Computer Algebra Independent Integration Tests

Summer 2023 edition

1-Algebraic-functions/1.1-Binomial-products/1.1.2-Quadratic/23-1.1.2.6-g-x-^m-a+b-x^2-^p-c+d-x^2-^q-e+f-x^2-^r

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Contents

CHAPTER 1

INTRODUCTION

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 [51]. This is test number [23].

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 (51)	0.00 (0)
Mathematica	100.00 (51)	0.00 (0)
Sympy	54.90 (28)	45.10 (23)
Maple	27.45 (14)	72.55 (37)
Fricas	27.45 (14)	72.55 (37)
Mupad	27.45 (14)	72.55 (37)
Giac	27.45 (14)	72.55 (37)
Maxima	27.45 (14)	72.55 (37)

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 1. antiderivative contains a hypergeometric function and the optimal antiderivative does not. 2. antiderivative contains a special function and the optimal antiderivative does not. 3. antiderivative contains the imaginary unit and the optimal antiderivative does not.
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.

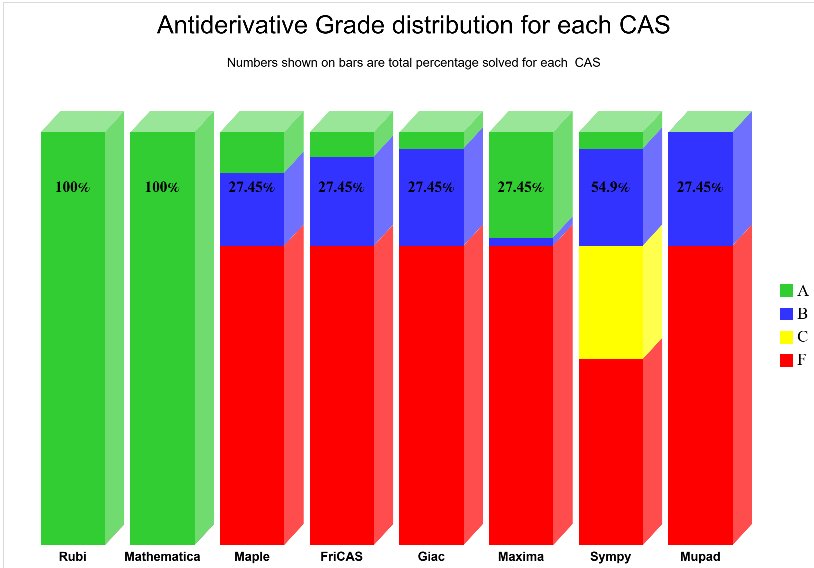
Table 1.2: Description of grading applied to integration result

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

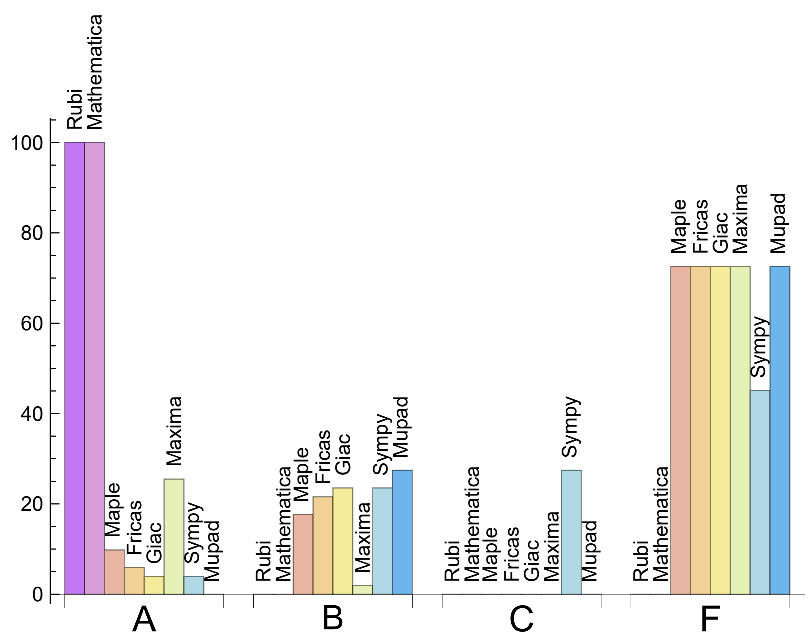
System	% A grade	% B grade	% C grade	% F grade
Rubi	100.000	0.000	0.000	0.000
Mathematica	100.000	0.000	0.000	0.000
Maxima	25.490	1.961	0.000	72.549
Maple	9.804	17.647	0.000	72.549
Fricas	5.882	21.569	0.000	72.549
Giac	3.922	23.529	0.000	72.549
Sympy	3.922	23.529	27.451	45.098
Mupad	0.000	27.451	0.000	72.549

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 timeout failure	Percentage exception failure
Rubi	0	0.00	0.00	0.00
Mathematica	0	0.00	0.00	0.00
Sympy	23	43.48	56.52	0.00
Fricas	37	100.00	0.00	0.00
Maple	37	100.00	0.00	0.00
Mupad	37	0.00	100.00	0.00
Giac	37	100.00	0.00	0.00
Maxima	37	100.00	0.00	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	0.24
Fricas	0.29
Rubi	0.30
Giac	0.33
Mathematica	0.46
Maple	3.08
Mupad	5.86
Sympy	14.26

Table 1.5: Time performance for each CAS

System	Mean size	Normalized mean	Median size	Normalized median
Mathematica	161.47	0.69	149.00	0.72
Rubi	262.39	1.00	216.00	1.00
Maxima	293.71	1.59	242.00	1.68
Mupad	379.36	2.07	305.00	2.21
Fricas	803.64	3.92	513.50	3.57
Maple	1078.57	4.73	711.00	4.94
Giac	1512.00	7.01	1009.00	7.01
Sympy	3608.89	17.31	1764.50	12.10

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.

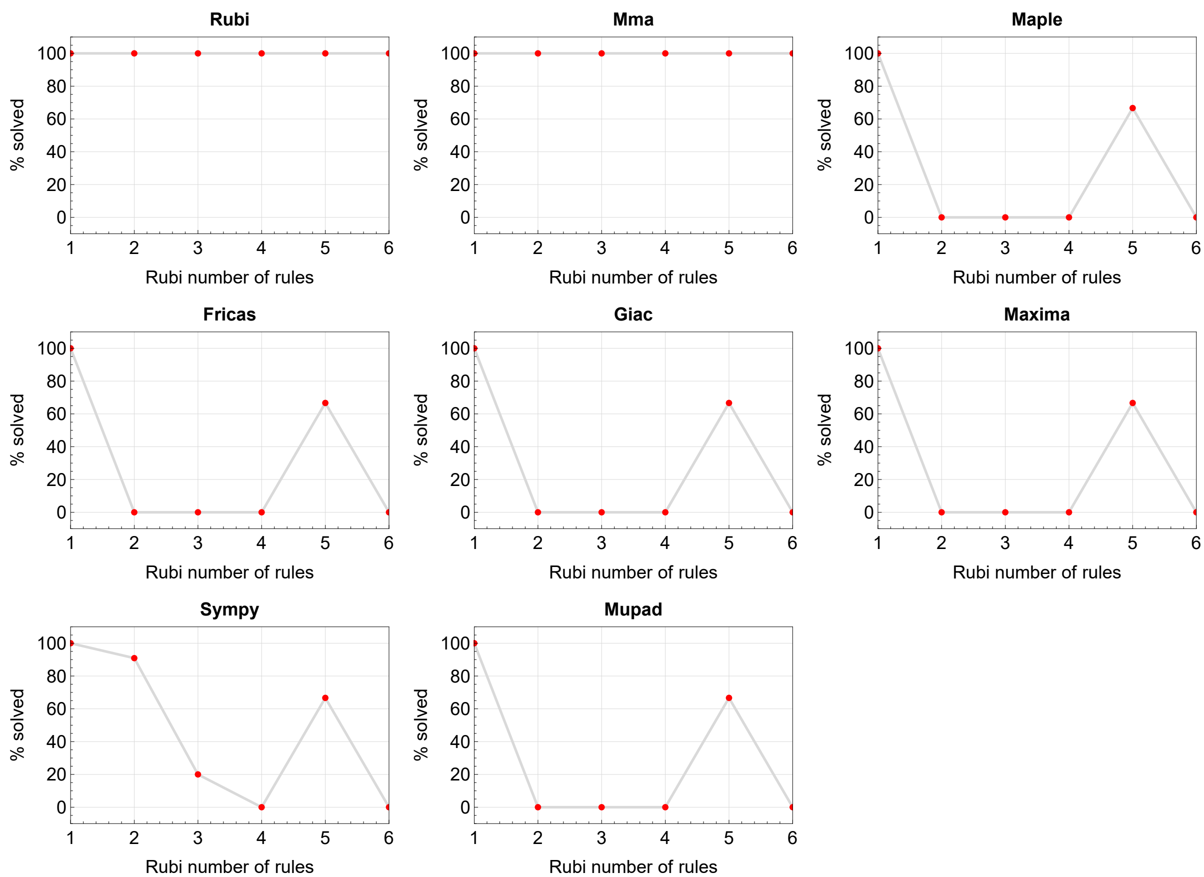


Figure 1.1: Solving statistics per number of Rubi rules used

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.

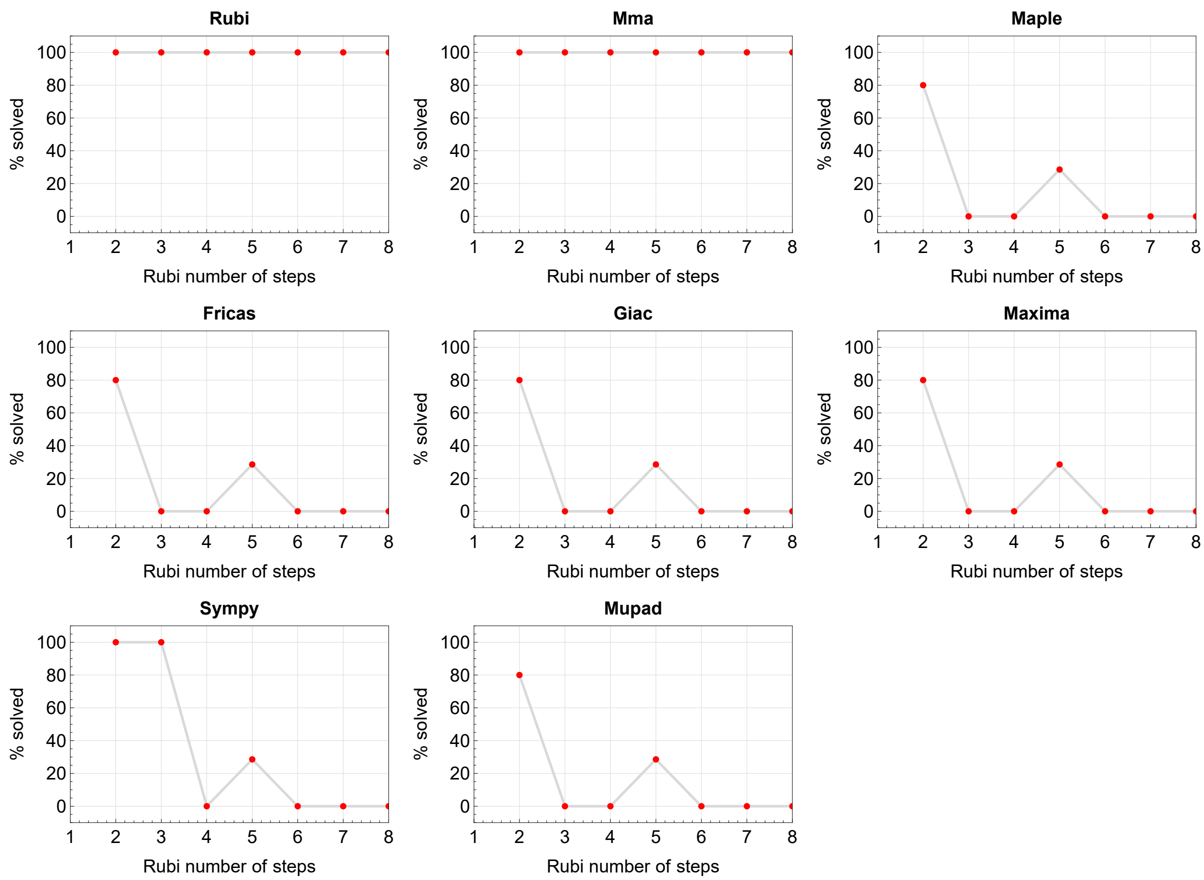


Figure 1.2: Solving statistics per number of Rubi steps used

The above diagram show that the precentage 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.

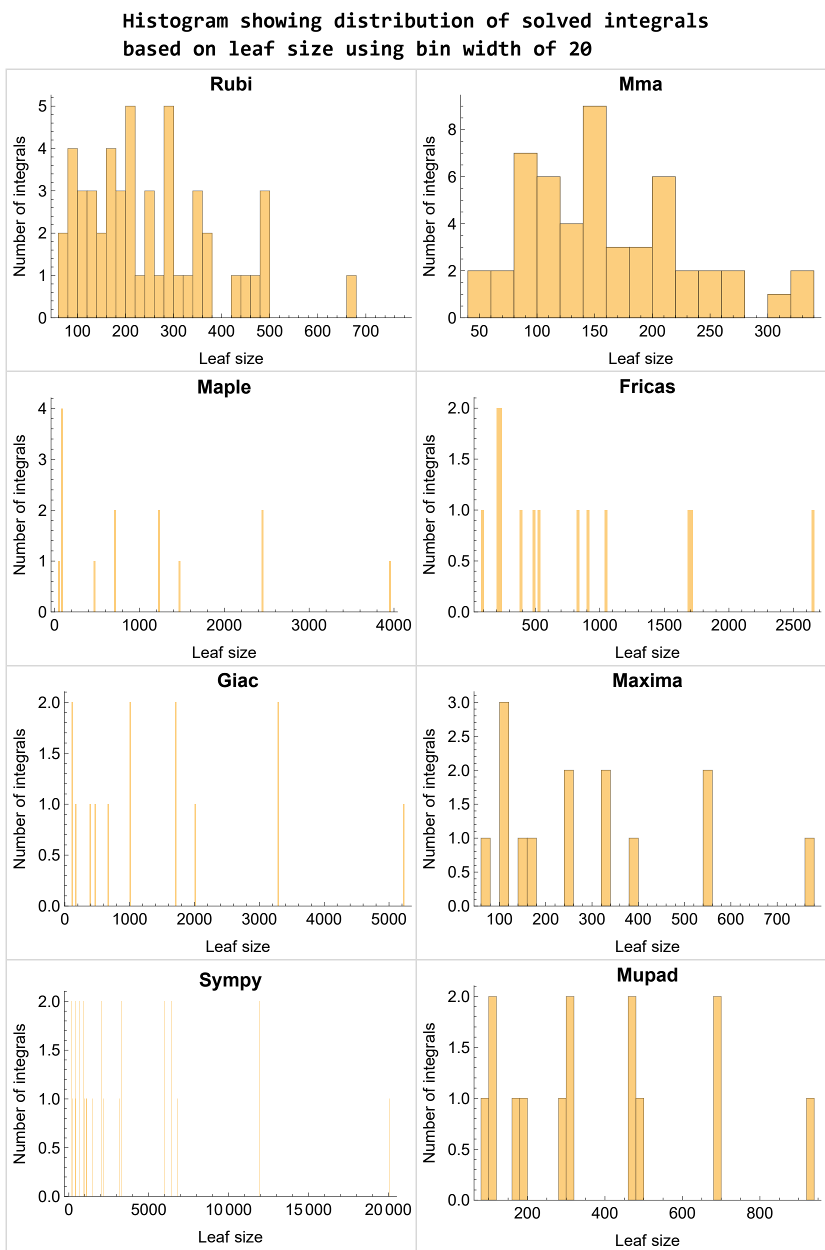


Figure 1.3: Solved integrals based on leaf size distribution

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.

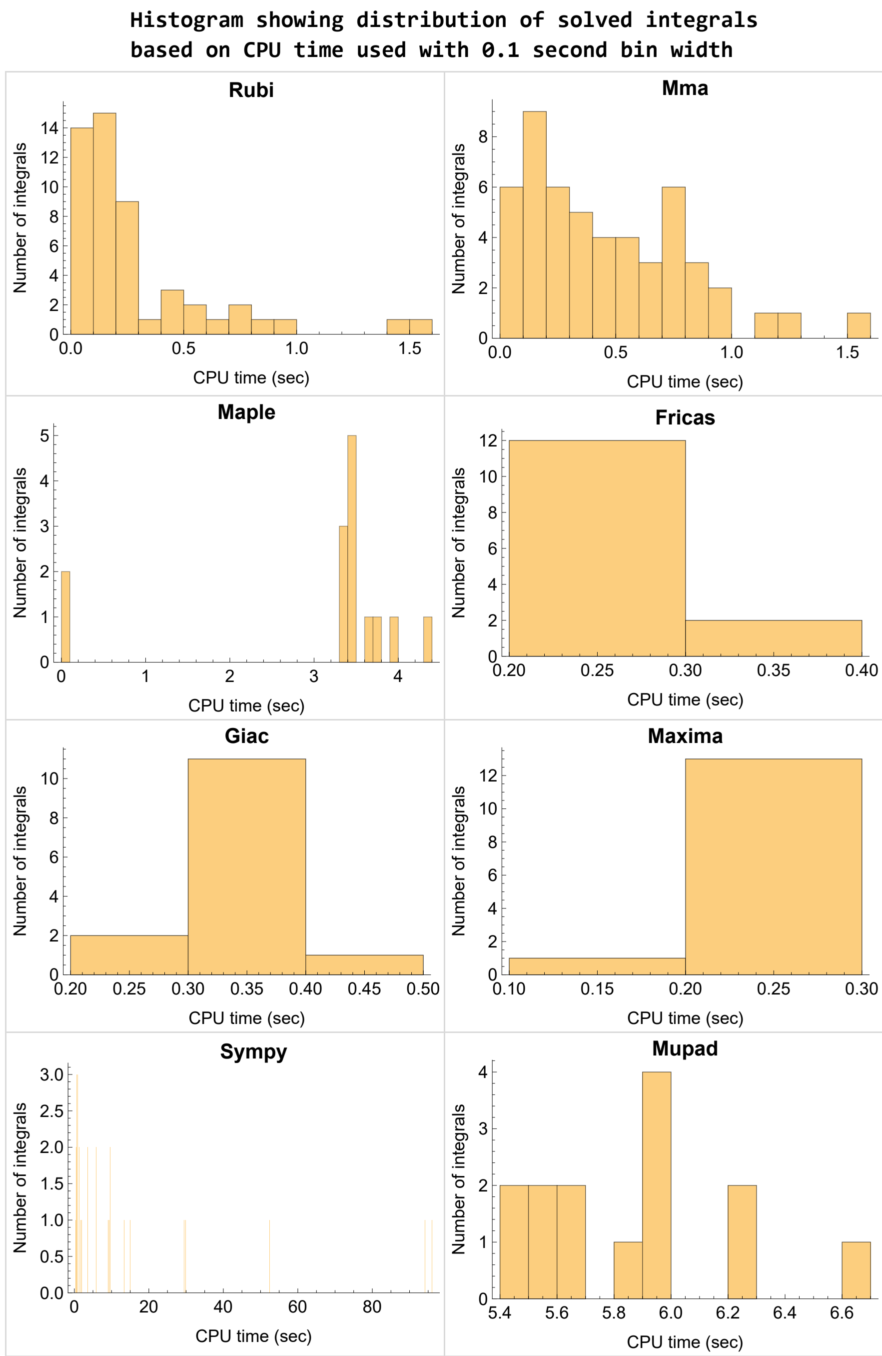


Figure 1.4: Solved integrals histogram based on CPU time used

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.

