*c^2) + ((2*c*e - b*g)*(b + 2*c*x^2)*(a + b*x^2 + c*x^4)^{(3/2)})/(32*c^2) + (x*(3*(3*c*d + b*f) + 7*c*f*x^2)*(a + b*x^2 + c*x^4)^{(3/2)})/(63*c) + (g*(a + b*x^2 + c*x^4)^{(5/2)})/(10*c) + (3*(b^2 - 4*a*c)^2*(2*c*e - b*g)*\text{ArcTanh}[(b + 2*c*x^2)/(2*\text{Sqrt}[c]*\text{Sqrt}[a + b*x^2 + c*x^4])])/(512*c^{(7/2)}) + (a^{(1/4)}*(18*b^3*c*d - 144*a*b*c^2*d - 8*b^4*f + 57*a*b^2*c*f - 84*a^2*c^2*f)*(\text{Sqrt}[a] + \text{Sqrt}[c]*x^2)*\text{Sqrt}[(a + b*x^2 + c*x^4)/(\text{Sqrt}[a] + \text{Sqrt}[c]*x^2)^2]*\text{EllipticE}[2*\text{ArcTan}[(c^{(1/4)}*x)/a^{(1/4)}]], (2 - b/(\text{Sqrt}[a]*\text{Sqrt}[c]))/4)/(315*c^{(11/4)}*\text{Sqrt}[a + b*x^2 + c*x^4]) - (a^{(1/4)}*(18*b^3*c*d - 144*a*b*c^2*d - 8*b^4*f + 57*a*b^2*c*f - 84*a^2*c^2*f + \text{Sqrt}[a]*\text{Sqrt}[c]*(9*b^2*c*d - 180*a*c^2*d - 4*b^3*f + 24*a*b*c*f))*(\text{Sqrt}[a] + \text{Sqrt}[c]*x^2)*\text{Sqrt}[(a + b*x^2 + c*x^4)/(\text{Sqrt}[a] + \text{Sqrt}[c]*x^2)^2]*\text{EllipticF}[2*\text{ArcTan}[(c^{(1/4)}*x)/a^{(1/4)}]], (2 - b/(\text{Sqrt}[a]*\text{Sqrt}[c]))/4)/(630*c^{(11/4)}*\text{Sqrt}[a + b*x^2 + c*x^4])$$
Rule 212

$$\text{Int}[(a_) + (b_)*(x_)^2)^{-1}, x\_Symbol] \rightarrow \text{Simp}[(1/(\text{Rt}[a, 2]*\text{Rt}[-b, 2]))*\text{ArcTanh}[\text{Rt}[-b, 2]*(x/\text{Rt}[a, 2])], x] /; \text{FreeQ}\{a, b, x\} \ \&\& \ \text{NegQ}[a/b] \ \&\& \ (\text{GtQ}[a, 0] \ || \ \text{LtQ}[b, 0])$$
Rule 626

$$\text{Int}[(a_) + (b_)*(x_) + (c_)*(x_)^2)^{(p_)}, x\_Symbol] \rightarrow \text{Simp}[(b + 2*c*x)*((a + b*x + c*x^2)^p/(2*c*(2*p + 1))), x] - \text{Dist}[p*((b^2 - 4*a*c)/(2*c*(2*p + 1))), \text{Int}[(a + b*x + c*x^2)^{(p-1)}, x], x] /; \text{FreeQ}\{a, b, c, x\} \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0] \ \&\& \ \text{GtQ}[p, 0] \ \&\& \ \text{IntegerQ}[4*p]$$
Rule 635

$$\text{Int}[1/\text{Sqrt}[(a_) + (b_)*(x_) + (c_)*(x_)^2], x\_Symbol] \rightarrow \text{Dist}[2, \text{Subst}[\text{Int}[1/(4*c - x^2), x], x, (b + 2*c*x)/\text{Sqrt}[a + b*x + c*x^2]], x] /; \text{FreeQ}\{a, b, c, x\} \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0]$$
Rule 654

$$\text{Int}[(d_) + (e_)*(x_))*((a_) + (b_)*(x_) + (c_)*(x_)^2)^{(p_)}, x\_Symbol] \rightarrow \text{Simp}[e*((a + b*x + c*x^2)^{(p+1)})/(2*c*(p+1)), x] + \text{Dist}[(2*c*d - b*e)/(2*c), \text{Int}[(a + b*x + c*x^2)^p, x], x] /; \text{FreeQ}\{a, b, c, d, e, p, x\} \ \&\& \ \text{NeQ}[2*c*d - b*e, 0] \ \&\& \ \text{NeQ}[p, -1]$$
Rule 1117

$$\text{Int}[1/\text{Sqrt}[(a_) + (b_)*(x_)^2 + (c_)*(x_)^4], x\_Symbol] \rightarrow \text{With}\{q = \text{Rt}[c/a, 4]\}, \text{Simp}[(1 + q^2*x^2)*(\text{Sqrt}[(a + b*x^2 + c*x^4)/(a*(1 + q^2*x^2)^2)]/(2*q*\text{Sqrt}[a + b*x^2 + c*x^4]))*\text{EllipticF}[2*\text{ArcTan}[q*x], 1/2 - b*(q^2/(4*c))]$$

], x]] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[c/a]

#### Rule 1190

Int[((d\_) + (e\_)\*(x\_)^2)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Simp[x\*(2\*b\*e\*p + c\*d\*(4\*p + 3) + c\*e\*(4\*p + 1)\*x^2)\*((a + b\*x^2 + c\*x^4)^p/(c\*(4\*p + 1)\*(4\*p + 3))), x] + Dist[2\*(p/(c\*(4\*p + 1)\*(4\*p + 3))), Int[Simp[2\*a\*c\*d\*(4\*p + 3) - a\*b\*e + (2\*a\*c\*e\*(4\*p + 1) + b\*c\*d\*(4\*p + 3) - b^2\*e\*(2\*p + 1))\*x^2, x]\*(a + b\*x^2 + c\*x^4)^(p - 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && GtQ[p, 0] && FractionQ[p] && IntegerQ[2\*p]

#### Rule 1209

Int[((d\_) + (e\_)\*(x\_)^2)/Sqrt[(a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4], x\_Symbol] := With[{q = Rt[c/a, 4]}, Simp[(-d)\*x\*(Sqrt[a + b\*x^2 + c\*x^4]/(a\*(1 + q^2\*x^2))), x] + Simp[d\*(1 + q^2\*x^2)\*(Sqrt[a + b\*x^2 + c\*x^4]/(a\*(1 + q^2\*x^2)^2)]/(q\*Sqrt[a + b\*x^2 + c\*x^4])\*EllipticE[2\*ArcTan[q\*x], 1/2 - b\*(q^2/(4\*c))], x] /; EqQ[e + d\*q^2, 0] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[c/a]

#### Rule 1211

Int[((d\_) + (e\_)\*(x\_)^2)/Sqrt[(a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4], x\_Symbol] := With[{q = Rt[c/a, 2]}, Dist[(e + d\*q)/q, Int[1/Sqrt[a + b\*x^2 + c\*x^4], x], x] - Dist[e/q, Int[(1 - q\*x^2)/Sqrt[a + b\*x^2 + c\*x^4], x], x] /; NeQ[e + d\*q, 0] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[c/a]

#### Rule 1261

Int[(x\_)\*((d\_) + (e\_)\*(x\_)^2)^(q\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Dist[1/2, Subst[Int[(d + e\*x)^q\*(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]

#### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]



Rubi steps

$$\begin{aligned}
\text{integral} &= \int (d + fx^2) (a + bx^2 + cx^4)^{3/2} dx + \int x(e + gx^2) (a + bx^2 + cx^4)^{3/2} dx \\
&= \frac{x(3(3cd + bf) + 7cfx^2) (a + bx^2 + cx^4)^{3/2}}{63c} \\
&\quad + \frac{1}{2} \text{Subst} \left( \int (e + gx) (a + bx + cx^2)^{3/2} dx, x, x^2 \right) \\
&\quad + \frac{\int (a(18cd - bf) + (9bcd - 4b^2f + 14acf) x^2) \sqrt{a + bx^2 + cx^4} dx}{21c} \\
&= \frac{x(9b^2cd + 90ac^2d - 4b^3f + 9abcf + 3c(9bcd - 4b^2f + 14acf) x^2) \sqrt{a + bx^2 + cx^4}}{315c^2} \\
&\quad + \frac{x(3(3cd + bf) + 7cfx^2) (a + bx^2 + cx^4)^{3/2}}{63c} + \frac{g(a + bx^2 + cx^4)^{5/2}}{10c} \\
&\quad + \frac{\int \frac{-a(9b^2cd - 180ac^2d - 4b^3f + 24abcf) + (-18b^3cd + 144abc^2d + 8b^4f - 57ab^2cf + 84a^2c^2f) x^2}{\sqrt{a + bx^2 + cx^4}} dx}{315c^2} \\
&\quad + \frac{(2ce - bg) \text{Subst} \left( \int (a + bx + cx^2)^{3/2} dx, x, x^2 \right)}{4c} \\
&= \frac{x(9b^2cd + 90ac^2d - 4b^3f + 9abcf + 3c(9bcd - 4b^2f + 14acf) x^2) \sqrt{a + bx^2 + cx^4}}{315c^2} \\
&\quad + \frac{(2ce - bg) (b + 2cx^2) (a + bx^2 + cx^4)^{3/2}}{32c^2} \\
&\quad + \frac{x(3(3cd + bf) + 7cfx^2) (a + bx^2 + cx^4)^{3/2}}{63c} + \frac{g(a + bx^2 + cx^4)^{5/2}}{10c} \\
&\quad + \frac{(\sqrt{a}(18b^3cd - 144abc^2d - 8b^4f + 57ab^2cf - 84a^2c^2f)) \int \frac{1 - \frac{\sqrt{cx^2}}{\sqrt{a}}}{\sqrt{a + bx^2 + cx^4}} dx}{315c^{5/2}} \\
&\quad - \frac{(\sqrt{a}(18b^3cd - 144abc^2d - 8b^4f + 57ab^2cf - 84a^2c^2f + \sqrt{a}\sqrt{c}(9b^2cd - 180ac^2d - 4b^3f + 24abcf)) \text{Subst} \left( \int \sqrt{a + bx + cx^2} dx, x, x^2 \right)}{315c^{5/2}} \\
&\quad - \frac{(3(b^2 - 4ac) (2ce - bg)) \text{Subst} \left( \int \sqrt{a + bx + cx^2} dx, x, x^2 \right)}{64c^2}
\end{aligned}$$

$$\begin{aligned}
&= -\frac{(18b^3cd - 144abc^2d - 8b^4f + 57ab^2cf - 84a^2c^2f)x\sqrt{a+bx^2+cx^4}}{315c^{5/2}(\sqrt{a}+\sqrt{cx^2})} \\
&\quad -\frac{3(b^2-4ac)(2ce-bg)(b+2cx^2)\sqrt{a+bx^2+cx^4}}{256c^3} \\
&\quad +\frac{x(9b^2cd+90ac^2d-4b^3f+9abcf+3c(9bcd-4b^2f+14acf)x^2)\sqrt{a+bx^2+cx^4}}{315c^2} \\
&\quad +\frac{(2ce-bg)(b+2cx^2)(a+bx^2+cx^4)^{3/2}}{32c^2} \\
&\quad +\frac{x(3(3cd+bf)+7cfx^2)(a+bx^2+cx^4)^{3/2}}{63c} + \frac{g(a+bx^2+cx^4)^{5/2}}{10c} \\
&\quad +\frac{\sqrt[4]{a}(18b^3cd-144abc^2d-8b^4f+57ab^2cf-84a^2c^2f)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}E\left(2\tan^{-1}\left(\frac{\sqrt[4]{a}}{\sqrt[4]{cx^2}}\right)\right)}{315c^{11/4}\sqrt{a+bx^2+cx^4}} \\
&\quad -\frac{\sqrt[4]{a}(18b^3cd-144abc^2d-8b^4f+57ab^2cf-84a^2c^2f+\sqrt{a}\sqrt{c}(9b^2cd-180ac^2d-4b^3f+24abcf))}{630c^{11/4}\sqrt{a+bx^2+cx^4}} \\
&\quad +\frac{\left(3(b^2-4ac)^2(2ce-bg)\right)\text{Subst}\left(\int\frac{1}{\sqrt{a+bx+cx^2}}dx,x,x^2\right)}{512c^3} \\
&= -\frac{(18b^3cd - 144abc^2d - 8b^4f + 57ab^2cf - 84a^2c^2f)x\sqrt{a+bx^2+cx^4}}{315c^{5/2}(\sqrt{a}+\sqrt{cx^2})} \\
&\quad -\frac{3(b^2-4ac)(2ce-bg)(b+2cx^2)\sqrt{a+bx^2+cx^4}}{256c^3} \\
&\quad +\frac{x(9b^2cd+90ac^2d-4b^3f+9abcf+3c(9bcd-4b^2f+14acf)x^2)\sqrt{a+bx^2+cx^4}}{315c^2} \\
&\quad +\frac{(2ce-bg)(b+2cx^2)(a+bx^2+cx^4)^{3/2}}{32c^2} \\
&\quad +\frac{x(3(3cd+bf)+7cfx^2)(a+bx^2+cx^4)^{3/2}}{63c} + \frac{g(a+bx^2+cx^4)^{5/2}}{10c} \\
&\quad +\frac{\sqrt[4]{a}(18b^3cd-144abc^2d-8b^4f+57ab^2cf-84a^2c^2f)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}E\left(2\tan^{-1}\left(\frac{\sqrt[4]{a}}{\sqrt[4]{cx^2}}\right)\right)}{315c^{11/4}\sqrt{a+bx^2+cx^4}} \\
&\quad -\frac{\sqrt[4]{a}(18b^3cd-144abc^2d-8b^4f+57ab^2cf-84a^2c^2f+\sqrt{a}\sqrt{c}(9b^2cd-180ac^2d-4b^3f+24abcf))}{630c^{11/4}\sqrt{a+bx^2+cx^4}} \\
&\quad +\frac{\left(3(b^2-4ac)^2(2ce-bg)\right)\text{Subst}\left(\int\frac{1}{4c-x^2}dx,x,\frac{b+2cx^2}{\sqrt{a+bx^2+cx^4}}\right)}{256c^3}
\end{aligned}$$

$$\begin{aligned}
&= -\frac{(18b^3cd - 144abc^2d - 8b^4f + 57ab^2cf - 84a^2c^2f)x\sqrt{a+bx^2+cx^4}}{315c^{5/2}(\sqrt{a}+\sqrt{cx^2})} \\
&\quad - \frac{3(b^2-4ac)(2ce-bg)(b+2cx^2)\sqrt{a+bx^2+cx^4}}{256c^3} \\
&\quad + \frac{x(9b^2cd + 90ac^2d - 4b^3f + 9abcf + 3c(9bcd - 4b^2f + 14acf)x^2)\sqrt{a+bx^2+cx^4}}{315c^2} \\
&\quad + \frac{(2ce-bg)(b+2cx^2)(a+bx^2+cx^4)^{3/2}}{32c^2} \\
&\quad + \frac{x(3(3cd+bf)+7cfx^2)(a+bx^2+cx^4)^{3/2}}{63c} + \frac{g(a+bx^2+cx^4)^{5/2}}{10c} \\
&\quad + \frac{3(b^2-4ac)^2(2ce-bg)\tanh^{-1}\left(\frac{b+2cx^2}{2\sqrt{c}\sqrt{a+bx^2+cx^4}}\right)}{512c^{7/2}} \\
&\quad + \frac{\sqrt[4]{a}(18b^3cd - 144abc^2d - 8b^4f + 57ab^2cf - 84a^2c^2f)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}E\left(2\tan^{-1}\left(\frac{\sqrt{a+bx^2+cx^4}}{\sqrt{a}+\sqrt{cx^2}}\right)\right)}{315c^{11/4}\sqrt{a+bx^2+cx^4}} \\
&\quad - \frac{\sqrt[4]{a}(18b^3cd - 144abc^2d - 8b^4f + 57ab^2cf - 84a^2c^2f + \sqrt{a}\sqrt{c}(9b^2cd - 180ac^2d - 4b^3f + 24abc))}{630c^{11/4}\sqrt{a+bx^2+cx^4}}
\end{aligned}$$

### Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 11.69 (sec) , antiderivative size = 2588, normalized size of antiderivative = 3.61

$$\int (d + ex + fx^2 + gx^3)(a + bx^2 + cx^4)^{3/2} dx = \text{Result too large to show}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)\*(a + b\*x^2 + c\*x^4)^(3/2),x]

[Out] (-2\*sqrt[c]\*sqrt[c/(b + sqrt[b^2 - 4\*a\*c])])\*(a + b\*x^2 + c\*x^4)\*(-945\*b^4\*g + 2\*b^3\*c\*(945\*e + x\*(512\*f + 315\*g\*x)) - 12\*b^2\*c\*(-525\*a\*g + c\*x\*(192\*d + 105\*e\*x + 64\*f\*x^2 + 42\*g\*x^3)) - 8\*b\*c^2\*(3\*a\*(525\*e + 256\*f\*x + 147\*g\*x^2) + 2\*c\*x^3\*(1152\*d + 945\*e\*x + 800\*f\*x^2 + 693\*g\*x^3)) - 16\*c^2\*(504\*a^2\*g + 2\*c^2\*x^5\*(360\*d + 7\*x\*(45\*e + 40\*f\*x + 36\*g\*x^2)) + a\*c\*x\*(2160\*d + 7\*x\*(225\*e + 16\*x\*(11\*f + 9\*g\*x)))) + (2304\*I)\*sqrt[2]\*b^3\*c^(3/2)\*(b - sqrt[b^2 - 4\*a\*c])\*d\*sqrt[(b + sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2)/(b + sqrt[b^2 - 4\*a\*c])]\*sqrt[1 + (2\*c\*x^2)/(b - sqrt[b^2 - 4\*a\*c])]\*(EllipticE[I\*ArcSinh[sqrt[2]\*sqrt[c/(b + sqrt[b^2 - 4\*a\*c])]\*x], (b + sqrt[b^2 - 4\*a\*c])/(b - sqrt[b^2 - 4\*a\*c])]) - EllipticF[I\*ArcSinh[sqrt[2]\*sqrt[c/(b + sqrt[b^2 - 4\*a\*c])]\*x], (b + sqrt[b^2 - 4\*a\*c])/(b - sqrt[b^2 - 4\*a\*c])]) + (18432\*I)\*sqrt[2]\*a\*b\*c^(5/2)\*(-b + sqrt[b^2 - 4\*a\*c])\*d\*sqrt[(b + sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2)/(b + sqrt[b^2 - 4\*a\*c])]\*sqrt[1 + (2\*c\*x^2)/(b - sqrt[b^2 - 4\*a\*c])]\*(EllipticE[I\*ArcSinh[sqrt[2]\*sqrt[c/(b + sqrt[b^2 - 4\*a\*c])]\*x], (b + sqrt[b^2 - 4\*a\*c])/(b - sqrt[b^2 - 4\*a\*c])])

$$\begin{aligned}
& 2 - 4*a*c)/(b - \text{Sqrt}[b^2 - 4*a*c]) - \text{EllipticF}[I*\text{ArcSinh}[\text{Sqrt}[2]*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]]*x], (b + \text{Sqrt}[b^2 - 4*a*c])/(b - \text{Sqrt}[b^2 - 4*a*c]) \\
& ] + (7296*I)*\text{Sqrt}[2]*a*b^2*c^{(3/2)}*(b - \text{Sqrt}[b^2 - 4*a*c])*f*\text{Sqrt}[(b + \text{Sqrt}[b^2 - 4*a*c] + 2*c*x^2)/(b + \text{Sqrt}[b^2 - 4*a*c])]*\text{Sqrt}[1 + (2*c*x^2)/(b - \\
& \text{Sqrt}[b^2 - 4*a*c])]*(\text{EllipticE}[I*\text{ArcSinh}[\text{Sqrt}[2]*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]]*x], (b + \text{Sqrt}[b^2 - 4*a*c])/(b - \text{Sqrt}[b^2 - 4*a*c]) - \text{EllipticF}[I*\text{Ar} \\
& \text{cSinh}[\text{Sqrt}[2]*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]]*x], (b + \text{Sqrt}[b^2 - 4*a*c])/(b - \text{Sqrt}[b^2 - 4*a*c])) + (1024*I)*\text{Sqrt}[2]*b^4*\text{Sqrt}[c]*(-b + \text{Sqrt}[b^2 - 4* \\
& a*c])*f*\text{Sqrt}[(b + \text{Sqrt}[b^2 - 4*a*c] + 2*c*x^2)/(b + \text{Sqrt}[b^2 - 4*a*c])]*\text{Sqr} \\
& \text{t}[1 + (2*c*x^2)/(b - \text{Sqrt}[b^2 - 4*a*c])]*(\text{EllipticE}[I*\text{ArcSinh}[\text{Sqrt}[2]*\text{Sqrt}[ \\
& c/(b + \text{Sqrt}[b^2 - 4*a*c])]]*x], (b + \text{Sqrt}[b^2 - 4*a*c])/(b - \text{Sqrt}[b^2 - 4*a* \\
& c])) - \text{EllipticF}[I*\text{ArcSinh}[\text{Sqrt}[2]*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]]*x], (b + \\
& \text{Sqrt}[b^2 - 4*a*c])/(b - \text{Sqrt}[b^2 - 4*a*c])) + (10752*I)*\text{Sqrt}[2]*a^2*c^{(5/ \\
& 2)}*(-b + \text{Sqrt}[b^2 - 4*a*c])*f*\text{Sqrt}[(b + \text{Sqrt}[b^2 - 4*a*c] + 2*c*x^2)/(b + \text{S} \\
& \text{qrt}[b^2 - 4*a*c])]*\text{Sqrt}[1 + (2*c*x^2)/(b - \text{Sqrt}[b^2 - 4*a*c])]*(\text{EllipticE}[I \\
& *\text{ArcSinh}[\text{Sqrt}[2]*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]]*x], (b + \text{Sqrt}[b^2 - 4*a*c] \\
& )/(b - \text{Sqrt}[b^2 - 4*a*c]) - \text{EllipticF}[I*\text{ArcSinh}[\text{Sqrt}[2]*\text{Sqrt}[c/(b + \text{Sqrt}[b \\
& ^2 - 4*a*c])]]*x], (b + \text{Sqrt}[b^2 - 4*a*c])/(b - \text{Sqrt}[b^2 - 4*a*c])) + (2304 \\
& *I)*\text{Sqrt}[2]*a*b^2*c^{(5/2)}*d*\text{Sqrt}[(b + \text{Sqrt}[b^2 - 4*a*c] + 2*c*x^2)/(b + \text{Sqr} \\
& \text{t}[b^2 - 4*a*c])]*\text{Sqrt}[1 + (2*c*x^2)/(b - \text{Sqrt}[b^2 - 4*a*c])]*\text{EllipticF}[I*\text{Ar} \\
& \text{cSinh}[\text{Sqrt}[2]*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]]*x], (b + \text{Sqrt}[b^2 - 4*a*c])/( \\
& b - \text{Sqrt}[b^2 - 4*a*c]) - (46080*I)*\text{Sqrt}[2]*a^2*c^{(7/2)}*d*\text{Sqrt}[(b + \text{Sqrt}[b^ \\
& ^2 - 4*a*c] + 2*c*x^2)/(b + \text{Sqrt}[b^2 - 4*a*c])]*\text{Sqrt}[1 + (2*c*x^2)/(b - \text{Sqrt} \\
& [b^2 - 4*a*c])]*\text{EllipticF}[I*\text{ArcSinh}[\text{Sqrt}[2]*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]] \\
& *x], (b + \text{Sqrt}[b^2 - 4*a*c])/(b - \text{Sqrt}[b^2 - 4*a*c]) - (1024*I)*\text{Sqrt}[2]*a* \\
& b^3*c^{(3/2)}*f*\text{Sqrt}[(b + \text{Sqrt}[b^2 - 4*a*c] + 2*c*x^2)/(b + \text{Sqrt}[b^2 - 4*a*c] \\
& )]*\text{Sqrt}[1 + (2*c*x^2)/(b - \text{Sqrt}[b^2 - 4*a*c])]*\text{EllipticF}[I*\text{ArcSinh}[\text{Sqrt}[2]* \\
& \text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]]*x], (b + \text{Sqrt}[b^2 - 4*a*c])/(b - \text{Sqrt}[b^2 - \\
& 4*a*c])) + (6144*I)*\text{Sqrt}[2]*a^2*b*c^{(5/2)}*f*\text{Sqrt}[(b + \text{Sqrt}[b^2 - 4*a*c] + \\
& 2*c*x^2)/(b + \text{Sqrt}[b^2 - 4*a*c])]*\text{Sqrt}[1 + (2*c*x^2)/(b - \text{Sqrt}[b^2 - 4*a*c] \\
& )]*\text{EllipticF}[I*\text{ArcSinh}[\text{Sqrt}[2]*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]]*x], (b + \text{Sqr} \\
& \text{t}[b^2 - 4*a*c])/(b - \text{Sqrt}[b^2 - 4*a*c]) - 1890*b^4*c*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 \\
& - 4*a*c])]*e*\text{Sqrt}[a + b*x^2 + c*x^4]*\text{Log}[b + 2*c*x^2 - 2*\text{Sqrt}[c]*\text{Sqrt}[a + b \\
& *x^2 + c*x^4]] + 15120*a*b^2*c^2*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]*e*\text{Sqrt}[a + \\
& b*x^2 + c*x^4]*\text{Log}[b + 2*c*x^2 - 2*\text{Sqrt}[c]*\text{Sqrt}[a + b*x^2 + c*x^4]] - 3024 \\
& 0*a^2*c^3*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]*e*\text{Sqrt}[a + b*x^2 + c*x^4]*\text{Log}[b + \\
& 2*c*x^2 - 2*\text{Sqrt}[c]*\text{Sqrt}[a + b*x^2 + c*x^4]] + 945*b^5*\text{Sqrt}[c/(b + \text{Sqrt}[b^ \\
& 2 - 4*a*c])]*g*\text{Sqrt}[a + b*x^2 + c*x^4]*\text{Log}[b + 2*c*x^2 - 2*\text{Sqrt}[c]*\text{Sqrt}[a + \\
& b*x^2 + c*x^4]] - 7560*a*b^3*c*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]*g*\text{Sqrt}[a + \\
& b*x^2 + c*x^4]*\text{Log}[b + 2*c*x^2 - 2*\text{Sqrt}[c]*\text{Sqrt}[a + b*x^2 + c*x^4]] + 15120 \\
& *a^2*b*c^2*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]*g*\text{Sqrt}[a + b*x^2 + c*x^4]*\text{Log}[b \\
& + 2*c*x^2 - 2*\text{Sqrt}[c]*\text{Sqrt}[a + b*x^2 + c*x^4]]/(161280*c^{(7/2)}*\text{Sqrt}[c/(b + \\
& \text{Sqrt}[b^2 - 4*a*c])]*\text{Sqrt}[a + b*x^2 + c*x^4])
\end{aligned}$$