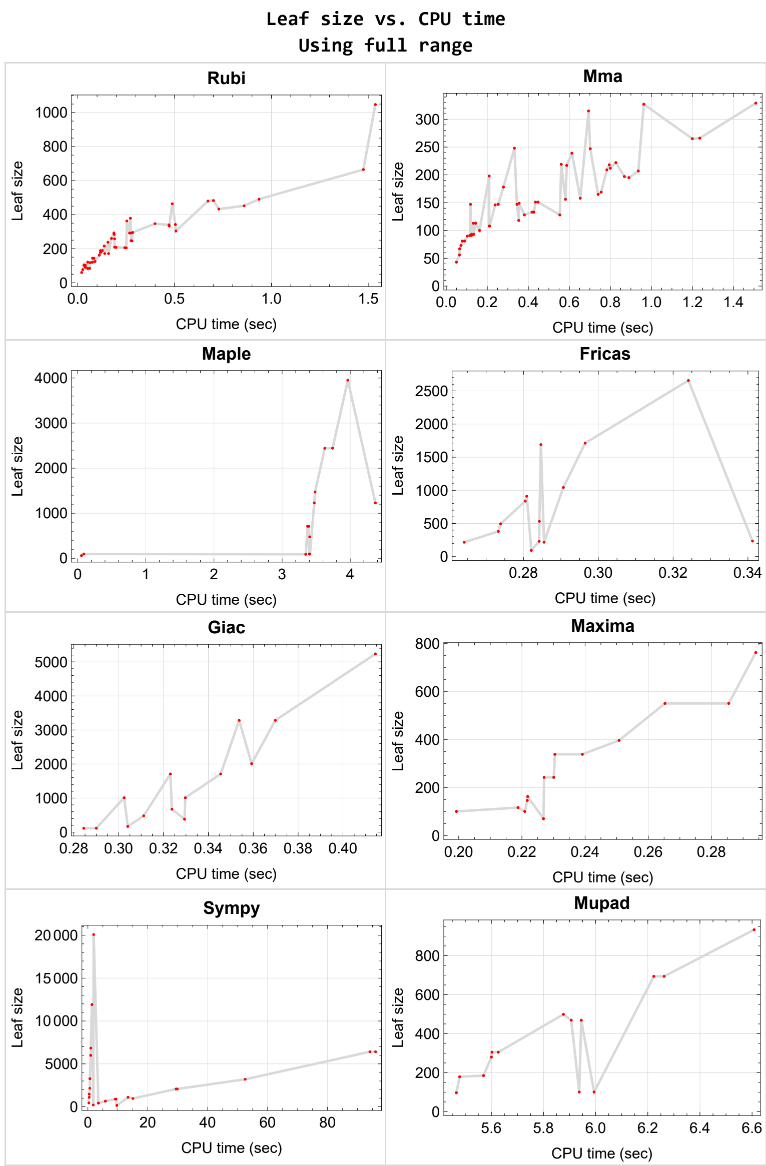


Figure 1.5: Leaf size vs. CPU time. Full range

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/`

```
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.

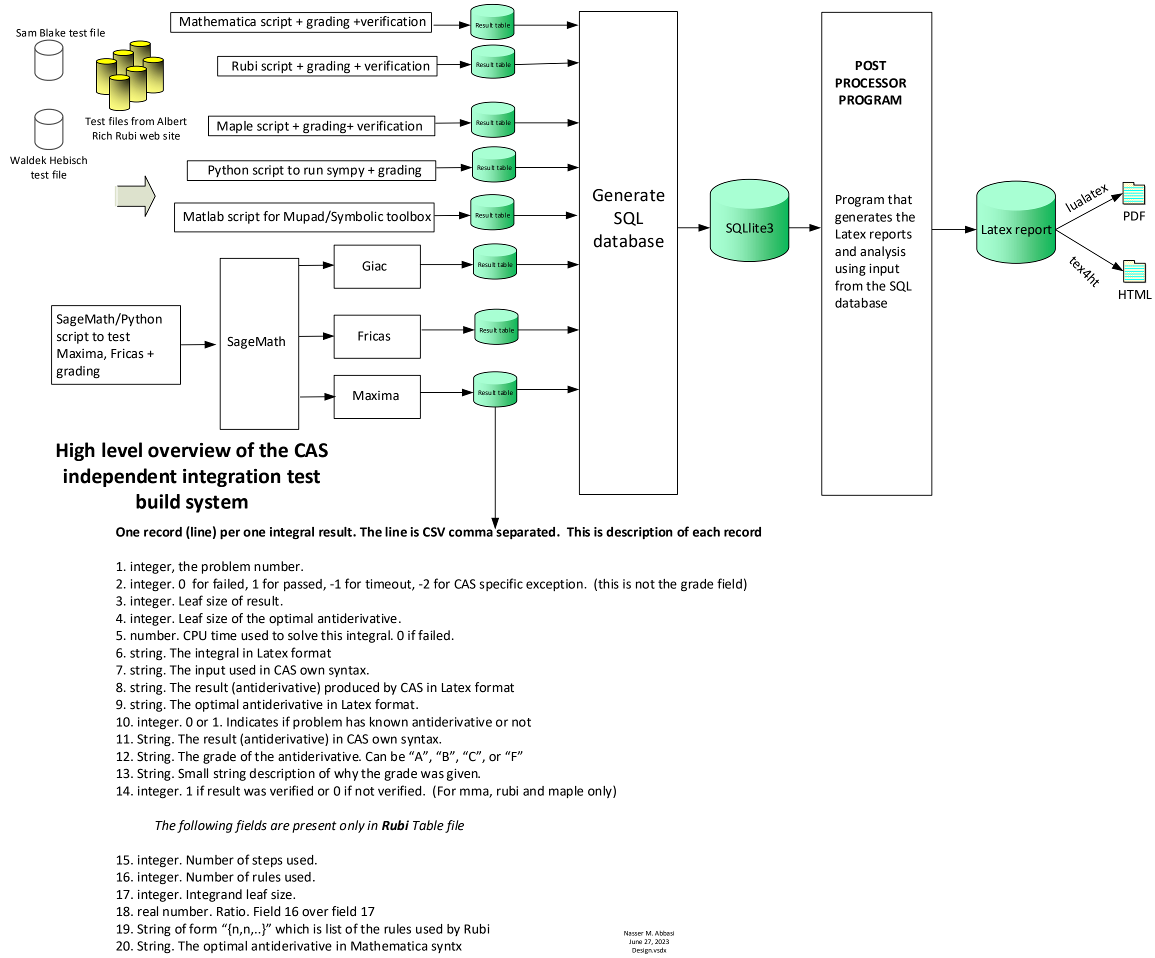
The following is an example of using Matlab's symbolic toolbox (Mupad) to solve an integral

```
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.



CHAPTER 2

DETAILED SUMMARY TABLES OF RESULTS

2.1 List of integrals sorted by grade for each CAS

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 }

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, 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 }

B grade { }

C grade { }

F normal fail { }

F(-1) timedout fail { }

F(-2) exception fail { }

Maple

A grade { 3, 4, 11, 50, 51 }

B grade { 1, 2, 8, 9, 10, 15, 16, 17, 18 }

C grade { }

F normal fail { 5, 6, 7, 12, 13, 14, 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 }

F(-1) timedout fail { }

F(-2) exception fail { }

Fricas

A grade { 4, 50, 51 }

B grade { 1, 2, 3, 8, 9, 10, 11, 15, 16, 17, 18 }

C grade { }

F normal fail { 5, 6, 7, 12, 13, 14, 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 }

F(-1) timedout fail { }

F(-2) exception fail { }

Maxima

A grade { 1, 2, 3, 4, 8, 9, 10, 11, 16, 17, 18, 50, 51 }

B grade { 15 }

C grade { }

F normal fail { 5, 6, 7, 12, 13, 14, 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 }

F(-1) timedout fail { }

F(-2) exception fail { }

Giac

A grade { $50, 51$ }

B grade { $1, 2, 3, 4, 8, 9, 10, 11, 15, 16, 17, 18$ }

C grade { }

F normal fail { $5, 6, 7, 12, 13, 14, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49$ }

F(-1) timedout fail { }

F(-2) exception fail { }

Mupad

A grade { }

B grade { $1, 2, 3, 4, 8, 9, 10, 11, 15, 16, 17, 18, 50, 51$ }

C grade { }

F normal fail { }

F(-1) timedout fail { $5, 6, 7, 12, 13, 14, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49$ }

F(-2) exception fail { }

Sympy

A grade { $50, 51$ }

B grade { $1, 2, 3, 4, 8, 9, 10, 11, 15, 16, 17, 18$ }

C grade { $5, 6, 7, 12, 19, 22, 23, 24, 25, 26, 32, 33, 39, 40$ }

F normal fail { $13, 14, 20, 21, 27, 30, 31, 34, 37, 38$ }

F(-1) timedout fail { $28, 29, 35, 36, 41, 42, 43, 44, 45, 46, 47, 48, 49$ }

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	B	A	B	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	189	189	151	1229	338	911	5992	1708	469
N.S.	1	1.00	0.80	6.50	1.79	4.82	31.70	9.04	2.48
time (sec)	N/A	0.128	0.447	4.369	0.230	0.281	0.948	0.323	5.945

Problem 2	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	B	A	B	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	144	144	113	711	242	532	3271	1009	305
N.S.	1	1.00	0.78	4.94	1.68	3.69	22.72	7.01	2.12
time (sec)	N/A	0.084	0.132	3.375	0.227	0.284	0.661	0.302	5.626

Problem 3	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	97	97	73	96	146	235	1460	478	185
N.S.	1	1.00	0.75	0.99	1.51	2.42	15.05	4.93	1.91
time (sec)	N/A	0.039	0.072	0.090	0.222	0.341	0.460	0.311	5.570

Problem 4	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	A	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	60	60	43	59	70	94	439	167	97
N.S.	1	1.00	0.72	0.98	1.17	1.57	7.32	2.78	1.62
time (sec)	N/A	0.020	0.049	0.055	0.227	0.282	0.322	0.304	5.465

Problem 5	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	118	118	93	0	0	0	418	0	0
N.S.	1	1.00	0.79	0.00	0.00	0.00	3.54	0.00	0.00
time (sec)	N/A	0.064	0.133	0.000	0.000	0.000	3.518	0.000	0.000

Problem 6	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	171	171	108	0	0	0	2069	0	0
N.S.	1	1.00	0.63	0.00	0.00	0.00	12.10	0.00	0.00
time (sec)	N/A	0.159	0.211	0.000	0.000	0.000	29.417	0.000	0.000

Problem 7	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	209	209	133	0	0	0	6411	0	0
N.S.	1	1.00	0.64	0.00	0.00	0.00	30.67	0.00	0.00
time (sec)	N/A	0.191	0.418	0.000	0.000	0.000	96.012	0.000	0.000

Problem 8	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	B	A	B	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	292	292	247	2443	550	1711	11914	3283	694
N.S.	1	1.00	0.85	8.37	1.88	5.86	40.80	11.24	2.38
time (sec)	N/A	0.187	0.702	3.741	0.285	0.296	1.357	0.354	6.223

Problem 9	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	B	A	B	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	216	216	178	1471	396	1043	6836	2010	499
N.S.	1	1.00	0.82	6.81	1.83	4.83	31.65	9.31	2.31
time (sec)	N/A	0.137	0.279	3.484	0.251	0.291	0.965	0.359	5.876

Problem 10	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	B	A	B	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	144	144	113	711	242	495	3271	1009	305
N.S.	1	1.00	0.78	4.94	1.68	3.44	22.72	7.01	2.12
time (sec)	N/A	0.077	0.143	3.392	0.230	0.274	0.671	0.330	5.602

Problem 11	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	A	A	B	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	91	91	67	90	116	217	1096	380	179
N.S.	1	1.00	0.74	0.99	1.27	2.38	12.04	4.18	1.97
time (sec)	N/A	0.038	0.065	3.347	0.219	0.285	0.444	0.329	5.478

Problem 12	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	178	178	146	0	0	0	649	0	0
N.S.	1	1.00	0.82	0.00	0.00	0.00	3.65	0.00	0.00
time (sec)	N/A	0.117	0.238	0.000	0.000	0.000	5.861	0.000	0.000

Problem 13	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	247	247	156	0	0	0	0	0	0
N.S.	1	1.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.275	0.581	0.000	0.000	0.000	0.000	0.000	0.000

Problem 14	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	292	292	165	0	0	0	0	0	0
N.S.	1	1.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.268	0.740	0.000	0.000	0.000	0.000	0.000	0.000

Problem 15	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	B	B	B	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	379	379	327	3953	762	2657	20086	5234	933
N.S.	1	1.00	0.86	10.43	2.01	7.01	53.00	13.81	2.46
time (sec)	N/A	0.272	0.963	3.965	0.294	0.324	1.927	0.414	6.608

Problem 16	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	B	A	B	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	284	284	239	2443	550	1690	11914	3283	694
N.S.	1	1.00	0.84	8.60	1.94	5.95	41.95	11.56	2.44
time (sec)	N/A	0.189	0.612	3.627	0.265	0.285	1.329	0.370	6.263

Problem 17	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	B	A	B	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	189	189	151	1229	338	837	5992	1708	469
N.S.	1	1.00	0.80	6.50	1.79	4.43	31.70	9.04	2.48
time (sec)	N/A	0.118	0.435	3.472	0.239	0.280	0.941	0.345	5.906

Problem 18	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	B	A	B	B	B	B
verified	N/A	Yes	Yes	Yes	TBD	TBD	TBD	TBD	TBD
size	121	121	90	475	162	381	2152	673	280
N.S.	1	1.00	0.74	3.93	1.34	3.15	17.79	5.56	2.31
time (sec)	N/A	0.051	0.102	3.406	0.222	0.273	0.632	0.324	5.600

Problem 19	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	258	258	217	0	0	0	887	0	0
N.S.	1	1.00	0.84	0.00	0.00	0.00	3.44	0.00	0.00
time (sec)	N/A	0.190	0.587	0.000	0.000	0.000	9.384	0.000	0.000

Problem 20	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	347	347	209	0	0	0	0	0	0
N.S.	1	1.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.399	0.783	0.000	0.000	0.000	0.000	0.000	0.000

Problem 21	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	480	480	218	0	0	0	0	0	0
N.S.	1	1.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.672	0.795	0.000	0.000	0.000	0.000	0.000	0.000

Problem 22	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	363	363	315	0	0	0	1102	0	0
N.S.	1	1.00	0.87	0.00	0.00	0.00	3.04	0.00	0.00
time (sec)	N/A	0.254	0.693	0.000	0.000	0.000	13.386	0.000	0.000

Problem 23	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	260	260	219	0	0	0	887	0	0
N.S.	1	1.00	0.84	0.00	0.00	0.00	3.41	0.00	0.00
time (sec)	N/A	0.174	0.560	0.000	0.000	0.000	9.122	0.000	0.000

Problem 24	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	180	180	147	0	0	0	649	0	0
N.S.	1	1.00	0.82	0.00	0.00	0.00	3.61	0.00	0.00
time (sec)	N/A	0.121	0.253	0.000	0.000	0.000	5.841	0.000	0.000

Problem 25	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	120	120	93	0	0	0	418	0	0
N.S.	1	1.00	0.78	0.00	0.00	0.00	3.48	0.00	0.00
time (sec)	N/A	0.076	0.123	0.000	0.000	0.000	3.501	0.000	0.000

Problem 26	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	77	77	56	0	0	0	201	0	0
N.S.	1	1.00	0.73	0.00	0.00	0.00	2.61	0.00	0.00
time (sec)	N/A	0.026	0.064	0.000	0.000	0.000	1.794	0.000	0.000

Problem 27	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	125	125	100	0	0	0	0	0	0
N.S.	1	1.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.089	0.162	0.000	0.000	0.000	0.000	0.000	0.000

Problem 28	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	206	206	149	0	0	0	0	0	0
N.S.	1	1.00	0.72	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.243	0.355	0.000	0.000	0.000	0.000	0.000	0.000

Problem 29	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	342	342	195	0	0	0	0	0	0
N.S.	1	1.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.504	0.891	0.000	0.000	0.000	0.000	0.000	0.000

Problem 30	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	340	340	212	0	0	0	0	0	0
N.S.	1	1.00	0.62	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.471	0.800	0.000	0.000	0.000	0.000	0.000	0.000

Problem 31	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	246	246	158	0	0	0	0	0	0
N.S.	1	1.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.280	0.653	0.000	0.000	0.000	0.000	0.000	0.000

Problem 32	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	171	171	108	0	0	0	2069	0	0
N.S.	1	1.00	0.63	0.00	0.00	0.00	12.10	0.00	0.00
time (sec)	N/A	0.140	0.209	0.000	0.000	0.000	29.820	0.000	0.000

Problem 33	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	103	103	81	0	0	0	954	0	0
N.S.	1	1.00	0.79	0.00	0.00	0.00	9.26	0.00	0.00
time (sec)	N/A	0.032	0.078	0.000	0.000	0.000	15.021	0.000	0.000

Problem 34	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	205	205	147	0	0	0	0	0	0
N.S.	1	1.00	0.72	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.250	0.344	0.000	0.000	0.000	0.000	0.000	0.000

Problem 35	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	304	304	207	0	0	0	0	0	0
N.S.	1	1.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.507	0.936	0.000	0.000	0.000	0.000	0.000	0.000

Problem 36	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	491	491	265	0	0	0	0	0	0
N.S.	1	1.00	0.54	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.936	1.200	0.000	0.000	0.000	0.000	0.000	0.000

Problem 37	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	433	433	222	0	0	0	0	0	0
N.S.	1	1.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.729	0.827	0.000	0.000	0.000	0.000	0.000	0.000

Problem 38	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	292	292	169	0	0	0	0	0	0
N.S.	1	1.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.275	0.755	0.000	0.000	0.000	0.000	0.000	0.000

Problem 39	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	208	208	133	0	0	0	6411	0	0
N.S.	1	1.00	0.64	0.00	0.00	0.00	30.82	0.00	0.00
time (sec)	N/A	0.198	0.427	0.000	0.000	0.000	94.112	0.000	0.000

Problem 40	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	C	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	103	103	81	0	0	0	3199	0	0
N.S.	1	1.00	0.79	0.00	0.00	0.00	31.06	0.00	0.00
time (sec)	N/A	0.039	0.089	0.000	0.000	0.000	52.496	0.000	0.000

Problem 41	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	333	333	197	0	0	0	0	0	0
N.S.	1	1.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.473	0.868	0.000	0.000	0.000	0.000	0.000	0.000

Problem 42	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	452	452	266	0	0	0	0	0	0
N.S.	1	1.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.859	1.236	0.000	0.000	0.000	0.000	0.000	0.000

Problem 43	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	665	665	329	0	0	0	0	0	0
N.S.	1	1.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	1.475	1.509	0.000	0.000	0.000	0.000	0.000	0.000

Problem 44	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	1059	1047	248	0	0	0	0	0	0
N.S.	1	0.99	0.23	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	1.537	0.332	0.000	0.000	0.000	0.000	0.000	0.000

Problem 45	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	495	464	198	0	0	0	0	0	0
N.S.	1	0.94	0.40	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.488	0.209	0.000	0.000	0.000	0.000	0.000	0.000

Problem 46	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	253	238	147	0	0	0	0	0	0
N.S.	1	0.94	0.58	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.156	0.118	0.000	0.000	0.000	0.000	0.000	0.000

Problem 47	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	162	162	118	0	0	0	0	0	0
N.S.	1	1.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.111	0.353	0.000	0.000	0.000	0.000	0.000	0.000

Problem 48	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	295	295	128	0	0	0	0	0	0
N.S.	1	1.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.284	0.380	0.000	0.000	0.000	0.000	0.000	0.000

Problem 49	Optimal	Rubi	MMA	Maple	Maxima	Fricas	Sympy	Giac	Mupad
grade	N/A	A	A	F	F	F	F(-1)	F	F(-1)
verified	N/A	Yes	Yes	N/A	TBD	TBD	TBD	TBD	TBD
size	483	483	128	0	0	0	0	0	0
N.S.	1	1.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00
time (sec)	N/A	0.701	0.553	0.000	0.000	0.000	0.000	0.000	0.000

Problem 50	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	84	84	91	95	100	231	151	113	101
N.S.	1	1.00	1.08	1.13	1.19	2.75	1.80	1.35	1.20
time (sec)	N/A	0.051	0.115	3.401	0.199	0.284	9.664	0.284	5.994

Problem 51	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	84	84	91	95	100	217	151	113	101
N.S.	1	1.00	1.08	1.13	1.19	2.58	1.80	1.35	1.20
time (sec)	N/A	0.062	0.123	3.409	0.221	0.264	9.668	0.290	5.937

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 [48] had the largest ratio of [.193500000000000005]

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	29	0.034
2	A	2	1	1.00	29	0.034
3	A	2	1	1.00	27	0.037
4	A	2	1	1.00	20	0.050
5	A	3	2	1.00	29	0.069
6	A	3	3	1.00	29	0.103
7	A	3	3	1.00	29	0.103
8	A	2	1	1.00	31	0.032
9	A	2	1	1.00	31	0.032
10	A	2	1	1.00	29	0.034
11	A	2	1	1.00	22	0.045
12	A	3	2	1.00	31	0.065
13	A	4	3	1.00	31	0.097
14	A	4	3	1.00	31	0.097
15	A	2	1	1.00	31	0.032
16	A	2	1	1.00	31	0.032
17	A	2	1	1.00	29	0.034
18	A	2	1	1.00	22	0.045
19	A	3	2	1.00	31	0.065
20	A	4	3	1.00	31	0.097
21	A	5	3	1.00	31	0.097
22	A	3	2	1.00	31	0.065
23	A	3	2	1.00	31	0.065
24	A	3	2	1.00	31	0.065

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	$\frac{\text{number of rules}}{\text{integrand leaf size}}$
25	A	3	2	1.00	29	0.069
26	A	2	2	1.00	22	0.091
27	A	4	2	1.00	31	0.065
28	A	5	3	1.00	31	0.097
29	A	6	3	1.00	31	0.097
30	A	4	3	1.00	31	0.097
31	A	4	3	1.00	31	0.097
32	A	3	3	1.00	29	0.103
33	A	2	2	1.00	22	0.091
34	A	5	3	1.00	31	0.097
35	A	6	3	1.00	31	0.097
36	A	7	3	1.00	31	0.097
37	A	5	3	1.00	31	0.097
38	A	4	3	1.00	31	0.097
39	A	3	3	1.00	29	0.103
40	A	2	2	1.00	22	0.091
41	A	6	3	1.00	31	0.097
42	A	7	3	1.00	31	0.097
43	A	8	3	1.00	31	0.097
44	A	6	4	0.99	31	0.129
45	A	5	4	0.94	31	0.129
46	A	4	4	0.94	29	0.138
47	A	6	5	1.00	31	0.161
48	A	7	6	1.00	31	0.194
49	A	8	6	1.00	31	0.194
50	A	5	5	1.00	29	0.172
51	A	5	5	1.00	29	0.172

CHAPTER 3

LISTING OF INTEGRALS

3.1 $\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx$

Optimal result

Integrand size = 29, antiderivative size = 189

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \frac{a^3Ac(ex)^{1+m}}{e(1+m)} + \frac{a^2(3Abc+aBc+aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{a(3Ab(bc+ad)+aB(3bc+ad))(ex)^{5+m}}{e^5(5+m)} + \frac{b(3aB(bc+ad)+Ab(bc+3ad))(ex)^{7+m}}{e^7(7+m)} + \frac{b^2(bBc+Abd+3aBd)(ex)^{9+m}}{e^9(9+m)} + \frac{b^3Bd(ex)^{11+m}}{e^{11}(11+m)}$$

```
[Out] a^3*A*c*(e*x)^(1+m)/e/(1+m)+a^2*(A*a*d+3*A*b*c+B*a*c)*(e*x)^(3+m)/e^3/(3+m)
+a*(3*A*b*(a*d+b*c)+a*B*(a*d+3*b*c))*(e*x)^(5+m)/e^5/(5+m)+b*(3*a*B*(a*d+b*
c)+A*b*(3*a*d+b*c))*(e*x)^(7+m)/e^7/(7+m)+b^2*(A*b*d+3*B*a*d+B*b*c)*(e*x)^(
9+m)/e^9/(9+m)+b^3*B*d*(e*x)^(11+m)/e^11/(11+m)
```

Rubi [A] (verified)

Time = 0.13 (sec) , antiderivative size = 189, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1, $\frac{\text{number of rules}}{\text{integrand size}} = 0.034$, Rules used

$= \{584\}$

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \frac{a^3Ac(ex)^{m+1}}{e(m+1)} + \frac{a^2(ex)^{m+3}(aAd+aBc+3Abc)}{e^3(m+3)} + \frac{b^2(ex)^{m+9}(3aBd+Abd+bBc)}{e^9(m+9)} + \frac{b(ex)^{m+7}(Ab(3ad+bc)+3aB(ad+bc))}{e^7(m+7)} + \frac{a(ex)^{m+5}(3Ab(ad+bc)+aB(ad+3bc))}{e^5(m+5)} + \frac{b^3Bd(ex)^{m+11}}{e^{11}(m+11)}$$

```
[In] Int[(e*x)^m*(a + b*x^2)^3*(A + B*x^2)*(c + d*x^2),x]
[Out] (a^3*A*c*(e*x)^(1 + m))/(e*(1 + m)) + (a^2*(3*A*b*c + a*B*c + a*A*d)*(e*x)^
(3 + m))/(e^3*(3 + m)) + (a*(3*A*b*(b*c + a*d) + a*B*(3*b*c + a*d))*(e*x)^(
5 + m))/(e^5*(5 + m)) + (b*(3*a*B*(b*c + a*d) + A*b*(b*c + 3*a*d))*(e*x)^(7
 + m))/(e^7*(7 + m)) + (b^2*(b*B*c + A*b*d + 3*a*B*d)*(e*x)^(9 + m))/(e^9*(
9 + m)) + (b^3*B*d*(e*x)^(11 + m))/(e^11*(11 + m))
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\text{integral} = \int \left(a^3Ac(ex)^m + \frac{a^2(3Abc+aBc+aAd)(ex)^{2+m}}{e^2} + \frac{a(3Ab(bc+ad)+aB(3bc+ad))(ex)^{4+m}}{e^4} + \frac{b(3aB(bc+ad)+Ab(bc+3ad))(ex)^{6+m}}{e^6} + \frac{b^2(bBc+Abd+3aBd)(ex)^{8+m}}{e^8} + \frac{b^3Bd(ex)^{10+m}}{e^{10}}\right) dx$$

$$= \frac{a^3Ac(ex)^{1+m}}{e(1+m)} + \frac{a^2(3Abc+aBc+aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{a(3Ab(bc+ad)+aB(3bc+ad))(ex)^{5+m}}{e^5(5+m)} + \frac{b(3aB(bc+ad)+Ab(bc+3ad))(ex)^{7+m}}{e^7(7+m)} + \frac{b^2(bBc+Abd+3aBd)(ex)^{9+m}}{e^9(9+m)} + \frac{b^3Bd(ex)^{11+m}}{e^{11}(11+m)}$$

Mathematica [A] (verified)

Time = 0.45 (sec) , antiderivative size = 151, normalized size of antiderivative = 0.80

$$\int (ex)^m (a+bx^2)^3 (A+Bx^2)(c+dx^2)\,dx = x(ex)^m\left(\frac{a^3Ac}{1+m}+\frac{a^2(3Abc+aBc+aAd)x^2}{3+m}+\frac{a(3Ab(bc+ad)+aB(3bc+ad))x^4}{5+m}+\frac{b(3aB(bc+ad)+Ab(bc+3ad))x^6}{7+m}+\frac{b^2(bBc+Abd+3aBd)x^8}{9+m}+\frac{b^3Bdx^{10}}{11+m}\right)$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)^3*(A + B*x^2)*(c + d*x^2),x]
```

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

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 1228 vs. 2(189) = 378.

Time = 4.37 (sec) , antiderivative size = 1229, normalized size of antiderivative = 6.50

method	result	size
gosper	Expression too large to display	1229
risch	Expression too large to display	1229
parallelrisch	Expression too large to display	1709

```
[In] int((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c),x,method=_RETURNVERBOSE)
```

```
[Out] x*(B*b^3*d*m^5*x^10+25*B*b^3*d*m^4*x^10+A*b^3*d*m^5*x^8+3*B*a*b^2*d*m^5*x^8
+B*b^3*c*m^5*x^8+230*B*b^3*d*m^3*x^10+27*A*b^3*d*m^4*x^8+81*B*a*b^2*d*m^4*x
^8+27*B*b^3*c*m^4*x^8+950*B*b^3*d*m^2*x^10+3*A*a*b^2*d*m^5*x^6+A*b^3*c*m^5*
x^6+262*A*b^3*d*m^3*x^8+3*B*a^2*b*d*m^5*x^6+3*B*a*b^2*c*m^5*x^6+786*B*a*b^2
*d*m^3*x^8+262*B*b^3*c*m^3*x^8+1689*B*b^3*d*m*x^10+87*A*a*b^2*d*m^4*x^6+29*
A*b^3*c*m^4*x^6+1122*A*b^3*d*m^2*x^8+87*B*a^2*b*d*m^4*x^6+87*B*a*b^2*c*m^4*
x^6+3366*B*a*b^2*d*m^2*x^8+1122*B*b^3*c*m^2*x^8+945*B*b^3*d*x^10+3*A*a^2*b*
d*m^5*x^4+3*A*a*b^2*c*m^5*x^4+906*A*a*b^2*d*m^3*x^6+302*A*b^3*c*m^3*x^6+204
1*A*b^3*d*m*x^8+B*a^3*d*m^5*x^4+3*B*a^2*b*c*m^5*x^4+906*B*a^2*b*d*m^3*x^6+9
06*B*a*b^2*c*m^3*x^6+6123*B*a*b^2*d*m*x^8+2041*B*b^3*c*m*x^8+93*A*a^2*b*d*m
^4*x^4+93*A*a*b^2*c*m^4*x^4+4098*A*a*b^2*d*m^2*x^6+1366*A*b^3*c*m^2*x^6+115
5*A*b^3*d*x^8+31*B*a^3*d*m^4*x^4+93*B*a^2*b*c*m^4*x^4+4098*B*a^2*b*d*m^2*x^
```

```
6+4098*B*a*b^2*c*m^2*x^6+3465*B*a*b^2*d*x^8+1155*B*b^3*c*x^8+A*a^3*d*m^5*x^
2+3*A*a^2*b*c*m^5*x^2+1050*A*a^2*b*d*m^3*x^4+1050*A*a*b^2*c*m^3*x^4+7731*A*
a*b^2*d*m*x^6+2577*A*b^3*c*m*x^6+B*a^3*c*m^5*x^2+350*B*a^3*d*m^3*x^4+1050*B
*a^2*b*c*m^3*x^4+7731*B*a^2*b*d*m*x^6+7731*B*a*b^2*c*m*x^6+33*A*a^3*d*m^4*x
^2+99*A*a^2*b*c*m^4*x^2+5190*A*a^2*b*d*m^2*x^4+5190*A*a*b^2*c*m^2*x^4+4455*
A*a*b^2*d*x^6+1485*A*b^3*c*x^6+33*B*a^3*c*m^4*x^2+1730*B*a^3*d*m^2*x^4+5190
*B*a^2*b*c*m^2*x^4+4455*B*a^2*b*d*x^6+4455*B*a*b^2*c*x^6+A*a^3*c*m^5+406*A*
a^3*d*m^3*x^2+1218*A*a^2*b*c*m^3*x^2+10467*A*a^2*b*d*m*x^4+10467*A*a*b^2*c*
m*x^4+406*B*a^3*c*m^3*x^2+3489*B*a^3*d*m*x^4+10467*B*a^2*b*c*m*x^4+35*A*a^3
*c*m^4+2262*A*a^3*d*m^2*x^2+6786*A*a^2*b*c*m^2*x^2+6237*A*a^2*b*d*x^4+6237*
A*a*b^2*c*x^4+2262*B*a^3*c*m^2*x^2+2079*B*a^3*d*x^4+6237*B*a^2*b*c*x^4+470*
A*a^3*c*m^3+5353*A*a^3*d*m*x^2+16059*A*a^2*b*c*m*x^2+5353*B*a^3*c*m*x^2+301
0*A*a^3*c*m^2+3465*A*a^3*d*x^2+10395*A*a^2*b*c*x^2+3465*B*a^3*c*x^2+9129*A*
a^3*c*m+10395*A*a^3*c)*(e*x)^m/(11+m)/(9+m)/(7+m)/(5+m)/(3+m)/(1+m)
```

Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 911 vs. $2(189) = 378$.