## Maple [A] (verified)

Time = 5.79 (sec) , antiderivative size = 1209, normalized size of antiderivative = 1.69

method	result	size
risch	Expression too large to display	1209
elliptic	Expression too large to display	1376
default	Expression too large to display	1580

```
[In] int((g*x^3+f*x^2+e*x+d)*(c*x^4+b*x^2+a)^(3/2),x,method=_RETURNVERBOSE)
```

```
[Out] 1/80640/c^3*(8064*c^4*g*x^8+8960*c^4*f*x^7+11088*b*c^3*g*x^6+10080*c^4*e*x^6+12800*b*c^3*f*x^5+11520*c^4*d*x^5+16128*a*c^3*g*x^4+504*b^2*c^2*g*x^4+15120*b*c^3*e*x^4+19712*a*c^3*f*x^3+768*b^2*c^2*f*x^3+18432*b*c^3*d*x^3+3528*a*b*c^2*g*x^2+25200*a*c^3*e*x^2-630*b^3*c*g*x^2+1260*b^2*c^2*e*x^2+6144*a*b*c^2*f*x+34560*a*c^3*d*x-1024*b^3*c*f*x+2304*b^2*c^2*d*x+8064*a^2*c^2*g-6300*a*b^2*c*g+12600*a*b*c^2*e+945*b^4*g-1890*b^3*c*e)*(c*x^4+b*x^2+a)^(1/2)-1/80640/c^3*(-11520*a^2*c^3*d^2^(1/2)/((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2)*(4-2*(-b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)*(4+2*(b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)/(c*x^4+b*x^2+a)^(1/2)*EllipticF(1/2*x^2^(1/2)*((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2),1/2*(-4+2*b*(b+(-4*a*c+b^2)^(1/2))/a/c)^(1/2))+1536*a^2*b*c^2*f*2^(1/2)/((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2)*(4-2*(-b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)*(4+2*(b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)/(c*x^4+b*x^2+a)^(1/2)*EllipticF(1/2*x^2^(1/2)*((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2),1/2*(-4+2*b*(b+(-4*a*c+b^2)^(1/2))/a/c)^(1/2))-256*a*b^3*c*f*2^(1/2)/((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2)*(4-2*(-b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)*(4+2*(b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)/(c*x^4+b*x^2+a)^(1/2)*EllipticF(1/2*x^2^(1/2)*((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2),1/2*(-4+2*b*(b+(-4*a*c+b^2)^(1/2))/a/c)^(1/2))+576*a*b^2*c^2*d*2^(1/2)/((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2)*(4-2*(-b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)*(4+2*(b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)/(c*x^4+b*x^2+a)^(1/2)*EllipticF(1/2*x^2^(1/2)*((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2),1/2*(-4+2*b*(b+(-4*a*c+b^2)^(1/2))/a/c)^(1/2))+1/2*(21504*a^2*c^3*f-14592*a*b^2*c^2*f+36864*a*b*c^3*d+2048*b^4*c*f-4608*b^3*c^2*d)*a*2^(1/2)/((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2)*(4-2*(-b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)*(4+2*(b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)/(c*x^4+b*x^2+a)^(1/2)/(b+(-4*a*c+b^2)^(1/2))*(EllipticF(1/2*x^2^(1/2)*((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2),1/2*(-4+2*b*(b+(-4*a*c+b^2)^(1/2))/a/c)^(1/2))-EllipticE(1/2*x^2^(1/2)*((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2),1/2*(-4+2*b*(b+(-4*a*c+b^2)^(1/2))/a/c)^(1/2)))-1/2*(-15120*a^2*b*c^2*g+30240*a^2*c^3*e+7560*a*b^3*c*g-15120*a*b^2*c^2*e-945*b^5*g+1890*b^4*c*e)*ln((1/2*b+c*x^2)/c^(1/2)+(c*x^4+b*x^2+a)^(1/2))/c^(1/2))
```

**Fricas [A] (verification not implemented)**

none

Time = 0.31 (sec) , antiderivative size = 911, normalized size of antiderivative = 1.27

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^{3/2} dx =$$

$$512 \sqrt{\frac{1}{2}} \left( (18(b^3c^2 - 8abc^3)d - (8b^4c - 57ab^2c^2 + 84a^2c^3)f)x \sqrt{\frac{b^2 - 4ac}{c^2}} - (18(b^4c - 8ab^2c^2)d - (8b^5 - 57$$

```
[In] integrate((g*x^3+f*x^2+e*x+d)*(c*x^4+b*x^2+a)^(3/2),x, algorithm="fricas")
[Out] -1/322560*(512*sqrt(1/2)*((18*(b^3*c^2 - 8*a*b*c^3)*d - (8*b^4*c - 57*a*b^2*c^2
*c^2 + 84*a^2*c^3)*f)*x*sqrt((b^2 - 4*a*c)/c^2) - (18*(b^4*c - 8*a*b^2*c^2)
*d - (8*b^5 - 57*a*b^3*c + 84*a^2*b*c^2)*f)*x)*sqrt(c)*sqrt((c*sqrt((b^2 -
4*a*c)/c^2) - b)/c)*elliptic_e(arcsin(sqrt(1/2)*sqrt((c*sqrt((b^2 - 4*a*c)/
c^2) - b)/c)/x), 1/2*(b*c*sqrt((b^2 - 4*a*c)/c^2) + b^2 - 2*a*c)/(a*c)) - 5
12*sqrt(1/2)*((9*(2*b^3*c^2 + 20*a*c^4 - (16*a*b + b^2)*c^3)*d - (8*b^4*c +
12*(7*a^2 + 2*a*b)*c^3 - (57*a*b^2 + 4*b^3)*c^2)*f)*x*sqrt((b^2 - 4*a*c)/c
^2) - (9*(2*b^4*c - 20*a*b*c^3 - (16*a*b^2 - b^3)*c^2)*d - (8*b^5 + 12*(7*a
^2*b - 2*a*b^2)*c^2 - (57*a*b^3 - 4*b^4)*c)*f)*x)*sqrt(c)*sqrt((c*sqrt((b^2
- 4*a*c)/c^2) - b)/c)*elliptic_f(arcsin(sqrt(1/2)*sqrt((c*sqrt((b^2 - 4*a*
c)/c^2) - b)/c)/x), 1/2*(b*c*sqrt((b^2 - 4*a*c)/c^2) + b^2 - 2*a*c)/(a*c))
+ 945*(2*(b^4*c - 8*a*b^2*c^2 + 16*a^2*c^3)*e - (b^5 - 8*a*b^3*c + 16*a^2*b
*c^2)*g)*sqrt(c)*x*log(8*c^2*x^4 + 8*b*c*x^2 + b^2 - 4*sqrt(c*x^4 + b*x^2 +
a)*(2*c*x^2 + b)*sqrt(c) + 4*a*c) - 4*(8064*c^5*g*x^9 + 8960*c^5*f*x^8 + 1
008*(10*c^5*e + 11*b*c^4*g)*x^7 + 1280*(9*c^5*d + 10*b*c^4*f)*x^6 + 504*(30
*b*c^4*e + (b^2*c^3 + 32*a*c^4)*g)*x^5 + 256*(72*b*c^4*d + (3*b^2*c^3 + 77*
a*c^4)*f)*x^4 + 126*(10*(b^2*c^3 + 20*a*c^4)*e - (5*b^3*c^2 - 28*a*b*c^3)*g
)*x^3 + 256*(9*(b^2*c^3 + 15*a*c^4)*d - 4*(b^3*c^2 - 6*a*b*c^3)*f)*x^2 - 46
08*(b^3*c^2 - 8*a*b*c^3)*d + 256*(8*b^4*c - 57*a*b^2*c^2 + 84*a^2*c^3)*f -
63*(10*(3*b^3*c^2 - 20*a*b*c^3)*e - (15*b^4*c - 100*a*b^2*c^2 + 128*a^2*c^3
)*g)*x)*sqrt(c*x^4 + b*x^2 + a))/(c^4*x)
```

**Sympy [F]**

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^{3/2} dx = \int (a + bx^2 + cx^4)^{\frac{3}{2}} (d + ex + fx^2 + gx^3) dx$$

[In] integrate((g\*x\*\*3+f\*x\*\*2+e\*x+d)\*(c\*x\*\*4+b\*x\*\*2+a)\*\*(3/2),x)

[Out] Integral((a + b\*x\*\*2 + c\*x\*\*4)\*\*(3/2)\*(d + e\*x + f\*x\*\*2 + g\*x\*\*3), x)

**Maxima [F]**

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^{3/2} dx = \int (cx^4 + bx^2 + a)^{\frac{3}{2}} (gx^3 + fx^2 + ex + d) dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="maxima")

[Out] integrate((c\*x^4 + b\*x^2 + a)^(3/2)\*(g\*x^3 + f\*x^2 + e\*x + d), x)

**Giac [F]**

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^{3/2} dx = \int (cx^4 + bx^2 + a)^{\frac{3}{2}} (gx^3 + fx^2 + ex + d) dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="giac")

[Out] integrate((c\*x^4 + b\*x^2 + a)^(3/2)\*(g\*x^3 + f\*x^2 + e\*x + d), x)

**Mupad [F(-1)]**

Timed out.

$$\int (d + ex + fx^2 + gx^3) (a + bx^2 + cx^4)^{3/2} dx = \int (cx^4 + bx^2 + a)^{3/2} (gx^3 + fx^2 + ex + d) dx$$

[In] int((a + b\*x^2 + c\*x^4)^(3/2)\*(d + e\*x + f\*x^2 + g\*x^3),x)

[Out] int((a + b\*x^2 + c\*x^4)^(3/2)\*(d + e\*x + f\*x^2 + g\*x^3), x)

### 3.104 $\int (d + ex + fx^2 + gx^3) \sqrt{a + bx^2 + cx^4} dx$

Optimal result	1144
Rubi [A] (verified)	1145
Mathematica [C] (verified)	1149
Maple [A] (verified)	1150
Fricas [A] (verification not implemented)	1151
Sympy [F]	1151
Maxima [F]	1152
Giac [F]	1152
Mupad [F(-1)]	1152

#### Optimal result

Integrand size = 32, antiderivative size = 505

$$\int (d + ex + fx^2 + gx^3) \sqrt{a + bx^2 + cx^4} dx = \frac{(5bcd - 2b^2f + 6acf) x \sqrt{a + bx^2 + cx^4}}{15c^{3/2} (\sqrt{a} + \sqrt{cx^2})} + \frac{(2ce - bg) (b + 2cx^2) \sqrt{a + bx^2 + cx^4}}{16c^2} + \frac{x(5cd + bf + 3cfx^2) \sqrt{a + bx^2 + cx^4}}{15c} + \frac{g(a + bx^2 + cx^4)^{3/2}}{6c} - \frac{(b^2 - 4ac) (2ce - bg) \operatorname{arctanh}\left(\frac{b+2cx^2}{2\sqrt{c}\sqrt{a+bx^2+cx^4}}\right)}{32c^{5/2}}$$

$$- \frac{\sqrt{a}(5bcd - 2b^2f + 6acf) (\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}} E\left(2 \arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt{a}}\right) \middle| \frac{1}{4}\left(2 - \frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{15c^{7/4}\sqrt{a + bx^2 + cx^4}}$$

$$+ \frac{\sqrt{a}(b + 2\sqrt{a}\sqrt{c}) (5cd - 2bf + 3\sqrt{a}\sqrt{c}f) (\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}} \operatorname{EllipticF}\left(2 \arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt{a}}\right), \frac{1}{4}\left(2 - \frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{30c^{7/4}\sqrt{a + bx^2 + cx^4}}$$

[Out]  $\frac{1}{6}g*(c*x^4+b*x^2+a)^{(3/2)}/c-1/32*(-4*a*c+b^2)*(-b*g+2*c*e)*\operatorname{arctanh}(1/2*(2*c*x^2+b)/c^{(1/2)})/(c*x^4+b*x^2+a)^{(1/2)}/c^{(5/2)}+1/16*(-b*g+2*c*e)*(2*c*x^2+b)*(c*x^4+b*x^2+a)^{(1/2)}/c^2+1/15*x*(3*c*f*x^2+b*f+5*c*d)*(c*x^4+b*x^2+a)^{(1/2)}/c+1/15*(6*a*c*f-2*b^2*f+5*b*c*d)*x*(c*x^4+b*x^2+a)^{(1/2)}/c^{(3/2)}/(a^{(1/2)}+x^2*c^{(1/2)})-1/15*a^{(1/4)}*(6*a*c*f-2*b^2*f+5*b*c*d)*(\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)})))^2)^{(1/2)}/\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)}))*\operatorname{EllipticE}(\sin(2*\arctan(c^{(1/4)}*x/a^{(1/4)})),1/2*(2-b/a^{(1/2)}/c^{(1/2)}))^{(1/2)}*(a^{(1/2)}+x^2*c^{(1/2)})*((c*x^4+b*x^2+a)/(a^{(1/2)}+x^2*c^{(1/2)}))^2)^{(1/2)}/c^{(7/4)}/(c*x^4+b*x^2+a)^{(1/2)}+1/30*a^{(1/4)}*(\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)})))^2)^{(1/2)}/\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)}))*\operatorname{EllipticF}(\sin(2*\arctan(c^{(1/4)}*x/a^{(1/4)})),1/2*(2-b/a^{(1/2)}/c^{(1/2)}))^{(1/2)}*(a^{(1/2)}+x^2*c^{(1/2)})*(b+2*a^{(1/2)}*c^{(1/2)})*(5*c*d-2*b*f+3*f*a^{(1/2)}*c^{(1/2)})*((c*x^4+b*x^2+a)/(a^{(1/2)}+x^2*c^{(1/2)}))^2)^{(1/2)}/c^{(7/4)}/(c*x^4+b*x^2+a)^{(1/2)}$



**Rubi [A] (verified)**

Time = 0.18 (sec) , antiderivative size = 505, normalized size of antiderivative = 1.00, number of steps used = 10, number of rules used = 10,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.312$ , Rules used = {1687, 1190, 1211, 1117, 1209, 1261, 654, 626, 635, 212}

$$\int (d + ex + fx^2 + gx^3) \sqrt{a + bx^2 + cx^4} dx =$$

$$\frac{\sqrt[4]{a}(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}} (6acf - 2b^2f + 5bcd) E\left(2 \arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right) \middle| \frac{1}{4}\left(2 - \frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{15c^{7/4}\sqrt{a + bx^2 + cx^4}}$$

$$+ \frac{\sqrt[4]{a}(2\sqrt{a}\sqrt{c} + b) (\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}} (3\sqrt{a}\sqrt{c}f - 2bf + 5cd) \text{EllipticF}\left(2 \arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right), \frac{1}{4}\left(2 - \frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{30c^{7/4}\sqrt{a + bx^2 + cx^4}}$$

$$- \frac{(b^2 - 4ac)(2ce - bg)\text{arctanh}\left(\frac{b+2cx^2}{2\sqrt{c}\sqrt{a+bx^2+cx^4}}\right)}{32c^{5/2}}$$

$$+ \frac{x\sqrt{a + bx^2 + cx^4}(6acf - 2b^2f + 5bcd)}{15c^{3/2}(\sqrt{a} + \sqrt{cx^2})} + \frac{(b + 2cx^2)\sqrt{a + bx^2 + cx^4}(2ce - bg)}{16c^2}$$

$$+ \frac{x\sqrt{a + bx^2 + cx^4}(bf + 5cd + 3cfx^2)}{15c} + \frac{g(a + bx^2 + cx^4)^{3/2}}{6c}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)\*Sqrt[a + b\*x^2 + c\*x^4],x]

[Out] ((5\*b\*c\*d - 2\*b^2\*f + 6\*a\*c\*f)\*x\*Sqrt[a + b\*x^2 + c\*x^4])/(15\*c^(3/2)\*(Sqrt[a] + Sqrt[c]\*x^2)) + ((2\*c\*e - b\*g)\*(b + 2\*c\*x^2)\*Sqrt[a + b\*x^2 + c\*x^4])/(16\*c^2) + (x\*(5\*c\*d + b\*f + 3\*c\*f\*x^2)\*Sqrt[a + b\*x^2 + c\*x^4])/(15\*c) + (g\*(a + b\*x^2 + c\*x^4)^(3/2))/(6\*c) - ((b^2 - 4\*a\*c)\*(2\*c\*e - b\*g)\*ArcTanh[(b + 2\*c\*x^2)/(2\*Sqrt[c]\*Sqrt[a + b\*x^2 + c\*x^4])])/(32\*c^(5/2)) - (a^(1/4)\*(5\*b\*c\*d - 2\*b^2\*f + 6\*a\*c\*f)\*(Sqrt[a] + Sqrt[c]\*x^2)\*Sqrt[(a + b\*x^2 + c\*x^4)/(Sqrt[a] + Sqrt[c]\*x^2)^2]\*EllipticE[2\*ArcTan[(c^(1/4)\*x)/a^(1/4)], (2 - b/(Sqrt[a]\*Sqrt[c]))/4])/(15\*c^(7/4)\*Sqrt[a + b\*x^2 + c\*x^4]) + (a^(1/4)\*(b + 2\*Sqrt[a]\*Sqrt[c])\*(5\*c\*d - 2\*b\*f + 3\*Sqrt[a]\*Sqrt[c]\*f)\*(Sqrt[a] + Sqrt[c]\*x^2)\*Sqrt[(a + b\*x^2 + c\*x^4)/(Sqrt[a] + Sqrt[c]\*x^2)^2]\*EllipticF[2\*ArcTan[(c^(1/4)\*x)/a^(1/4)], (2 - b/(Sqrt[a]\*Sqrt[c]))/4])/(30\*c^(7/4)\*Sqrt[a + b\*x^2 + c\*x^4])

**Rule 212**

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

**Rule 626**

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[(b + 2\*c\*x)\*((a + b\*x + c\*x^2)^p/(2\*c\*(2\*p + 1))), x] - Dist[p\*((b^2 - 4\*a\*c)/(2\*c\*(2\*

$p + 1))$ ,  $\text{Int}[(a + b*x + c*x^2)^{(p - 1)}, x]$ ,  $x]$  /;  $\text{FreeQ}[\{a, b, c\}, x]$  &&  $\text{NeQ}[b^2 - 4*a*c, 0]$  &&  $\text{GtQ}[p, 0]$  &&  $\text{IntegerQ}[4*p]$

### Rule 635

$\text{Int}[1/\text{Sqrt}[(a_) + (b_)*(x_) + (c_)*(x_)^2], x\_Symbol]$   $\rightarrow$   $\text{Dist}[2, \text{Subst}[\text{Int}[1/(4*c - x^2), x], x, (b + 2*c*x)/\text{Sqrt}[a + b*x + c*x^2]], x]$  /;  $\text{FreeQ}[\{a, b, c\}, x]$  &&  $\text{NeQ}[b^2 - 4*a*c, 0]$

### Rule 654

$\text{Int}[((d_) + (e_)*(x_))*((a_) + (b_)*(x_) + (c_)*(x_)^2)^{(p_)}, x\_Symbol]$   $\rightarrow$   $\text{Simp}[e*((a + b*x + c*x^2)^{(p + 1)/(2*c*(p + 1))}, x] + \text{Dist}[(2*c*d - b*e)/(2*c), \text{Int}[(a + b*x + c*x^2)^p, x], x]$  /;  $\text{FreeQ}[\{a, b, c, d, e, p\}, x]$  &&  $\text{NeQ}[2*c*d - b*e, 0]$  &&  $\text{NeQ}[p, -1]$

### Rule 1117

$\text{Int}[1/\text{Sqrt}[(a_) + (b_)*(x_)^2 + (c_)*(x_)^4], x\_Symbol]$   $\rightarrow$   $\text{With}[\{q = \text{Rt}[c/a, 4]\}, \text{Simp}[(1 + q^2*x^2)*(\text{Sqrt}[a + b*x^2 + c*x^4]/(a*(1 + q^2*x^2)^2)]/(2*q*\text{Sqrt}[a + b*x^2 + c*x^4))*\text{EllipticF}[2*\text{ArcTan}[q*x], 1/2 - b*(q^2/(4*c))], x]$  /;  $\text{FreeQ}[\{a, b, c\}, x]$  &&  $\text{NeQ}[b^2 - 4*a*c, 0]$  &&  $\text{PosQ}[c/a]$

### Rule 1190

$\text{Int}[((d_) + (e_)*(x_)^2)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^{(p_)}, x\_Symbol]$   $\rightarrow$   $\text{Simp}[x*(2*b*e*p + c*d*(4*p + 3) + c*e*(4*p + 1)*x^2)*((a + b*x^2 + c*x^4)^p/(c*(4*p + 1)*(4*p + 3))), x] + \text{Dist}[2*(p/(c*(4*p + 1)*(4*p + 3))), \text{Int}[\text{Simp}[2*a*c*d*(4*p + 3) - a*b*e + (2*a*c*e*(4*p + 1) + b*c*d*(4*p + 3) - b^2*e*(2*p + 1))*x^2, x]*(a + b*x^2 + c*x^4)^{(p - 1)}, x], x]$  /;  $\text{FreeQ}[\{a, b, c, d, e\}, x]$  &&  $\text{NeQ}[b^2 - 4*a*c, 0]$  &&  $\text{NeQ}[c*d^2 - b*d*e + a*e^2, 0]$  &&  $\text{GtQ}[p, 0]$  &&  $\text{FractionQ}[p]$  &&  $\text{IntegerQ}[2*p]$

### Rule 1209

$\text{Int}[((d_) + (e_)*(x_)^2)/\text{Sqrt}[(a_) + (b_)*(x_)^2 + (c_)*(x_)^4], x\_Symbol]$   $\rightarrow$   $\text{With}[\{q = \text{Rt}[c/a, 4]\}, \text{Simp}[(-d)*x*(\text{Sqrt}[a + b*x^2 + c*x^4]/(a*(1 + q^2*x^2))), x] + \text{Simp}[d*(1 + q^2*x^2)*(\text{Sqrt}[a + b*x^2 + c*x^4]/(a*(1 + q^2*x^2)^2)]/(q*\text{Sqrt}[a + b*x^2 + c*x^4))*\text{EllipticE}[2*\text{ArcTan}[q*x], 1/2 - b*(q^2/(4*c))], x]$  /;  $\text{EqQ}[e + d*q^2, 0]$  /;  $\text{FreeQ}[\{a, b, c, d, e\}, x]$  &&  $\text{NeQ}[b^2 - 4*a*c, 0]$  &&  $\text{PosQ}[c/a]$

### Rule 1211

$\text{Int}[((d_) + (e_)*(x_)^2)/\text{Sqrt}[(a_) + (b_)*(x_)^2 + (c_)*(x_)^4], x\_Symbol]$   $\rightarrow$   $\text{With}[\{q = \text{Rt}[c/a, 2]\}, \text{Dist}[(e + d*q)/q, \text{Int}[1/\text{Sqrt}[a + b*x^2 + c*x^4$

], x], x] - Dist[e/q, Int[(1 - q\*x^2)/Sqrt[a + b\*x^2 + c\*x^4], x], x] /; NeQ[e + d\*q, 0] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[c/a]

### Rule 1261

Int[(x\_)\*((d\_) + (e\_)\*(x\_)^2)^(q\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Dist[1/2, Subst[Int[(d + e\*x)^q\*(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]

### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int (d + fx^2) \sqrt{a + bx^2 + cx^4} dx + \int x(e + gx^2) \sqrt{a + bx^2 + cx^4} dx \\
 &= \frac{x(5cd + bf + 3cfx^2) \sqrt{a + bx^2 + cx^4}}{15c} \\
 &\quad + \frac{1}{2} \text{Subst} \left( \int (e + gx) \sqrt{a + bx + cx^2} dx, x, x^2 \right) + \frac{\int \frac{a(10cd - bf) + (5bcd - 2b^2f + 6acf)x^2}{\sqrt{a + bx^2 + cx^4}} dx}{15c} \\
 &= \frac{x(5cd + bf + 3cfx^2) \sqrt{a + bx^2 + cx^4}}{15c} + \frac{g(a + bx^2 + cx^4)^{3/2}}{6c} \\
 &\quad + \frac{(\sqrt{a}(b + 2\sqrt{a}\sqrt{c})(5cd - 2bf + 3\sqrt{a}\sqrt{c}f)) \int \frac{1}{\sqrt{a + bx^2 + cx^4}} dx}{15c^{3/2}} \\
 &\quad - \frac{(\sqrt{a}(5bcd - 2b^2f + 6acf)) \int \frac{1 - \frac{\sqrt{cx^2}}{\sqrt{a}}}{\sqrt{a + bx^2 + cx^4}} dx}{15c^{3/2}} \\
 &\quad + \frac{(2ce - bg) \text{Subst}(\int \sqrt{a + bx + cx^2} dx, x, x^2)}{4c}
 \end{aligned}$$

$$\begin{aligned}
&= \frac{(5bcd - 2b^2f + 6acf)x\sqrt{a+bx^2+cx^4}}{15c^{3/2}(\sqrt{a}+\sqrt{cx^2})} + \frac{(2ce-bg)(b+2cx^2)\sqrt{a+bx^2+cx^4}}{16c^2} \\
&+ \frac{x(5cd+bf+3cfx^2)\sqrt{a+bx^2+cx^4}}{15c} + \frac{g(a+bx^2+cx^4)^{3/2}}{6c} \\
&\frac{\sqrt[4]{a}(5bcd-2b^2f+6acf)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}E\left(2\tan^{-1}\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right)\Big|_{\frac{1}{4}}\left(2-\frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{15c^{7/4}\sqrt{a+bx^2+cx^4}} \\
&- \frac{\sqrt[4]{a}(b+2\sqrt{a}\sqrt{c})(5cd-2bf+3\sqrt{a}\sqrt{c}f)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}F\left(2\tan^{-1}\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right)\Big|_{\frac{1}{4}}\left(2-\frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{30c^{7/4}\sqrt{a+bx^2+cx^4}} \\
&+ \frac{((b^2-4ac)(2ce-bg))\text{Subst}\left(\int\frac{1}{\sqrt{a+bx+cx^2}}dx, x, x^2\right)}{32c^2} \\
&= \frac{(5bcd - 2b^2f + 6acf)x\sqrt{a+bx^2+cx^4}}{15c^{3/2}(\sqrt{a}+\sqrt{cx^2})} + \frac{(2ce-bg)(b+2cx^2)\sqrt{a+bx^2+cx^4}}{16c^2} \\
&+ \frac{x(5cd+bf+3cfx^2)\sqrt{a+bx^2+cx^4}}{15c} + \frac{g(a+bx^2+cx^4)^{3/2}}{6c} \\
&\frac{\sqrt[4]{a}(5bcd-2b^2f+6acf)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}E\left(2\tan^{-1}\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right)\Big|_{\frac{1}{4}}\left(2-\frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{15c^{7/4}\sqrt{a+bx^2+cx^4}} \\
&- \frac{\sqrt[4]{a}(b+2\sqrt{a}\sqrt{c})(5cd-2bf+3\sqrt{a}\sqrt{c}f)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}F\left(2\tan^{-1}\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right)\Big|_{\frac{1}{4}}\left(2-\frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{30c^{7/4}\sqrt{a+bx^2+cx^4}} \\
&+ \frac{((b^2-4ac)(2ce-bg))\text{Subst}\left(\int\frac{1}{4c-x^2}dx, x, \frac{b+2cx^2}{\sqrt{a+bx^2+cx^4}}\right)}{16c^2} \\
&= \frac{(5bcd - 2b^2f + 6acf)x\sqrt{a+bx^2+cx^4}}{15c^{3/2}(\sqrt{a}+\sqrt{cx^2})} + \frac{(2ce-bg)(b+2cx^2)\sqrt{a+bx^2+cx^4}}{16c^2} \\
&+ \frac{x(5cd+bf+3cfx^2)\sqrt{a+bx^2+cx^4}}{15c} + \frac{g(a+bx^2+cx^4)^{3/2}}{6c} \\
&\frac{(b^2-4ac)(2ce-bg)\tanh^{-1}\left(\frac{b+2cx^2}{2\sqrt{c}\sqrt{a+bx^2+cx^4}}\right)}{32c^{5/2}} \\
&- \frac{\sqrt[4]{a}(5bcd-2b^2f+6acf)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}E\left(2\tan^{-1}\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right)\Big|_{\frac{1}{4}}\left(2-\frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{15c^{7/4}\sqrt{a+bx^2+cx^4}} \\
&- \frac{\sqrt[4]{a}(b+2\sqrt{a}\sqrt{c})(5cd-2bf+3\sqrt{a}\sqrt{c}f)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}F\left(2\tan^{-1}\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right)\Big|_{\frac{1}{4}}\left(2-\frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{30c^{7/4}\sqrt{a+bx^2+cx^4}}
\end{aligned}$$

**Mathematica [C] (verified)**

Result contains complex when optimal does not.