Time = 0.28 (sec) , antiderivative size = 911, normalized size of antiderivative = 4.82

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \frac{((Bb^3dm^5+25\,Bb^3dm^4+230\,Bb^3dm^3+950\,Bb^3dm^2+1689\,Bb^3dm+945\,Bb^3d)x^{11}+((Bb^3c+(3\,Bab^2 -}{}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c),x, algorithm="fricas")
```

```
[Out] ((B*b^3*d*m^5 + 25*B*b^3*d*m^4 + 230*B*b^3*d*m^3 + 950*B*b^3*d*m^2 + 1689*B
*b^3*d*m + 945*B*b^3*d)*x^11 + ((B*b^3*c + (3*B*a*b^2 + A*b^3)*d)*m^5 + 115
5*B*b^3*c + 27*(B*b^3*c + (3*B*a*b^2 + A*b^3)*d)*m^4 + 262*(B*b^3*c + (3*B*
a*b^2 + A*b^3)*d)*m^3 + 1122*(B*b^3*c + (3*B*a*b^2 + A*b^3)*d)*m^2 + 1155*(
3*B*a*b^2 + A*b^3)*d + 2041*(B*b^3*c + (3*B*a*b^2 + A*b^3)*d)*m)*x^9 + (((3
*B*a*b^2 + A*b^3)*c + 3*(B*a^2*b + A*a*b^2)*d)*m^5 + 29*((3*B*a*b^2 + A*b^3
)*c + 3*(B*a^2*b + A*a*b^2)*d)*m^4 + 302*((3*B*a*b^2 + A*b^3)*c + 3*(B*a^2*
b + A*a*b^2)*d)*m^3 + 1366*((3*B*a*b^2 + A*b^3)*c + 3*(B*a^2*b + A*a*b^2)*d
)*m^2 + 1485*(3*B*a*b^2 + A*b^3)*c + 4455*(B*a^2*b + A*a*b^2)*d + 2577*((3*
B*a*b^2 + A*b^3)*c + 3*(B*a^2*b + A*a*b^2)*d)*m)*x^7 + ((3*(B*a^2*b + A*a*b
^2)*c + (B*a^3 + 3*A*a^2*b)*d)*m^5 + 31*(3*(B*a^2*b + A*a*b^2)*c + (B*a^3 +
 3*A*a^2*b)*d)*m^4 + 350*(3*(B*a^2*b + A*a*b^2)*c + (B*a^3 + 3*A*a^2*b)*d)*
m^3 + 1730*(3*(B*a^2*b + A*a*b^2)*c + (B*a^3 + 3*A*a^2*b)*d)*m^2 + 6237*(B*
a^2*b + A*a*b^2)*c + 2079*(B*a^3 + 3*A*a^2*b)*d + 3489*(3*(B*a^2*b + A*a*b^
2)*c + (B*a^3 + 3*A*a^2*b)*d)*m)*x^5 + ((A*a^3*d + (B*a^3 + 3*A*a^2*b)*c)*m
^5 + 3465*A*a^3*d + 33*(A*a^3*d + (B*a^3 + 3*A*a^2*b)*c)*m^4 + 406*(A*a^3*d
 + (B*a^3 + 3*A*a^2*b)*c)*m^3 + 2262*(A*a^3*d + (B*a^3 + 3*A*a^2*b)*c)*m^2
+ 3465*(B*a^3 + 3*A*a^2*b)*c + 5353*(A*a^3*d + (B*a^3 + 3*A*a^2*b)*c)*m)*x^
```

```
3 + (A*a^3*c*m^5 + 35*A*a^3*c*m^4 + 470*A*a^3*c*m^3 + 3010*A*a^3*c*m^2 + 91
29*A*a^3*c*m + 10395*A*a^3*c)*x)*(e*x)^m/(m^6 + 36*m^5 + 505*m^4 + 3480*m^3
 + 12139*m^2 + 19524*m + 10395)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 5992 vs. $2(184) = 368$.

Time = 0.95 (sec) , antiderivative size = 5992, normalized size of antiderivative = 31.70

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**3*(B*x**2+A)*(d*x**2+c),x)
```

```
[Out] Piecewise(((-A*a**3*c/(10*x**10) - A*a**3*d/(8*x**8) - 3*A*a**2*b*c/(8*x**8
) - A*a**2*b*d/(2*x**6) - A*a*b**2*c/(2*x**6) - 3*A*a*b**2*d/(4*x**4) - A*b
**3*c/(4*x**4) - A*b**3*d/(2*x**2) - B*a**3*c/(8*x**8) - B*a**3*d/(6*x**6)
- B*a**2*b*c/(2*x**6) - 3*B*a**2*b*d/(4*x**4) - 3*B*a*b**2*c/(4*x**4) - 3*B
*a*b**2*d/(2*x**2) - B*b**3*c/(2*x**2) + B*b**3*d*log(x))/e**11, Eq(m, -11)
), ((-A*a**3*c/(8*x**8) - A*a**3*d/(6*x**6) - A*a**2*b*c/(2*x**6) - 3*A*a**
2*b*d/(4*x**4) - 3*A*a*b**2*c/(4*x**4) - 3*A*a*b**2*d/(2*x**2) - A*b**3*c/(
2*x**2) + A*b**3*d*log(x) - B*a**3*c/(6*x**6) - B*a**3*d/(4*x**4) - 3*B*a**
2*b*c/(4*x**4) - 3*B*a**2*b*d/(2*x**2) - 3*B*a*b**2*c/(2*x**2) + 3*B*a*b**2
*d*log(x) + B*b**3*c*log(x) + B*b**3*d*x**2/2)/e**9, Eq(m, -9)), ((-A*a**3*
c/(6*x**6) - A*a**3*d/(4*x**4) - 3*A*a**2*b*c/(4*x**4) - 3*A*a**2*b*d/(2*x*
*2) - 3*A*a*b**2*c/(2*x**2) + 3*A*a*b**2*d*log(x) + A*b**3*c*log(x) + A*b**
3*d*x**2/2 - B*a**3*c/(4*x**4) - B*a**3*d/(2*x**2) - 3*B*a**2*b*c/(2*x**2)
+ 3*B*a**2*b*d*log(x) + 3*B*a*b**2*c*log(x) + 3*B*a*b**2*d*x**2/2 + B*b**3*
c*x**2/2 + B*b**3*d*x**4/4)/e**7, Eq(m, -7)), ((-A*a**3*c/(4*x**4) - A*a**3
*d/(2*x**2) - 3*A*a**2*b*c/(2*x**2) + 3*A*a**2*b*d*log(x) + 3*A*a*b**2*c*lo
g(x) + 3*A*a*b**2*d*x**2/2 + A*b**3*c*x**2/2 + A*b**3*d*x**4/4 - B*a**3*c/(
2*x**2) + B*a**3*d*log(x) + 3*B*a**2*b*c*log(x) + 3*B*a**2*b*d*x**2/2 + 3*B
*a*b**2*c*x**2/2 + 3*B*a*b**2*d*x**4/4 + B*b**3*c*x**4/4 + B*b**3*d*x**6/6)
/e**5, Eq(m, -5)), ((-A*a**3*c/(2*x**2) + A*a**3*d*log(x) + 3*A*a**2*b*c*lo
g(x) + 3*A*a**2*b*d*x**2/2 + 3*A*a*b**2*c*x**2/2 + 3*A*a*b**2*d*x**4/4 + A*
b**3*c*x**4/4 + A*b**3*d*x**6/6 + B*a**3*c*log(x) + B*a**3*d*x**2/2 + 3*B*a
**2*b*c*x**2/2 + 3*B*a**2*b*d*x**4/4 + 3*B*a*b**2*c*x**4/4 + B*a*b**2*d*x**
6/2 + B*b**3*c*x**6/6 + B*b**3*d*x**8/8)/e**3, Eq(m, -3)), ((A*a**3*c*log(x
) + A*a**3*d*x**2/2 + 3*A*a**2*b*c*x**2/2 + 3*A*a**2*b*d*x**4/4 + 3*A*a*b**
2*c*x**4/4 + A*a*b**2*d*x**6/2 + A*b**3*c*x**6/6 + A*b**3*d*x**8/8 + B*a**3
*c*x**2/2 + B*a**3*d*x**4/4 + 3*B*a**2*b*c*x**4/4 + B*a**2*b*d*x**6/2 + B*a
*b**2*c*x**6/2 + 3*B*a*b**2*d*x**8/8 + B*b**3*c*x**8/8 + B*b**3*d*x**10/10)
/e, Eq(m, -1)), (A*a**3*c*m**5*x*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480
*m**3 + 12139*m**2 + 19524*m + 10395) + 35*A*a**3*c*m**4*x*(e*x)**m/(m**6 +
 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 470*A*a**
```

3*c*m**3*x*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1
9524*m + 10395) + 3010*A*a**3*c*m**2*x*(e*x)**m/(m**6 + 36*m**5 + 505*m**4
+ 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 9129*A*a**3*c*m*x*(e*x)**m/(m
6 + 36*m5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1039
5*A*a**3*c*x*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
 19524*m + 10395) + A*a**3*d*m**5*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4
+ 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 33*A*a**3*d*m**4*x**3*(e*x)**
m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) +
406*A*a**3*d*m**3*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12
139*m**2 + 19524*m + 10395) + 2262*A*a**3*d*m**2*x**3*(e*x)**m/(m**6 + 36*m
5 + 505*m4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 5353*A*a**3*d*
m*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524
*m + 10395) + 3465*A*a**3*d*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480
*m**3 + 12139*m**2 + 19524*m + 10395) + 3*A*a**2*b*c*m**5*x**3*(e*x)**m/(m*
*6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 99*A*
a**2*b*c*m**4*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*
m**2 + 19524*m + 10395) + 1218*A*a**2*b*c*m**3*x**3*(e*x)**m/(m**6 + 36*m**
5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 6786*A*a**2*b*c*
m**2*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19
524*m + 10395) + 16059*A*a**2*b*c*m*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**
4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 10395*A*a**2*b*c*x**3*(e*x)
m/(m6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395)
+ 3*A*a**2*b*d*m**5*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 +
12139*m**2 + 19524*m + 10395) + 93*A*a**2*b*d*m**4*x**5*(e*x)**m/(m**6 + 36
*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1050*A*a**2*
b*d*m**3*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2
+ 19524*m + 10395) + 5190*A*a**2*b*d*m**2*x**5*(e*x)**m/(m**6 + 36*m**5 + 5
05*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 10467*A*a**2*b*d*m*x*
5(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m +
 10395) + 6237*A*a**2*b*d*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m
3 + 12139*m2 + 19524*m + 10395) + 3*A*a*b**2*c*m**5*x**5*(e*x)**m/(m**6
 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 93*A*a*
b**2*c*m**4*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m*
*2 + 19524*m + 10395) + 1050*A*a*b**2*c*m**3*x**5*(e*x)**m/(m**6 + 36*m**5
+ 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 5190*A*a*b**2*c*m*
*2*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1952
4*m + 10395) + 10467*A*a*b**2*c*m*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4
+ 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 6237*A*a*b**2*c*x**5*(e*x)**m
/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3
*A*a*b**2*d*m**5*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 121
39*m**2 + 19524*m + 10395) + 87*A*a*b**2*d*m**4*x**7*(e*x)**m/(m**6 + 36*m*
*5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 906*A*a*b**2*d*
m**3*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19
524*m + 10395) + 4098*A*a*b**2*d*m**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m
4 + 3480*m3 + 12139*m**2 + 19524*m + 10395) + 7731*A*a*b**2*d*m*x**7*(e

```
*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 1039
5) + 4455*A*a*b**2*d*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 +
 12139*m**2 + 19524*m + 10395) + A*b**3*c*m**5*x**7*(e*x)**m/(m**6 + 36*m**
5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 29*A*b**3*c*m**4
*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*
m + 10395) + 302*A*b**3*c*m**3*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3
480*m**3 + 12139*m**2 + 19524*m + 10395) + 1366*A*b**3*c*m**2*x**7*(e*x)**m
/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 2
577*A*b**3*c*m*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139
*m**2 + 19524*m + 10395) + 1485*A*b**3*c*x**7*(e*x)**m/(m**6 + 36*m**5 + 50
5*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + A*b**3*d*m**5*x**9*(e*
x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395
) + 27*A*b**3*d*m**4*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 +
 12139*m**2 + 19524*m + 10395) + 262*A*b**3*d*m**3*x**9*(e*x)**m/(m**6 + 36
*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1122*A*b**3*
d*m**2*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
19524*m + 10395) + 2041*A*b**3*d*m*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4
 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1155*A*b**3*d*x**9*(e*x)**m/
(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + B*
a**3*c*m**5*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m*
*2 + 19524*m + 10395) + 33*B*a**3*c*m**4*x**3*(e*x)**m/(m**6 + 36*m**5 + 50
5*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 406*B*a**3*c*m**3*x**3
*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 1
0395) + 2262*B*a**3*c*m**2*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*
m**3 + 12139*m**2 + 19524*m + 10395) + 5353*B*a**3*c*m*x**3*(e*x)**m/(m**6
+ 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3465*B*a
**3*c*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1
9524*m + 10395) + B*a**3*d*m**5*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 +
3480*m**3 + 12139*m**2 + 19524*m + 10395) + 31*B*a**3*d*m**4*x**5*(e*x)**m/
(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 35
0*B*a**3*d*m**3*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 1213
9*m**2 + 19524*m + 10395) + 1730*B*a**3*d*m**2*x**5*(e*x)**m/(m**6 + 36*m**
5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3489*B*a**3*d*m*
x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m
 + 10395) + 2079*B*a**3*d*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m
**3 + 12139*m**2 + 19524*m + 10395) + 3*B*a**2*b*c*m**5*x**5*(e*x)**m/(m**6
 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 93*B*a*
*2*b*c*m**4*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m*
*2 + 19524*m + 10395) + 1050*B*a**2*b*c*m**3*x**5*(e*x)**m/(m**6 + 36*m**5
+ 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 5190*B*a**2*b*c*m*
*2*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1952
4*m + 10395) + 10467*B*a**2*b*c*m*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4
+ 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 6237*B*a**2*b*c*x**5*(e*x)**m
/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3
*B*a**2*b*d*m**5*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 121
```