Time = 12.54 (sec) , antiderivative size = 661, normalized size of antiderivative = 1.31

$$\int (d + ex + fx^2 + gx^3) \sqrt{a + bx^2 + cx^4} dx$$

$$= \frac{2\sqrt{c}(a + bx^2 + cx^4)(-15b^2g + 2bc(15e + x(8f + 5gx)) + 4c(10ag + cx(20d + x(15e + 2x(6f + 5gx))))}{}$$

```
[In] Integrate[(d + e*x + f*x^2 + g*x^3)*Sqrt[a + b*x^2 + c*x^4],x]
[Out] (2*Sqrt[c]*(a + b*x^2 + c*x^4)*(-15*b^2*g + 2*b*c*(15*e + x*(8*f + 5*g*x))
+ 4*c*(10*a*g + c*x*(20*d + x*(15*e + 2*x*(6*f + 5*g*x)))) + ((-8*I)*Sqrt[
2]*Sqrt[c]*(-b + Sqrt[b^2 - 4*a*c])*(-5*b*c*d + 2*b^2*f - 6*a*c*f)*Sqrt[(b
- Sqrt[b^2 - 4*a*c] + 2*c*x^2)/(b - Sqrt[b^2 - 4*a*c]])*Sqrt[(b + Sqrt[b^2
- 4*a*c] + 2*c*x^2)/(b + Sqrt[b^2 - 4*a*c]])*EllipticE[I*ArcSinh[Sqrt[2]*Sq
rt[c/(b + Sqrt[b^2 - 4*a*c]])*x], (b + Sqrt[b^2 - 4*a*c])/(b - Sqrt[b^2 - 4
*a*c]]) + (8*I)*Sqrt[2]*Sqrt[c]*(-2*b^3*f + b*c*(-5*Sqrt[b^2 - 4*a*c]*d + 8
*a*f) + b^2*(5*c*d + 2*Sqrt[b^2 - 4*a*c]*f) - 2*a*c*(10*c*d + 3*Sqrt[b^2 -
4*a*c]*f))*Sqrt[(b - Sqrt[b^2 - 4*a*c] + 2*c*x^2)/(b - Sqrt[b^2 - 4*a*c]])*
Sqrt[(b + Sqrt[b^2 - 4*a*c] + 2*c*x^2)/(b + Sqrt[b^2 - 4*a*c]])*EllipticF[I
*ArcSinh[Sqrt[2]*Sqrt[c/(b + Sqrt[b^2 - 4*a*c]])*x], (b + Sqrt[b^2 - 4*a*c]
)/(b - Sqrt[b^2 - 4*a*c]]) - 15*(b^2 - 4*a*c)*Sqrt[c/(b + Sqrt[b^2 - 4*a*c]
)]*(-2*c*e + b*g)*Sqrt[a + b*x^2 + c*x^4]*Log[b + 2*c*x^2 - 2*Sqrt[c]*Sqrt[
a + b*x^2 + c*x^4])/Sqrt[c/(b + Sqrt[b^2 - 4*a*c]])]/(480*c^(5/2)*Sqrt[a +
b*x^2 + c*x^4])
```

### Maple [A] (verified)

Time = 5.34 (sec) , antiderivative size = 620, normalized size of antiderivative = 1.23

method	result
elliptic	$\frac{g x^4 \sqrt{c x^4 + b x^2 + a}}{6} + \frac{f x^3 \sqrt{c x^4 + b x^2 + a}}{5} + \frac{\left(\frac{b g}{6} + e c\right) x^2 \sqrt{c x^4 + b x^2 + a}}{4 c} + \frac{\left(\frac{b f}{5} + c d\right) x \sqrt{c x^4 + b x^2 + a}}{3 c} + \frac{\left(\frac{a g}{3} + b e - \frac{3\left(\frac{b g}{6} + e c\right) b}{4 c}\right) \sqrt{40 a c^2 d \sqrt{2} \sqrt{4 - \frac{2(-b + \sqrt{-4 a c + b^2}}{a}}}}{2 c}}$
risch	$\frac{(40 g x^4 c^2 + 48 f x^3 c^2 + 10 b c g x^2 + 60 c^2 e x^2 + 16 b f x c + 80 c^2 d x + 40 a c g - 15 b^2 g + 30 e b c) \sqrt{c x^4 + b x^2 + a}}{240 c^2}$
default	$d \left( \frac{x \sqrt{c x^4 + b x^2 + a}}{3} + \frac{a \sqrt{2} \sqrt{4 - \frac{2(-b + \sqrt{-4 a c + b^2}) x^2}{a}} \sqrt{4 + \frac{2(b + \sqrt{-4 a c + b^2}) x^2}{a}} F\left(\frac{x \sqrt{2} \sqrt{\frac{-b + \sqrt{-4 a c + b^2}}{a}}, \sqrt{\frac{-4 + \frac{2 b(b + \sqrt{-4 a c + b^2})}{a c}}}{2}}\right)}{6 \sqrt{\frac{-b + \sqrt{-4 a c + b^2}}{a}} \sqrt{c x^4 + b x^2 + a}} \right)$

[In] int((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^(1/2),x,method=\_RETURNVERBOSE)

[Out] 1/6\*g\*x^4\*(c\*x^4+b\*x^2+a)^(1/2)+1/5\*f\*x^3\*(c\*x^4+b\*x^2+a)^(1/2)+1/4\*(1/6\*b\*g+e\*c)/c\*x^2\*(c\*x^4+b\*x^2+a)^(1/2)+1/3\*(1/5\*b\*f+c\*d)/c\*x\*(c\*x^4+b\*x^2+a)^(1/2)+1/2\*(1/3\*a\*g+b\*e-3/4\*(1/6\*b\*g+e\*c)/c\*b)/c\*(c\*x^4+b\*x^2+a)^(1/2)+1/4\*(d\*a-1/3\*(1/5\*b\*f+c\*d)/c\*a)\*2^(1/2)/((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2)\*(4-2\*(-b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)\*(4+2\*(b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)/(c\*x^4+b\*x^2+a)^(1/2)\*EllipticF(1/2\*x\*2^(1/2)\*((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2),1/2\*(-4+2\*b\*(b+(-4\*a\*c+b^2)^(1/2))/a/c)^(1/2))+1/2\*(a\*e-1/2\*(1/6\*b\*g+e\*c)/c\*a-1/2\*(1/3\*a\*g+b\*e-3/4\*(1/6\*b\*g+e\*c)/c\*b)/c\*b)\*ln((2\*c\*x^2+b)/c^(1/2)+2\*(c\*x^4+b\*x^2+a)^(1/2))/c^(1/2)-1/2\*(2/5\*a\*f+b\*d-2/3\*(1/5\*b\*f+c\*d)/c\*b)\*a\*2^(1/2)/((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2)\*(4-2\*(-b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)\*(4+2\*(b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)/(c\*x^4+b\*x^2+a)^(1/2)/(b+(-4\*a\*c+b^2)^(1/2))\*EllipticF(1/2\*x\*2^(1/2)\*((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2),1/2\*(-4+2\*b\*(b+(-4\*a\*c+b^2)^(1/2))/a/c)^(1/2))-EllipticE(1/2\*x\*2^(1/2)\*((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2),1/2\*(-4+2\*b\*(b+(-4\*a\*c+b^2)^(1/2))/a/c)^(1/2)))

**Fricas [A] (verification not implemented)**

none

Time = 0.26 (sec) , antiderivative size = 574, normalized size of antiderivative = 1.14

$$\int (d + ex + fx^2 + gx^3) \sqrt{a + bx^2 + cx^4} dx$$

$$32 \sqrt{\frac{1}{2}} \left( (5bc^2d - 2(b^2c - 3ac^2)f)x \sqrt{\frac{b^2 - 4ac}{c^2}} - (5b^2cd - 2(b^3 - 3abc)f)x \right) \sqrt{c} \sqrt{\frac{c\sqrt{\frac{b^2 - 4ac}{c^2}} - b}{c}} E(\arcsin \left( \sqrt{\frac{c\sqrt{\frac{b^2 - 4ac}{c^2}} - b}{c}} \right))$$


---

```
[In] integrate((g*x^3+f*x^2+e*x+d)*(c*x^4+b*x^2+a)^(1/2),x, algorithm="fricas")
[Out] 1/960*(32*sqrt(1/2)*((5*b*c^2*d - 2*(b^2*c - 3*a*c^2)*f)*x*sqrt((b^2 - 4*a*c)/c^2) - (5*b^2*c*d - 2*(b^3 - 3*a*b*c)*f)*x)*sqrt(c)*sqrt((c*sqrt((b^2 - 4*a*c)/c^2) - b)/c)*elliptic_e(arcsin(sqrt(1/2)*sqrt((c*sqrt((b^2 - 4*a*c)/c^2) - b)/c)/x), 1/2*(b*c*sqrt((b^2 - 4*a*c)/c^2) + b^2 - 2*a*c)/(a*c)) - 3*2*sqrt(1/2)*((5*(b*c^2 - 2*c^3)*d - (2*b^2*c - (6*a + b)*c^2)*f)*x*sqrt((b^2 - 4*a*c)/c^2) - (5*(b^2*c + 2*b*c^2)*d - (2*b^3 - (6*a*b - b^2)*c)*f)*x)*sqrt(c)*sqrt((c*sqrt((b^2 - 4*a*c)/c^2) - b)/c)*elliptic_f(arcsin(sqrt(1/2)*sqrt((c*sqrt((b^2 - 4*a*c)/c^2) - b)/c)/x), 1/2*(b*c*sqrt((b^2 - 4*a*c)/c^2) + b^2 - 2*a*c)/(a*c)) + 15*(2*(b^2*c - 4*a*c^2)*e - (b^3 - 4*a*b*c)*g)*sqrt(c)*x*log(8*c^2*x^4 + 8*b*c*x^2 + b^2 - 4*sqrt(c*x^4 + b*x^2 + a)*(2*c*x^2 + b)*sqrt(c) + 4*a*c) + 4*(40*c^3*g*x^5 + 48*c^3*f*x^4 + 80*b*c^2*d + 10*(6*c^3*e + b*c^2*g)*x^3 + 16*(5*c^3*d + b*c^2*f)*x^2 - 32*(b^2*c - 3*a*c^2)*f + 5*(6*b*c^2*e - (3*b^2*c - 8*a*c^2)*g)*x)*sqrt(c*x^4 + b*x^2 + a))/(c^3*x)
```

**Sympy [F]**

$$\int (d + ex + fx^2 + gx^3) \sqrt{a + bx^2 + cx^4} dx = \int \sqrt{a + bx^2 + cx^4} (d + ex + fx^2 + gx^3) dx$$

```
[In] integrate((g*x**3+f*x**2+e*x+d)*(c*x**4+b*x**2+a)**(1/2),x)
```

```
[Out] Integral(sqrt(a + b*x**2 + c*x**4)*(d + e*x + f*x**2 + g*x**3), x)
```

**Maxima [F]**

$$\int (d + ex + fx^2 + gx^3) \sqrt{a + bx^2 + cx^4} dx = \int \sqrt{cx^4 + bx^2 + a} (gx^3 + fx^2 + ex + d) dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^(1/2),x, algorithm="maxima")

[Out] integrate(sqrt(c\*x^4 + b\*x^2 + a)\*(g\*x^3 + f\*x^2 + e\*x + d), x)

**Giac [F]**

$$\int (d + ex + fx^2 + gx^3) \sqrt{a + bx^2 + cx^4} dx = \int \sqrt{cx^4 + bx^2 + a} (gx^3 + fx^2 + ex + d) dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)\*(c\*x^4+b\*x^2+a)^(1/2),x, algorithm="giac")

[Out] integrate(sqrt(c\*x^4 + b\*x^2 + a)\*(g\*x^3 + f\*x^2 + e\*x + d), x)

**Mupad [F(-1)]**

Timed out.

$$\int (d + ex + fx^2 + gx^3) \sqrt{a + bx^2 + cx^4} dx = \int \sqrt{cx^4 + bx^2 + a} (gx^3 + fx^2 + ex + d) dx$$

[In] int((a + b\*x^2 + c\*x^4)^(1/2)\*(d + e\*x + f\*x^2 + g\*x^3),x)

[Out] int((a + b\*x^2 + c\*x^4)^(1/2)\*(d + e\*x + f\*x^2 + g\*x^3), x)



### 3.105 $\int \frac{d+ex+fx^2+gx^3}{\sqrt{a+bx^2+cx^4}} dx$

Optimal result	1153
Rubi [A] (verified)	1154
Mathematica [C] (verified)	1157
Maple [A] (verified)	1157
Fricas [A] (verification not implemented)	1158
Sympy [F]	1159
Maxima [F]	1159
Giac [F]	1159
Mupad [F(-1)]	1159

#### Optimal result

Integrand size = 32, antiderivative size = 359

$$\int \frac{d+ex+fx^2+gx^3}{\sqrt{a+bx^2+cx^4}} dx$$

$$= \frac{g\sqrt{a+bx^2+cx^4}}{2c} + \frac{fx\sqrt{a+bx^2+cx^4}}{\sqrt{c}(\sqrt{a}+\sqrt{cx^2})} + \frac{(2ce-bg)\operatorname{arctanh}\left(\frac{b+2cx^2}{2\sqrt{c}\sqrt{a+bx^2+cx^4}}\right)}{4c^{3/2}}$$

$$- \frac{\sqrt[4]{a}f(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}E\left(2\arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right)\middle|\frac{1}{4}\left(2-\frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{c^{3/4}\sqrt{a+bx^2+cx^4}}$$

$$+ \frac{\sqrt[4]{a}\left(\frac{\sqrt{cd}}{\sqrt{a}}+f\right)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}\operatorname{EllipticF}\left(2\arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right),\frac{1}{4}\left(2-\frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{2c^{3/4}\sqrt{a+bx^2+cx^4}}$$

[Out]  $\frac{1}{4}*(-b*g+2*c*e)*\operatorname{arctanh}\left(\frac{1}{2}*(2*c*x^2+b)/c^{(1/2)}/(c*x^4+b*x^2+a)^{(1/2)}\right)/c^{(3/2)}+1/2*g*(c*x^4+b*x^2+a)^{(1/2)}/c+f*x*(c*x^4+b*x^2+a)^{(1/2)}/c^{(1/2)}/(a^{(1/2)}+x^2*c^{(1/2)})-a^{(1/4)}*f*(\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)}))^2)^{(1/2)}/\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)}))*\operatorname{EllipticE}(\sin(2*\arctan(c^{(1/4)}*x/a^{(1/4)})),1/2*(2-b/a^{(1/2)}/c^{(1/2)})^{(1/2)})*(a^{(1/2)}+x^2*c^{(1/2)})*((c*x^4+b*x^2+a)/(a^{(1/2)}+x^2*c^{(1/2)})^2)^{(1/2)}/c^{(3/4)}/(c*x^4+b*x^2+a)^{(1/2)}+1/2*a^{(1/4)}*(\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)}))^2)^{(1/2)}/\cos(2*\arctan(c^{(1/4)}*x/a^{(1/4)}))*\operatorname{EllipticF}(\sin(2*\arctan(c^{(1/4)}*x/a^{(1/4)})),1/2*(2-b/a^{(1/2)}/c^{(1/2)})^{(1/2)})*(a^{(1/2)}+x^2*c^{(1/2)})*(f+d*c^{(1/2)}/a^{(1/2)})*((c*x^4+b*x^2+a)/(a^{(1/2)}+x^2*c^{(1/2)})^2)^{(1/2)}/c^{(3/4)}/(c*x^4+b*x^2+a)^{(1/2)}$

**Rubi [A] (verified)**

Time = 0.10 (sec) , antiderivative size = 359, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.250$ , Rules used = {1687, 1211, 1117, 1209, 1261, 654, 635, 212}

$$\int \frac{d + ex + fx^2 + gx^3}{\sqrt{a + bx^2 + cx^4}} dx$$

$$= \frac{\sqrt[4]{a}(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}} \left( \frac{\sqrt{cd}}{\sqrt{a}} + f \right) \text{EllipticF} \left( 2 \arctan \left( \frac{\sqrt[4]{cx}}{\sqrt{a}} \right), \frac{1}{4} \left( 2 - \frac{b}{\sqrt{a}\sqrt{c}} \right) \right)}{2c^{3/4}\sqrt{a + bx^2 + cx^4}}$$

$$- \frac{\sqrt[4]{a}f(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}} E \left( 2 \arctan \left( \frac{\sqrt[4]{cx}}{\sqrt{a}} \right) \middle| \frac{1}{4} \left( 2 - \frac{b}{\sqrt{a}\sqrt{c}} \right) \right)}{c^{3/4}\sqrt{a + bx^2 + cx^4}}$$

$$+ \frac{(2ce - bg) \operatorname{arctanh} \left( \frac{b+2cx^2}{2\sqrt{c}\sqrt{a+bx^2+cx^4}} \right)}{4c^{3/2}} + \frac{fx\sqrt{a + bx^2 + cx^4}}{\sqrt{c}(\sqrt{a} + \sqrt{cx^2})} + \frac{g\sqrt{a + bx^2 + cx^4}}{2c}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)/Sqrt[a + b\*x^2 + c\*x^4], x]

[Out] (g\*Sqrt[a + b\*x^2 + c\*x^4])/(2\*c) + (f\*x\*Sqrt[a + b\*x^2 + c\*x^4])/(Sqrt[c]\*(Sqrt[a] + Sqrt[c]\*x^2)) + ((2\*c\*e - b\*g)\*ArcTanh[(b + 2\*c\*x^2)/(2\*Sqrt[c]\*Sqrt[a + b\*x^2 + c\*x^4])])/(4\*c^(3/2)) - (a^(1/4)\*f\*(Sqrt[a] + Sqrt[c]\*x^2)\*Sqrt[(a + b\*x^2 + c\*x^4)/(Sqrt[a] + Sqrt[c]\*x^2)^2]\*EllipticE[2\*ArcTan[(c^(1/4)\*x)/a^(1/4)], (2 - b/(Sqrt[a]\*Sqrt[c]))/4])/(c^(3/4)\*Sqrt[a + b\*x^2 + c\*x^4]) + (a^(1/4)\*((Sqrt[c]\*d)/Sqrt[a] + f)\*(Sqrt[a] + Sqrt[c]\*x^2)\*Sqrt[(a + b\*x^2 + c\*x^4)/(Sqrt[a] + Sqrt[c]\*x^2)^2]\*EllipticF[2\*ArcTan[(c^(1/4)\*x)/a^(1/4)], (2 - b/(Sqrt[a]\*Sqrt[c]))/4])/(2\*c^(3/4)\*Sqrt[a + b\*x^2 + c\*x^4])

**Rule 212**

Int[((a\_) + (b\_.)\*(x\_)^2)^(-1), x\_Symbol] := Simp[(1/(Rt[a, 2]\*Rt[-b, 2]))\*ArcTanh[Rt[-b, 2]\*(x/Rt[a, 2])], x] /; FreeQ[{a, b}, x] && NegQ[a/b] && (GtQ[a, 0] || LtQ[b, 0])

**Rule 635**

Int[1/Sqrt[(a\_) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2], x\_Symbol] := Dist[2, Subst[Int[1/(4\*c - x^2), x], x, (b + 2\*c\*x)/Sqrt[a + b\*x + c\*x^2]], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

**Rule 654**

Int[((d\_.) + (e\_.)\*(x\_))\*((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[e\*(a + b\*x + c\*x^2)^(p + 1)/(2\*c\*(p + 1)), x] + Dist[(2\*c\*d - b

\*e)/(2\*c), Int[(a + b\*x + c\*x^2)^p, x] /; FreeQ[{a, b, c, d, e, p}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[p, -1]

#### Rule 1117

Int[1/Sqrt[(a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4], x\_Symbol] := With[{q = Rt[c/a, 4]}, Simp[(1 + q^2\*x^2)\*(Sqrt[a + b\*x^2 + c\*x^4]/(a\*(1 + q^2\*x^2)^2)]/(2\*q\*Sqrt[a + b\*x^2 + c\*x^4])\*EllipticF[2\*ArcTan[q\*x], 1/2 - b\*(q^2/(4\*c))], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[c/a]

#### Rule 1209

Int[((d\_) + (e\_)\*(x\_)^2)/Sqrt[(a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4], x\_Symbol] := With[{q = Rt[c/a, 4]}, Simp[(-d)\*x\*(Sqrt[a + b\*x^2 + c\*x^4]/(a\*(1 + q^2\*x^2))), x] + Simp[d\*(1 + q^2\*x^2)\*(Sqrt[a + b\*x^2 + c\*x^4]/(a\*(1 + q^2\*x^2)^2)]/(q\*Sqrt[a + b\*x^2 + c\*x^4])\*EllipticE[2\*ArcTan[q\*x], 1/2 - b\*(q^2/(4\*c))], x] /; EqQ[e + d\*q^2, 0] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[c/a]

#### Rule 1211

Int[((d\_) + (e\_)\*(x\_)^2)/Sqrt[(a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4], x\_Symbol] := With[{q = Rt[c/a, 2]}, Dist[(e + d\*q)/q, Int[1/Sqrt[a + b\*x^2 + c\*x^4], x], x] - Dist[e/q, Int[(1 - q\*x^2)/Sqrt[a + b\*x^2 + c\*x^4], x], x] /; NeQ[e + d\*q, 0] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[c/a]

#### Rule 1261

Int[(x\_)\*((d\_) + (e\_)\*(x\_)^2)^(q\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Dist[1/2, Subst[Int[(d + e\*x)^q\*(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]

#### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

#### Rubi steps

$$\text{integral} = \int \frac{d + fx^2}{\sqrt{a + bx^2 + cx^4}} dx + \int \frac{x(e + gx^2)}{\sqrt{a + bx^2 + cx^4}} dx$$

$$\begin{aligned}
&= \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{\sqrt{a + bx + cx^2}} dx, x, x^2 \right) - \frac{(\sqrt{a}f) \int \frac{1 - \frac{\sqrt{cx^2}}{\sqrt{a}}}{\sqrt{a + bx^2 + cx^4}} dx}{\sqrt{c}} \\
&\quad + \left( d + \frac{\sqrt{a}f}{\sqrt{c}} \right) \int \frac{1}{\sqrt{a + bx^2 + cx^4}} dx \\
&= \frac{g\sqrt{a + bx^2 + cx^4}}{2c} + \frac{fx\sqrt{a + bx^2 + cx^4}}{\sqrt{c}(\sqrt{a} + \sqrt{cx^2})} \\
&\quad - \frac{\sqrt[4]{a}f(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a + bx^2 + cx^4}{(\sqrt{a} + \sqrt{cx^2})^2}} E \left( 2 \tan^{-1} \left( \frac{\sqrt[4]{Cx}}{\sqrt[4]{a}} \right) \middle| \frac{1}{4} \left( 2 - \frac{b}{\sqrt{a}\sqrt{c}} \right) \right)}{c^{3/4}\sqrt{a + bx^2 + cx^4}} \\
&\quad + \frac{(\sqrt{cd} + \sqrt{a}f)(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a + bx^2 + cx^4}{(\sqrt{a} + \sqrt{cx^2})^2}} F \left( 2 \tan^{-1} \left( \frac{\sqrt[4]{Cx}}{\sqrt[4]{a}} \right) \middle| \frac{1}{4} \left( 2 - \frac{b}{\sqrt{a}\sqrt{c}} \right) \right)}{2\sqrt[4]{ac^3}\sqrt{a + bx^2 + cx^4}} \\
&\quad + \frac{(2ce - bg) \text{Subst} \left( \int \frac{1}{\sqrt{a + bx + cx^2}} dx, x, x^2 \right)}{4c} \\
&= \frac{g\sqrt{a + bx^2 + cx^4}}{2c} + \frac{fx\sqrt{a + bx^2 + cx^4}}{\sqrt{c}(\sqrt{a} + \sqrt{cx^2})} \\
&\quad - \frac{\sqrt[4]{a}f(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a + bx^2 + cx^4}{(\sqrt{a} + \sqrt{cx^2})^2}} E \left( 2 \tan^{-1} \left( \frac{\sqrt[4]{Cx}}{\sqrt[4]{a}} \right) \middle| \frac{1}{4} \left( 2 - \frac{b}{\sqrt{a}\sqrt{c}} \right) \right)}{c^{3/4}\sqrt{a + bx^2 + cx^4}} \\
&\quad + \frac{(\sqrt{cd} + \sqrt{a}f)(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a + bx^2 + cx^4}{(\sqrt{a} + \sqrt{cx^2})^2}} F \left( 2 \tan^{-1} \left( \frac{\sqrt[4]{Cx}}{\sqrt[4]{a}} \right) \middle| \frac{1}{4} \left( 2 - \frac{b}{\sqrt{a}\sqrt{c}} \right) \right)}{2\sqrt[4]{ac^3}\sqrt{a + bx^2 + cx^4}} \\
&\quad + \frac{(2ce - bg) \text{Subst} \left( \int \frac{1}{4c - x^2} dx, x, \frac{b + 2cx^2}{\sqrt{a + bx^2 + cx^4}} \right)}{2c} \\
&= \frac{g\sqrt{a + bx^2 + cx^4}}{2c} + \frac{fx\sqrt{a + bx^2 + cx^4}}{\sqrt{c}(\sqrt{a} + \sqrt{cx^2})} + \frac{(2ce - bg) \tanh^{-1} \left( \frac{b + 2cx^2}{2\sqrt{c}\sqrt{a + bx^2 + cx^4}} \right)}{4c^{3/2}} \\
&\quad - \frac{\sqrt[4]{a}f(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a + bx^2 + cx^4}{(\sqrt{a} + \sqrt{cx^2})^2}} E \left( 2 \tan^{-1} \left( \frac{\sqrt[4]{Cx}}{\sqrt[4]{a}} \right) \middle| \frac{1}{4} \left( 2 - \frac{b}{\sqrt{a}\sqrt{c}} \right) \right)}{c^{3/4}\sqrt{a + bx^2 + cx^4}} \\
&\quad + \frac{(\sqrt{cd} + \sqrt{a}f)(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a + bx^2 + cx^4}{(\sqrt{a} + \sqrt{cx^2})^2}} F \left( 2 \tan^{-1} \left( \frac{\sqrt[4]{Cx}}{\sqrt[4]{a}} \right) \middle| \frac{1}{4} \left( 2 - \frac{b}{\sqrt{a}\sqrt{c}} \right) \right)}{2\sqrt[4]{ac^3}\sqrt{a + bx^2 + cx^4}}
\end{aligned}$$

### Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 10.87 (sec) , antiderivative size = 525, normalized size of antiderivative = 1.46

$$\int \frac{d + ex + fx^2 + gx^3}{\sqrt{a + bx^2 + cx^4}} dx$$

$$= \frac{i\sqrt{2}\sqrt{c}(-b + \sqrt{b^2 - 4ac}) f \sqrt{\frac{b - \sqrt{b^2 - 4ac} + 2cx^2}{b - \sqrt{b^2 - 4ac}}} \sqrt{\frac{b + \sqrt{b^2 - 4ac} + 2cx^2}{b + \sqrt{b^2 - 4ac}}} E\left(\operatorname{arcsinh}\left(\sqrt{2}\sqrt{\frac{c}{b + \sqrt{b^2 - 4ac}}}x\right) \middle| \frac{b + \sqrt{b^2 - 4ac}}{b - \sqrt{b^2 - 4ac}}\right)}{4c^{3/2}\sqrt{c/(b + \sqrt{b^2 - 4ac})}\sqrt{a + bx^2 + cx^4}}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)/Sqrt[a + b\*x^2 + c\*x^4],x]

[Out] (I\*Sqrt[2]\*Sqrt[c]\*(-b + Sqrt[b^2 - 4\*a\*c])\*f\*Sqrt[(b - Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2)/(b - Sqrt[b^2 - 4\*a\*c]])\*Sqrt[(b + Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2)/(b + Sqrt[b^2 - 4\*a\*c]])\*EllipticE[I\*ArcSinh[Sqrt[2]\*Sqrt[c/(b + Sqrt[b^2 - 4\*a\*c]])]\*x], (b + Sqrt[b^2 - 4\*a\*c])/(b - Sqrt[b^2 - 4\*a\*c])) - I\*Sqrt[2]\*Sqrt[c]\*(2\*c\*d + (-b + Sqrt[b^2 - 4\*a\*c])\*f)\*Sqrt[(b - Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2)/(b - Sqrt[b^2 - 4\*a\*c]])\*Sqrt[(b + Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2)/(b + Sqrt[b^2 - 4\*a\*c]])\*EllipticF[I\*ArcSinh[Sqrt[2]\*Sqrt[c/(b + Sqrt[b^2 - 4\*a\*c]])]\*x], (b + Sqrt[b^2 - 4\*a\*c])/(b - Sqrt[b^2 - 4\*a\*c])) + Sqrt[c/(b + Sqrt[b^2 - 4\*a\*c])]\*(2\*Sqrt[c]\*g\*(a + b\*x^2 + c\*x^4) + (-2\*c\*e + b\*g)\*Sqrt[a + b\*x^2 + c\*x^4]\*Log[b + 2\*c\*x^2 - 2\*Sqrt[c]\*Sqrt[a + b\*x^2 + c\*x^4]])/(4\*c^(3/2)\*Sqrt[c/(b + Sqrt[b^2 - 4\*a\*c])]\*Sqrt[a + b\*x^2 + c\*x^4])

### Maple [A] (verified)

Time = 4.08 (sec) , antiderivative size = 426, normalized size of antiderivative = 1.19

method	result
elliptic	$\frac{g\sqrt{cx^4+bx^2+a}}{2c} + \frac{d\sqrt{2}\sqrt{4-\frac{2(-b+\sqrt{-4ac+b^2})x^2}{a}}\sqrt{4+\frac{2(b+\sqrt{-4ac+b^2})x^2}{a}}F\left(\frac{x\sqrt{2}\sqrt{\frac{-b+\sqrt{-4ac+b^2}}{a}}}{2},\sqrt{-4+\frac{2b(b+\sqrt{-4ac+b^2})}{ac}}\right)}{4\sqrt{\frac{-b+\sqrt{-4ac+b^2}}{a}}\sqrt{cx^4+bx^2+a}}$
risch	$\frac{g\sqrt{cx^4+bx^2+a}}{2c} - \frac{cd\sqrt{2}\sqrt{4-\frac{2(-b+\sqrt{-4ac+b^2})x^2}{a}}\sqrt{4+\frac{2(b+\sqrt{-4ac+b^2})x^2}{a}}F\left(\frac{x\sqrt{2}\sqrt{\frac{-b+\sqrt{-4ac+b^2}}{a}}}{2},\sqrt{-4+\frac{2b(b+\sqrt{-4ac+b^2})}{ac}}\right)}{2\sqrt{\frac{-b+\sqrt{-4ac+b^2}}{a}}\sqrt{cx^4+bx^2+a}}$
default	$\frac{d\sqrt{2}\sqrt{4-\frac{2(-b+\sqrt{-4ac+b^2})x^2}{a}}\sqrt{4+\frac{2(b+\sqrt{-4ac+b^2})x^2}{a}}F\left(\frac{x\sqrt{2}\sqrt{\frac{-b+\sqrt{-4ac+b^2}}{a}}}{2},\sqrt{-4+\frac{2b(b+\sqrt{-4ac+b^2})}{ac}}\right)}{4\sqrt{\frac{-b+\sqrt{-4ac+b^2}}{a}}\sqrt{cx^4+bx^2+a}} + g\left(\frac{\sqrt{cx^4+bx^2+a}}{2c}\right)$

```
[In] int((g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^(1/2),x,method=_RETURNVERBOSE)
[Out] 1/2*g*(c*x^4+b*x^2+a)^(1/2)/c+1/4*d*2^(1/2)/((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2)
*(4-2*(-b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)*(4+2*(b+(-4*a*c+b^2)^(1/2))/a*
x^2)^(1/2)/(c*x^4+b*x^2+a)^(1/2)*EllipticF(1/2*x*2^(1/2)*((-b+(-4*a*c+b^2)^(1/2)
)/a)^(1/2),1/2*(-4+2*b*(b+(-4*a*c+b^2)^(1/2))/a/c)^(1/2))+1/2*(e-1/2*g
/c*b)*ln((2*c*x^2+b)/c^(1/2)+2*(c*x^4+b*x^2+a)^(1/2))/c^(1/2)-1/2*f*a*2^(1/2)
/((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2)*(4-2*(-b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)
*(4+2*(b+(-4*a*c+b^2)^(1/2))/a*x^2)^(1/2)/(c*x^4+b*x^2+a)^(1/2)/(b+(-4*a
*c+b^2)^(1/2))*(EllipticF(1/2*x*2^(1/2)*((-b+(-4*a*c+b^2)^(1/2))/a)^(1/2),
1/2*(-4+2*b*(b+(-4*a*c+b^2)^(1/2))/a/c)^(1/2))-EllipticE(1/2*x*2^(1/2)*((-b+
(-4*a*c+b^2)^(1/2))/a)^(1/2),1/2*(-4+2*b*(b+(-4*a*c+b^2)^(1/2))/a/c)^(1/2))
)
```

## Fricas [A] (verification not implemented)

none

Time = 0.19 (sec) , antiderivative size = 376, normalized size of antiderivative = 1.05

$$\int \frac{d + ex + fx^2 + gx^3}{\sqrt{a + bx^2 + cx^4}} dx$$

$$4 \sqrt{\frac{1}{2}} \left( acfx \sqrt{\frac{b^2 - 4ac}{c^2}} - abfx \right) \sqrt{c} \sqrt{\frac{c \sqrt{\frac{b^2 - 4ac}{c^2}} - b}{c}} E \left( \arcsin \left( \frac{\sqrt{\frac{1}{2}} \sqrt{\frac{c \sqrt{\frac{b^2 - 4ac}{c^2}} - b}{c}}}{x} \right) \mid \frac{bc \sqrt{\frac{b^2 - 4ac}{c^2}} + b^2 - 2ac}{2ac} \right) + 4 \sqrt{\frac{1}{2}} \left( (c^2 \dots \right)$$


---

```
[In] integrate((g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^(1/2),x, algorithm="fricas")
[Out] 1/8*(4*sqrt(1/2)*(a*c*f*x*sqrt((b^2 - 4*a*c)/c^2) - a*b*f*x)*sqrt(c)*sqrt((
c*sqrt((b^2 - 4*a*c)/c^2) - b)/c)*elliptic_e(arcsin(sqrt(1/2)*sqrt((c*sqrt(
(b^2 - 4*a*c)/c^2) - b)/c)/x), 1/2*(b*c*sqrt((b^2 - 4*a*c)/c^2) + b^2 - 2*a
*c)/(a*c)) + 4*sqrt(1/2)*((c^2*d - a*c*f)*x*sqrt((b^2 - 4*a*c)/c^2) + (b*c*
d + a*b*f)*x)*sqrt(c)*sqrt((c*sqrt((b^2 - 4*a*c)/c^2) - b)/c)*elliptic_f(ar
csin(sqrt(1/2)*sqrt((c*sqrt((b^2 - 4*a*c)/c^2) - b)/c)/x), 1/2*(b*c*sqrt((b
^2 - 4*a*c)/c^2) + b^2 - 2*a*c)/(a*c)) - (2*a*c*e - a*b*g)*sqrt(c)*x*log(8*
c^2*x^4 + 8*b*c*x^2 + b^2 - 4*sqrt(c*x^4 + b*x^2 + a)*(2*c*x^2 + b)*sqrt(c)
+ 4*a*c) + 4*sqrt(c*x^4 + b*x^2 + a)*(a*c*g*x + 2*a*c*f))/(a*c^2*x)
```

**Sympy [F]**

$$\int \frac{d + ex + fx^2 + gx^3}{\sqrt{a + bx^2 + cx^4}} dx = \int \frac{d + ex + fx^2 + gx^3}{\sqrt{a + bx^2 + cx^4}} dx$$

[In] integrate((g\*x\*\*3+f\*x\*\*2+e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a)\*\*(1/2),x)

[Out] Integral((d + e\*x + f\*x\*\*2 + g\*x\*\*3)/sqrt(a + b\*x\*\*2 + c\*x\*\*4), x)

**Maxima [F]**

$$\int \frac{d + ex + fx^2 + gx^3}{\sqrt{a + bx^2 + cx^4}} dx = \int \frac{gx^3 + fx^2 + ex + d}{\sqrt{cx^4 + bx^2 + a}} dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^(1/2),x, algorithm="maxima")

[Out] integrate((g\*x^3 + f\*x^2 + e\*x + d)/sqrt(c\*x^4 + b\*x^2 + a), x)

**Giac [F]**

$$\int \frac{d + ex + fx^2 + gx^3}{\sqrt{a + bx^2 + cx^4}} dx = \int \frac{gx^3 + fx^2 + ex + d}{\sqrt{cx^4 + bx^2 + a}} dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^(1/2),x, algorithm="giac")

[Out] integrate((g\*x^3 + f\*x^2 + e\*x + d)/sqrt(c\*x^4 + b\*x^2 + a), x)

**Mupad [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{\sqrt{a + bx^2 + cx^4}} dx = \int \frac{gx^3 + fx^2 + ex + d}{\sqrt{cx^4 + bx^2 + a}} dx$$

[In] int((d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^(1/2),x)

[Out] int((d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^(1/2), x)

### 3.106 $\int \frac{d+ex+fx^2+gx^3}{(a+bx^2+cx^4)^{3/2}} dx$

Optimal result	1160
Rubi [A] (verified)	1161
Mathematica [C] (verified)	1163
Maple [A] (verified)	1164
Fricas [A] (verification not implemented)	1164
Sympy [F]	1165
Maxima [F]	1165
Giac [F]	1166
Mupad [F(-1)]	1166

#### Optimal result

Integrand size = 32, antiderivative size = 447

$$\int \frac{d+ex+fx^2+gx^3}{(a+bx^2+cx^4)^{3/2}} dx = \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{a(b^2-4ac)\sqrt{a+bx^2+cx^4}} - \frac{be-2ag+(2ce-bg)x^2}{(b^2-4ac)\sqrt{a+bx^2+cx^4}} - \frac{\sqrt{c}(bd-2af)x\sqrt{a+bx^2+cx^4}}{a(b^2-4ac)(\sqrt{a}+\sqrt{cx^2})} + \frac{\sqrt[4]{c}(bd-2af)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}E\left(2\arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right)\middle|\frac{1}{4}\left(2-\frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{a^{3/4}(b^2-4ac)\sqrt{a+bx^2+cx^4}} - \frac{(\sqrt{cd}-\sqrt{af})(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}\text{EllipticF}\left(2\arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right),\frac{1}{4}\left(2-\frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{2a^{3/4}(b-2\sqrt{a}\sqrt{c})\sqrt[4]{c}\sqrt{a+bx^2+cx^4}}$$

```
[Out] x*(b^2*d-2*a*c*d-a*b*f+c*(-2*a*f+b*d)*x^2)/a/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^(1/2)+(-b*e+2*a*g-(-b*g+2*c*e)*x^2)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^(1/2)-(-2*a*f+b*d)*x*c^(1/2)*(c*x^4+b*x^2+a)^(1/2)/a/(-4*a*c+b^2)/(a^(1/2)+x^2*c^(1/2))+c^(1/4)*(-2*a*f+b*d)*(cos(2*arctan(c^(1/4)*x/a^(1/4)))^2)^(1/2)/cos(2*arctan(c^(1/4)*x/a^(1/4)))*EllipticE(sin(2*arctan(c^(1/4)*x/a^(1/4))),1/2*(2-b/a^(1/2)/c^(1/2))^(1/2))*(a^(1/2)+x^2*c^(1/2))*((c*x^4+b*x^2+a)/(a^(1/2)+x^2*c^(1/2)))^(1/2)/a^(3/4)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^(1/2)-1/2*(cos(2*arctan(c^(1/4)*x/a^(1/4)))^2)^(1/2)/cos(2*arctan(c^(1/4)*x/a^(1/4)))*EllipticF(sin(2*arctan(c^(1/4)*x/a^(1/4))),1/2*(2-b/a^(1/2)/c^(1/2))^(1/2))*(-f*a^(1/2)+d*c^(1/2))*(a^(1/2)+x^2*c^(1/2))*((c*x^4+b*x^2+a)/(a^(1/2)+x^2*c^(1/2)))^(1/2)/a^(3/4)/c^(1/4)/(b-2*a^(1/2)*c^(1/2))/(c*x^4+b*x^2+a)^(1/2)
```



**Rubi [A] (verified)**

Time = 0.17 (sec) , antiderivative size = 447, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 7,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.219$ , Rules used = {1687, 1192, 1211, 1117, 1209, 1261, 650}

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{\sqrt[4]{c}(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}(bd - 2af)E\left(2 \arctan\left(\frac{\sqrt[4]{cx}}{\sqrt{a}}\right) \middle| \frac{1}{4}\left(2 - \frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{a^{3/4}(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}} - \frac{(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}(\sqrt{cd} - \sqrt{af}) \text{EllipticF}\left(2 \arctan\left(\frac{\sqrt[4]{cx}}{\sqrt{a}}\right), \frac{1}{4}\left(2 - \frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{2a^{3/4}\sqrt[4]{c}(b - 2\sqrt{a}\sqrt{c})\sqrt{a + bx^2 + cx^4}} - \frac{\sqrt{cx}\sqrt{a + bx^2 + cx^4}(bd - 2af)}{a(b^2 - 4ac)(\sqrt{a} + \sqrt{cx^2})} + \frac{x(cx^2(bd - 2af) - abf - 2acd + b^2d)}{a(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}} - \frac{-2ag + x^2(2ce - bg) + be}{(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^(3/2), x]

[Out] (x\*(b^2\*d - 2\*a\*c\*d - a\*b\*f + c\*(b\*d - 2\*a\*f)\*x^2))/(a\*(b^2 - 4\*a\*c)\*Sqrt[a + b\*x^2 + c\*x^4]) - (b\*e - 2\*a\*g + (2\*c\*e - b\*g)\*x^2)/((b^2 - 4\*a\*c)\*Sqrt[a + b\*x^2 + c\*x^4]) - (Sqrt[c]\*(b\*d - 2\*a\*f)\*x\*Sqrt[a + b\*x^2 + c\*x^4])/(a\*(b^2 - 4\*a\*c)\*(Sqrt[a] + Sqrt[c]\*x^2)) + (c^(1/4)\*(b\*d - 2\*a\*f)\*(Sqrt[a] + Sqrt[c]\*x^2)\*Sqrt[(a + b\*x^2 + c\*x^4)/(Sqrt[a] + Sqrt[c]\*x^2)^2]\*EllipticE[2\*ArcTan[(c^(1/4)\*x)/a^(1/4)], (2 - b/(Sqrt[a]\*Sqrt[c]))/4])/(a^(3/4)\*(b^2 - 4\*a\*c)\*Sqrt[a + b\*x^2 + c\*x^4]) - ((Sqrt[c]\*d - Sqrt[a]\*f)\*(Sqrt[a] + Sqrt[c]\*x^2)\*Sqrt[(a + b\*x^2 + c\*x^4)/(Sqrt[a] + Sqrt[c]\*x^2)^2]\*EllipticF[2\*ArcTan[(c^(1/4)\*x)/a^(1/4)], (2 - b/(Sqrt[a]\*Sqrt[c]))/4])/(2\*a^(3/4)\*(b - 2\*Sqrt[a]\*Sqrt[c])\*c^(1/4)\*Sqrt[a + b\*x^2 + c\*x^4])

Rule 650

Int[((d\_.) + (e\_.)\*(x\_))/((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(3/2), x\_Symbol] := Simp[-2\*((b\*d - 2\*a\*e + (2\*c\*d - b\*e)\*x)/((b^2 - 4\*a\*c)\*Sqrt[a + b\*x + c\*x^2])), x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0]

Rule 1117

Int[1/Sqrt[(a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4], x\_Symbol] := With[{q = Rt[c/a, 4]}, Simp[(1 + q^2\*x^2)\*(Sqrt[(a + b\*x^2 + c\*x^4)/(a\*(1 + q^2\*x^2)^2])]/(2\*q\*Sqrt[a + b\*x^2 + c\*x^4]))\*EllipticF[2\*ArcTan[q\*x], 1/2 - b\*(q^2/(4\*c))], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[c/a]

Rule 1192

```
Int[((d_) + (e_.)*(x_)^2)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol]
:= Simp[x*(a*b*e - d*(b^2 - 2*a*c) - c*(b*d - 2*a*e)*x^2)*((a + b*x^2 + c*x^4)^(p + 1)/(2*a*(p + 1)*(b^2 - 4*a*c))), x] + Dist[1/(2*a*(p + 1)*(b^2 - 4*a*c)), Int[Simp[(2*p + 3)*d*b^2 - a*b*e - 2*a*c*d*(4*p + 5) + (4*p + 7)*(d*b - 2*a*e)*c*x^2, x]*(a + b*x^2 + c*x^4)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && NeQ[c*d^2 - b*d*e + a*e^2, 0] && LtQ[p, -1] && IntegerQ[2*p]
```

### Rule 1209

```
Int[((d_) + (e_.)*(x_)^2)/Sqrt[(a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4], x_Symbol]
:= With[{q = Rt[c/a, 4]}, Simp[(-d)*x*(Sqrt[a + b*x^2 + c*x^4]/(a*(1 + q^2*x^2))), x] + Simp[d*(1 + q^2*x^2)*(Sqrt[a + b*x^2 + c*x^4]/(a*(1 + q^2*x^2)^2)]/(q*Sqrt[a + b*x^2 + c*x^4])*EllipticE[2*ArcTan[q*x], 1/2 - b*(q^2/(4*c))], x] /; EqQ[e + d*q^2, 0] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && PosQ[c/a]
```

### Rule 1211

```
Int[((d_) + (e_.)*(x_)^2)/Sqrt[(a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4], x_Symbol]
:= With[{q = Rt[c/a, 2]}, Dist[(e + d*q)/q, Int[1/Sqrt[a + b*x^2 + c*x^4], x], x] - Dist[e/q, Int[(1 - q*x^2)/Sqrt[a + b*x^2 + c*x^4], x], x] /; NeQ[e + d*q, 0] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && PosQ[c/a]
```

### Rule 1261

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol]
:= Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

### Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]
```

### Rubi steps

$$\text{integral} = \int \frac{d + fx^2}{(a + bx^2 + cx^4)^{3/2}} dx + \int \frac{x(e + gx^2)}{(a + bx^2 + cx^4)^{3/2}} dx$$

$$\begin{aligned}
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{a(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}} \\
&\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{(a + bx + cx^2)^{3/2}} dx, x, x^2 \right) - \frac{\int \frac{a(2cd - bf) + c(bd - 2af)x^2}{\sqrt{a + bx^2 + cx^4}} dx}{a(b^2 - 4ac)} \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{a(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}} \\
&\quad - \frac{be - 2ag + (2ce - bg)x^2}{(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}} + \frac{(\sqrt{c}(bd - 2af)) \int \frac{1 - \frac{\sqrt{cx^2}}{\sqrt{a}}}{\sqrt{a + bx^2 + cx^4}} dx}{\sqrt{a}(b^2 - 4ac)} \\
&\quad - \frac{(\sqrt{c}(bd - 2af) + \sqrt{a}(2cd - bf)) \int \frac{1}{\sqrt{a + bx^2 + cx^4}} dx}{\sqrt{a}(b^2 - 4ac)} \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{a(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}} \\
&\quad - \frac{be - 2ag + (2ce - bg)x^2}{(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}} - \frac{\sqrt{c}(bd - 2af)x\sqrt{a + bx^2 + cx^4}}{a(b^2 - 4ac)(\sqrt{a} + \sqrt{cx^2})} \\
&\quad + \frac{\sqrt[4]{c}(bd - 2af)(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a + bx^2 + cx^4}{(\sqrt{a} + \sqrt{cx^2})^2}} E \left( 2 \tan^{-1} \left( \frac{\sqrt[4]{cx}}{\sqrt[4]{a}} \right) \middle| \frac{1}{4} \left( 2 - \frac{b}{\sqrt{a}\sqrt{c}} \right) \right)}{a^{3/4}(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}} \\
&\quad - \frac{(\sqrt{cd} - \sqrt{af})(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a + bx^2 + cx^4}{(\sqrt{a} + \sqrt{cx^2})^2}} F \left( 2 \tan^{-1} \left( \frac{\sqrt[4]{cx}}{\sqrt[4]{a}} \right) \middle| \frac{1}{4} \left( 2 - \frac{b}{\sqrt{a}\sqrt{c}} \right) \right)}{2a^{3/4}(b - 2\sqrt{a}\sqrt{c})\sqrt[4]{c}\sqrt{a + bx^2 + cx^4}}
\end{aligned}$$

### Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 11.16 (sec) , antiderivative size = 513, normalized size of antiderivative = 1.15

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{3/2}} dx =$$

$$4\sqrt{\frac{c}{b + \sqrt{b^2 - 4ac}}}(-2a^2g - bdx(b + cx^2) + 2acx(d + x(e + fx)) + ab(e + x(f - gx))) + i(-b + \sqrt{b^2 - 4ac})$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^(3/2),x]

[Out] -1/4\*(4\*sqrt[c/(b + sqrt[b^2 - 4\*a\*c])]\*(-2\*a^2\*g - b\*d\*x\*(b + c\*x^2) + 2\*a\*c\*x\*(d + x\*(e + f\*x)) + a\*b\*(e + x\*(f - g\*x))) + I\*(-b + sqrt[b^2 - 4\*a\*c])\*(b\*d - 2\*a\*f)\*sqrt[(b + sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2)/(b + sqrt[b^2 - 4\*a\*c])]\*sqrt[(2\*b - 2\*sqrt[b^2 - 4\*a\*c] + 4\*c\*x^2)/(b - sqrt[b^2 - 4\*a\*c])]\*E1

lipticE[I\*ArcSinh[Sqrt[2]\*Sqrt[c/(b + Sqrt[b^2 - 4\*a\*c])]]\*x], (b + Sqrt[b^2 - 4\*a\*c])/(b - Sqrt[b^2 - 4\*a\*c]) - I\*(-(b^2\*d) + 4\*a\*c\*d + b\*Sqrt[b^2 - 4\*a\*c]\*d - 2\*a\*Sqrt[b^2 - 4\*a\*c]\*f)\*Sqrt[(b + Sqrt[b^2 - 4\*a\*c] + 2\*c\*x^2)/(b + Sqrt[b^2 - 4\*a\*c])]\*Sqrt[(2\*b - 2\*Sqrt[b^2 - 4\*a\*c] + 4\*c\*x^2)/(b - Sqrt[b^2 - 4\*a\*c])]\*EllipticF[I\*ArcSinh[Sqrt[2]\*Sqrt[c/(b + Sqrt[b^2 - 4\*a\*c])]]\*x], (b + Sqrt[b^2 - 4\*a\*c])/(b - Sqrt[b^2 - 4\*a\*c])]/(a\*(b^2 - 4\*a\*c)\*Sqrt[c/(b + Sqrt[b^2 - 4\*a\*c])]\*Sqrt[a + b\*x^2 + c\*x^4])

**Maple [A] (verified)**

Time = 2.11 (sec) , antiderivative size = 565, normalized size of antiderivative = 1.26

method	result
elliptic	$-\frac{2c\left(-\frac{(2af-bd)x^3}{2a(4ac-b^2)}+\frac{(bg-2ec)x^2}{2c(4ac-b^2)}-\frac{(abf+2acd-b^2d)x}{2ac(4ac-b^2)}+\frac{2ag-be}{2(4ac-b^2)c}\right)}{\sqrt{\left(x^4+\frac{bx^2}{c}+\frac{a}{c}\right)c}}+\frac{\left(\frac{d}{a}-\frac{abf+2acd-b^2d}{a(4ac-b^2)}\right)\sqrt{2}\sqrt{4-\frac{2(-b+\sqrt{-4ac+b^2})x^2}{a}}\sqrt{4+\frac{2(b+\sqrt{-4ac+b^2})x^2}{a}}}{4\sqrt{\frac{-b+\sqrt{-4ac+b^2}}{a}}}$
default	Expression too large to display

[In] int((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^(3/2),x,method=\_RETURNVERBOSE)

[Out] -2\*c\*(-1/2\*(2\*a\*f-b\*d)/a/(4\*a\*c-b^2)\*x^3+1/2\*(b\*g-2\*c\*e)/c/(4\*a\*c-b^2)\*x^2-1/2\*(a\*b\*f+2\*a\*c\*d-b^2\*d)/a/c/(4\*a\*c-b^2)\*x+1/2\*(2\*a\*g-b\*e)/(4\*a\*c-b^2)/c)/((x^4+1/c\*b\*x^2+a/c)\*c)^(1/2)+1/4\*(d/a-(a\*b\*f+2\*a\*c\*d-b^2\*d)/a/(4\*a\*c-b^2))\*2^(1/2)/((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2)\*(4-2\*(-b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)\*(4+2\*(b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)/(c\*x^4+b\*x^2+a)^(1/2)\*EllipticF(1/2\*x\*2^(1/2)\*((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2),1/2\*(-4+2\*b\*(b+(-4\*a\*c+b^2)^(1/2))/a/c)^(1/2))+1/2\*c\*(2\*a\*f-b\*d)/(4\*a\*c-b^2)\*2^(1/2)/((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2)\*(4-2\*(-b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)\*(4+2\*(b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)/(c\*x^4+b\*x^2+a)^(1/2)/(b+(-4\*a\*c+b^2)^(1/2))\*(EllipticF(1/2\*x\*2^(1/2)\*((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2),1/2\*(-4+2\*b\*(b+(-4\*a\*c+b^2)^(1/2))/a/c)^(1/2))-EllipticE(1/2\*x\*2^(1/2)\*((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2),1/2\*(-4+2\*b\*(b+(-4\*a\*c+b^2)^(1/2))/a/c)^(1/2)))

**Fricas [A] (verification not implemented)**

none

Time = 0.11 (sec) , antiderivative size = 723, normalized size of antiderivative = 1.62

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{3/2}} dx =$$

$$\sqrt{\frac{1}{2}} \left( ab^2cd - 2a^2bcf + (b^2c^2d - 2abc^2f)x^4 + (b^3cd - 2ab^2cf)x^2 - (a^2bcd - 2a^3cf + (abc^2d - 2a^2c^2f)x^4 \right)$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="fricas")

[Out] 
$$-1/2*(\sqrt{1/2}*(a*b^2*c*d - 2*a^2*b*c*f + (b^2*c^2*d - 2*a*b*c^2*f)*x^4 + (b^3*c*d - 2*a*b^2*c*f)*x^2 - (a^2*b*c*d - 2*a^3*c*f + (a*b*c^2*d - 2*a^2*c^2*f)*x^4 + (a*b^2*c*d - 2*a^2*b*c*f)*x^2)*\sqrt{(b^2 - 4*a*c)/a^2})*\sqrt{a}*\sqrt{(a*\sqrt{(b^2 - 4*a*c)/a^2} - b)/a}*\text{elliptic\_e}(\arcsin(\sqrt{1/2}*x*\sqrt{(a*\sqrt{(b^2 - 4*a*c)/a^2} - b)/a})), 1/2*(a*b*\sqrt{(b^2 - 4*a*c)/a^2} + b^2 - 2*a*c)/(a*c)) - \sqrt{1/2}*(((2*a*b + b^2)*c^2*d - (a*b^2*c + 2*a*b*c^2)*f)*x^4 + (2*a^2*b + a*b^2)*c*d + ((2*a*b^2 + b^3)*c*d - (a*b^3 + 2*a*b^2*c)*f)*x^2 - (a^2*b^2 + 2*a^2*b*c)*f + (((2*a^2 - a*b)*c^2*d - (a^2*b*c - 2*a^2*c^2)*f)*x^4 + (2*a^3 - a^2*b)*c*d + ((2*a^2*b - a*b^2)*c*d - (a^2*b^2 - 2*a^2*b*c)*f)*x^2 - (a^3*b - 2*a^3*c)*f)*\sqrt{(b^2 - 4*a*c)/a^2})*\sqrt{a}*\sqrt{(a*\sqrt{(b^2 - 4*a*c)/a^2} - b)/a}*\text{elliptic\_f}(\arcsin(\sqrt{1/2}*x*\sqrt{(a*\sqrt{(b^2 - 4*a*c)/a^2} - b)/a})), 1/2*(a*b*\sqrt{(b^2 - 4*a*c)/a^2} + b^2 - 2*a*c)/(a*c)) + 2*(a^2*b*c*e - 2*a^3*c*g - (a*b*c^2*d - 2*a^2*c^2*f)*x^3 + (2*a^2*c^2*e - a^2*b*c*g)*x^2 + (a^2*b*c*f - (a*b^2*c - 2*a^2*c^2)*d)*x)*\sqrt{c*x^4 + b*x^2 + a})/(a^3*b^2*c - 4*a^4*c^2 + (a^2*b^2*c^2 - 4*a^3*c^3)*x^4 + (a^2*b^3*c - 4*a^3*b*c^2)*x^2)$$

Sympy [F]

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{3/2}} dx = \int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{\frac{3}{2}}} dx$$

[In] integrate((g\*x\*\*3+f\*x\*\*2+e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a)\*\*(3/2),x)

[Out] Integral((d + e\*x + f\*x\*\*2 + g\*x\*\*3)/(a + b\*x\*\*2 + c\*x\*\*4)\*\*(3/2), x)

Maxima [F]

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{3/2}} dx = \int \frac{gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^{\frac{3}{2}}} dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="maxima")

[Out] integrate((g\*x^3 + f\*x^2 + e\*x + d)/(c\*x^4 + b\*x^2 + a)^(3/2), x)

**Giac [F]**

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{3/2}} dx = \int \frac{gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^{3/2}} dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="giac")

[Out] integrate((g\*x^3 + f\*x^2 + e\*x + d)/(c\*x^4 + b\*x^2 + a)^(3/2), x)

**Mupad [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{3/2}} dx = \int \frac{gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^{3/2}} dx$$

[In] int((d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^(3/2),x)

[Out] int((d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^(3/2), x)

$$3.107 \quad \int \frac{d+ex+fx^2+gx^3}{(a+bx^2+cx^4)^{5/2}} dx$$

Optimal result	1167
Rubi [A] (verified)	1168
Mathematica [C] (verified)	1171
Maple [A] (verified)	1172
Fricas [B] (verification not implemented)	1173
Sympy [F(-1)]	1174
Maxima [F]	1174
Giac [F]	1174
Mupad [F(-1)]	1175

### Optimal result

Integrand size = 32, antiderivative size = 680

$$\begin{aligned} \int \frac{d+ex+fx^2+gx^3}{(a+bx^2+cx^4)^{5/2}} dx = & \frac{x(b^2d-2acd-abf+c(bd-2af)x^2)}{3a(b^2-4ac)(a+bx^2+cx^4)^{3/2}} \\ & - \frac{be-2ag+(2ce-bg)x^2}{3(b^2-4ac)(a+bx^2+cx^4)^{3/2}} + \frac{4(2ce-bg)(b+2cx^2)}{3(b^2-4ac)^2\sqrt{a+bx^2+cx^4}} \\ & + \frac{x(2b^4d-17ab^2cd+20a^2c^2d+ab^3f+4a^2bcf+c(2b^3d-16abcd+ab^2f+12a^2cf)x^2)}{3a^2(b^2-4ac)^2\sqrt{a+bx^2+cx^4}} \\ & - \frac{\sqrt{c}(2b^3d-16abcd+ab^2f+12a^2cf)x\sqrt{a+bx^2+cx^4}}{3a^2(b^2-4ac)^2(\sqrt{a}+\sqrt{cx^2})} \\ & + \frac{\sqrt[4]{c}(2b^3d-16abcd+ab^2f+12a^2cf)(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}E\left(2\arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt{a}}\right)\middle|\frac{1}{4}\left(2-\frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{3a^{7/4}(b^2-4ac)^2\sqrt{a+bx^2+cx^4}} \\ & - \frac{\sqrt{c}(2b^2d-3\sqrt{ab}\sqrt{cd}-10acd+abf+6a^{3/2}\sqrt{cf})(\sqrt{a}+\sqrt{cx^2})\sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}}\text{EllipticF}\left(2\arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt{a}}\right)\right)}{6a^{7/4}(b-2\sqrt{a}\sqrt{c})(b^2-4ac)\sqrt{a+bx^2+cx^4}} \end{aligned}$$

[Out]  $\frac{1}{3}x(b^2d-2ac*d-ab*f+c(-2a*f+b*d)*x^2)/a/(-4a*c+b^2)/(c*x^4+b*x^2+a)^{(3/2)}+1/3*(-b*e+2*a*g-(-b*g+2*c*e)*x^2)/(-4a*c+b^2)/(c*x^4+b*x^2+a)^{(3/2)}+4/3*(-b*g+2*c*e)*(2*c*x^2+b)/(-4a*c+b^2)^2/(c*x^4+b*x^2+a)^{(1/2)}+1/3*x*(2*b^4*d-17*a*b^2*c*d+20*a^2*c^2*d+a*b^3*f+4*a^2*b*c*f+c*(12*a^2*c*f+a*b^2*f-16*a*b*c*d+2*b^3*d)*x^2)/a^2/(-4a*c+b^2)^2/(c*x^4+b*x^2+a)^{(1/2)}-1/3*(12*a^2*c*f+a*b^2*f-16*a*b*c*d+2*b^3*d)*x*c^{(1/2)}*(c*x^4+b*x^2+a)^{(1/2)}/a^2/(-4a*c+b^2)^2/(a^{(1/2)}+x^2*c^{(1/2)})+1/3*c^{(1/4)}*(12*a^2*c*f+a*b^2*f-16*a*b*c*d+2*b^3*d)*(cos(2*arctan(c^{(1/4)}*x/a^{(1/4)})))^{(1/2)}/cos(2*arctan(c^{(1/4)}*x/a^{(1/4)}))*EllipticE(sin(2*arctan(c^{(1/4)}*x/a^{(1/4)})),1/2*(2-b/a^{(1/2)}/c^{(1/4)}))$

$$\begin{aligned} & (1/2))^{(1/2)} * (a^{(1/2)} + x^2 * c^{(1/2)}) * ((c * x^4 + b * x^2 + a) / (a^{(1/2)} + x^2 * c^{(1/2)}))^{(1/2)} / a^{(7/4)} / (-4 * a * c + b^2)^{1/2} / (c * x^4 + b * x^2 + a)^{(1/2)} - 1/6 * c^{(1/4)} * (\cos(2 * \arctan(c^{(1/4)} * x / a^{(1/4)})))^{(1/2)} / \cos(2 * \arctan(c^{(1/4)} * x / a^{(1/4)})) * \text{EllipticF}(\sin(2 * \arctan(c^{(1/4)} * x / a^{(1/4)})), 1/2 * (2 - b / a^{(1/2)} / c^{(1/2)}))^{(1/2)} * (a^{(1/2)} + x^2 * c^{(1/2)}) * (2 * b^2 * d - 10 * a * c * d + a * b * f + 6 * a^{(3/2)} * f * c^{(1/2)} - 3 * b * d * a^{(1/2)} * c^{(1/2)}) * ((c * x^4 + b * x^2 + a) / (a^{(1/2)} + x^2 * c^{(1/2)}))^{(1/2)} / a^{(7/4)} / (-4 * a * c + b^2) / (b - 2 * a^{(1/2)} * c^{(1/2)}) / (c * x^4 + b * x^2 + a)^{(1/2)} \end{aligned}$$

### Rubi [A] (verified)

Time = 0.32 (sec) , antiderivative size = 680, normalized size of antiderivative = 1.00, number of steps used = 9, number of rules used = 8,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.250$ , Rules used = {1687, 1192, 1211, 1117, 1209, 1261, 652, 627}

$$\begin{aligned} & \int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{5/2}} dx = \\ & \frac{\sqrt[4]{c}(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}} (6a^{3/2}\sqrt{c}f - 3\sqrt{ab}\sqrt{cd} + abf - 10acd + 2b^2d) \text{EllipticF}\left(2 \arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right), \right)}{6a^{7/4} (b - 2\sqrt{a}\sqrt{c}) (b^2 - 4ac) \sqrt{a + bx^2 + cx^4}} \\ & - \frac{\sqrt{cx}\sqrt{a + bx^2 + cx^4}(12a^2cf + ab^2f - 16abcd + 2b^3d)}{3a^2 (b^2 - 4ac)^2 (\sqrt{a} + \sqrt{cx^2})} \\ & + \frac{x(cx^2(12a^2cf + ab^2f - 16abcd + 2b^3d) + 4a^2bcf + 20a^2c^2d + ab^3f - 17ab^2cd + 2b^4d)}{3a^2 (b^2 - 4ac)^2 \sqrt{a + bx^2 + cx^4}} \\ & + \frac{\sqrt[4]{c}(\sqrt{a} + \sqrt{cx^2}) \sqrt{\frac{a+bx^2+cx^4}{(\sqrt{a}+\sqrt{cx^2})^2}} (12a^2cf + ab^2f - 16abcd + 2b^3d) E\left(2 \arctan\left(\frac{\sqrt[4]{Cx}}{\sqrt[4]{a}}\right) \middle| \frac{1}{4}\left(2 - \frac{b}{\sqrt{a}\sqrt{c}}\right)\right)}{3a^{7/4} (b^2 - 4ac)^2 \sqrt{a + bx^2 + cx^4}} \\ & + \frac{x(cx^2(bd - 2af) - abf - 2acd + b^2d)}{3a (b^2 - 4ac) (a + bx^2 + cx^4)^{3/2}} \\ & + \frac{4(b + 2cx^2)(2ce - bg)}{3(b^2 - 4ac)^2 \sqrt{a + bx^2 + cx^4}} - \frac{-2ag + x^2(2ce - bg) + be}{3(b^2 - 4ac) (a + bx^2 + cx^4)^{3/2}} \end{aligned}$$

[In] Int[(d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^(5/2), x]

[Out] (x\*(b^2\*d - 2\*a\*c\*d - a\*b\*f + c\*(b\*d - 2\*a\*f)\*x^2))/(3\*a\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)^(3/2)) - (b\*e - 2\*a\*g + (2\*c\*e - b\*g)\*x^2)/(3\*(b^2 - 4\*a\*c)\*(a + b\*x^2 + c\*x^4)^(3/2)) + (4\*(2\*c\*e - b\*g)\*(b + 2\*c\*x^2))/(3\*(b^2 - 4\*a\*c)^2\*sqrt[a + b\*x^2 + c\*x^4]) + (x\*(2\*b^4\*d - 17\*a\*b^2\*c\*d + 20\*a^2\*c^2\*d + a\*b^3\*f + 4\*a^2\*b\*c\*f + c\*(2\*b^3\*d - 16\*a\*b\*c\*d + a\*b^2\*f + 12\*a^2\*c\*f)\*x^2))/(3\*a^2\*(b^2 - 4\*a\*c)^2\*sqrt[a + b\*x^2 + c\*x^4]) - (sqrt[c]\*(2\*b^3\*d - 16\*a\*b\*c\*d + a\*b^2\*f + 12\*a^2\*c\*f)\*x\*sqrt[a + b\*x^2 + c\*x^4])/(3\*a^2\*(b^2 - 4\*a\*c)^2\*(sqrt[a] + sqrt[c]\*x^2)) + (c^(1/4)\*(2\*b^3\*d - 16\*a\*b\*c\*d + a\*b^2\*f + 12\*a^2\*c\*f)\*(sqrt[a] + sqrt[c]\*x^2)\*sqrt[(a + b\*x^2 + c\*x^4)/(sqrt[a]



+ Sqrt[c]\*x^2)^2]\*EllipticE[2\*ArcTan[(c^(1/4)\*x)/a^(1/4)], (2 - b/(Sqrt[a]\*Sqrt[c]))/4]/(3\*a^(7/4)\*(b^2 - 4\*a\*c)^2\*Sqrt[a + b\*x^2 + c\*x^4]) - (c^(1/4)\*(2\*b^2\*d - 3\*Sqrt[a]\*b\*Sqrt[c]\*d - 10\*a\*c\*d + a\*b\*f + 6\*a^(3/2)\*Sqrt[c]\*f)\*(Sqrt[a] + Sqrt[c]\*x^2)\*Sqrt[(a + b\*x^2 + c\*x^4)/(Sqrt[a] + Sqrt[c]\*x^2)^2]\*EllipticF[2\*ArcTan[(c^(1/4)\*x)/a^(1/4)], (2 - b/(Sqrt[a]\*Sqrt[c]))/4]/(6\*a^(7/4)\*(b - 2\*Sqrt[a]\*Sqrt[c])\*(b^2 - 4\*a\*c)\*Sqrt[a + b\*x^2 + c\*x^4])

#### Rule 627

Int[((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(-3/2), x\_Symbol] := Simp[-2\*((b + 2\*c\*x)/(b^2 - 4\*a\*c)\*Sqrt[a + b\*x + c\*x^2]), x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0]

#### Rule 652

Int[((d\_.) + (e\_.)\*(x\_))\*((a\_.) + (b\_.)\*(x\_) + (c\_.)\*(x\_)^2)^(p\_), x\_Symbol] := Simp[((b\*d - 2\*a\*e + (2\*c\*d - b\*e)\*x)/((p + 1)\*(b^2 - 4\*a\*c)))\*(a + b\*x + c\*x^2)^(p + 1), x] - Dist[(2\*p + 3)\*((2\*c\*d - b\*e)/((p + 1)\*(b^2 - 4\*a\*c))), Int[(a + b\*x + c\*x^2)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0] && LtQ[p, -1] && NeQ[p, -3/2]

#### Rule 1117

Int[1/Sqrt[(a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4], x\_Symbol] := With[{q = Rt[c/a, 4]}, Simp[(1 + q^2\*x^2)\*(Sqrt[(a + b\*x^2 + c\*x^4)/(a\*(1 + q^2\*x^2)^2)]/(2\*q\*Sqrt[a + b\*x^2 + c\*x^4]))\*EllipticF[2\*ArcTan[q\*x], 1/2 - b\*(q^2/(4\*c))], x] /; FreeQ[{a, b, c}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[c/a]

#### Rule 1192

Int[((d\_) + (e\_.)\*(x\_)^2)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_), x\_Symbol] := Simp[x\*(a\*b\*e - d\*(b^2 - 2\*a\*c) - c\*(b\*d - 2\*a\*e)\*x^2)\*((a + b\*x^2 + c\*x^4)^(p + 1)/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c))), x] + Dist[1/(2\*a\*(p + 1)\*(b^2 - 4\*a\*c)), Int[Simp[(2\*p + 3)\*d\*b^2 - a\*b\*e - 2\*a\*c\*d\*(4\*p + 5) + (4\*p + 7)\*(d\*b - 2\*a\*e)\*c\*x^2, x]\*(a + b\*x^2 + c\*x^4)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && NeQ[c\*d^2 - b\*d\*e + a\*e^2, 0] && LtQ[p, -1] && IntegerQ[2\*p]

#### Rule 1209

Int[((d\_) + (e\_.)\*(x\_)^2)/Sqrt[(a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4], x\_Symbol] := With[{q = Rt[c/a, 4]}, Simp[(-d)\*x\*(Sqrt[a + b\*x^2 + c\*x^4]/(a\*(1 + q^2\*x^2))), x] + Simp[d\*(1 + q^2\*x^2)\*(Sqrt[(a + b\*x^2 + c\*x^4)/(a\*(1 + q^2\*x^2)^2)]/(q\*Sqrt[a + b\*x^2 + c\*x^4]))\*EllipticE[2\*ArcTan[q\*x], 1/2 - b\*(q^2/(4\*c))], x] /; EqQ[e + d\*q^2, 0] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4\*a\*c, 0] && PosQ[c/a]

## Rule 1211

```
Int[((d_) + (e_.)*(x_)^2)/Sqrt[(a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4], x_Symbol]
:= With[{q = Rt[c/a, 2]}, Dist[(e + d*q)/q, Int[1/Sqrt[a + b*x^2 + c*x^4], x], x] - Dist[e/q, Int[(1 - q*x^2)/Sqrt[a + b*x^2 + c*x^4], x], x] /; NeQ[e + d*q, 0] /; FreeQ[{a, b, c, d, e}, x] && NeQ[b^2 - 4*a*c, 0] && PosQ[c/a]
```

## Rule 1261

```
Int[(x_)*((d_) + (e_.)*(x_)^2)^(q_.)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_.), x_Symbol]
:= Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

## Rule 1687

```
Int[(Pq_)*((a_) + (b_.)*(x_)^2 + (c_.)*(x_)^4)^(p_), x_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q - 1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]
```

## Rubi steps

$$\begin{aligned}
\text{integral} &= \int \frac{d + fx^2}{(a + bx^2 + cx^4)^{5/2}} dx + \int \frac{x(e + gx^2)}{(a + bx^2 + cx^4)^{5/2}} dx \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{3a(b^2 - 4ac)(a + bx^2 + cx^4)^{3/2}} \\
&\quad + \frac{1}{2} \text{Subst} \left( \int \frac{e + gx}{(a + bx + cx^2)^{5/2}} dx, x, x^2 \right) - \frac{\int \frac{-2b^2d + 10acd - abf - 3c(bd - 2af)x^2}{(a + bx^2 + cx^4)^{3/2}} dx}{3a(b^2 - 4ac)} \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{3a(b^2 - 4ac)(a + bx^2 + cx^4)^{3/2}} - \frac{be - 2ag + (2ce - bg)x^2}{3(b^2 - 4ac)(a + bx^2 + cx^4)^{3/2}} \\
&\quad + \frac{x(2b^4d - 17ab^2cd + 20a^2c^2d + ab^3f + 4a^2bcf + c(2b^3d - 16abcd + ab^2f + 12a^2cf)x^2)}{3a^2(b^2 - 4ac)^2 \sqrt{a + bx^2 + cx^4}} \\
&\quad + \frac{\int \frac{-ac(b^2d - 20acd + 8abf) - c(2b^3d - 16abcd + ab^2f + 12a^2cf)x^2}{\sqrt{a + bx^2 + cx^4}} dx}{3a^2(b^2 - 4ac)^2} \\
&\quad - \frac{(2(2ce - bg)) \text{Subst} \left( \int \frac{1}{(a + bx + cx^2)^{3/2}} dx, x, x^2 \right)}{3(b^2 - 4ac)}
\end{aligned}$$

$$\begin{aligned}
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{3a(b^2 - 4ac)(a + bx^2 + cx^4)^{3/2}} \\
&\quad - \frac{be - 2ag + (2ce - bg)x^2}{3(b^2 - 4ac)(a + bx^2 + cx^4)^{3/2}} + \frac{4(2ce - bg)(b + 2cx^2)}{3(b^2 - 4ac)^2\sqrt{a + bx^2 + cx^4}} \\
&\quad + \frac{x(2b^4d - 17ab^2cd + 20a^2c^2d + ab^3f + 4a^2bcf + c(2b^3d - 16abcd + ab^2f + 12a^2cf)x^2)}{3a^2(b^2 - 4ac)^2\sqrt{a + bx^2 + cx^4}} \\
&\quad + \frac{(\sqrt{c}(2b^3d - 16abcd + ab^2f + 12a^2cf)) \int \frac{1 - \frac{\sqrt{cx^2}}{\sqrt{a}}}{\sqrt{a + bx^2 + cx^4}} dx}{3a^{3/2}(b^2 - 4ac)^2} \\
&\quad - \frac{(\sqrt{c}(2b^3d - 16abcd + ab^2f + 12a^2cf + \sqrt{a}\sqrt{c}(b^2d - 20acd + 8abf))) \int \frac{1}{\sqrt{a + bx^2 + cx^4}} dx}{3a^{3/2}(b^2 - 4ac)^2} \\
&= \frac{x(b^2d - 2acd - abf + c(bd - 2af)x^2)}{3a(b^2 - 4ac)(a + bx^2 + cx^4)^{3/2}} \\
&\quad - \frac{be - 2ag + (2ce - bg)x^2}{3(b^2 - 4ac)(a + bx^2 + cx^4)^{3/2}} + \frac{4(2ce - bg)(b + 2cx^2)}{3(b^2 - 4ac)^2\sqrt{a + bx^2 + cx^4}} \\
&\quad + \frac{x(2b^4d - 17ab^2cd + 20a^2c^2d + ab^3f + 4a^2bcf + c(2b^3d - 16abcd + ab^2f + 12a^2cf)x^2)}{3a^2(b^2 - 4ac)^2\sqrt{a + bx^2 + cx^4}} \\
&\quad - \frac{\sqrt{c}(2b^3d - 16abcd + ab^2f + 12a^2cf)x\sqrt{a + bx^2 + cx^4}}{3a^2(b^2 - 4ac)^2(\sqrt{a} + \sqrt{cx^2})} \\
&\quad + \frac{\sqrt[4]{c}(2b^3d - 16abcd + ab^2f + 12a^2cf)(\sqrt{a} + \sqrt{cx^2})\sqrt{\frac{a + bx^2 + cx^4}{(\sqrt{a} + \sqrt{cx^2})^2}} E\left(2 \tan^{-1}\left(\frac{\sqrt[4]{cx^2}}{\sqrt{a}}\right) \Big| \frac{1}{4}\left(2 - \frac{b}{\sqrt{a}}\right)\right)}{3a^{7/4}(b^2 - 4ac)^2\sqrt{a + bx^2 + cx^4}} \\
&\quad - \frac{\sqrt[4]{c}(2b^3d - 16abcd + ab^2f + 12a^2cf + \sqrt{a}\sqrt{c}(b^2d - 20acd + 8abf))(\sqrt{a} + \sqrt{cx^2})\sqrt{\frac{a + bx^2 + cx^4}{(\sqrt{a} + \sqrt{cx^2})^2}}}{6a^{7/4}(b^2 - 4ac)^2\sqrt{a + bx^2 + cx^4}}
\end{aligned}$$

### Mathematica [C] (verified)

Result contains complex when optimal does not.