```
39*m**2 + 19524*m + 10395) + 87*B*a**2*b*d*m**4*x**7*(e*x)**m/(m**6 + 36*m*
*5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 906*B*a**2*b*d*
m**3*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19
524*m + 10395) + 4098*B*a**2*b*d*m**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m
**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 7731*B*a**2*b*d*m*x**7*(e
*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 1039
5) + 4455*B*a**2*b*d*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 +
 12139*m**2 + 19524*m + 10395) + 3*B*a*b**2*c*m**5*x**7*(e*x)**m/(m**6 + 36
*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 87*B*a*b**2*
c*m**4*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
19524*m + 10395) + 906*B*a*b**2*c*m**3*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*
m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 4098*B*a*b**2*c*m**2*x**
7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m +
10395) + 7731*B*a*b**2*c*m*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*
m**3 + 12139*m**2 + 19524*m + 10395) + 4455*B*a*b**2*c*x**7*(e*x)**m/(m**6
+ 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3*B*a*b*
*2*d*m**5*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2
 + 19524*m + 10395) + 81*B*a*b**2*d*m**4*x**9*(e*x)**m/(m**6 + 36*m**5 + 50
5*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 786*B*a*b**2*d*m**3*x*
*9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m +
 10395) + 3366*B*a*b**2*d*m**2*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3
480*m**3 + 12139*m**2 + 19524*m + 10395) + 6123*B*a*b**2*d*m*x**9*(e*x)**m/
(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 34
65*B*a*b**2*d*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*
m**2 + 19524*m + 10395) + B*b**3*c*m**5*x**9*(e*x)**m/(m**6 + 36*m**5 + 505
*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 27*B*b**3*c*m**4*x**9*(
e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 103
95) + 262*B*b**3*c*m**3*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**
3 + 12139*m**2 + 19524*m + 10395) + 1122*B*b**3*c*m**2*x**9*(e*x)**m/(m**6
+ 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 2041*B*b
**3*c*m*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
 19524*m + 10395) + 1155*B*b**3*c*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4
+ 3480*m**3 + 12139*m**2 + 19524*m + 10395) + B*b**3*d*m**5*x**11*(e*x)**m/
(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 25
*B*b**3*d*m**4*x**11*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 1213
9*m**2 + 19524*m + 10395) + 230*B*b**3*d*m**3*x**11*(e*x)**m/(m**6 + 36*m**
5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 950*B*b**3*d*m**
2*x**11*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1952
4*m + 10395) + 1689*B*b**3*d*m*x**11*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 +
3480*m**3 + 12139*m**2 + 19524*m + 10395) + 945*B*b**3*d*x**11*(e*x)**m/(m*
*6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395), True))
```

Maxima [A] (verification not implemented)

none

Time = 0.23 (sec) , antiderivative size = 338, normalized size of antiderivative = 1.79

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right) dx = \frac{Bb^3de^m x^{11}x^m}{m+11} + \frac{Bb^3ce^m x^9x^m}{m+9} + \frac{3\,Bab^2de^m x^9x^m}{m+9} + \frac{Ab^3de^m x^9x^m}{m+9} + \frac{3\,Bab^2ce^m x^7x^m}{m+7} + \frac{Ab^3ce^m x^7x^m}{m+7} + \frac{3\,Ba^2bde^m x^7x^m}{m+7} + \frac{3\,Aab^2de^m x^7x^m}{m+7} + \frac{3\,Ba^2bce^m x^5x^m}{m+5} + \frac{3\,Aab^2ce^m x^5x^m}{m+5} + \frac{Ba^3de^m x^5x^m}{m+5} + \frac{3\,Aa^2bde^m x^5x^m}{m+5} + \frac{Ba^3ce^m x^3x^m}{m+3} + \frac{3\,Aa^2bce^m x^3x^m}{m+3} + \frac{Aa^3de^m x^3x^m}{m+3} + \frac{(ex)^{m+1}\,Aa^3c}{e(m+1)}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c),x, algorithm="maxima")
```

```
[Out] B*b^3*d*e^m*x^11*x^m/(m + 11) + B*b^3*c*e^m*x^9*x^m/(m + 9) + 3*B*a*b^2*d*e
^m*x^9*x^m/(m + 9) + A*b^3*d*e^m*x^9*x^m/(m + 9) + 3*B*a*b^2*c*e^m*x^7*x^m/
(m + 7) + A*b^3*c*e^m*x^7*x^m/(m + 7) + 3*B*a^2*b*d*e^m*x^7*x^m/(m + 7) + 3
*A*a*b^2*d*e^m*x^7*x^m/(m + 7) + 3*B*a^2*b*c*e^m*x^5*x^m/(m + 5) + 3*A*a*b^
2*c*e^m*x^5*x^m/(m + 5) + B*a^3*d*e^m*x^5*x^m/(m + 5) + 3*A*a^2*b*d*e^m*x^5
*x^m/(m + 5) + B*a^3*c*e^m*x^3*x^m/(m + 3) + 3*A*a^2*b*c*e^m*x^3*x^m/(m + 3
) + A*a^3*d*e^m*x^3*x^m/(m + 3) + (e*x)^(m + 1)*A*a^3*c/(e*(m + 1))
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1708 vs. 2(189) = 378.

Time = 0.32 (sec) , antiderivative size = 1708, normalized size of antiderivative = 9.04

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right) dx = \text{Too large to display}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c),x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*b^3*d*m^5*x^11 + 25*(e*x)^m*B*b^3*d*m^4*x^11 + (e*x)^m*B*b^3*c*m
^5*x^9 + 3*(e*x)^m*B*a*b^2*d*m^5*x^9 + (e*x)^m*A*b^3*d*m^5*x^9 + 230*(e*x)^
```

```
m*B*b^3*d*m^3*x^11 + 27*(e*x)^m*B*b^3*c*m^4*x^9 + 81*(e*x)^m*B*a*b^2*d*m^4*
x^9 + 27*(e*x)^m*A*b^3*d*m^4*x^9 + 950*(e*x)^m*B*b^3*d*m^2*x^11 + 3*(e*x)^m
*B*a*b^2*c*m^5*x^7 + (e*x)^m*A*b^3*c*m^5*x^7 + 3*(e*x)^m*B*a^2*b*d*m^5*x^7
+ 3*(e*x)^m*A*a*b^2*d*m^5*x^7 + 262*(e*x)^m*B*b^3*c*m^3*x^9 + 786*(e*x)^m*B
*a*b^2*d*m^3*x^9 + 262*(e*x)^m*A*b^3*d*m^3*x^9 + 1689*(e*x)^m*B*b^3*d*m*x^1
1 + 87*(e*x)^m*B*a*b^2*c*m^4*x^7 + 29*(e*x)^m*A*b^3*c*m^4*x^7 + 87*(e*x)^m*
B*a^2*b*d*m^4*x^7 + 87*(e*x)^m*A*a*b^2*d*m^4*x^7 + 1122*(e*x)^m*B*b^3*c*m^2
*x^9 + 3366*(e*x)^m*B*a*b^2*d*m^2*x^9 + 1122*(e*x)^m*A*b^3*d*m^2*x^9 + 945*
(e*x)^m*B*b^3*d*x^11 + 3*(e*x)^m*B*a^2*b*c*m^5*x^5 + 3*(e*x)^m*A*a*b^2*c*m^
5*x^5 + (e*x)^m*B*a^3*d*m^5*x^5 + 3*(e*x)^m*A*a^2*b*d*m^5*x^5 + 906*(e*x)^m
*B*a*b^2*c*m^3*x^7 + 302*(e*x)^m*A*b^3*c*m^3*x^7 + 906*(e*x)^m*B*a^2*b*d*m^
3*x^7 + 906*(e*x)^m*A*a*b^2*d*m^3*x^7 + 2041*(e*x)^m*B*b^3*c*m*x^9 + 6123*(
e*x)^m*B*a*b^2*d*m*x^9 + 2041*(e*x)^m*A*b^3*d*m*x^9 + 93*(e*x)^m*B*a^2*b*c*
m^4*x^5 + 93*(e*x)^m*A*a*b^2*c*m^4*x^5 + 31*(e*x)^m*B*a^3*d*m^4*x^5 + 93*(e
*x)^m*A*a^2*b*d*m^4*x^5 + 4098*(e*x)^m*B*a*b^2*c*m^2*x^7 + 1366*(e*x)^m*A*b
^3*c*m^2*x^7 + 4098*(e*x)^m*B*a^2*b*d*m^2*x^7 + 4098*(e*x)^m*A*a*b^2*d*m^2*
x^7 + 1155*(e*x)^m*B*b^3*c*x^9 + 3465*(e*x)^m*B*a*b^2*d*x^9 + 1155*(e*x)^m*
A*b^3*d*x^9 + (e*x)^m*B*a^3*c*m^5*x^3 + 3*(e*x)^m*A*a^2*b*c*m^5*x^3 + (e*x)
^m*A*a^3*d*m^5*x^3 + 1050*(e*x)^m*B*a^2*b*c*m^3*x^5 + 1050*(e*x)^m*A*a*b^2*
c*m^3*x^5 + 350*(e*x)^m*B*a^3*d*m^3*x^5 + 1050*(e*x)^m*A*a^2*b*d*m^3*x^5 +
7731*(e*x)^m*B*a*b^2*c*m*x^7 + 2577*(e*x)^m*A*b^3*c*m*x^7 + 7731*(e*x)^m*B*
a^2*b*d*m*x^7 + 7731*(e*x)^m*A*a*b^2*d*m*x^7 + 33*(e*x)^m*B*a^3*c*m^4*x^3 +
 99*(e*x)^m*A*a^2*b*c*m^4*x^3 + 33*(e*x)^m*A*a^3*d*m^4*x^3 + 5190*(e*x)^m*B
*a^2*b*c*m^2*x^5 + 5190*(e*x)^m*A*a*b^2*c*m^2*x^5 + 1730*(e*x)^m*B*a^3*d*m^
2*x^5 + 5190*(e*x)^m*A*a^2*b*d*m^2*x^5 + 4455*(e*x)^m*B*a*b^2*c*x^7 + 1485*
(e*x)^m*A*b^3*c*x^7 + 4455*(e*x)^m*B*a^2*b*d*x^7 + 4455*(e*x)^m*A*a*b^2*d*x
^7 + (e*x)^m*A*a^3*c*m^5*x + 406*(e*x)^m*B*a^3*c*m^3*x^3 + 1218*(e*x)^m*A*a
^2*b*c*m^3*x^3 + 406*(e*x)^m*A*a^3*d*m^3*x^3 + 10467*(e*x)^m*B*a^2*b*c*m*x^
5 + 10467*(e*x)^m*A*a*b^2*c*m*x^5 + 3489*(e*x)^m*B*a^3*d*m*x^5 + 10467*(e*x
)^m*A*a^2*b*d*m*x^5 + 35*(e*x)^m*A*a^3*c*m^4*x + 2262*(e*x)^m*B*a^3*c*m^2*x
^3 + 6786*(e*x)^m*A*a^2*b*c*m^2*x^3 + 2262*(e*x)^m*A*a^3*d*m^2*x^3 + 6237*(
e*x)^m*B*a^2*b*c*x^5 + 6237*(e*x)^m*A*a*b^2*c*x^5 + 2079*(e*x)^m*B*a^3*d*x^
5 + 6237*(e*x)^m*A*a^2*b*d*x^5 + 470*(e*x)^m*A*a^3*c*m^3*x + 5353*(e*x)^m*B
*a^3*c*m*x^3 + 16059*(e*x)^m*A*a^2*b*c*m*x^3 + 5353*(e*x)^m*A*a^3*d*m*x^3 +
 3010*(e*x)^m*A*a^3*c*m^2*x + 3465*(e*x)^m*B*a^3*c*x^3 + 10395*(e*x)^m*A*a^
2*b*c*x^3 + 3465*(e*x)^m*A*a^3*d*x^3 + 9129*(e*x)^m*A*a^3*c*m*x + 10395*(e*
x)^m*A*a^3*c*x)/(m^6 + 36*m^5 + 505*m^4 + 3480*m^3 + 12139*m^2 + 19524*m +
10395)
```

Mupad [B] (verification not implemented)

Time = 5.94 (sec) , antiderivative size = 469, normalized size of antiderivative = 2.48

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx$$
$$= \frac{a^2\,x^3\,{\left(e\,x\right)}^m\,\left(A\,a\,d+3\,A\,b\,c+B\,a\,c\right)\,\left(m^5+33\,m^4+406\,m^3+2262\,m^2+5353\,m+3465\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+\frac{b^2\,x^9\,{\left(e\,x\right)}^m\,\left(A\,b\,d+3\,B\,a\,d+B\,b\,c\right)\,\left(m^5+27\,m^4+262\,m^3+1122\,m^2+2041\,m+1155\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+\frac{a\,x^5\,{\left(e\,x\right)}^m\,\left(3\,A\,b^2\,c+B\,a^2\,d+3\,A\,a\,b\,d+3\,B\,a\,b\,c\right)\,\left(m^5+31\,m^4+350\,m^3+1730\,m^2+3489\,m+2079\right.}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+\frac{b\,x^7\,{\left(e\,x\right)}^m\,\left(A\,b^2\,c+3\,B\,a^2\,d+3\,A\,a\,b\,d+3\,B\,a\,b\,c\right)\,\left(m^5+29\,m^4+302\,m^3+1366\,m^2+2577\,m+1485\right.}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+\frac{B\,b^3\,d\,x^{11}\,{\left(e\,x\right)}^m\,\left(m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+\frac{A\,a^3\,c\,x\,{\left(e\,x\right)}^m\,\left(m^5+35\,m^4+470\,m^3+3010\,m^2+9129\,m+10395\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^3*(c + d*x^2),x)
```

```
[Out] (a^2*x^3*(e*x)^m*(A*a*d + 3*A*b*c + B*a*c)*(5353*m + 2262*m^2 + 406*m^3 + 3
3*m^4 + m^5 + 3465))/(19524*m + 12139*m^2 + 3480*m^3 + 505*m^4 + 36*m^5 + m
^6 + 10395) + (b^2*x^9*(e*x)^m*(A*b*d + 3*B*a*d + B*b*c)*(2041*m + 1122*m^2
 + 262*m^3 + 27*m^4 + m^5 + 1155))/(19524*m + 12139*m^2 + 3480*m^3 + 505*m^
4 + 36*m^5 + m^6 + 10395) + (a*x^5*(e*x)^m*(3*A*b^2*c + B*a^2*d + 3*A*a*b*d
 + 3*B*a*b*c)*(3489*m + 1730*m^2 + 350*m^3 + 31*m^4 + m^5 + 2079))/(19524*m
 + 12139*m^2 + 3480*m^3 + 505*m^4 + 36*m^5 + m^6 + 10395) + (b*x^7*(e*x)^m*
(A*b^2*c + 3*B*a^2*d + 3*A*a*b*d + 3*B*a*b*c)*(2577*m + 1366*m^2 + 302*m^3
+ 29*m^4 + m^5 + 1485))/(19524*m + 12139*m^2 + 3480*m^3 + 505*m^4 + 36*m^5
+ m^6 + 10395) + (B*b^3*d*x^11*(e*x)^m*(1689*m + 950*m^2 + 230*m^3 + 25*m^4
 + m^5 + 945))/(19524*m + 12139*m^2 + 3480*m^3 + 505*m^4 + 36*m^5 + m^6 + 1
0395) + (A*a^3*c*x*(e*x)^m*(9129*m + 3010*m^2 + 470*m^3 + 35*m^4 + m^5 + 10
395))/(19524*m + 12139*m^2 + 3480*m^3 + 505*m^4 + 36*m^5 + m^6 + 10395)
```

3.2 $\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx$

Optimal result

Integrand size = 29, antiderivative size = 144

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \frac{a^2Ac(ex)^{1+m}}{e(1+m)}+\frac{a(2Abc+aBc+aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{(aB(2bc+ad)+Ab(bc+2ad))(ex)^{5+m}}{e^5(5+m)} + \frac{b(bBc+Abd+2aBd)(ex)^{7+m}}{e^7(7+m)} + \frac{b^2Bd(ex)^{9+m}}{e^9(9+m)}$$

```
[Out] a^2*A*c*(e*x)^(1+m)/e/(1+m)+a*(A*a*d+2*A*b*c+B*a*c)*(e*x)^(3+m)/e^3/(3+m)+(
a*B*(a*d+2*b*c)+A*b*(2*a*d+b*c))*(e*x)^(5+m)/e^5/(5+m)+b*(A*b*d+2*B*a*d+B*b
*c)*(e*x)^(7+m)/e^7/(7+m)+b^2*B*d*(e*x)^(9+m)/e^9/(9+m)
```

Rubi [A] (verified)

Time = 0.08 (sec) , antiderivative size = 144, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.034, Rules used = {584}

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \frac{a^2Ac(ex)^{m+1}}{e(m+1)}+\frac{b(ex)^{m+7}(2aBd+Abd+bBc)}{e^7(m+7)} + \frac{(ex)^{m+5}(Ab(2ad+bc)+aB(ad+2bc))}{e^5(m+5)} + \frac{a(ex)^{m+3}(aAd+aBc+2Abc)}{e^3(m+3)} + \frac{b^2Bd(ex)^{m+9}}{e^9(m+9)}$$

```
[In] Int[(e*x)^m*(a + b*x^2)^2*(A + B*x^2)*(c + d*x^2),x]
```

```
[Out] (a^2*A*c*(e*x)^(1 + m))/(e*(1 + m)) + (a*(2*A*b*c + a*B*c + a*A*d)*(e*x)^(3
 + m))/(e^3*(3 + m)) + ((a*B*(2*b*c + a*d) + A*b*(b*c + 2*a*d))*(e*x)^(5 +
m))/(e^5*(5 + m)) + (b*(b*B*c + A*b*d + 2*a*B*d)*(e*x)^(7 + m))/(e^7*(7 + m
)) + (b^2*B*d*(e*x)^(9 + m))/(e^9*(9 + m))
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \int \left(a^2Ac(ex)^m + \frac{a(2Abc+aBc+aAd)(ex)^{2+m}}{e^2} + \frac{(aB(2bc+ad)+Ab(bc+2ad))(ex)^{4+m}}{e^4} + \frac{b(bBc+Abd+2aBd)(ex)^{6+m}}{e^6} + \frac{b^2Bd(ex)^{8+m}}{e^8}\right) dx \\ &= \frac{a^2Ac(ex)^{1+m}}{e(1+m)} + \frac{a(2Abc+aBc+aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{(aB(2bc+ad)+Ab(bc+2ad))(ex)^{5+m}}{e^5(5+m)} + \frac{b(bBc+Abd+2aBd)(ex)^{7+m}}{e^7(7+m)} + \frac{b^2Bd(ex)^{9+m}}{e^9(9+m)}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.13 (sec) , antiderivative size = 113, normalized size of antiderivative = 0.78

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = x(ex)^m \left(\frac{a^2Ac}{1+m} + \frac{a(2Abc+aBc+aAd)x^2}{3+m} + \frac{(aB(2bc+ad)+Ab(bc+2ad))x^4}{5+m} + \frac{b(bBc+Abd+2aBd)x^6}{7+m} + \frac{b^2Bdx^8}{9+m}\right)$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)^2*(A + B*x^2)*(c + d*x^2),x]
```

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

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 710 vs. $2(144) = 288$.

Time = 3.38 (sec) , antiderivative size = 711, normalized size of antiderivative = 4.94

method	result
gosper	$\frac{x(B b^2 d m^4 x^8+16 B b^2 d m^3 x^8+A b^2 d m^4 x^6+2 B a b d m^4 x^6+B b^2 c m^4 x^6+86 B b^2 d m^2 x^8+18 A b^2 d m^3 x^6+36 B a b d m^3 x^6+18 B b^2}{}$
risch	$\frac{x(B b^2 d m^4 x^8+16 B b^2 d m^3 x^8+A b^2 d m^4 x^6+2 B a b d m^4 x^6+B b^2 c m^4 x^6+86 B b^2 d m^2 x^8+18 A b^2 d m^3 x^6+36 B a b d m^3 x^6+18 B b^2}{}$
parallelrisch	Expression too large to display

```
[In] int((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c),x,method=_RETURNVERBOSE)
```