Time = 11.99 (sec) , antiderivative size = 598, normalized size of antiderivative = 0.88

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{5/2}} dx = \frac{-4a(b^2 - 4ac)(-2a^2g - bdx(b + cx^2) + 2acx(d + x(e + fx)) + ab(e + x(f - g)))}{(a + bx^2 + cx^4)^{5/2}}$$

[In] Integrate[(d + e\*x + f\*x^2 + g\*x^3)/(a + b\*x^2 + c\*x^4)^(5/2), x]

[Out] (-4\*a\*(b^2 - 4\*a\*c)\*(-2\*a^2\*g - b\*d\*x\*(b + c\*x^2) + 2\*a\*c\*x\*(d + x\*(e + f\*x)) + a\*b\*(e + x\*(f - g\*x))) + 4\*(a + b\*x^2 + c\*x^4)\*(2\*b^3\*d\*x\*(b + c\*x^2) + a\*b\*x\*(-17\*b\*c\*d + b^2\*f - 16\*c^2\*d\*x^2 + b\*c\*f\*x^2) + 4\*a^2\*(-(b^2\*g) +

$$c^2*x*(5*d + x*(4*e + 3*f*x)) + b*c*(2*e + x*(f - 2*g*x))) + (I*\text{Sqrt}[2]*\text{Sqrt}[(b + \text{Sqrt}[b^2 - 4*a*c] + 2*c*x^2)/(b + \text{Sqrt}[b^2 - 4*a*c]))*\text{Sqrt}[1 + (2*c*x^2)/(b - \text{Sqrt}[b^2 - 4*a*c])]*(a + b*x^2 + c*x^4)*(-((-b + \text{Sqrt}[b^2 - 4*a*c])*(2*b^3*d - 16*a*b*c*d + a*b^2*f + 12*a^2*c*f)*\text{EllipticE}[I*\text{ArcSinh}[\text{Sqrt}[2]*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]]*x], (b + \text{Sqrt}[b^2 - 4*a*c])/(b - \text{Sqrt}[b^2 - 4*a*c])) + (-2*b^4*d + b^3*(2*\text{Sqrt}[b^2 - 4*a*c]*d - a*f) + 4*a*b*c*(-4*\text{Sqrt}[b^2 - 4*a*c]*d + a*f) + a*b^2*(18*c*d + \text{Sqrt}[b^2 - 4*a*c]*f) + 4*a^2*c*(-10*c*d + 3*\text{Sqrt}[b^2 - 4*a*c]*f))*\text{EllipticF}[I*\text{ArcSinh}[\text{Sqrt}[2]*\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])]]*x], (b + \text{Sqrt}[b^2 - 4*a*c])/(b - \text{Sqrt}[b^2 - 4*a*c])))/\text{Sqrt}[c/(b + \text{Sqrt}[b^2 - 4*a*c])])/(12*a^2*(b^2 - 4*a*c)^2*(a + b*x^2 + c*x^4)^(3/2))$$

### Maple [A] (verified)

Time = 2.32 (sec) , antiderivative size = 829, normalized size of antiderivative = 1.22

method	result
elliptic	$\frac{\left(\frac{(2af-bd)x^3}{3ca(4ac-b^2)} - \frac{(bg-2ec)x^2}{3(4ac-b^2)c^2} + \frac{(abf+2acd-b^2d)x}{3a(4ac-b^2)c^2} - \frac{2ag-be}{3(4ac-b^2)c^2}\right)\sqrt{cx^4+bx^2+a}}{\left(x^4+\frac{bx^2}{c}+\frac{a}{c}\right)^2} - \frac{2c\left(-\frac{(12a^2cf+ab^2f-16abcd+2b^3d)x^3}{6a^2(4ac-b^2)^2} + \frac{4(bg-2ec)}{3(4ac-b^2)}\right)}{\sqrt{\dots}}$
default	Expression too large to display

[In] int((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^(5/2),x,method=\_RETURNVERBOSE)

[Out] (1/3/c\*(2\*a\*f-b\*d)/a/(4\*a\*c-b^2)\*x^3-1/3\*(b\*g-2\*c\*e)/(4\*a\*c-b^2)/c^2\*x^2+1/3\*(a\*b\*f+2\*a\*c\*d-b^2\*d)/a/(4\*a\*c-b^2)/c^2\*x-1/3\*(2\*a\*g-b\*e)/(4\*a\*c-b^2)/c^2)\*(c\*x^4+b\*x^2+a)^(1/2)/(x^4+1/c\*b\*x^2+a/c)^2-2\*c\*(-1/6\*(12\*a^2\*c\*f+a\*b^2\*f-16\*a\*b\*c\*d+2\*b^3\*d)/a^2/(4\*a\*c-b^2)^2\*x^3+4/3\*(b\*g-2\*c\*e)/(4\*a\*c-b^2)^2\*x^2-1/6\*(4\*a^2\*b\*c\*f+20\*a^2\*c^2\*d+a\*b^3\*f-17\*a\*b^2\*c\*d+2\*b^4\*d)/a^2/(4\*a\*c-b^2)^2/c\*x+2/3\*b\*(b\*g-2\*c\*e)/(4\*a\*c-b^2)^2/c)/((x^4+1/c\*b\*x^2+a/c)\*c)^(1/2)+1/4\*(-1/3/(4\*a\*c-b^2)\*(a\*b\*f-10\*a\*c\*d+2\*b^2\*d)/a^2-1/3\*(4\*a^2\*b\*c\*f+20\*a^2\*c^2\*d+a\*b^3\*f-17\*a\*b^2\*c\*d+2\*b^4\*d)/a^2/(4\*a\*c-b^2)^2)\*2^(1/2)/((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2)\*(4-2\*(-b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)\*(4+2\*(b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)/(c\*x^4+b\*x^2+a)^(1/2)\*\text{EllipticF}(1/2\*x^2^(1/2)\*((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2),1/2\*(-4+2\*b\*(b+(-4\*a\*c+b^2)^(1/2))/a/c)^(1/2))+1/6\*c\*(12\*a^2\*c\*f+a\*b^2\*f-16\*a\*b\*c\*d+2\*b^3\*d)/(4\*a\*c-b^2)^2/a\*2^(1/2)/((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2)\*(4-2\*(-b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)\*(4+2\*(b+(-4\*a\*c+b^2)^(1/2))/a\*x^2)^(1/2)/(c\*x^4+b\*x^2+a)^(1/2)/(b+(-4\*a\*c+b^2)^(1/2))\*(\text{EllipticF}(1/2\*x^2^(1/2)\*((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2),1/2\*(-4+2\*b\*(b+(-4\*a\*c+b^2)^(1/2))/a/c)^(1/2))- \text{EllipticE}(1/2\*x^2^(1/2)\*((-b+(-4\*a\*c+b^2)^(1/2))/a)^(1/2),1/2\*(-4+2\*b\*(b+(-4\*a\*c+b^2)^(1/2))/a/c)^(1/2)))

**Fricas [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 1948 vs. 2(652) = 1304.

Time = 0.14 (sec) , antiderivative size = 1948, normalized size of antiderivative = 2.86

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{5/2}} dx = \text{Too large to display}$$

```
[In] integrate((g*x^3+f*x^2+e*x+d)/(c*x^4+b*x^2+a)^(5/2),x, algorithm="fricas")
[Out] -1/6*(sqrt(1/2)*((2*(b^4*c^2 - 8*a*b^2*c^3)*d + (a*b^3*c^2 + 12*a^2*b*c^3)*
f)*x^8 + 2*(2*(b^5*c - 8*a*b^3*c^2)*d + (a*b^4*c + 12*a^2*b^2*c^2)*f)*x^6 +
(2*(b^6 - 6*a*b^4*c - 16*a^2*b^2*c^2)*d + (a*b^5 + 14*a^2*b^3*c + 24*a^3*b
*c^2)*f)*x^4 + 2*(2*(a*b^5 - 8*a^2*b^3*c)*d + (a^2*b^4 + 12*a^3*b^2*c)*f)*x
^2 + 2*(a^2*b^4 - 8*a^3*b^2*c)*d + (a^3*b^3 + 12*a^4*b*c)*f - ((2*(a*b^3*c^
2 - 8*a^2*b*c^3)*d + (a^2*b^2*c^2 + 12*a^3*c^3)*f)*x^8 + 2*(2*(a*b^4*c - 8*
a^2*b^2*c^2)*d + (a^2*b^3*c + 12*a^3*b*c^2)*f)*x^6 + (2*(a*b^5 - 6*a^2*b^3*
c - 16*a^3*b*c^2)*d + (a^2*b^4 + 14*a^3*b^2*c + 24*a^4*c^2)*f)*x^4 + 2*(2*(
a^2*b^4 - 8*a^3*b^2*c)*d + (a^3*b^3 + 12*a^4*b*c)*f)*x^2 + 2*(a^3*b^3 - 8*a
^4*b*c)*d + (a^4*b^2 + 12*a^5*c)*f)*sqrt((b^2 - 4*a*c)/a^2)*sqrt(a)*sqrt((
a*sqrt((b^2 - 4*a*c)/a^2) - b)/a)*elliptic_e(arcsin(sqrt(1/2)*x*sqrt((a*sqrt
((b^2 - 4*a*c)/a^2) - b)/a)), 1/2*(a*b*sqrt((b^2 - 4*a*c)/a^2) + b^2 - 2*a
*c)/(a*c)) + sqrt(1/2)*(((4*(5*a^2*b + 4*a*b^2)*c^3 - (a*b^3 + 2*b^4)*c^2)*
d - (12*a^2*b*c^3 + (8*a^2*b^2 + a*b^3)*c^2)*f)*x^8 + 2*((4*(5*a^2*b^2 + 4*
a*b^3)*c^2 - (a*b^4 + 2*b^5)*c)*d - (12*a^2*b^2*c^2 + (8*a^2*b^3 + a*b^4)*c
)*f)*x^6 - ((a*b^5 + 2*b^6 - 8*(5*a^3*b + 4*a^2*b^2)*c^2 - 6*(3*a^2*b^3 + 2
*a*b^4)*c)*d + (8*a^2*b^4 + a*b^5 + 24*a^3*b*c^2 + 2*(8*a^3*b^2 + 7*a^2*b^3
)*c)*f)*x^4 - 2*((a^2*b^4 + 2*a*b^5 - 4*(5*a^3*b^2 + 4*a^2*b^3)*c)*d + (8*a
^3*b^3 + a^2*b^4 + 12*a^3*b^2*c)*f)*x^2 - (a^3*b^3 + 2*a^2*b^4 - 4*(5*a^4*b
+ 4*a^3*b^2)*c)*d - (8*a^4*b^2 + a^3*b^3 + 12*a^4*b*c)*f + (((4*(5*a^3 - 4
*a^2*b)*c^3 - (a^2*b^2 - 2*a*b^3)*c^2)*d + (12*a^3*c^3 - (8*a^3*b - a^2*b^2
)*c^2)*f)*x^8 + 2*((4*(5*a^3*b - 4*a^2*b^2)*c^2 - (a^2*b^3 - 2*a*b^4)*c)*d
+ (12*a^3*b*c^2 - (8*a^3*b^2 - a^2*b^3)*c)*f)*x^6 - ((a^2*b^4 - 2*a*b^5 - 8
*(5*a^4 - 4*a^3*b)*c^2 - 6*(3*a^3*b^2 - 2*a^2*b^3)*c)*d + (8*a^3*b^3 - a^2*
b^4 - 24*a^4*c^2 + 2*(8*a^4*b - 7*a^3*b^2)*c)*f)*x^4 - 2*((a^3*b^3 - 2*a^2*
b^4 - 4*(5*a^4*b - 4*a^3*b^2)*c)*d + (8*a^4*b^2 - a^3*b^3 - 12*a^4*b*c)*f)*
x^2 - (a^4*b^2 - 2*a^3*b^3 - 4*(5*a^5 - 4*a^4*b)*c)*d - (8*a^5*b - a^4*b^2
- 12*a^5*c)*f)*sqrt((b^2 - 4*a*c)/a^2)*sqrt(a)*sqrt((a*sqrt((b^2 - 4*a*c)/
a^2) - b)/a)*elliptic_f(arcsin(sqrt(1/2)*x*sqrt((a*sqrt((b^2 - 4*a*c)/a^2)
- b)/a)), 1/2*(a*b*sqrt((b^2 - 4*a*c)/a^2) + b^2 - 2*a*c)/(a*c)) - 2*((2*(a
*b^3*c^2 - 8*a^2*b*c^3)*d + (a^2*b^2*c^2 + 12*a^3*c^3)*f)*x^7 + 8*(2*a^3*c^
3*e - a^3*b*c^2*g)*x^6 + ((4*a*b^4*c - 33*a^2*b^2*c^2 + 20*a^3*c^3)*d + 2*(
a^2*b^3*c + 8*a^3*b*c^2)*f)*x^5 + 12*(2*a^3*b*c^2*e - a^3*b^2*c*g)*x^4 + (2
*(a*b^5 - 7*a^2*b^3*c)*d + (a^2*b^4 + 3*a^3*b^2*c + 20*a^4*c^2)*f)*x^3 + 3*
(2*(a^3*b^2*c + 4*a^4*c^2)*e - (a^3*b^3 + 4*a^4*b*c)*g)*x^2 - (a^3*b^3 - 12
```

$*a^4*b*c)*e - 2*(a^4*b^2 + 4*a^5*c)*g + (8*a^4*b*c*f + (3*a^2*b^4 - 23*a^3*b^2*c + 28*a^4*c^2)*d)*x)*\sqrt{c*x^4 + b*x^2 + a})/(a^5*b^4 - 8*a^6*b^2*c + 16*a^7*c^2 + (a^3*b^4*c^2 - 8*a^4*b^2*c^3 + 16*a^5*c^4)*x^8 + 2*(a^3*b^5*c - 8*a^4*b^3*c^2 + 16*a^5*b*c^3)*x^6 + (a^3*b^6 - 6*a^4*b^4*c + 32*a^6*c^3)*x^4 + 2*(a^4*b^5 - 8*a^5*b^3*c + 16*a^6*b*c^2)*x^2)$

## Sympy [F(-1)]

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{5/2}} dx = \text{Timed out}$$

[In] integrate((g\*x\*\*3+f\*x\*\*2+e\*x+d)/(c\*x\*\*4+b\*x\*\*2+a)\*\*(5/2),x)

[Out] Timed out

## Maxima [F]

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{5/2}} dx = \int \frac{gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^{5/2}} dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^(5/2),x, algorithm="maxima")

[Out] integrate((g\*x^3 + f\*x^2 + e\*x + d)/(c\*x^4 + b\*x^2 + a)^(5/2), x)

## Giac [F]

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{5/2}} dx = \int \frac{gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^{5/2}} dx$$

[In] integrate((g\*x^3+f\*x^2+e\*x+d)/(c\*x^4+b\*x^2+a)^(5/2),x, algorithm="giac")

[Out] integrate((g\*x^3 + f\*x^2 + e\*x + d)/(c\*x^4 + b\*x^2 + a)^(5/2), x)

**Mupad [F(-1)]**

Timed out.

$$\int \frac{d + ex + fx^2 + gx^3}{(a + bx^2 + cx^4)^{5/2}} dx = \int \frac{gx^3 + fx^2 + ex + d}{(cx^4 + bx^2 + a)^{5/2}} dx$$

```
[In] int((d + e*x + f*x^2 + g*x^3)/(a + b*x^2 + c*x^4)^(5/2), x)
```

```
[Out] int((d + e*x + f*x^2 + g*x^3)/(a + b*x^2 + c*x^4)^(5/2), x)
```

$$3.108 \quad \int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx$$

Optimal result	1176
Rubi [A] (verified)	1176
Mathematica [A] (verified)	1177
Maple [A] (verified)	1177
Fricas [A] (verification not implemented)	1177
Sympy [F]	1178
Maxima [A] (verification not implemented)	1178
Giac [B] (verification not implemented)	1178
Mupad [B] (verification not implemented)	1179

### Optimal result

Integrand size = 28, antiderivative size = 19

$$\int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{gx}{\sqrt{a + bx^2 + cx^4}}$$

[Out] g\*x/(c\*x^4+b\*x^2+a)^(1/2)

### Rubi [A] (verified)

Time = 0.01 (sec) , antiderivative size = 19, normalized size of antiderivative = 1.00, number of steps used = 1, number of rules used = 1,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.036$ , Rules used = {1602}

$$\int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{gx}{\sqrt{a + bx^2 + cx^4}}$$

[In] Int[(a\*g - c\*g\*x^4)/(a + b\*x^2 + c\*x^4)^(3/2),x]

[Out] (g\*x)/Sqrt[a + b\*x^2 + c\*x^4]

#### Rule 1602

```
Int[(Pp_)*(Qq_)^(m_), x_Symbol] := With[{p = Expon[Pp, x], q = Expon[Qq, x]},
Simp[Coeff[Pp, x, p]*x^(p - q + 1)*(Qq^(m + 1)/((p + m*q + 1)*Coeff[Qq, x, q])), x] /; NeQ[p + m*q + 1, 0] && EqQ[(p + m*q + 1)*Coeff[Qq, x, q]*Pp, Coeff[Pp, x, p]*x^(p - q)*((p - q + 1)*Qq + (m + 1)*x*D[Qq, x])] /; FreeQ[m, x] && PolyQ[Pp, x] && PolyQ[Qq, x] && NeQ[m, -1]
```

#### Rubi steps

$$\text{integral} = \frac{gx}{\sqrt{a + bx^2 + cx^4}}$$



**Mathematica [A] (verified)**

Time = 10.09 (sec) , antiderivative size = 19, normalized size of antiderivative = 1.00

$$\int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{gx}{\sqrt{a + bx^2 + cx^4}}$$

[In] Integrate[(a\*g - c\*g\*x^4)/(a + b\*x^2 + c\*x^4)^(3/2),x]

[Out] (g\*x)/Sqrt[a + b\*x^2 + c\*x^4]

**Maple [A] (verified)**

Time = 1.10 (sec) , antiderivative size = 18, normalized size of antiderivative = 0.95

method	result	size
gospers	$\frac{gx}{\sqrt{cx^4+bx^2+a}}$	18
default	$\frac{gx}{\sqrt{cx^4+bx^2+a}}$	18
trager	$\frac{gx}{\sqrt{cx^4+bx^2+a}}$	18
elliptic	$\frac{gx}{\sqrt{cx^4+bx^2+a}}$	18
pseudoelliptic	$\frac{gx}{\sqrt{cx^4+bx^2+a}}$	18

[In] int((-c\*g\*x^4+a\*g)/(c\*x^4+b\*x^2+a)^(3/2),x,method=\_RETURNVERBOSE)

[Out] g\*x/(c\*x^4+b\*x^2+a)^(1/2)

**Fricas [A] (verification not implemented)**

none

Time = 0.27 (sec) , antiderivative size = 17, normalized size of antiderivative = 0.89

$$\int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{gx}{\sqrt{cx^4 + bx^2 + a}}$$

[In] integrate((-c\*g\*x^4+a\*g)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="fricas")

[Out] g\*x/sqrt(c\*x^4 + b\*x^2 + a)

**Sympy [F]**

$$\int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = -g \left( \int \left( -\frac{a}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} \right) dx + \int \frac{cx^4}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} dx \right)$$

[In] integrate((-c\*g\*x\*\*4+a\*g)/(c\*x\*\*4+b\*x\*\*2+a)\*\*(3/2),x)

[Out] -g\*(Integral(-a/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x) + Integral(c\*x\*\*4/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x))

**Maxima [A] (verification not implemented)**

none

Time = 0.22 (sec) , antiderivative size = 17, normalized size of antiderivative = 0.89

$$\int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{gx}{\sqrt{cx^4 + bx^2 + a}}$$

[In] integrate((-c\*g\*x^4+a\*g)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="maxima")

[Out] g\*x/sqrt(c\*x^4 + b\*x^2 + a)

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 60 vs. 2(17) = 34.

Time = 0.67 (sec) , antiderivative size = 60, normalized size of antiderivative = 3.16

$$\int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{(b^4g - 8ab^2cg + 16a^2c^2g)x}{\sqrt{cx^4 + bx^2 + a}(b^4 - 8ab^2c + 16a^2c^2)}$$

[In] integrate((-c\*g\*x^4+a\*g)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="giac")

[Out] (b^4\*g - 8\*a\*b^2\*c\*g + 16\*a^2\*c^2\*g)\*x/(sqrt(c\*x^4 + b\*x^2 + a)\*(b^4 - 8\*a\*b^2\*c + 16\*a^2\*c^2))

**Mupad [B] (verification not implemented)**

Time = 8.01 (sec) , antiderivative size = 17, normalized size of antiderivative = 0.89

$$\int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{gx}{\sqrt{cx^4 + bx^2 + a}}$$

[In] int((a\*g - c\*g\*x^4)/(a + b\*x^2 + c\*x^4)^(3/2),x)

[Out] (g\*x)/(a + b\*x^2 + c\*x^4)^(1/2)

$$3.109 \quad \int \frac{ag+ex-cgx^4}{(a+bx^2+cx^4)^{3/2}} dx$$

Optimal result	1180
Rubi [A] (verified)	1180
Mathematica [A] (verified)	1182
Maple [A] (verified)	1182
Fricas [A] (verification not implemented)	1182
Sympy [F]	1183
Maxima [A] (verification not implemented)	1183
Giac [B] (verification not implemented)	1183
Mupad [B] (verification not implemented)	1184

### Optimal result

Integrand size = 31, antiderivative size = 57

$$\int \frac{ag+ex-cgx^4}{(a+bx^2+cx^4)^{3/2}} dx = \frac{gx}{\sqrt{a+bx^2+cx^4}} - \frac{e(b+2cx^2)}{(b^2-4ac)\sqrt{a+bx^2+cx^4}}$$

[Out]  $g*x/(c*x^4+b*x^2+a)^{(1/2)}-e*(2*c*x^2+b)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^{(1/2)}$

### Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 57, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.161$ , Rules used = {1687, 1602, 12, 1121, 627}

$$\int \frac{ag+ex-cgx^4}{(a+bx^2+cx^4)^{3/2}} dx = \frac{gx}{\sqrt{a+bx^2+cx^4}} - \frac{e(b+2cx^2)}{(b^2-4ac)\sqrt{a+bx^2+cx^4}}$$

[In]  $\text{Int}[(a*g + e*x - c*g*x^4)/(a + b*x^2 + c*x^4)^{(3/2)}, x]$

[Out]  $(g*x)/\text{Sqrt}[a + b*x^2 + c*x^4] - (e*(b + 2*c*x^2))/((b^2 - 4*a*c)*\text{Sqrt}[a + b*x^2 + c*x^4])$

#### Rule 12

$\text{Int}[(a_*)*(u_), x\_Symbol] \rightarrow \text{Dist}[a, \text{Int}[u, x], x] /;$  FreeQ[a, x] && !MatchQ[u, (b\_)\*(v\_)] /; FreeQ[b, x]

#### Rule 627

$\text{Int}[((a_.) + (b_.)*(x_) + (c_.)*(x_)^2)^{-3/2}, x\_Symbol] \rightarrow \text{Simp}[-2*((b + 2*c*x)/((b^2 - 4*a*c)*\text{Sqrt}[a + b*x + c*x^2])), x] /;$  FreeQ[{a, b, c}, x] &&

NeQ[b^2 - 4\*a\*c, 0]

### Rule 1121

Int[(x\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Dist[1/2, Subst[Int[(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x]

### Rule 1602

Int[(Pp\_)\*(Qq\_)^(m\_), x\_Symbol] := With[{p = Expon[Pp, x], q = Expon[Qq, x]}, Simp[Coeff[Pp, x, p]\*x^(p - q + 1)\*(Qq^(m + 1)/((p + m\*q + 1)\*Coeff[Qq, x, q])), x] /; NeQ[p + m\*q + 1, 0] && EqQ[(p + m\*q + 1)\*Coeff[Qq, x, q]\*Pp, Coeff[Pp, x, p]\*x^(p - q)\*((p - q + 1)\*Qq + (m + 1)\*x\*D[Qq, x])] /; FreeQ[m, x] && PolyQ[Pp, x] && PolyQ[Qq, x] && NeQ[m, -1]

### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_)\*(x\_)^2 + (c\_)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{ex}{(a + bx^2 + cx^4)^{3/2}} dx + \int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx \\
 &= \frac{gx}{\sqrt{a + bx^2 + cx^4}} + e \int \frac{x}{(a + bx^2 + cx^4)^{3/2}} dx \\
 &= \frac{gx}{\sqrt{a + bx^2 + cx^4}} + \frac{1}{2} e \text{Subst} \left( \int \frac{1}{(a + bx + cx^2)^{3/2}} dx, x, x^2 \right) \\
 &= \frac{gx}{\sqrt{a + bx^2 + cx^4}} - \frac{e(b + 2cx^2)}{(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}}
 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 10.13 (sec) , antiderivative size = 51, normalized size of antiderivative = 0.89

$$\int \frac{ag + ex - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{-be + b^2gx - 4acgx - 2cex^2}{(b^2 - 4ac) \sqrt{a + bx^2 + cx^4}}$$

[In] Integrate[(a\*g + e\*x - c\*g\*x^4)/(a + b\*x^2 + c\*x^4)^(3/2),x]

[Out]  $(-(b*e) + b^2*g*x - 4*a*c*g*x - 2*c*e*x^2)/((b^2 - 4*a*c)*\text{Sqrt}[a + b*x^2 + c*x^4])$

**Maple [A] (verified)**

Time = 1.60 (sec) , antiderivative size = 52, normalized size of antiderivative = 0.91

method	result
gospers	$\frac{4acgx - b^2gx + 2cx^2e + be}{\sqrt{cx^4 + bx^2 + a}(4ac - b^2)}$
trager	$\frac{4acgx - b^2gx + 2cx^2e + be}{\sqrt{cx^4 + bx^2 + a}(4ac - b^2)}$
elliptic	$\frac{e(2cx^2 + b)}{\sqrt{cx^4 + bx^2 + a}(4ac - b^2)} + \frac{gx}{\sqrt{cx^4 + bx^2 + a}}$
default	$ag \left( -\frac{2c \left( \frac{bx^3}{2a(4ac - b^2)} - \frac{(2ac - b^2)x}{2a(4ac - b^2)c} \right)}{\sqrt{\left(x^4 + \frac{bx^2}{c} + \frac{a}{c}\right)c}} + \frac{\left(\frac{1}{a} - \frac{2ac - b^2}{a(4ac - b^2)}\right) \sqrt{2} \sqrt{4 - \frac{2(-b + \sqrt{-4ac + b^2})x^2}{a}} \sqrt{4 + \frac{2(b + \sqrt{-4ac + b^2})x^2}{a}} F\left(\frac{x\sqrt{2} \sqrt{-b + \sqrt{-4ac + b^2}}}{2\sqrt{4 - \frac{2(-b + \sqrt{-4ac + b^2})x^2}{a}}}\right)}{4\sqrt{-b + \sqrt{-4ac + b^2}} \sqrt{cx^4 + bx^2 + a}} \right)$

[In] int((-c\*g\*x^4+a\*g+e\*x)/(c\*x^4+b\*x^2+a)^(3/2),x,method=\_RETURNVERBOSE)

[Out]  $(4*a*c*g*x - b^2*g*x + 2*c*e*x^2 + b*e)/(c*x^4 + b*x^2 + a)^(1/2)/(4*a*c - b^2)$

**Fricas [A] (verification not implemented)**

none

Time = 0.27 (sec) , antiderivative size = 82, normalized size of antiderivative = 1.44

$$\int \frac{ag + ex - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = -\frac{\sqrt{cx^4 + bx^2 + a}(2cex^2 - (b^2 - 4ac)gx + be)}{(b^2c - 4ac^2)x^4 + ab^2 - 4a^2c + (b^3 - 4abc)x^2}$$

[In] integrate((-c\*g\*x^4+a\*g+e\*x)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="fricas")

[Out]  $-\text{sqrt}(c*x^4 + b*x^2 + a)*(2*c*e*x^2 - (b^2 - 4*a*c)*g*x + b*e)/((b^2*c - 4*a*c^2)*x^4 + a*b^2 - 4*a^2*c + (b^3 - 4*a*b*c)*x^2)$

## SymPy [F]

$$\int \frac{ag + ex - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx =$$

$$- \int \left( \frac{ag}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} \right) dx$$

$$- \int \left( \frac{ex}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} \right) dx$$

$$- \int \frac{cgx^4}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} dx$$

[In] integrate((-c\*g\*x\*\*4+a\*g+e\*x)/(c\*x\*\*4+b\*x\*\*2+a)\*\*(3/2),x)

[Out] -Integral(-a\*g/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x) - Integral(-e\*x/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x) - Integral(c\*g\*x\*\*4/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x)

## Maxima [A] (verification not implemented)

none

Time = 0.24 (sec) , antiderivative size = 51, normalized size of antiderivative = 0.89

$$\int \frac{ag + ex - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = -\frac{2cex^2 + be - (b^2g - 4acg)x}{\sqrt{cx^4 + bx^2 + a}(b^2 - 4ac)}$$

[In] integrate((-c\*g\*x^4+a\*g+e\*x)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="maxima")

[Out] -(2\*c\*e\*x^2 + b\*e - (b^2\*g - 4\*a\*c\*g)\*x)/(sqrt(c\*x^4 + b\*x^2 + a)\*(b^2 - 4\*a\*c))

## Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 138 vs. 2(53) = 106.

Time = 0.66 (sec) , antiderivative size = 138, normalized size of antiderivative = 2.42

$$\int \frac{ag + ex - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = -\frac{\left( \frac{2(b^2ce - 4ac^2e)x}{b^4 - 8ab^2c + 16a^2c^2} - \frac{b^4g - 8ab^2cg + 16a^2c^2g}{b^4 - 8ab^2c + 16a^2c^2} \right) x + \frac{b^3e - 4abce}{b^4 - 8ab^2c + 16a^2c^2}}{\sqrt{cx^4 + bx^2 + a}}$$

[In] integrate((-c\*g\*x^4+a\*g+e\*x)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="giac")

[Out] -((2\*(b^2\*c\*e - 4\*a\*c^2\*e)\*x/(b^4 - 8\*a\*b^2\*c + 16\*a^2\*c^2) - (b^4\*g - 8\*a\*b^2\*c\*g + 16\*a^2\*c^2\*g)/(b^4 - 8\*a\*b^2\*c + 16\*a^2\*c^2))\*x + (b^3\*e - 4\*a\*b\*c\*e)/(b^4 - 8\*a\*b^2\*c + 16\*a^2\*c^2))/sqrt(c\*x^4 + b\*x^2 + a)

**Mupad [B] (verification not implemented)**

Time = 7.92 (sec) , antiderivative size = 51, normalized size of antiderivative = 0.89

$$\int \frac{ag + ex - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{-gb^2x + eb + 2cex^2 + 4acgx}{(4ac - b^2)\sqrt{cx^4 + bx^2 + a}}$$

[In] int((a\*g + e\*x - c\*g\*x^4)/(a + b\*x^2 + c\*x^4)^(3/2),x)

[Out] (b\*e + 2\*c\*e\*x^2 - b^2\*g\*x + 4\*a\*c\*g\*x)/((4\*a\*c - b^2)\*(a + b\*x^2 + c\*x^4)^(1/2))



$$3.110 \quad \int \frac{ag + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx$$

Optimal result	1185
Rubi [A] (verified)	1185
Mathematica [A] (verified)	1187
Maple [A] (verified)	1187
Fricas [A] (verification not implemented)	1187
Sympy [F]	1188
Maxima [A] (verification not implemented)	1188
Giac [B] (verification not implemented)	1188
Mupad [B] (verification not implemented)	1189

### Optimal result

Integrand size = 33, antiderivative size = 57

$$\int \frac{ag + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{gx}{\sqrt{a + bx^2 + cx^4}} + \frac{f(2a + bx^2)}{(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}}$$

[Out]  $g*x/(c*x^4+b*x^2+a)^{(1/2)}+f*(b*x^2+2*a)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^{(1/2)}$

### Rubi [A] (verified)

Time = 0.05 (sec), antiderivative size = 57, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.152$ , Rules used = {1687, 1602, 12, 1128, 650}

$$\int \frac{ag + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{f(2a + bx^2)}{(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}} + \frac{gx}{\sqrt{a + bx^2 + cx^4}}$$

[In]  $\text{Int}[(a*g + f*x^3 - c*g*x^4)/(a + b*x^2 + c*x^4)^{(3/2)}, x]$

[Out]  $(g*x)/\text{Sqrt}[a + b*x^2 + c*x^4] + (f*(2*a + b*x^2))/((b^2 - 4*a*c)*\text{Sqrt}[a + b*x^2 + c*x^4])$

#### Rule 12

$\text{Int}[(a_*)(u_), x\_Symbol] \rightarrow \text{Dist}[a, \text{Int}[u, x], x] /; \text{FreeQ}[a, x] \&\& \text{!MatchQ}[u, (b_*)(v_)] /; \text{FreeQ}[b, x]$

#### Rule 650

$\text{Int}[((d_.) + (e_*)(x_))/((a_.) + (b_*)(x_) + (c_*)(x_)^2)^{(3/2)}, x\_Symbol] \rightarrow \text{Simp}[-2*((b*d - 2*a*e + (2*c*d - b*e)*x)/((b^2 - 4*a*c)*\text{Sqrt}[a + b*x$

+ c\*x^2)), x] /; FreeQ[{a, b, c, d, e}, x] && NeQ[2\*c\*d - b\*e, 0] && NeQ[b^2 - 4\*a\*c, 0]

### Rule 1128

Int[(x\_)^(m\_.)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_.), x\_Symbol] := Dist[1/2, Subst[Int[x^((m - 1)/2)\*(a + b\*x + c\*x^2)^p, x], x, x^2], x] /; FreeQ[{a, b, c, p}, x] && IntegerQ[(m - 1)/2]

### Rule 1602

Int[(Pp\_)\*(Qq\_)^(m\_.), x\_Symbol] := With[{p = Expon[Pp, x], q = Expon[Qq, x]}, Simp[Coeff[Pp, x, p]\*x^(p - q + 1)\*(Qq^(m + 1)/((p + m\*q + 1)\*Coeff[Qq, x, q])), x] /; NeQ[p + m\*q + 1, 0] && EqQ[(p + m\*q + 1)\*Coeff[Qq, x, q]\*Pp, Coeff[Pp, x, p]\*x^(p - q)\*((p - q + 1)\*Qq + (m + 1)\*x\*D[Qq, x])] /; FreeQ[m, x] && PolyQ[Pp, x] && PolyQ[Qq, x] && NeQ[m, -1]

### Rule 1687

Int[(Pq\_)\*((a\_) + (b\_.)\*(x\_)^2 + (c\_.)\*(x\_)^4)^(p\_), x\_Symbol] := Module[{q = Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2\*k]\*x^(2\*k), {k, 0, q/2}]\*(a + b\*x^2 + c\*x^4)^p, x] + Int[x\*Sum[Coeff[Pq, x, 2\*k + 1]\*x^(2\*k), {k, 0, (q - 1)/2}]\*(a + b\*x^2 + c\*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x] && !PolyQ[Pq, x^2]

### Rubi steps

$$\begin{aligned}
 \text{integral} &= \int \frac{fx^3}{(a + bx^2 + cx^4)^{3/2}} dx + \int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx \\
 &= \frac{gx}{\sqrt{a + bx^2 + cx^4}} + f \int \frac{x^3}{(a + bx^2 + cx^4)^{3/2}} dx \\
 &= \frac{gx}{\sqrt{a + bx^2 + cx^4}} + \frac{1}{2} f \text{Subst} \left( \int \frac{x}{(a + bx + cx^2)^{3/2}} dx, x, x^2 \right) \\
 &= \frac{gx}{\sqrt{a + bx^2 + cx^4}} + \frac{f(2a + bx^2)}{(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}}
 \end{aligned}$$

**Mathematica [A] (verified)**

Time = 10.08 (sec) , antiderivative size = 48, normalized size of antiderivative = 0.84

$$\int \frac{ag + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{bx(bg + fx) + 2a(f - 2cgx)}{(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}}$$

[In] Integrate[(a\*g + f\*x^3 - c\*g\*x^4)/(a + b\*x^2 + c\*x^4)^(3/2),x]

[Out] (b\*x\*(b\*g + f\*x) + 2\*a\*(f - 2\*c\*g\*x))/((b^2 - 4\*a\*c)\*Sqrt[a + b\*x^2 + c\*x^4])

**Maple [A] (verified)**

Time = 1.60 (sec) , antiderivative size = 53, normalized size of antiderivative = 0.93

method	result
gospers	$\frac{4acgx - b^2gx - bfx^2 - 2af}{\sqrt{cx^4 + bx^2 + a}(4ac - b^2)}$
trager	$\frac{4acgx - b^2gx - bfx^2 - 2af}{\sqrt{cx^4 + bx^2 + a}(4ac - b^2)}$
elliptic	$-\frac{f(bx^2 + 2a)}{\sqrt{cx^4 + bx^2 + a}(4ac - b^2)} + \frac{gx}{\sqrt{cx^4 + bx^2 + a}}$
default	$-\frac{f(bx^2 + 2a)}{\sqrt{cx^4 + bx^2 + a}(4ac - b^2)} + ag \left( -\frac{2c \left( \frac{bx^3}{2a(4ac - b^2)} - \frac{(2ac - b^2)x}{2a(4ac - b^2)c} \right)}{\sqrt{\left(x^4 + \frac{bx^2}{c} + \frac{a}{c}\right)c}} + \frac{\left(\frac{1}{a} - \frac{2ac - b^2}{a(4ac - b^2)}\right)\sqrt{2}\sqrt{4 - \frac{2(-b + \sqrt{-4ac + b^2})x^2}{a}}\sqrt{4 + \frac{2(-b - \sqrt{-4ac + b^2})x^2}{a}}}{4\sqrt{-b + \dots}}$

[In] int((-c\*g\*x^4+f\*x^3+a\*g)/(c\*x^4+b\*x^2+a)^(3/2),x,method=\_RETURNVERBOSE)

[Out] (4\*a\*c\*g\*x-b^2\*g\*x-b\*f\*x^2-2\*a\*f)/(c\*x^4+b\*x^2+a)^(1/2)/(4\*a\*c-b^2)

**Fricas [A] (verification not implemented)**

none

Time = 0.28 (sec) , antiderivative size = 80, normalized size of antiderivative = 1.40

$$\int \frac{ag + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{\sqrt{cx^4 + bx^2 + a}(bfx^2 + (b^2 - 4ac)gx + 2af)}{(b^2c - 4ac^2)x^4 + ab^2 - 4a^2c + (b^3 - 4abc)x^2}$$

[In] integrate((-c\*g\*x^4+f\*x^3+a\*g)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="fricas")

[Out] sqrt(c\*x^4 + b\*x^2 + a)\*(b\*f\*x^2 + (b^2 - 4\*a\*c)\*g\*x + 2\*a\*f)/((b^2\*c - 4\*a\*c^2)\*x^4 + a\*b^2 - 4\*a^2\*c + (b^3 - 4\*a\*b\*c)\*x^2)

**Sympy [F]**

$$\int \frac{ag + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx =$$

$$- \int \left( \frac{ag}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} \right) dx$$

$$- \int \left( \frac{fx^3}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} \right) dx$$

$$- \int \frac{cgx^4}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} dx$$

[In] integrate((-c\*g\*x\*\*4+f\*x\*\*3+a\*g)/(c\*x\*\*4+b\*x\*\*2+a)\*\*(3/2),x)

[Out] -Integral(-a\*g/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x) - Integral(-f\*x\*\*3/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x) - Integral(c\*g\*x\*\*4/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x)

**Maxima [A] (verification not implemented)**

none

Time = 0.23 (sec) , antiderivative size = 49, normalized size of antiderivative = 0.86

$$\int \frac{ag + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{bfx^2 + 2af + (b^2g - 4acg)x}{\sqrt{cx^4 + bx^2 + a}(b^2 - 4ac)}$$

[In] integrate((-c\*g\*x^4+f\*x^3+a\*g)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="maxima")

[Out] (b\*f\*x^2 + 2\*a\*f + (b^2\*g - 4\*a\*c\*g)\*x)/(sqrt(c\*x^4 + b\*x^2 + a)\*(b^2 - 4\*a\*c))

**Giac [B] (verification not implemented)**

Leaf count of result is larger than twice the leaf count of optimal. 136 vs. 2(53) = 106.

Time = 0.62 (sec) , antiderivative size = 136, normalized size of antiderivative = 2.39

$$\int \frac{ag + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{\left( \frac{(b^3f - 4abcf)x}{b^4 - 8ab^2c + 16a^2c^2} + \frac{b^4g - 8ab^2cg + 16a^2c^2g}{b^4 - 8ab^2c + 16a^2c^2} \right) x + \frac{2(ab^2f - 4a^2cf)}{b^4 - 8ab^2c + 16a^2c^2}}{\sqrt{cx^4 + bx^2 + a}}$$

[In] integrate((-c\*g\*x^4+f\*x^3+a\*g)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="giac")

[Out] (((b^3\*f - 4\*a\*b\*c\*f)\*x/(b^4 - 8\*a\*b^2\*c + 16\*a^2\*c^2) + (b^4\*g - 8\*a\*b^2\*c\*g + 16\*a^2\*c^2\*g)/(b^4 - 8\*a\*b^2\*c + 16\*a^2\*c^2))\*x + 2\*(a\*b^2\*f - 4\*a^2\*c\*f)/(b^4 - 8\*a\*b^2\*c + 16\*a^2\*c^2))/sqrt(c\*x^4 + b\*x^2 + a)

**Mupad [B] (verification not implemented)**

Time = 7.94 (sec) , antiderivative size = 51, normalized size of antiderivative = 0.89

$$\int \frac{ag + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = -\frac{gb^2x + fbx^2 - 4acgx + 2af}{(4ac - b^2)\sqrt{cx^4 + bx^2 + a}}$$

[In] int((a\*g + f\*x^3 - c\*g\*x^4)/(a + b\*x^2 + c\*x^4)^(3/2),x)

[Out] -(2\*a\*f + b\*f\*x^2 + b^2\*g\*x - 4\*a\*c\*g\*x)/((4\*a\*c - b^2)\*(a + b\*x^2 + c\*x^4)^(1/2))

$$3.111 \quad \int \frac{ag+ex+fx^3-cgx^4}{(a+bx^2+cx^4)^{3/2}} dx$$

Optimal result	1190
Rubi [A] (verified)	1190
Mathematica [A] (verified)	1191
Maple [A] (verified)	1192
Fricas [A] (verification not implemented)	1192
Sympy [F]	1192
Maxima [A] (verification not implemented)	1193
Giac [B] (verification not implemented)	1193
Mupad [B] (verification not implemented)	1194

### Optimal result

Integrand size = 36, antiderivative size = 69

$$\int \frac{ag+ex+fx^3-cgx^4}{(a+bx^2+cx^4)^{3/2}} dx = \frac{gx}{\sqrt{a+bx^2+cx^4}} - \frac{be-2af+(2ce-bf)x^2}{(b^2-4ac)\sqrt{a+bx^2+cx^4}}$$

[Out]  $g*x/(c*x^4+b*x^2+a)^{(1/2)}+(-b*e+2*a*f-(-b*f+2*c*e)*x^2)/(-4*a*c+b^2)/(c*x^4+b*x^2+a)^{(1/2)}$

### Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 69, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 4,  $\frac{\text{number of rules}}{\text{integrand size}} = 0.111$ , Rules used = {1687, 1602, 1261, 650}

$$\int \frac{ag+ex+fx^3-cgx^4}{(a+bx^2+cx^4)^{3/2}} dx = \frac{gx}{\sqrt{a+bx^2+cx^4}} - \frac{-2af+x^2(2ce-bf)+be}{(b^2-4ac)\sqrt{a+bx^2+cx^4}}$$

[In]  $\text{Int}[(a*g + e*x + f*x^3 - c*g*x^4)/(a + b*x^2 + c*x^4)^{(3/2)}, x]$

[Out]  $(g*x)/\text{Sqrt}[a + b*x^2 + c*x^4] - (b*e - 2*a*f + (2*c*e - b*f)*x^2)/((b^2 - 4*a*c)*\text{Sqrt}[a + b*x^2 + c*x^4])$

#### Rule 650

$\text{Int}[\frac{(d + e*x)}{(a + b*x + c*x^2)^{(3/2)}, x\_Symbol] \rightarrow \text{Simp}[-2*((b*d - 2*a*e + (2*c*d - b*e)*x)/((b^2 - 4*a*c)*\text{Sqrt}[a + b*x + c*x^2])], x] /; \text{FreeQ}\{a, b, c, d, e\}, x] \ \&\& \ \text{NeQ}[2*c*d - b*e, 0] \ \&\& \ \text{NeQ}[b^2 - 4*a*c, 0]$

Rule 1261

```
Int[(x_)*((d_) + (e_)*(x_)^2)^(q_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(
p_), x_Symbol] := Dist[1/2, Subst[Int[(d + e*x)^q*(a + b*x + c*x^2)^p, x],
x, x^2], x] /; FreeQ[{a, b, c, d, e, p, q}, x]
```

Rule 1602

```
Int[(Pp_)*(Qq_)^(m_), x_Symbol] := With[{p = Expon[Pp, x], q = Expon[Qq, x
]}, Simp[Coeff[Pp, x, p]*x^(p - q + 1)*(Qq^(m + 1)/((p + m*q + 1)*Coeff[Qq,
x, q])), x] /; NeQ[p + m*q + 1, 0] && EqQ[(p + m*q + 1)*Coeff[Qq, x, q]*Pp
, Coeff[Pp, x, p]*x^(p - q)*((p - q + 1)*Qq + (m + 1)*x*D[Qq, x]]] /; Free
Q[m, x] && PolyQ[Pp, x] && PolyQ[Qq, x] && NeQ[m, -1]
```

Rule 1687

```
Int[(Pq_)*((a_) + (b_)*(x_)^2 + (c_)*(x_)^4)^(p_), x_Symbol] := Module[{q
= Expon[Pq, x], k}, Int[Sum[Coeff[Pq, x, 2*k]*x^(2*k), {k, 0, q/2}]*(a + b
*x^2 + c*x^4)^p, x] + Int[x*Sum[Coeff[Pq, x, 2*k + 1]*x^(2*k), {k, 0, (q -
1)/2}]*(a + b*x^2 + c*x^4)^p, x]] /; FreeQ[{a, b, c, p}, x] && PolyQ[Pq, x]
&& !PolyQ[Pq, x^2]
```

Rubi steps

$$\begin{aligned} \text{integral} &= \int \frac{x(e + fx^2)}{(a + bx^2 + cx^4)^{3/2}} dx + \int \frac{ag - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx \\ &= \frac{gx}{\sqrt{a + bx^2 + cx^4}} + \frac{1}{2} \text{Subst} \left( \int \frac{e + fx}{(a + bx + cx^2)^{3/2}} dx, x, x^2 \right) \\ &= \frac{gx}{\sqrt{a + bx^2 + cx^4}} - \frac{be - 2af + (2ce - bf)x^2}{(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}} \end{aligned}$$

**Mathematica [A] (verified)**

Time = 10.16 (sec) , antiderivative size = 61, normalized size of antiderivative = 0.88

$$\int \frac{ag + ex + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{-be + 2af + b^2gx - 4acgx - 2cex^2 + bfx^2}{(b^2 - 4ac)\sqrt{a + bx^2 + cx^4}}$$

```
[In] Integrate[(a*g + e*x + f*x^3 - c*g*x^4)/(a + b*x^2 + c*x^4)^(3/2),x]
```

```
[Out] (- (b*e) + 2*a*f + b^2*g*x - 4*a*c*g*x - 2*c*e*x^2 + b*f*x^2)/((b^2 - 4*a*c)
*Sqrt[a + b*x^2 + c*x^4])
```

**Maple [A] (verified)**

Time = 1.79 (sec) , antiderivative size = 63, normalized size of antiderivative = 0.91

method	result	size
gospers	$\frac{4acgx - b^2gx - bfx^2 + 2cx^2e - 2af + be}{\sqrt{cx^4 + bx^2 + a}(4ac - b^2)}$	63
trager	$\frac{4acgx - b^2gx - bfx^2 + 2cx^2e - 2af + be}{\sqrt{cx^4 + bx^2 + a}(4ac - b^2)}$	63
elliptic	$-\frac{bfx^2 - 2cx^2e + 2af - be}{\sqrt{cx^4 + bx^2 + a}(4ac - b^2)} + \frac{gx}{\sqrt{cx^4 + bx^2 + a}}$	69
default	Expression too large to display	1012

[In] `int((-c*g*x^4+f*x^3+a*g+e*x)/(c*x^4+b*x^2+a)^(3/2),x,method=_RETURNVERBOSE)`

[Out]  $(4*a*c*g*x - b^2*g*x - b*f*x^2 + 2*c*e*x^2 - 2*a*f + b*e)/(c*x^4 + b*x^2 + a)^{(1/2)}/(4*a*c - b^2)$

**Fricas [A] (verification not implemented)**

none

Time = 0.29 (sec) , antiderivative size = 92, normalized size of antiderivative = 1.33

$$\int \frac{ag + ex + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{\sqrt{cx^4 + bx^2 + a}((b^2 - 4ac)gx - (2ce - bf)x^2 - be + 2af)}{(b^2c - 4a^2c)x^4 + ab^2 - 4a^2c + (b^3 - 4abc)x^2}$$

[In] `integrate((-c*g*x^4+f*x^3+a*g+e*x)/(c*x^4+b*x^2+a)^(3/2),x, algorithm="fricas")`

[Out]  $\sqrt{c*x^4 + b*x^2 + a}*((b^2 - 4*a*c)*g*x - (2*c*e - b*f)*x^2 - b*e + 2*a*f)/((b^2*c - 4*a*c^2)*x^4 + a*b^2 - 4*a^2*c + (b^3 - 4*a*b*c)*x^2)$

**Sympy [F]**

$$\begin{aligned} & \int \frac{ag + ex + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \\ & - \int \left( \frac{ag}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} \right) dx \\ & - \int \left( \frac{ex}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} \right) dx \\ & - \int \left( \frac{fx^3}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} \right) dx \\ & - \int \frac{cgx^4}{a\sqrt{a + bx^2 + cx^4} + bx^2\sqrt{a + bx^2 + cx^4} + cx^4\sqrt{a + bx^2 + cx^4}} dx \end{aligned}$$



[In] integrate((-c\*g\*x\*\*4+f\*x\*\*3+a\*g+e\*x)/(c\*x\*\*4+b\*x\*\*2+a)\*\*(3/2),x)

[Out] -Integral(-a\*g/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x) - Integral(-e\*x/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x) - Integral(-f\*x\*\*3/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x) - Integral(c\*g\*x\*\*4/(a\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + b\*x\*\*2\*sqrt(a + b\*x\*\*2 + c\*x\*\*4) + c\*x\*\*4\*sqrt(a + b\*x\*\*2 + c\*x\*\*4)), x)

## Maxima [A] (verification not implemented)

none

Time = 0.23 (sec) , antiderivative size = 94, normalized size of antiderivative = 1.36

$$\int \frac{ag + ex + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = -\frac{\sqrt{cx^4 + bx^2 + a}((2ce - bf)x^2 + be - 2af - (b^2g - 4acg)x)}{(b^2c - 4ac^2)x^4 + ab^2 - 4a^2c + (b^3 - 4abc)x^2}$$

[In] integrate((-c\*g\*x^4+f\*x^3+a\*g+e\*x)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="maxima")

[Out] -sqrt(c\*x^4 + b\*x^2 + a)\*((2\*c\*e - b\*f)\*x^2 + b\*e - 2\*a\*f - (b^2\*g - 4\*a\*c\*g)\*x)/((b^2\*c - 4\*a\*c^2)\*x^4 + a\*b^2 - 4\*a^2\*c + (b^3 - 4\*a\*b\*c)\*x^2)

## Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 164 vs. 2(65) = 130.

Time = 0.66 (sec) , antiderivative size = 164, normalized size of antiderivative = 2.38

$$\int \frac{ag + ex + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = \frac{\left(\frac{(2b^2ce - 8ac^2e - b^3f + 4abcf)x}{b^4 - 8ab^2c + 16a^2c^2} - \frac{b^4g - 8ab^2cg + 16a^2c^2g}{b^4 - 8ab^2c + 16a^2c^2}\right)x + \frac{b^3e - 4abce - 2ab^2f + 8a^2cf}{b^4 - 8ab^2c + 16a^2c^2}}{\sqrt{cx^4 + bx^2 + a}}$$

[In] integrate((-c\*g\*x^4+f\*x^3+a\*g+e\*x)/(c\*x^4+b\*x^2+a)^(3/2),x, algorithm="giac")

[Out] -(((2\*b^2\*c\*e - 8\*a\*c^2\*e - b^3\*f + 4\*a\*b\*c\*f)\*x/(b^4 - 8\*a\*b^2\*c + 16\*a^2\*c^2) - (b^4\*g - 8\*a\*b^2\*c\*g + 16\*a^2\*c^2\*g)/(b^4 - 8\*a\*b^2\*c + 16\*a^2\*c^2))\*x + (b^3\*e - 4\*a\*b\*c\*e - 2\*a\*b^2\*f + 8\*a^2\*c\*f)/(b^4 - 8\*a\*b^2\*c + 16\*a^2\*c^2))/sqrt(c\*x^4 + b\*x^2 + a)

**Mupad [B] (verification not implemented)**

Time = 8.00 (sec) , antiderivative size = 62, normalized size of antiderivative = 0.90

$$\int \frac{ag + ex + fx^3 - cgx^4}{(a + bx^2 + cx^4)^{3/2}} dx = -\frac{gb^2x + fbx^2 - eb - 2ceex^2 - 4acgx + 2af}{(4ac - b^2)\sqrt{cx^4 + bx^2 + a}}$$

[In] `int((a*g + e*x + f*x^3 - c*g*x^4)/(a + b*x^2 + c*x^4)^(3/2),x)`

[Out] `-(2*a*f - b*e + b*f*x^2 - 2*c*e*x^2 + b^2*g*x - 4*a*c*g*x)/((4*a*c - b^2)*(a + b*x^2 + c*x^4)^(1/2))`

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# CHAPTER 4

---

## APPENDIX

4.1 Listing of Grading functions . . . . . 1195

### 4.1 Listing of Grading functions

The following are the current version of the grading functions used for grading the quality of the antiderivative with reference to the optimal antiderivative included in the test suite.