```
[Out] x*(B*b^2*d*m^4*x^8+16*B*b^2*d*m^3*x^8+A*b^2*d*m^4*x^6+2*B*a*b*d*m^4*x^6+B*b
^2*c*m^4*x^6+86*B*b^2*d*m^2*x^8+18*A*b^2*d*m^3*x^6+36*B*a*b*d*m^3*x^6+18*B*
b^2*c*m^3*x^6+176*B*b^2*d*m*x^8+2*A*a*b*d*m^4*x^4+A*b^2*c*m^4*x^4+104*A*b^2
*d*m^2*x^6+B*a^2*d*m^4*x^4+2*B*a*b*c*m^4*x^4+208*B*a*b*d*m^2*x^6+104*B*b^2*
c*m^2*x^6+105*B*b^2*d*x^8+40*A*a*b*d*m^3*x^4+20*A*b^2*c*m^3*x^4+222*A*b^2*d
*m*x^6+20*B*a^2*d*m^3*x^4+40*B*a*b*c*m^3*x^4+444*B*a*b*d*m*x^6+222*B*b^2*c*
m*x^6+A*a^2*d*m^4*x^2+2*A*a*b*c*m^4*x^2+260*A*a*b*d*m^2*x^4+130*A*b^2*c*m^2
*x^4+135*A*b^2*d*x^6+B*a^2*c*m^4*x^2+130*B*a^2*d*m^2*x^4+260*B*a*b*c*m^2*x^
4+270*B*a*b*d*x^6+135*B*b^2*c*x^6+22*A*a^2*d*m^3*x^2+44*A*a*b*c*m^3*x^2+600
*A*a*b*d*m*x^4+300*A*b^2*c*m*x^4+22*B*a^2*c*m^3*x^2+300*B*a^2*d*m*x^4+600*B
*a*b*c*m*x^4+A*a^2*c*m^4+164*A*a^2*d*m^2*x^2+328*A*a*b*c*m^2*x^2+378*A*a*b*
d*x^4+189*A*b^2*c*x^4+164*B*a^2*c*m^2*x^2+189*B*a^2*d*x^4+378*B*a*b*c*x^4+2
4*A*a^2*c*m^3+458*A*a^2*d*m*x^2+916*A*a*b*c*m*x^2+458*B*a^2*c*m*x^2+206*A*a
^2*c*m^2+315*A*a^2*d*x^2+630*A*a*b*c*x^2+315*B*a^2*c*x^2+744*A*a^2*c*m+945*
A*a^2*c)*(e*x)^m/(9+m)/(7+m)/(5+m)/(3+m)/(1+m)
```

Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 532 vs. $2(144) = 288$.

Time = 0.28 (sec) , antiderivative size = 532, normalized size of antiderivative = 3.69

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right) dx$$
$$= \frac{((Bb^2dm^4 + 16\,Bb^2dm^3 + 86\,Bb^2dm^2 + 176\,Bb^2dm + 105\,Bb^2d)x^9 + ((Bb^2c + (2\,Bab + Ab^2)d)m^4 + 135\,B}{}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c),x, algorithm="fricas")
```

```
[Out] ((B*b^2*d*m^4 + 16*B*b^2*d*m^3 + 86*B*b^2*d*m^2 + 176*B*b^2*d*m + 105*B*b^2
*d)*x^9 + ((B*b^2*c + (2*B*a*b + A*b^2)*d)*m^4 + 135*B*b^2*c + 18*(B*b^2*c
+ (2*B*a*b + A*b^2)*d)*m^3 + 104*(B*b^2*c + (2*B*a*b + A*b^2)*d)*m^2 + 135*
```

```
(2*B*a*b + A*b^2)*d + 222*(B*b^2*c + (2*B*a*b + A*b^2)*d)*m)*x^7 + (((2*B*a
*b + A*b^2)*c + (B*a^2 + 2*A*a*b)*d)*m^4 + 20*((2*B*a*b + A*b^2)*c + (B*a^2
 + 2*A*a*b)*d)*m^3 + 130*((2*B*a*b + A*b^2)*c + (B*a^2 + 2*A*a*b)*d)*m^2 +
189*(2*B*a*b + A*b^2)*c + 189*(B*a^2 + 2*A*a*b)*d + 300*((2*B*a*b + A*b^2)*
c + (B*a^2 + 2*A*a*b)*d)*m)*x^5 + ((A*a^2*d + (B*a^2 + 2*A*a*b)*c)*m^4 + 31
5*A*a^2*d + 22*(A*a^2*d + (B*a^2 + 2*A*a*b)*c)*m^3 + 164*(A*a^2*d + (B*a^2
+ 2*A*a*b)*c)*m^2 + 315*(B*a^2 + 2*A*a*b)*c + 458*(A*a^2*d + (B*a^2 + 2*A*a
*b)*c)*m)*x^3 + (A*a^2*c*m^4 + 24*A*a^2*c*m^3 + 206*A*a^2*c*m^2 + 744*A*a^2
*c*m + 945*A*a^2*c)*x)*(e*x)^m/(m^5 + 25*m^4 + 230*m^3 + 950*m^2 + 1689*m +
 945)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 3271 vs. 2(139) = 278.

Time = 0.66 (sec) , antiderivative size = 3271, normalized size of antiderivative = 22.72

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**2*(B*x**2+A)*(d*x**2+c),x)
```

```
[Out] Piecewise(((-A*a**2*c/(8*x**8) - A*a**2*d/(6*x**6) - A*a*b*c/(3*x**6) - A*a
*b*d/(2*x**4) - A*b**2*c/(4*x**4) - A*b**2*d/(2*x**2) - B*a**2*c/(6*x**6) -
 B*a**2*d/(4*x**4) - B*a*b*c/(2*x**4) - B*a*b*d/x**2 - B*b**2*c/(2*x**2) +
B*b**2*d*log(x))/e**9, Eq(m, -9)), ((-A*a**2*c/(6*x**6) - A*a**2*d/(4*x**4)
 - A*a*b*c/(2*x**4) - A*a*b*d/x**2 - A*b**2*c/(2*x**2) + A*b**2*d*log(x) -
B*a**2*c/(4*x**4) - B*a**2*d/(2*x**2) - B*a*b*c/x**2 + 2*B*a*b*d*log(x) + B
*b**2*c*log(x) + B*b**2*d*x**2/2)/e**7, Eq(m, -7)), ((-A*a**2*c/(4*x**4) -
A*a**2*d/(2*x**2) - A*a*b*c/x**2 + 2*A*a*b*d*log(x) + A*b**2*c*log(x) + A*b
**2*d*x**2/2 - B*a**2*c/(2*x**2) + B*a**2*d*log(x) + 2*B*a*b*c*log(x) + B*a
*b*d*x**2 + B*b**2*c*x**2/2 + B*b**2*d*x**4/4)/e**5, Eq(m, -5)), ((-A*a**2*
c/(2*x**2) + A*a**2*d*log(x) + 2*A*a*b*c*log(x) + A*a*b*d*x**2 + A*b**2*c*x
**2/2 + A*b**2*d*x**4/4 + B*a**2*c*log(x) + B*a**2*d*x**2/2 + B*a*b*c*x**2
+ B*a*b*d*x**4/2 + B*b**2*c*x**4/4 + B*b**2*d*x**6/6)/e**3, Eq(m, -3)), ((A
*a**2*c*log(x) + A*a**2*d*x**2/2 + A*a*b*c*x**2 + A*a*b*d*x**4/2 + A*b**2*c
*x**4/4 + A*b**2*d*x**6/6 + B*a**2*c*x**2/2 + B*a**2*d*x**4/4 + B*a*b*c*x**
4/2 + B*a*b*d*x**6/3 + B*b**2*c*x**6/6 + B*b**2*d*x**8/8)/e, Eq(m, -1)), (A
*a**2*c*m**4*x*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 94
5) + 24*A*a**2*c*m**3*x*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 16
89*m + 945) + 206*A*a**2*c*m**2*x*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950
*m**2 + 1689*m + 945) + 744*A*a**2*c*m*x*(e*x)**m/(m**5 + 25*m**4 + 230*m**
3 + 950*m**2 + 1689*m + 945) + 945*A*a**2*c*x*(e*x)**m/(m**5 + 25*m**4 + 23
0*m**3 + 950*m**2 + 1689*m + 945) + A*a**2*d*m**4*x**3*(e*x)**m/(m**5 + 25*
m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 22*A*a**2*d*m**3*x**3*(e*x)**m
/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 164*A*a**2*d*m**2*
```

```
x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 458*A
*a**2*d*m*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 94
5) + 315*A*a**2*d*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 168
9*m + 945) + 2*A*a*b*c*m**4*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*
m**2 + 1689*m + 945) + 44*A*a*b*c*m**3*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*
m**3 + 950*m**2 + 1689*m + 945) + 328*A*a*b*c*m**2*x**3*(e*x)**m/(m**5 + 25
*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 916*A*a*b*c*m*x**3*(e*x)**m/(
m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 630*A*a*b*c*x**3*(e*
x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 2*A*a*b*d*m**
4*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 40*
A*a*b*d*m**3*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m +
 945) + 260*A*a*b*d*m**2*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**
2 + 1689*m + 945) + 600*A*a*b*d*m*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3
+ 950*m**2 + 1689*m + 945) + 378*A*a*b*d*x**5*(e*x)**m/(m**5 + 25*m**4 + 23
0*m**3 + 950*m**2 + 1689*m + 945) + A*b**2*c*m**4*x**5*(e*x)**m/(m**5 + 25*
m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 20*A*b**2*c*m**3*x**5*(e*x)**m
/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 130*A*b**2*c*m**2*
x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 300*A
*b**2*c*m*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 94
5) + 189*A*b**2*c*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 168
9*m + 945) + A*b**2*d*m**4*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m
**2 + 1689*m + 945) + 18*A*b**2*d*m**3*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*
m**3 + 950*m**2 + 1689*m + 945) + 104*A*b**2*d*m**2*x**7*(e*x)**m/(m**5 + 2
5*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 222*A*b**2*d*m*x**7*(e*x)**m
/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 135*A*b**2*d*x**7*
(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + B*a**2*c*m
**4*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 2
2*B*a**2*c*m**3*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*
m + 945) + 164*B*a**2*c*m**2*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950
*m**2 + 1689*m + 945) + 458*B*a**2*c*m*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*
m**3 + 950*m**2 + 1689*m + 945) + 315*B*a**2*c*x**3*(e*x)**m/(m**5 + 25*m**
4 + 230*m**3 + 950*m**2 + 1689*m + 945) + B*a**2*d*m**4*x**5*(e*x)**m/(m**5
 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 20*B*a**2*d*m**3*x**5*(e
*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 130*B*a**2*d
*m**2*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) +
 300*B*a**2*d*m*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*
m + 945) + 189*B*a**2*d*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2
 + 1689*m + 945) + 2*B*a*b*c*m**4*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3
+ 950*m**2 + 1689*m + 945) + 40*B*a*b*c*m**3*x**5*(e*x)**m/(m**5 + 25*m**4
+ 230*m**3 + 950*m**2 + 1689*m + 945) + 260*B*a*b*c*m**2*x**5*(e*x)**m/(m**
5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 600*B*a*b*c*m*x**5*(e*x
)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 378*B*a*b*c*x*
*5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 2*B*a*b
*d*m**4*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945)
 + 36*B*a*b*d*m**3*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 16
```

```
89*m + 945) + 208*B*a*b*d*m**2*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 9
50*m**2 + 1689*m + 945) + 444*B*a*b*d*m*x**7*(e*x)**m/(m**5 + 25*m**4 + 230
*m**3 + 950*m**2 + 1689*m + 945) + 270*B*a*b*d*x**7*(e*x)**m/(m**5 + 25*m**
4 + 230*m**3 + 950*m**2 + 1689*m + 945) + B*b**2*c*m**4*x**7*(e*x)**m/(m**5
 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 18*B*b**2*c*m**3*x**7*(e
*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 104*B*b**2*c
*m**2*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) +
 222*B*b**2*c*m*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*
m + 945) + 135*B*b**2*c*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2
 + 1689*m + 945) + B*b**2*d*m**4*x**9*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 +
 950*m**2 + 1689*m + 945) + 16*B*b**2*d*m**3*x**9*(e*x)**m/(m**5 + 25*m**4
+ 230*m**3 + 950*m**2 + 1689*m + 945) + 86*B*b**2*d*m**2*x**9*(e*x)**m/(m**
5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 176*B*b**2*d*m*x**9*(e*
x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 105*B*b**2*d*
x**9*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945), True))
```

Maxima [A] (verification not implemented)

none

Time = 0.23 (sec) , antiderivative size = 242, normalized size of antiderivative = 1.68

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)\,dx = \frac{Bb^2de^mx^9x^m}{m+9} + \frac{Bb^2ce^mx^7x^m}{m+7} + \frac{2\,Babde^mx^7x^m}{m+7} + \frac{Ab^2de^mx^7x^m}{m+7} + \frac{2\,Babce^mx^5x^m}{m+5} + \frac{Ab^2ce^mx^5x^m}{m+5} + \frac{Ba^2de^mx^5x^m}{m+5} + \frac{2\,Aabde^mx^5x^m}{m+5} + \frac{Ba^2ce^mx^3x^m}{m+3} + \frac{2\,Aabce^mx^3x^m}{m+3} + \frac{Aa^2de^mx^3x^m}{m+3} + \frac{(ex)^{m+1}\,Aa^2c}{e(m+1)}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c),x, algorithm="maxima")
```

```
[Out] B*b^2*d*e^m*x^9*x^m/(m + 9) + B*b^2*c*e^m*x^7*x^m/(m + 7) + 2*B*a*b*d*e^m*x
^7*x^m/(m + 7) + A*b^2*d*e^m*x^7*x^m/(m + 7) + 2*B*a*b*c*e^m*x^5*x^m/(m + 5
) + A*b^2*c*e^m*x^5*x^m/(m + 5) + B*a^2*d*e^m*x^5*x^m/(m + 5) + 2*A*a*b*d*e
^m*x^5*x^m/(m + 5) + B*a^2*c*e^m*x^3*x^m/(m + 3) + 2*A*a*b*c*e^m*x^3*x^m/(m
 + 3) + A*a^2*d*e^m*x^3*x^m/(m + 3) + (e*x)^(m + 1)*A*a^2*c/(e*(m + 1))
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1009 vs. 2(144) = 288.

Time = 0.30 (sec) , antiderivative size = 1009, normalized size of antiderivative = 7.01

$$\int (ex)^m (a+bx^2)^2 (A+Bx^2) (c+dx^2) \, dx$$
$$= \frac{(ex)^m Bb^2dm^4x^9 + 16 (ex)^m Bb^2dm^3x^9 + (ex)^m Bb^2cm^4x^7 + 2 (ex)^m Babdm^4x^7 + (ex)^m Ab^2dm^4x^7 + 86 (e}{}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c),x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*b^2*d*m^4*x^9 + 16*(e*x)^m*B*b^2*d*m^3*x^9 + (e*x)^m*B*b^2*c*m^4
*x^7 + 2*(e*x)^m*B*a*b*d*m^4*x^7 + (e*x)^m*A*b^2*d*m^4*x^7 + 86*(e*x)^m*B*b
^2*d*m^2*x^9 + 18*(e*x)^m*B*b^2*c*m^3*x^7 + 36*(e*x)^m*B*a*b*d*m^3*x^7 + 18
*(e*x)^m*A*b^2*d*m^3*x^7 + 176*(e*x)^m*B*b^2*d*m*x^9 + 2*(e*x)^m*B*a*b*c*m^
4*x^5 + (e*x)^m*A*b^2*c*m^4*x^5 + (e*x)^m*B*a^2*d*m^4*x^5 + 2*(e*x)^m*A*a*b
*d*m^4*x^5 + 104*(e*x)^m*B*b^2*c*m^2*x^7 + 208*(e*x)^m*B*a*b*d*m^2*x^7 + 10
4*(e*x)^m*A*b^2*d*m^2*x^7 + 105*(e*x)^m*B*b^2*d*x^9 + 40*(e*x)^m*B*a*b*c*m^
3*x^5 + 20*(e*x)^m*A*b^2*c*m^3*x^5 + 20*(e*x)^m*B*a^2*d*m^3*x^5 + 40*(e*x)^
m*A*a*b*d*m^3*x^5 + 222*(e*x)^m*B*b^2*c*m*x^7 + 444*(e*x)^m*B*a*b*d*m*x^7 +
 222*(e*x)^m*A*b^2*d*m*x^7 + (e*x)^m*B*a^2*c*m^4*x^3 + 2*(e*x)^m*A*a*b*c*m^
4*x^3 + (e*x)^m*A*a^2*d*m^4*x^3 + 260*(e*x)^m*B*a*b*c*m^2*x^5 + 130*(e*x)^m
*A*b^2*c*m^2*x^5 + 130*(e*x)^m*B*a^2*d*m^2*x^5 + 260*(e*x)^m*A*a*b*d*m^2*x^
5 + 135*(e*x)^m*B*b^2*c*x^7 + 270*(e*x)^m*B*a*b*d*x^7 + 135*(e*x)^m*A*b^2*d
*x^7 + 22*(e*x)^m*B*a^2*c*m^3*x^3 + 44*(e*x)^m*A*a*b*c*m^3*x^3 + 22*(e*x)^m
*A*a^2*d*m^3*x^3 + 600*(e*x)^m*B*a*b*c*m*x^5 + 300*(e*x)^m*A*b^2*c*m*x^5 +
300*(e*x)^m*B*a^2*d*m*x^5 + 600*(e*x)^m*A*a*b*d*m*x^5 + (e*x)^m*A*a^2*c*m^4
*x + 164*(e*x)^m*B*a^2*c*m^2*x^3 + 328*(e*x)^m*A*a*b*c*m^2*x^3 + 164*(e*x)^
m*A*a^2*d*m^2*x^3 + 378*(e*x)^m*B*a*b*c*x^5 + 189*(e*x)^m*A*b^2*c*x^5 + 189
*(e*x)^m*B*a^2*d*x^5 + 378*(e*x)^m*A*a*b*d*x^5 + 24*(e*x)^m*A*a^2*c*m^3*x +
 458*(e*x)^m*B*a^2*c*m*x^3 + 916*(e*x)^m*A*a*b*c*m*x^3 + 458*(e*x)^m*A*a^2*
d*m*x^3 + 206*(e*x)^m*A*a^2*c*m^2*x + 315*(e*x)^m*B*a^2*c*x^3 + 630*(e*x)^m
*A*a*b*c*x^3 + 315*(e*x)^m*A*a^2*d*x^3 + 744*(e*x)^m*A*a^2*c*m*x + 945*(e*x
)^m*A*a^2*c*x)/(m^5 + 25*m^4 + 230*m^3 + 950*m^2 + 1689*m + 945)
```

Mupad [B] (verification not implemented)

Time = 5.63 (sec) , antiderivative size = 305, normalized size of antiderivative = 2.12

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = (e\,x)^m \left(\frac{x^5\,(A\,b^2\,c+B\,a^2\,d+2\,A\,a\,b\,d+2\,B\,a\,b\,c)\,\left(m^4+20\,m^3+130\,m^2+300\,m+189\right)}{m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945} + \frac{a\,x^3\,(A\,a\,d+2\,A\,b\,c+B\,a\,c)\,\left(m^4+22\,m^3+164\,m^2+458\,m+315\right)}{m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945} + \frac{b\,x^7\,(A\,b\,d+2\,B\,a\,d+B\,b\,c)\,\left(m^4+18\,m^3+104\,m^2+222\,m+135\right)}{m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945} + \frac{A\,a^2\,c\,x\,\left(m^4+24\,m^3+206\,m^2+744\,m+945\right)}{m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945} + \frac{B\,b^2\,d\,x^9\,\left(m^4+16\,m^3+86\,m^2+176\,m+105\right)}{m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945}\right)$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^2*(c + d*x^2),x)
```

```
[Out] (e*x)^m*((x^5*(A*b^2*c + B*a^2*d + 2*A*a*b*d + 2*B*a*b*c)*(300*m + 130*m^2
+ 20*m^3 + m^4 + 189))/(1689*m + 950*m^2 + 230*m^3 + 25*m^4 + m^5 + 945) +
(a*x^3*(A*a*d + 2*A*b*c + B*a*c)*(458*m + 164*m^2 + 22*m^3 + m^4 + 315))/(1
689*m + 950*m^2 + 230*m^3 + 25*m^4 + m^5 + 945) + (b*x^7*(A*b*d + 2*B*a*d +
 B*b*c)*(222*m + 104*m^2 + 18*m^3 + m^4 + 135))/(1689*m + 950*m^2 + 230*m^3
 + 25*m^4 + m^5 + 945) + (A*a^2*c*x*(744*m + 206*m^2 + 24*m^3 + m^4 + 945))
/(1689*m + 950*m^2 + 230*m^3 + 25*m^4 + m^5 + 945) + (B*b^2*d*x^9*(176*m +
86*m^2 + 16*m^3 + m^4 + 105))/(1689*m + 950*m^2 + 230*m^3 + 25*m^4 + m^5 +
945))
```