There is a version for Maple and for Mathematica/Rubi. There is a version for grading Sympy and version for use with Sagemath.

The following are links to the current source code.

The following are the listings of source code of the grading functions.

#### Mathematica and Rubi grading function

```
(* Original version thanks to Albert Rich emailed on 03/21/2017 *)
(* ::Package:: *)

(* Nasser: April 7, 2022. add second output which gives reason for the grade *)
(*      Small rewrite of logic in main function to make it*)
(*      match Maple's logic. No change in functionality otherwise*)

(* ::Subsection:: *)
(*GradeAntiderivative[result,optimal]*)

(* ::Text:: *)
(*If result and optimal are mathematical expressions, *)
```

```

(*      GradeAntiderivative[result,optimal] returns*)
(* "F" if the result fails to integrate an expression that*)
(*   is integrable*)
(* "C" if result involves higher level functions than necessary*)
(* "B" if result is more than twice the size of the optimal*)
(*   antiderivative*)
(* "A" if result can be considered optimal*)

GradeAntiderivative[result_,optimal_] := Module[{expnResult,expnOptimal,leafCountResult,leafCo
  expnResult = ExpnType[result];
  expnOptimal = ExpnType[optimal];
  leafCountResult = LeafCount[result];
  leafCountOptimal = LeafCount[optimal];

  (*Print["expnResult=",expnResult," expnOptimal=",expnOptimal];*)
  If[expnResult<=expnOptimal,
    If[Not[FreeQ[result,Complex]], (*result contains complex*)
      If[Not[FreeQ[optimal,Complex]], (*optimal contains complex*)
        If[leafCountResult<=2*leafCountOptimal,
          finalresult={"A",""}
          ,(*ELSE*)
          finalresult={"B","Both result and optimal contain complex but leaf count is
        ]
      ,(*ELSE*)
      finalresult={"C","Result contains complex when optimal does not."}
    ]
    ,(*ELSE*)(*result does not contains complex*)
    If[leafCountResult<=2*leafCountOptimal,
      finalresult={"A",""}
      ,(*ELSE*)
      finalresult={"B","Leaf count is larger than twice the leaf count of optimal. $"}
    ]
  ]
  ,(*ELSE*) (*expnResult>expnOptimal*)
  If[FreeQ[result,Integrate] && FreeQ[result,Int],
    finalresult={"C","Result contains higher order function than in optimal. Order "<>
    ,
    finalresult={"F","Contains unresolved integral."}
  ]
];

  finalresult
]

(* ::Text:: *)
(*The following summarizes the type number assigned an *)

```

```

(*expression based on the functions it involves*)
(*1 = rational function*)
(*2 = algebraic function*)
(*3 = elementary function*)
(*4 = special function*)
(*5 = hyperpergeometric function*)
(*6 = appell function*)
(*7 = rootsum function*)
(*8 = integrate function*)
(*9 = unknown function*)

```

```

ExpnType[expn_] :=
  If[AtomQ[expn],
    1,
    If[ListQ[expn],
      Max[Map[ExpnType, expn]],
      If[Head[expn]===Power,
        If[IntegerQ[expn[[2]]],
          ExpnType[expn[[1]]],
          If[Head[expn[[2]]]===Rational,
            If[IntegerQ[expn[[1]]] || Head[expn[[1]]]===Rational,
              1,
              Max[ExpnType[expn[[1]], 2]],
            Max[ExpnType[expn[[1]], ExpnType[expn[[2]], 3]],
          If[Head[expn]===Plus || Head[expn]===Times,
            Max[ExpnType[First[expn]], ExpnType[Rest[expn]]],
          If[ElementaryFunctionQ[Head[expn]],
            Max[3, ExpnType[expn[[1]]],
          If[SpecialFunctionQ[Head[expn]],
            Apply[Max, Append[Map[ExpnType, Apply[List, expn]], 4]],
          If[HypergeometricFunctionQ[Head[expn]],
            Apply[Max, Append[Map[ExpnType, Apply[List, expn]], 5]],
          If[AppellFunctionQ[Head[expn]],
            Apply[Max, Append[Map[ExpnType, Apply[List, expn]], 6]],
          If[Head[expn]===RootSum,
            Apply[Max, Append[Map[ExpnType, Apply[List, expn]], 7]],
          If[Head[expn]===Integrate || Head[expn]===Int,
            Apply[Max, Append[Map[ExpnType, Apply[List, expn]], 8]],
          9]]]]]]]]]]

```

```

ElementaryFunctionQ[func_] :=
  MemberQ[{
    Exp, Log,
    Sin, Cos, Tan, Cot, Sec, Csc,
    ArcSin, ArcCos, ArcTan, ArcCot, ArcSec, ArcCsc,

```

```

    Sinh, Cosh, Tanh, Coth, Sech, Csch,
    ArcSinh, ArcCosh, ArcTanh, ArcCoth, ArcSech, ArcCsch
  }, func]

SpecialFunctionQ[func_] :=
  MemberQ[{
    Erf, Erfc, Erfi,
    FresnelS, FresnelC,
    ExpIntegralE, ExpIntegralEi, LogIntegral,
    SinIntegral, CosIntegral, SinhIntegral, CoshIntegral,
    Gamma, LogGamma, PolyGamma,
    Zeta, PolyLog, ProductLog,
    EllipticF, EllipticE, EllipticPi
  }, func]

HypergeometricFunctionQ[func_] :=
  MemberQ[{Hypergeometric1F1, Hypergeometric2F1, HypergeometricPFQ}, func]

AppellFunctionQ[func_] :=
  MemberQ[{AppellF1}, func]

```

## Maple grading function

```

# File: GradeAntiderivative.mpl
# Original version thanks to Albert Rich emailed on 03/21/2017

#Nasser 03/22/2017 Use Maple leaf count instead since buildin
#Nasser 03/23/2017 missing 'ln' for ElementaryFunctionQ added
#Nasser 03/24/2017 corrected the check for complex result
#Nasser 10/27/2017 check for leafsize and do not call ExpnType()
#
# if leaf size is "too large". Set at 500,000
#Nasser 12/22/2019 Added debug flag, added 'dilog' to special functions
#
# see problem 156, file Apostol_Problems
#Nasser 4/07/2022 add second output which gives reason for the grade

GradeAntiderivative := proc(result, optimal)
local leaf_count_result,
      leaf_count_optimal,
      ExpnType_result,
      ExpnType_optimal,
      debug:=false;

      leaf_count_result:=leafcount(result);

```

```

#do NOT call ExpnType() if leaf size is too large. Recursion problem
if leaf_count_result > 500000 then
    return "B","result has leaf size over 500,000. Avoiding possible recursion issues
fi;

leaf_count_optimal := leafcount(optimal);
ExpnType_result := ExpnType(result);
ExpnType_optimal := ExpnType(optimal);

if debug then
    print("ExpnType_result",ExpnType_result," ExpnType_optimal=",ExpnType_optimal);
fi;

# If result and optimal are mathematical expressions,
# GradeAntiderivative[result,optimal] returns
# "F" if the result fails to integrate an expression that
# is integrable
# "C" if result involves higher level functions than necessary
# "B" if result is more than twice the size of the optimal
# antiderivative
# "A" if result can be considered optimal

#This check below actually is not needed, since I only
#call this grading only for passed integrals. i.e. I check
#for "F" before calling this. But no harm of keeping it here.
#just in case.

if not type(result,freeof('int')) then
    return "F","Result contains unresolved integral";
fi;

if ExpnType_result<=ExpnType_optimal then
    if debug then
        print("ExpnType_result<=ExpnType_optimal");
    fi;
    if is_contains_complex(result) then
        if is_contains_complex(optimal) then
            if debug then
                print("both result and optimal complex");
            fi;
            if leaf_count_result<=2*leaf_count_optimal then
                return "A"," ";
            else
                return "B",cat("Both result and optimal contain complex but leaf count of
                                convert(leaf_count_result,string)," vs. $2 ("
```

```

                                convert(leaf_count_optimal,string)," ) = ",convert(2*leaf_c
    end if
else #result contains complex but optimal is not
    if debug then
        print("result contains complex but optimal is not");
    fi;
    return "C","Result contains complex when optimal does not.";
fi;
else # result do not contain complex
    # this assumes optimal do not as well. No check is needed here.
    if debug then
        print("result do not contain complex, this assumes optimal do not as well")
    fi;
    if leaf_count_result<=2*leaf_count_optimal then
        if debug then
            print("leaf_count_result<=2*leaf_count_optimal");
        fi;
        return "A"," ";
    else
        if debug then
            print("leaf_count_result>2*leaf_count_optimal");
        fi;
        return "B",cat("Leaf count of result is larger than twice the leaf count of opt
                                convert(leaf_count_result,string)," $ vs. $2(",
                                convert(leaf_count_optimal,string)," )=",convert(2*leaf_count
    fi;
fi;
else #ExpnType(result) > ExpnType(optimal)
    if debug then
        print("ExpnType(result) > ExpnType(optimal)");
    fi;
    return "C",cat("Result contains higher order function than in optimal. Order ",
                    convert(ExpnType_result,string)," vs. order ",
                    convert(ExpnType_optimal,string),".");
fi;

end proc:

#
# is_contains_complex(result)
# takes expressions and returns true if it contains "I" else false
#
#Nasser 032417
is_contains_complex:= proc(expression)
    return (has(expression,I));
end proc:

```



```

# The following summarizes the type number assigned an expression
# based on the functions it involves
# 1 = rational function
# 2 = algebraic function
# 3 = elementary function
# 4 = special function
# 5 = hyperpergeometric function
# 6 = appell function
# 7 = rootsum function
# 8 = integrate function
# 9 = unknown function

ExpnType := proc(expn)
  if type(expn,'atomic') then
    1
  elif type(expn,'list') then
    apply(max,map(ExpnType,expn))
  elif type(expn,'sqrt') then
    if type(op(1,expn),'rational') then
      1
    else
      max(2,ExpnType(op(1,expn)))
    end if
  elif type(expn,'^^') then
    if type(op(2,expn),'integer') then
      ExpnType(op(1,expn))
    elif type(op(2,expn),'rational') then
      if type(op(1,expn),'rational') then
        1
      else
        max(2,ExpnType(op(1,expn)))
      end if
    else
      max(3,ExpnType(op(1,expn)),ExpnType(op(2,expn)))
    end if
  elif type(expn,'+`') or type(expn,'*`') then
    max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
  elif ElementaryFunctionQ(op(0,expn)) then
    max(3,ExpnType(op(1,expn)))
  elif SpecialFunctionQ(op(0,expn)) then
    max(4,apply(max,map(ExpnType,[op(expn)])))
  elif HypergeometricFunctionQ(op(0,expn)) then
    max(5,apply(max,map(ExpnType,[op(expn)])))
  elif AppellFunctionQ(op(0,expn)) then
    max(6,apply(max,map(ExpnType,[op(expn)])))
  elif op(0,expn)='int' then
    max(8,apply(max,map(ExpnType,[op(expn)]))) else

```

```

9
end if
end proc:

ElementaryFunctionQ := proc(func)
  member(func, [
    exp, log, ln,
    sin, cos, tan, cot, sec, csc,
    arcsin, arccos, arctan, arccot, arcsec, arccsc,
    sinh, cosh, tanh, coth, sech, csch,
    arcsinh, arccosh, arctanh, arccoth, arcsech, arccsch])
end proc:

SpecialFunctionQ := proc(func)
  member(func, [
    erf, erfc, erfi,
    FresnelS, FresnelC,
    Ei, Ei, Li, Si, Ci, Shi, Chi,
    GAMMA, lnGAMMA, Psi, Zeta, polylog, dilog, LambertW,
    EllipticF, EllipticE, EllipticPi])
end proc:

HypergeometricFunctionQ := proc(func)
  member(func, [Hypergeometric1F1, hypergeom, HypergeometricPFQ])
end proc:

AppellFunctionQ := proc(func)
  member(func, [AppellF1])
end proc:

# u is a sum or product. rest(u) returns all but the
# first term or factor of u.
rest := proc(u) local v;
  if nops(u)=2 then
    op(2,u)
  else
    apply(op(0,u), op(2..nops(u), u))
  end if
end proc:

#leafcount(u) returns the number of nodes in u.
#Nasser 3/23/17 Replaced by build-in leafCount from package in Maple
leafcount := proc(u)
  MmaTranslator[Mma][LeafCount](u);
end proc:

```

## Sympy grading function

```

#Dec 24, 2019. Nasser M. Abbasi:
#      Port of original Maple grading function by
#      Albert Rich to use with Sympy/Python
#Dec 27, 2019 Nasser. Added `RootSum`. See problem 177, Timofeev file
#      added 'exp_polar'
from sympy import *

def leaf_count(expr):
    #sympy do not have leaf count function. This is approximation
    return round(1.7*count_ops(expr))

def is_sqrt(expr):
    if isinstance(expr,Pow):
        if expr.args[1] == Rational(1,2):
            return True
        else:
            return False
    else:
        return False

def is_elementary_function(func):
    return func in [exp,log,ln,sin,cos,tan,cot,sec,csc,
        asin,acos,atan,acot,asec,acsc,sinh,cosh,tanh,coth,sech,csch,
        asinh,acosh,atanh,acoth,asech,acsch
    ]

def is_special_function(func):
    return func in [ erf,erfc,erfi,
        fresnels,fresnelc,Ei,Ei,Li,Si,Ci,Shi,Chi,
        gamma,loggamma,digamma,zeta,polylog,LambertW,
        elliptic_f,elliptic_e,elliptic_pi,exp_polar
    ]

def is_hypergeometric_function(func):
    return func in [hyper]

def is_appell_function(func):
    return func in [appellf1]

def is_atom(expn):
    try:
        if expn.isAtom or isinstance(expn,int) or isinstance(expn,float):
            return True
        else:
            return False

```

```

except AttributeError as error:
    return False

def expnType(expn):
    debug=False
    if debug:
        print("expn=",expn,"type(expn)=",type(expn))

    if is_atom(expn):
        return 1
    elif isinstance(expn,list):
        return max(map(expnType, expn)) #apply(max,map(ExpnType,expn))
    elif is_sqrt(expn):
        if isinstance(expn.args[0],Rational): #type(op(1,expn),'rational')
            return 1
        else:
            return max(2,expnType(expn.args[0])) #max(2,ExpnType(op(1,expn)))
    elif isinstance(expn,Pow): #type(expn,'^')
        if isinstance(expn.args[1],Integer): #type(op(2,expn),'integer')
            return expnType(expn.args[0]) #ExpnType(op(1,expn))
        elif isinstance(expn.args[1],Rational): #type(op(2,expn),'rational')
            if isinstance(expn.args[0],Rational): #type(op(1,expn),'rational')
                return 1
            else:
                return max(2,expnType(expn.args[0])) #max(2,ExpnType(op(1,expn)))
        else:
            return max(3,expnType(expn.args[0]),expnType(expn.args[1])) #max(3,ExpnType(op(1,expn)),ExpnTy
    elif isinstance(expn,Add) or isinstance(expn,Mul): #type(expn,'+') or type(expn,'*')
        m1 = expnType(expn.args[0])
        m2 = expnType(list(expn.args[1:]))
        return max(m1,m2) #max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
    elif is_elementary_function(expn.func): #ElementaryFunctionQ(op(0,expn))
        return max(3,expnType(expn.args[0])) #max(3,ExpnType(op(1,expn)))
    elif is_special_function(expn.func): #SpecialFunctionQ(op(0,expn))
        m1 = max(map(expnType, list(expn.args)))
        return max(4,m1) #max(4,apply(max,map(ExpnType,[op(expn)])))
    elif is_hypergeometric_function(expn.func): #HypergeometricFunctionQ(op(0,expn))
        m1 = max(map(expnType, list(expn.args)))
        return max(5,m1) #max(5,apply(max,map(ExpnType,[op(expn)])))
    elif is_appell_function(expn.func):
        m1 = max(map(expnType, list(expn.args)))
        return max(6,m1) #max(5,apply(max,map(ExpnType,[op(expn)])))
    elif isinstance(expn,RootSum):
        m1 = max(map(expnType, list(expn.args))) #Apply[Max,Append[Map[ExpnType,Apply[List,expn]],7]],
        return max(7,m1)
    elif str(expn).find("Integral") != -1:

```

```

    m1 = max(map(expnType, list(expn.args)))
    return max(8,m1)  #max(5,apply(max,map(ExpnType,[op(expn)])))
else:
    return 9

```

*#main function*

```
def grade_antiderivative(result,optimal):
```

```

    #print ("Enter grade_antiderivative for sagemath")
    #print("Enter grade_antiderivative, result=",result," optimal=",optimal)

```

```

    leaf_count_result = leaf_count(result)
    leaf_count_optimal = leaf_count(optimal)

```

```

    #print("leaf_count_result=",leaf_count_result)
    #print("leaf_count_optimal=",leaf_count_optimal)

```

```

    expnType_result = expnType(result)
    expnType_optimal = expnType(optimal)

```

```
if str(result).find("Integral") != -1:
```

```

    grade = "F"
    grade_annotation = ""

```

```
else:
```

```
    if expnType_result <= expnType_optimal:
```

```
        if result.has(I):
```

```
            if optimal.has(I): #both result and optimal complex
```

```
                if leaf_count_result <= 2*leaf_count_optimal:
```

```

                    grade = "A"
                    grade_annotation = ""

```

```
                else:
```

```
                    grade = "B"
```

```
                    grade_annotation = "Both result and optimal contain complex but leaf count of result is large"
```

```
            else: #result contains complex but optimal is not
```

```
                grade = "C"
```

```
                grade_annotation = "Result contains complex when optimal does not."
```

```
        else: # result do not contain complex, this assumes optimal do not as well
```

```
            if leaf_count_result <= 2*leaf_count_optimal:
```

```

                grade = "A"
                grade_annotation = ""

```

```
            else:
```

```
                grade = "B"
```

```
                grade_annotation = "Leaf count of result is larger than twice the leaf count of optimal. "+str(leaf_count_result) + " vs " + str(leaf_count_optimal) + "."
```

```
        else:
```

```
            grade = "C"
```

```
            grade_annotation = "Result contains higher order function than in optimal. Order "+str(ExpnType_result) + " vs " + str(ExpnType_optimal) + "."
```

```

#print("Before returning. grade=",grade, " grade_annotation=",grade_annotation)

return grade, grade_annotation

```

## SageMath grading function

```

#Dec 24, 2019. Nasser: Ported original Maple grading function by
#    Albert Rich to use with Sagemath. This is used to
#    grade Fricas, Giac and Maxima results.
#Dec 24, 2019. Nasser: Added 'exp_integral_e' and 'sng', 'sin_integral'
#    'arctan2', 'floor', 'abs', 'log_integral'
#June 4, 2022 Made default grade_annotation "none" instead of "" due
#    issue later when reading the file.
#July 14, 2022. Added ellipticF. This is until they fix sagemath, then remove it.

from sage.all import *
from sage.symbolic.operators import add_vararg, mul_vararg

debug=False;

def tree_size(expr):
    r"""
    Return the tree size of this expression.
    """
    #print("Enter tree_size, expr is ",expr)

    if expr not in SR:
        # deal with lists, tuples, vectors
        return 1 + sum(tree_size(a) for a in expr)
    expr = SR(expr)
    x, aa = expr.operator(), expr.operands()
    if x is None:
        return 1
    else:
        return 1 + sum(tree_size(a) for a in aa)

def is_sqrt(expr):
    if expr.operator() == operator.pow: #isinstance(expr, Pow):
        if expr.operands()[1]==1/2: #expr.args[1] == Rational(1,2):
            if debug: print ("expr is sqrt")
            return True
        else:
            return False
    else:
        return False

```

```

def is_elementary_function(func):
    #debug=False
    m = func.name() in ['exp','log','ln',
        'sin','cos','tan','cot','sec','csc',
        'arcsin','arccos','arctan','arccot','arcsec','arccsc',
        'sinh','cosh','tanh','coth','sech','csch',
        'arcsinh','arccosh','arctanh','arccoth','arcsech','arccsch','sgn',
        'arctan2','floor','abs'
    ]
    if debug:
        if m:
            print ("func ", func , " is elementary_function")
        else:
            print ("func ", func , " is NOT elementary_function")

    return m

def is_special_function(func):
    #debug=False
    if debug:
        print ("type(func)=", type(func))

    m= func.name() in ['erf','erfc','erfi','fresnel_sin','fresnel_cos','Ei',
        'Ei','Li','Si','sin_integral','Ci','cos_integral','Shi','sinh_integral',
        'Chi','cosh_integral','gamma','log_gamma','psi,zeta',
        'polylog','lambert_w','elliptic_f','elliptic_e','ellipticF',
        'elliptic_pi','exp_integral_e','log_integral']

    if debug:
        print ("m=",m)
        if m:
            print ("func ", func , " is special_function")
        else:
            print ("func ", func , " is NOT special_function")

    return m

def is_hypergeometric_function(func):
    return func.name() in ['hypergeometric','hypergeometric_M','hypergeometric_U']

def is_appell_function(func):
    return func.name() in ['hypergeometric']    #[appellf1] can't find this in sagemath

```

```

def is_atom(expn):

    #debug=False
    if debug:
        print ("Enter is_atom, expn=",expn)

    if not hasattr(expn, 'parent'):
        return False

    #thanks to answer at https://ask.sagemath.org/question/49179/what-is-sagemath-equivalent-to-atomic-type
    try:
        if expn.parent() is SR:
            return expn.operator() is None
        if expn.parent() in (ZZ, QQ, AA, QQbar):
            return expn in expn.parent() # Should always return True
        if hasattr(expn.parent(), "base_ring") and hasattr(expn.parent(), "gens"):
            return expn in expn.parent().base_ring() or expn in expn.parent().gens()

        return False

    except AttributeError as error:
        print("Exception,AttributeError in is_atom")
        print ("caught exception" , type(error).__name__ )
        return False

def expnType(expn):

    if debug:
        print (">>>>>Enter expnType, expn=", expn)
        print (">>>>>is_atom(expn)=", is_atom(expn))

    if is_atom(expn):
        return 1
    elif type(expn)==list: #isinstance(expn,list):
        return max(map(expnType, expn)) #apply(max,map(ExpnType,expn))
    elif is_sqrt(expn):
        if type(expn.operands()[0])==Rational: #type(isinstance(expn.args[0],Rational):
            return 1
        else:
            return max(2,expnType(expn.operands()[0])) #max(2,expnType(expn.args[0]))
    elif expn.operator() == operator.pow: #isinstance(expn,Pow)
        if type(expn.operands()[1])==Integer: #isinstance(expn.args[1],Integer)
            return expnType(expn.operands()[0]) #expnType(expn.args[0])
        elif type(expn.operands()[1])==Rational: #isinstance(expn.args[1],Rational)
            if type(expn.operands()[0])==Rational: #isinstance(expn.args[0],Rational)

```



```

    return 1
  else:
    return max(2,expnType(expn.operands()[0])) #max(2,expnType(expn.args[0]))
  else:
    return max(3,expnType(expn.operands()[0]),expnType(expn.operands()[1])) #max(3,expnType(expn.
elif expn.operator() == add_vararg or expn.operator() == mul_vararg: #isinstance(expn,Add) or isinst
    m1 = expnType(expn.operands()[0]) #expnType(expn.args[0])
    m2 = expnType(expn.operands()[1:]) #expnType(list(expn.args[1:]))
    return max(m1,m2) #max(ExpnType(op(1,expn)),max(ExpnType(rest(expn))))
elif is_elementary_function(expn.operator()): #is_elementary_function(expn.func)
    return max(3,expnType(expn.operands()[0]))
elif is_special_function(expn.operator()): #is_special_function(expn.func)
    m1 = max(map(expnType, expn.operands())) #max(map(expnType, list(expn.args)))
    return max(4,m1) #max(4,m1)
elif is_hypergeometric_function(expn.operator()): #is_hypergeometric_function(expn.func)
    m1 = max(map(expnType, expn.operands())) #max(map(expnType, list(expn.args)))
    return max(5,m1) #max(5,m1)
elif is_appell_function(expn.operator()):
    m1 = max(map(expnType, expn.operands())) #max(map(expnType, list(expn.args)))
    return max(6,m1) #max(6,m1)
elif str(expn).find("Integral") != -1: #this will never happen, since it
    #is checked before calling the grading function that is passed.
    #but kept it here.
    m1 = max(map(expnType, expn.operands())) #max(map(expnType, list(expn.args)))
    return max(8,m1) #max(5,apply(max,map(ExpnType,[op(expn)])))
else:
    return 9

#main function
def grade_antiderivative(result,optimal):

    if debug:
        print ("Enter grade_antiderivative for sagemath")
        print("Enter grade_antiderivative, result=",result)
        print("Enter grade_antiderivative, optimal=",optimal)
        print("type(anti)=",type(result))
        print("type(optimal)=",type(optimal))

    leaf_count_result = tree_size(result) #leaf_count(result)
    leaf_count_optimal = tree_size(optimal) #leaf_count(optimal)

    #if debug: print ("leaf_count_result=", leaf_count_result, "leaf_count_optimal=",leaf_count_optimal)

    expnType_result = expnType(result)
    expnType_optimal = expnType(optimal)

```

```

if debug: print ("expnType_result=", expnType_result, "expnType_optimal=",expnType_optimal)

if expnType_result <= expnType_optimal:
    if result.has(I):
        if optimal.has(I): #both result and optimal complex
            if leaf_count_result <= 2*leaf_count_optimal:
                grade = "A"
                grade_annotation = "none"
            else:
                grade = "B"
                grade_annotation = "Both result and optimal contain complex but leaf count of result is larger than"
        else: #result contains complex but optimal is not
            grade = "C"
            grade_annotation = "Result contains complex when optimal does not."
    else: # result do not contain complex, this assumes optimal do not as well
        if leaf_count_result <= 2*leaf_count_optimal:
            grade = "A"
            grade_annotation = "none"
        else:
            grade = "B"
            grade_annotation = "Leaf count of result is larger than twice the leaf count of optimal. " + str(leaf_c

else:
    grade = "C"
    grade_annotation = "Result contains higher order function than in optimal. Order " + str(expnType_result

print("Before returning. grade=",grade, " grade_annotation=",grade_annotation)

return grade, grade_annotation

```