3.3 $\int (ex)^m (a+bx^2)(A+Bx^2)(c+dx^2)\,dx$

Optimal result

Integrand size = 27, antiderivative size = 97

$$\int (ex)^m \left(a+bx^2\right)\left(A+Bx^2\right)\left(c+dx^2\right)\,dx = \frac{aAc(ex)^{1+m}}{e(1+m)} + \frac{(Abc+aBc+aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{(bBc+Abd+aBd)(ex)^{5+m}}{e^5(5+m)} + \frac{bBd(ex)^{7+m}}{e^7(7+m)}$$

```
[Out] a*A*c*(e*x)^(1+m)/e/(1+m)+(A*a*d+A*b*c+B*a*c)*(e*x)^(3+m)/e^3/(3+m)+(A*b*d+
B*a*d+B*b*c)*(e*x)^(5+m)/e^5/(5+m)+b*B*d*(e*x)^(7+m)/e^7/(7+m)
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 97, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1, $\frac{\text{number of rules}}{\text{integrand size}} = 0.037$, Rules used = {584}

$$\int (ex)^m \left(a+bx^2\right)\left(A+Bx^2\right)\left(c+dx^2\right)\,dx = \frac{(ex)^{m+5}(aBd+Abd+bBc)}{e^5(m+5)} + \frac{(ex)^{m+3}(aAd+aBc+Abc)}{e^3(m+3)} + \frac{aAc(ex)^{m+1}}{e(m+1)} + \frac{bBd(ex)^{m+7}}{e^7(m+7)}$$

```
[In] Int[(e*x)^m*(a + b*x^2)*(A + B*x^2)*(c + d*x^2),x]
```

```
[Out] (a*A*c*(e*x)^(1 + m))/(e*(1 + m)) + ((A*b*c + a*B*c + a*A*d)*(e*x)^(3 + m))
/(e^3*(3 + m)) + ((b*B*c + A*b*d + a*B*d)*(e*x)^(5 + m))/(e^5*(5 + m)) + (b
*B*d*(e*x)^(7 + m))/(e^7*(7 + m))
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \int \left(aAc(ex)^m + \frac{(Abc+aBc+aAd)(ex)^{2+m}}{e^2} + \frac{(bBc+Abd+aBd)(ex)^{4+m}}{e^4} + \frac{bBd(ex)^{6+m}}{e^6}\right) dx \\ &= \frac{aAc(ex)^{1+m}}{e(1+m)} + \frac{(Abc+aBc+aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{(bBc+Abd+aBd)(ex)^{5+m}}{e^5(5+m)} + \frac{bBd(ex)^{7+m}}{e^7(7+m)}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.07 (sec) , antiderivative size = 73, normalized size of antiderivative = 0.75

$$\int (ex)^m \left(a+bx^2\right)\left(A+Bx^2\right)\left(c+dx^2\right) dx = x(ex)^m \left(\frac{aAc}{1+m} + \frac{(Abc+aBc+aAd)x^2}{3+m} + \frac{(bBc+Abd+aBd)x^4}{5+m} + \frac{bBdx^6}{7+m}\right)$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)*(A + B*x^2)*(c + d*x^2),x]
```

```
[Out] x*(e*x)^m*((a*A*c)/(1 + m) + ((A*b*c + a*B*c + a*A*d)*x^2)/(3 + m) + ((b*B*
c + A*b*d + a*B*d)*x^4)/(5 + m) + (b*B*d*x^6)/(7 + m))
```

Maple [A] (verified)

Time = 0.09 (sec) , antiderivative size = 96, normalized size of antiderivative = 0.99

method	result
norman	$\frac{(Abd+Bad+Bbc)x^5 e^{m\ln(ex)}}{5+m}+\frac{(Aad+Abc+Bac)x^3 e^{m\ln(ex)}}{3+m}+\frac{Aacx\, e^{m\ln(ex)}}{1+m}+\frac{Bbd\,x^7 e^{m\ln(ex)}}{7+m}$
gosper	$x\left(Bbd\,m^3x^6+9Bbd\,m^2x^6+Abd\,m^3x^4+Bad\,m^3x^4+Bbc\,m^3x^4+23Bbdm\,x^6+11Abd\,m^2x^4+11Bad\,m^2x^4+11Bbc\,m^2x^4+15Bb$
risch	$x\left(Bbd\,m^3x^6+9Bbd\,m^2x^6+Abd\,m^3x^4+Bad\,m^3x^4+Bbc\,m^3x^4+23Bbdm\,x^6+11Abd\,m^2x^4+11Bad\,m^2x^4+11Bbc\,m^2x^4+15Bb$
parallelrisch	$A\,x^3(ex)^m ad\,m^3+A\,x^3(ex)^m bc\,m^3+31B\,x^5(ex)^m adm+31B\,x^5(ex)^m bcm+B\,x^3(ex)^m ac\,m^3+13A\,x^3(ex)^m ad\,m^2+13A\,x^3(ex$

```
[In] int((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c),x,method=_RETURNVERBOSE)
```

```
[Out] (A*b*d+B*a*d+B*b*c)/(5+m)*x^5*exp(m*ln(e*x))+(A*a*d+A*b*c+B*a*c)/(3+m)*x^3*
exp(m*ln(e*x))+A*a*c/(1+m)*x*exp(m*ln(e*x))+B*b*d/(7+m)*x^7*exp(m*ln(e*x))
```

Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 235 vs. $2(97) = 194$.

Time = 0.34 (sec) , antiderivative size = 235, normalized size of antiderivative = 2.42

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \frac{((Bbdm^3 + 9\,Bbdm^2 + 23\,Bbdm + 15\,Bbd)x^7 + ((Bbc + (Ba + Ab)d)m^3 + 21\,Bbc + 11\,(Bbc + (Ba + Ab)}{}$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c),x, algorithm="fricas")
```

```
[Out] ((B*b*d*m^3 + 9*B*b*d*m^2 + 23*B*b*d*m + 15*B*b*d)*x^7 + ((B*b*c + (B*a + A
*b)*d)*m^3 + 21*B*b*c + 11*(B*b*c + (B*a + A*b)*d)*m^2 + 21*(B*a + A*b)*d +
 31*(B*b*c + (B*a + A*b)*d)*m)*x^5 + ((A*a*d + (B*a + A*b)*c)*m^3 + 35*A*a*
d + 13*(A*a*d + (B*a + A*b)*c)*m^2 + 35*(B*a + A*b)*c + 47*(A*a*d + (B*a +
A*b)*c)*m)*x^3 + (A*a*c*m^3 + 15*A*a*c*m^2 + 71*A*a*c*m + 105*A*a*c)*x)*(e*
x)^m/(m^4 + 16*m^3 + 86*m^2 + 176*m + 105)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1460 vs. $2(92) = 184$.

Time = 0.46 (sec) , antiderivative size = 1460, normalized size of antiderivative = 15.05

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)*(B*x**2+A)*(d*x**2+c),x)
```

```
[Out] Piecewise(((-A*a*c/(6*x**6) - A*a*d/(4*x**4) - A*b*c/(4*x**4) - A*b*d/(2*x*
*2) - B*a*c/(4*x**4) - B*a*d/(2*x**2) - B*b*c/(2*x**2) + B*b*d*log(x))/e**7
, Eq(m, -7)), ((-A*a*c/(4*x**4) - A*a*d/(2*x**2) - A*b*c/(2*x**2) + A*b*d*l
og(x) - B*a*c/(2*x**2) + B*a*d*log(x) + B*b*c*log(x) + B*b*d*x**2/2)/e**5,
Eq(m, -5)), ((-A*a*c/(2*x**2) + A*a*d*log(x) + A*b*c*log(x) + A*b*d*x**2/2
+ B*a*c*log(x) + B*a*d*x**2/2 + B*b*c*x**2/2 + B*b*d*x**4/4)/e**3, Eq(m, -3
)), ((A*a*c*log(x) + A*a*d*x**2/2 + A*b*c*x**2/2 + A*b*d*x**4/4 + B*a*c*x**
2/2 + B*a*d*x**4/4 + B*b*c*x**4/4 + B*b*d*x**6/6)/e, Eq(m, -1)), (A*a*c*m**
3*x*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 15*A*a*c*m**2*x*(e*
x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 71*A*a*c*m*x*(e*x)**m/(m**
4 + 16*m**3 + 86*m**2 + 176*m + 105) + 105*A*a*c*x*(e*x)**m/(m**4 + 16*m**3
 + 86*m**2 + 176*m + 105) + A*a*d*m**3*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m
```

```
**2 + 176*m + 105) + 13*A*a*d*m**2*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2
+ 176*m + 105) + 47*A*a*d*m*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m
 + 105) + 35*A*a*d*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) +
 A*b*c*m**3*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 13*A*b
*c*m**2*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 47*A*b*c*m
*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 35*A*b*c*x**3*(e*
x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + A*b*d*m**3*x**5*(e*x)**m/(
m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 11*A*b*d*m**2*x**5*(e*x)**m/(m**4
 + 16*m**3 + 86*m**2 + 176*m + 105) + 31*A*b*d*m*x**5*(e*x)**m/(m**4 + 16*m
**3 + 86*m**2 + 176*m + 105) + 21*A*b*d*x**5*(e*x)**m/(m**4 + 16*m**3 + 86*
m**2 + 176*m + 105) + B*a*c*m**3*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 +
176*m + 105) + 13*B*a*c*m**2*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*
m + 105) + 47*B*a*c*m*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105
) + 35*B*a*c*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + B*a*d
*m**3*x**5*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 11*B*a*d*m**
2*x**5*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 31*B*a*d*m*x**5*
(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 21*B*a*d*x**5*(e*x)**m/
(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + B*b*c*m**3*x**5*(e*x)**m/(m**4 +
 16*m**3 + 86*m**2 + 176*m + 105) + 11*B*b*c*m**2*x**5*(e*x)**m/(m**4 + 16*
m**3 + 86*m**2 + 176*m + 105) + 31*B*b*c*m*x**5*(e*x)**m/(m**4 + 16*m**3 +
86*m**2 + 176*m + 105) + 21*B*b*c*x**5*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 +
 176*m + 105) + B*b*d*m**3*x**7*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m
+ 105) + 9*B*b*d*m**2*x**7*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105
) + 23*B*b*d*m*x**7*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 15*
B*b*d*x**7*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105), True))
```

Maxima [A] (verification not implemented)

none

Time = 0.22 (sec) , antiderivative size = 146, normalized size of antiderivative = 1.51

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \frac{Bbde^m x^7 x^m}{m+7} + \frac{Bbce^m x^5 x^m}{m+5} + \frac{Bade^m x^5 x^m}{m+5} + \frac{Abde^m x^5 x^m}{m+5} + \frac{Bace^m x^3 x^m}{m+3} + \frac{Abce^m x^3 x^m}{m+3} + \frac{Aade^m x^3 x^m}{m+3} + \frac{(ex)^{m+1} Aac}{e(m+1)}$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c),x, algorithm="maxima")
```

```
[Out] B*b*d*e^m*x^7*x^m/(m + 7) + B*b*c*e^m*x^5*x^m/(m + 5) + B*a*d*e^m*x^5*x^m/(
m + 5) + A*b*d*e^m*x^5*x^m/(m + 5) + B*a*c*e^m*x^3*x^m/(m + 3) + A*b*c*e^m*
x^3*x^m/(m + 3) + A*a*d*e^m*x^3*x^m/(m + 3) + (e*x)^(m + 1)*A*a*c/(e*(m + 1
))
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 478 vs. 2(97) = 194.

Time = 0.31 (sec) , antiderivative size = 478, normalized size of antiderivative = 4.93

$$\int (ex)^m (a+bx^2) (A+Bx^2) (c+dx^2) \, dx = \frac{(ex)^m Bbdm^3x^7 + 9\,(ex)^m Bbdm^2x^7 + (ex)^m Bbcm^3x^5 + (ex)^m Badm^3x^5 + (ex)^m Abdm^3x^5 + 23\,(ex)^m Bb}{}$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c),x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*b*d*m^3*x^7 + 9*(e*x)^m*B*b*d*m^2*x^7 + (e*x)^m*B*b*c*m^3*x^5 +
(e*x)^m*B*a*d*m^3*x^5 + (e*x)^m*A*b*d*m^3*x^5 + 23*(e*x)^m*B*b*d*m*x^7 + 11
*(e*x)^m*B*b*c*m^2*x^5 + 11*(e*x)^m*B*a*d*m^2*x^5 + 11*(e*x)^m*A*b*d*m^2*x^
5 + 15*(e*x)^m*B*b*d*x^7 + (e*x)^m*B*a*c*m^3*x^3 + (e*x)^m*A*b*c*m^3*x^3 +
(e*x)^m*A*a*d*m^3*x^3 + 31*(e*x)^m*B*b*c*m*x^5 + 31*(e*x)^m*B*a*d*m*x^5 + 3
1*(e*x)^m*A*b*d*m*x^5 + 13*(e*x)^m*B*a*c*m^2*x^3 + 13*(e*x)^m*A*b*c*m^2*x^3
 + 13*(e*x)^m*A*a*d*m^2*x^3 + 21*(e*x)^m*B*b*c*x^5 + 21*(e*x)^m*B*a*d*x^5 +
 21*(e*x)^m*A*b*d*x^5 + (e*x)^m*A*a*c*m^3*x + 47*(e*x)^m*B*a*c*m*x^3 + 47*(
e*x)^m*A*b*c*m*x^3 + 47*(e*x)^m*A*a*d*m*x^3 + 15*(e*x)^m*A*a*c*m^2*x + 35*(
e*x)^m*B*a*c*x^3 + 35*(e*x)^m*A*b*c*x^3 + 35*(e*x)^m*A*a*d*x^3 + 71*(e*x)^m
*A*a*c*m*x + 105*(e*x)^m*A*a*c*x)/(m^4 + 16*m^3 + 86*m^2 + 176*m + 105)
```

Mupad [B] (verification not implemented)

Time = 5.57 (sec) , antiderivative size = 185, normalized size of antiderivative = 1.91

$$\int (ex)^m (a+bx^2) (A+Bx^2) (c+dx^2) \, dx = (e\,x)^m \left(\frac{x^3\,(A\,a\,d+A\,b\,c+B\,a\,c)\,(m^3+13\,m^2+47\,m+35)}{m^4+16\,m^3+86\,m^2+176\,m+105} + \frac{x^5\,(A\,b\,d+B\,a\,d+B\,b\,c)\,(m^3+11\,m^2+31\,m+21)}{m^4+16\,m^3+86\,m^2+176\,m+105} + \frac{B\,b\,d\,x^7\,(m^3+9\,m^2+23\,m+15)}{m^4+16\,m^3+86\,m^2+176\,m+105} + \frac{A\,a\,c\,x\,(m^3+15\,m^2+71\,m+105)}{m^4+16\,m^3+86\,m^2+176\,m+105}\right)$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)*(c + d*x^2),x)
```

```
[Out] (e*x)^m*((x^3*(A*a*d + A*b*c + B*a*c)*(47*m + 13*m^2 + m^3 + 35))/(176*m +
86*m^2 + 16*m^3 + m^4 + 105) + (x^5*(A*b*d + B*a*d + B*b*c)*(31*m + 11*m^2
+ m^3 + 21))/(176*m + 86*m^2 + 16*m^3 + m^4 + 105) + (B*b*d*x^7*(23*m + 9*m
^2 + m^3 + 15))/(176*m + 86*m^2 + 16*m^3 + m^4 + 105) + (A*a*c*x*(71*m + 15
*m^2 + m^3 + 105))/(176*m + 86*m^2 + 16*m^3 + m^4 + 105))
```

3.4 $\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right) \, dx$

Optimal result

Integrand size = 20, antiderivative size = 60

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \frac{Ac(ex)^{1+m}}{e(1+m)} + \frac{(Bc+Ad)(ex)^{3+m}}{e^3(3+m)} + \frac{Bd(ex)^{5+m}}{e^5(5+m)}$$

```
[Out] A*c*(e*x)^(1+m)/e/(1+m)+(A*d+B*c)*(e*x)^(3+m)/e^3/(3+m)+B*d*(e*x)^(5+m)/e^5
/(5+m)
```

Rubi [A] (verified)

Time = 0.02 (sec) , antiderivative size = 60, 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 = {459}

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \frac{(ex)^{m+3}(Ad+Bc)}{e^3(m+3)} + \frac{Ac(ex)^{m+1}}{e(m+1)} + \frac{Bd(ex)^{m+5}}{e^5(m+5)}$$

```
[In] Int[(e*x)^m*(A + B*x^2)*(c + d*x^2),x]
```

```
[Out] (A*c*(e*x)^(1 + m))/(e*(1 + m)) + ((B*c + A*d)*(e*x)^(3 + m))/(e^3*(3 + m))
 + (B*d*(e*x)^(5 + m))/(e^5*(5 + m))
```

Rule 459

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(e*x)^m*(a + b*x^n)^p*(c + d*x^
n)^q, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[b*c - a*d, 0] && IGt
Q[p, 0] && IGtQ[q, 0]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \int \left(Ac(ex)^m + \frac{(Bc+Ad)(ex)^{2+m}}{e^2} + \frac{Bd(ex)^{4+m}}{e^4}\right) dx \\ &= \frac{Ac(ex)^{1+m}}{e(1+m)} + \frac{(Bc+Ad)(ex)^{3+m}}{e^3(3+m)} + \frac{Bd(ex)^{5+m}}{e^5(5+m)}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.05 (sec) , antiderivative size = 43, normalized size of antiderivative = 0.72

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = x(ex)^m \left(\frac{Ac}{1+m} + \frac{(Bc+Ad)x^2}{3+m} + \frac{Bdx^4}{5+m}\right)$$

```
[In] Integrate[(e*x)^m*(A + B*x^2)*(c + d*x^2),x]
[Out] x*(e*x)^m*((A*c)/(1 + m) + ((B*c + A*d)*x^2)/(3 + m) + (B*d*x^4)/(5 + m))
```

Maple [A] (verified)

Time = 0.06 (sec) , antiderivative size = 59, normalized size of antiderivative = 0.98

method	result
norman	$\frac{(Ad+Bc)x^3 e^{m\ln(ex)}}{3+m} + \frac{Acx\, e^{m\ln(ex)}}{1+m} + \frac{Bd\,x^5 e^{m\ln(ex)}}{5+m}$
gosper	$\frac{x(Bd\,m^2x^4+4Bdm\,x^4+Ad\,m^2x^2+Bc\,m^2x^2+3Bd\,x^4+6Adm\,x^2+6Bcm\,x^2+Ac\,m^2+5Ad\,x^2+5Bc\,x^2+8Acm+15Ac)(ex)^m}{(5+m)(3+m)(1+m)}$
risch	$\frac{x(Bd\,m^2x^4+4Bdm\,x^4+Ad\,m^2x^2+Bc\,m^2x^2+3Bd\,x^4+6Adm\,x^2+6Bcm\,x^2+Ac\,m^2+5Ad\,x^2+5Bc\,x^2+8Acm+15Ac)(ex)^m}{(5+m)(3+m)(1+m)}$
parallelrisch	$\frac{B\,x^5(ex)^m d\,m^2+4B\,x^5(ex)^m dm+A\,x^3(ex)^m d\,m^2+3B\,x^5(ex)^m d+B\,x^3(ex)^m c\,m^2+6A\,x^3(ex)^m dm+6B\,x^3(ex)^m cm+5A\,x^3(e}{(5+m)(3+m)(1+m)}$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c),x,method=_RETURNVERBOSE)
[Out] (A*d+B*c)/(3+m)*x^3*exp(m*ln(e*x))+A*c/(1+m)*x*exp(m*ln(e*x))+B*d/(5+m)*x^5
*exp(m*ln(e*x))
```

Fricas [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 94, normalized size of antiderivative = 1.57

$$\int (ex)^m \left(A+Bx^2\right)\left(c+dx^2\right)\,dx = \frac{((Bdm^2+4\,Bdm+3\,Bd)x^5+((Bc+Ad)m^2+5\,Bc+5\,Ad+6\,(Bc+Ad)m)x^3+(Acm^2+8\,Acm+15\,Ac)x)(ex)^m}{m^3+9\,m^2+23\,m+15}$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c),x, algorithm="fricas")
```

```
[Out] ((B*d*m^2 + 4*B*d*m + 3*B*d)*x^5 + ((B*c + A*d)*m^2 + 5*B*c + 5*A*d + 6*(B*
c + A*d)*m)*x^3 + (A*c*m^2 + 8*A*c*m + 15*A*c)*x)*(e*x)^m/(m^3 + 9*m^2 + 23
*m + 15)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 439 vs. 2(51) = 102.

Time = 0.32 (sec) , antiderivative size = 439, normalized size of antiderivative = 7.32

$$\int (ex)^m \left(A+Bx^2\right)\left(c+dx^2\right)\,dx = \begin{cases} \frac{-\frac{Ac}{4x^4}-\frac{Ad}{2x^2}-\frac{Bc}{2x^2}+Bd\log(x)}{e^5} \\ \frac{-\frac{Ac}{2x^2}+Ad\log(x)+Bc\log(x)+\frac{Bdx^2}{2}}{e^3} \\ \frac{Ac\log(x)+\frac{Adx^2}{2}+\frac{Bcx^2}{2}+\frac{Bdx^4}{4}}{e} \\ \frac{Acm^2x(ex)^m}{m^3+9m^2+23m+15}+\frac{8Acmx(ex)^m}{m^3+9m^2+23m+15}+\frac{15Acx(ex)^m}{m^3+9m^2+23m+15}+\frac{Adm^2x^3(ex)^m}{m^3+9m^2+23m+15}+\frac{6Admx^3(ex)^m}{m^3+9m^2+23m+15}+\frac{5Adx^3(ex)^m}{m^3+9m^2+23m+1} \end{cases}$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c),x)
```

```
[Out] Piecewise(((-A*c/(4*x**4) - A*d/(2*x**2) - B*c/(2*x**2) + B*d*log(x))/e**5,
 Eq(m, -5)), ((-A*c/(2*x**2) + A*d*log(x) + B*c*log(x) + B*d*x**2/2)/e**3,
Eq(m, -3)), ((A*c*log(x) + A*d*x**2/2 + B*c*x**2/2 + B*d*x**4/4)/e, Eq(m, -
1)), (A*c*m**2*x*(e*x)**m/(m**3 + 9*m**2 + 23*m + 15) + 8*A*c*m*x*(e*x)**m/
(m**3 + 9*m**2 + 23*m + 15) + 15*A*c*x*(e*x)**m/(m**3 + 9*m**2 + 23*m + 15)
 + A*d*m**2*x**3*(e*x)**m/(m**3 + 9*m**2 + 23*m + 15) + 6*A*d*m*x**3*(e*x)*
*m/(m**3 + 9*m**2 + 23*m + 15) + 5*A*d*x**3*(e*x)**m/(m**3 + 9*m**2 + 23*m
+ 15) + B*c*m**2*x**3*(e*x)**m/(m**3 + 9*m**2 + 23*m + 15) + 6*B*c*m*x**3*(
e*x)**m/(m**3 + 9*m**2 + 23*m + 15) + 5*B*c*x**3*(e*x)**m/(m**3 + 9*m**2 +
23*m + 15) + B*d*m**2*x**5*(e*x)**m/(m**3 + 9*m**2 + 23*m + 15) + 4*B*d*m*x
**5*(e*x)**m/(m**3 + 9*m**2 + 23*m + 15) + 3*B*d*x**5*(e*x)**m/(m**3 + 9*m*
*2 + 23*m + 15), True))
```

Maxima [A] (verification not implemented)

none

Time = 0.23 (sec) , antiderivative size = 70, normalized size of antiderivative = 1.17

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \frac{Bde^m x^5 x^m}{m+5} + \frac{Bce^m x^3 x^m}{m+3} + \frac{Ade^m x^3 x^m}{m+3} + \frac{(ex)^{m+1} Ac}{e(m+1)}$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c),x, algorithm="maxima")
```

```
[Out] B*d*e^m*x^5*x^m/(m + 5) + B*c*e^m*x^3*x^m/(m + 3) + A*d*e^m*x^3*x^m/(m + 3)
 + (e*x)^(m + 1)*A*c/(e*(m + 1))
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 167 vs. 2(60) = 120.

Time = 0.30 (sec) , antiderivative size = 167, normalized size of antiderivative = 2.78

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right) \, dx$$
$$= \frac{(ex)^m Bdm^2x^5 + 4\,(ex)^m Bdmx^5 + (ex)^m Bcm^2x^3 + (ex)^m Adm^2x^3 + 3\,(ex)^m Bdx^5 + 6\,(ex)^m Bcmx^3 + 6}{m^3 + 9\,m^2 + 23\,m}$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c),x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*d*m^2*x^5 + 4*(e*x)^m*B*d*m*x^5 + (e*x)^m*B*c*m^2*x^3 + (e*x)^m*
A*d*m^2*x^3 + 3*(e*x)^m*B*d*x^5 + 6*(e*x)^m*B*c*m*x^3 + 6*(e*x)^m*A*d*m*x^3
 + (e*x)^m*A*c*m^2*x + 5*(e*x)^m*B*c*x^3 + 5*(e*x)^m*A*d*x^3 + 8*(e*x)^m*A*
c*m*x + 15*(e*x)^m*A*c*x)/(m^3 + 9*m^2 + 23*m + 15)
```

Mupad [B] (verification not implemented)

Time = 5.47 (sec) , antiderivative size = 97, normalized size of antiderivative = 1.62

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = (e\,x)^m \left(\frac{x^3\,(A\,d+B\,c)\,\left(m^2+6\,m+5\right)}{m^3+9\,m^2+23\,m+15} + \frac{B\,d\,x^5\,\left(m^2+4\,m+3\right)}{m^3+9\,m^2+23\,m+15} + \frac{A\,c\,x\,\left(m^2+8\,m+15\right)}{m^3+9\,m^2+23\,m+15}\right)$$

```
[In] int((A + B*x^2)*(e*x)^m*(c + d*x^2),x)
```

```
[Out] (e*x)^m*((x^3*(A*d + B*c)*(6*m + m^2 + 5))/(23*m + 9*m^2 + m^3 + 15) + (B*d
*x^5*(4*m + m^2 + 3))/(23*m + 9*m^2 + m^3 + 15) + (A*c*x*(8*m + m^2 + 15))/
(23*m + 9*m^2 + m^3 + 15))
```

3.5 $\int \frac{(ex)^m(A+Bx^2)(c+dx^2)}{a+bx^2}\,dx$

Optimal result

Integrand size = 29, antiderivative size = 118

$$\int \frac{(ex)^m(A+Bx^2)(c+dx^2)}{a+bx^2}\,dx = \frac{(bBc+Abd-aBd)(ex)^{1+m}}{b^2e(1+m)}+\frac{Bd(ex)^{3+m}}{be^3(3+m)} + \frac{(Ab-aB)(bc-ad)(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{ab^2e(1+m)}$$

```
[Out] (A*b*d-B*a*d+B*b*c)*(e*x)^(1+m)/b^2/e/(1+m)+B*d*(e*x)^(3+m)/b/e^3/(3+m)+(A*
b-B*a)*(-a*d+b*c)*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a
)/a/b^2/e/(1+m)
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 118, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.069, Rules used = {584, 371}

$$\int \frac{(ex)^m(A+Bx^2)(c+dx^2)}{a+bx^2}\,dx = \frac{(ex)^{m+1}(Ab-aB)(bc-ad)\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)}{ab^2e(m+1)} + \frac{(ex)^{m+1}(-aBd+Abd+bBc)}{b^2e(m+1)}+\frac{Bd(ex)^{m+3}}{be^3(m+3)}$$

```
[In] Int[((e*x)^m*(A + B*x^2)*(c + d*x^2))/(a + b*x^2),x]
```

```
[Out] ((b*B*c + A*b*d - a*B*d)*(e*x)^(1 + m))/(b^2*e*(1 + m)) + (B*d*(e*x)^(3 + m
))/(b*e^3*(3 + m)) + ((A*b - a*B)*(b*c - a*d)*(e*x)^(1 + m)*Hypergeometric2
F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(a*b^2*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \int \left(\frac{(bBc+Abd-aBd)(ex)^m}{b^2}+\frac{Bd(ex)^{2+m}}{be^2}+\frac{\left(Ab^2c-abBc-aAbd+a^2Bd\right)(ex)^m}{b^2\left(a+bx^2\right)}\right)dx\\
&= \frac{(bBc+Abd-aBd)(ex)^{1+m}}{b^2e(1+m)}+\frac{Bd(ex)^{3+m}}{be^3(3+m)}+\frac{((Ab-aB)(bc-ad))\int \frac{(ex)^m}{a+bx^2}\,dx}{b^2}\\
&= \frac{(bBc+Abd-aBd)(ex)^{1+m}}{b^2e(1+m)}+\frac{Bd(ex)^{3+m}}{be^3(3+m)}\\
&\quad+\frac{(Ab-aB)(bc-ad)(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{bx^2}{a}\right)}{ab^2e(1+m)}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.13 (sec) , antiderivative size = 93, normalized size of antiderivative = 0.79

$$\int \frac{(ex)^m\left(A+Bx^2\right)\left(c+dx^2\right)}{a+bx^2}\,dx = \frac{x(ex)^m\left(\frac{bBc+Abd-aBd}{1+m}+\frac{bBdx^2}{3+m}+\frac{(-Ab+aB)(-bc+ad)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{a(1+m)}\right)}{b^2}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2)*(c + d*x^2))/(a + b*x^2),x]
```

```
[Out] (x*(e*x)^m*((b*B*c + A*b*d - a*B*d)/(1 + m) + (b*B*d*x^2)/(3 + m) + ((-(A*b
) + a*B)*(-(b*c) + a*d)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2
)/a)])/(a*(1 + m))))/b^2
```

Maple [F]

$$\int \frac{(ex)^m (x^2B + A)(d\,x^2 + c)}{b\,x^2 + a}dx$$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a),x)
[Out] int((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a),x)
```

Fricas [F]

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)}{a + bx^2}\,dx = \int \frac{(Bx^2 + A)(dx^2 + c)(ex)^m}{bx^2 + a}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a),x, algorithm="fricas")
[Out] integral((B*d*x^4 + (B*c + A*d)*x^2 + A*c)*(e*x)^m/(b*x^2 + a), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 3.52 (sec) , antiderivative size = 418, normalized size of antiderivative = 3.54

$$\begin{aligned}
\int \frac{(ex)^m (A + Bx^2)(c + dx^2)}{a + bx^2}\,dx &= \frac{Ace^m m x^{m+1} \Phi\left(\frac{bx^2 e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{1}{2}\right) \Gamma\left(\frac{m}{2} + \frac{1}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{3}{2}\right)} \\
&+ \frac{Ace^m x^{m+1} \Phi\left(\frac{bx^2 e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{1}{2}\right) \Gamma\left(\frac{m}{2} + \frac{1}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{3}{2}\right)} \\
&+ \frac{Ade^m m x^{m+3} \Phi\left(\frac{bx^2 e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{3}{2}\right) \Gamma\left(\frac{m}{2} + \frac{3}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)} \\
&+ \frac{3Ade^m x^{m+3} \Phi\left(\frac{bx^2 e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{3}{2}\right) \Gamma\left(\frac{m}{2} + \frac{3}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)} \\
&+ \frac{Bce^m m x^{m+3} \Phi\left(\frac{bx^2 e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{3}{2}\right) \Gamma\left(\frac{m}{2} + \frac{3}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)} \\
&+ \frac{3Bce^m x^{m+3} \Phi\left(\frac{bx^2 e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{3}{2}\right) \Gamma\left(\frac{m}{2} + \frac{3}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)} \\
&+ \frac{Bde^m m x^{m+5} \Phi\left(\frac{bx^2 e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{5}{2}\right) \Gamma\left(\frac{m}{2} + \frac{5}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{7}{2}\right)} \\
&+ \frac{5Bde^m x^{m+5} \Phi\left(\frac{bx^2 e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{5}{2}\right) \Gamma\left(\frac{m}{2} + \frac{5}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{7}{2}\right)}
\end{aligned}$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)/(b*x**2+a),x)
```

```
[Out] A*c*e**m*m*x**(m + 1)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*gamm
a(m/2 + 1/2)/(4*a*gamma(m/2 + 3/2)) + A*c*e**m*x**(m + 1)*lerchphi(b*x**2*e
xp_polar(I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(4*a*gamma(m/2 + 3/2)) + A
*d*e**m*m*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma
(m/2 + 3/2)/(4*a*gamma(m/2 + 5/2)) + 3*A*d*e**m*x**(m + 3)*lerchphi(b*x**2*
exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*a*gamma(m/2 + 5/2)) +
B*c*e**m*m*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamm
a(m/2 + 3/2)/(4*a*gamma(m/2 + 5/2)) + 3*B*c*e**m*x**(m + 3)*lerchphi(b*x**2
*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*a*gamma(m/2 + 5/2)) +
 B*d*e**m*m*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gam
ma(m/2 + 5/2)/(4*a*gamma(m/2 + 7/2)) + 5*B*d*e**m*x**(m + 5)*lerchphi(b*x**
2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(4*a*gamma(m/2 + 7/2))
```

Maxima [F]

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)}{a+bx^2} \, dx = \int \frac{(Bx^2+A)(dx^2+c)(ex)^m}{bx^2+a} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a),x, algorithm="maxima")
```

```
[Out] integrate((B*x^2 + A)*(d*x^2 + c)*(e*x)^m/(b*x^2 + a), x)
```

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)}{a+bx^2} \, dx = \int \frac{(Bx^2+A)(dx^2+c)(ex)^m}{bx^2+a} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a),x, algorithm="giac")
```

```
[Out] integrate((B*x^2 + A)*(d*x^2 + c)*(e*x)^m/(b*x^2 + a), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)}{a+bx^2} \, dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(d\,x^2+c)}{b\,x^2+a} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(c + d*x^2))/(a + b*x^2),x)
```

```
[Out] int(((A + B*x^2)*(e*x)^m*(c + d*x^2))/(a + b*x^2), x)
```

3.6 $\int \frac{(ex)^m(A+Bx^2)(c+dx^2)}{(a+bx^2)^2} dx$

Optimal result

Integrand size = 29, antiderivative size = 171

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)}{(a+bx^2)^2} dx = -\frac{d(Ab(1+m)-aB(3+m))(ex)^{1+m}}{2ab^2e(1+m)} + \frac{(Ab-aB)(ex)^{1+m}(c+dx^2)}{2abe(a+bx^2)} + \frac{(aB(bc(1+m)-ad(3+m))+Ab(ad(1+m)+b(c-cm)))(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2}\right.}{2a^2b^2e(1+m)}$$

```
[Out] -1/2*d*(A*b*(1+m)-a*B*(3+m))*(e*x)^(1+m)/a/b^2/e/(1+m)+1/2*(A*b-B*a)*(e*x)^
(1+m)*(d*x^2+c)/a/b/e/(b*x^2+a)+1/2*(a*B*(b*c*(1+m)-a*d*(3+m))+A*b*(a*d*(1+
m)+b*(-c*m+c)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/
a^2/b^2/e/(1+m)
```

Rubi [A] (verified)

Time = 0.16 (sec) , antiderivative size = 171, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.103, Rules used = {591, 470, 371}

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)}{(a+bx^2)^2} dx = \frac{(ex)^{m+1}\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)(Ab(ad(m+1)+b(c-cm))+aB(bc(m+1)-ad(m}{2a^2b^2e(m+1)} - \frac{d(ex)^{m+1}(Ab(m+1)-aB(m+3))}{2ab^2e(m+1)} + \frac{(c+dx^2)(ex)^{m+1}(Ab-aB)}{2abe(a+bx^2)}$$

```
[In] Int[((e*x)^m*(A + B*x^2)*(c + d*x^2))/(a + b*x^2)^2,x]
```

```
[Out] -1/2*(d*(A*b*(1 + m) - a*B*(3 + m))*(e*x)^(1 + m))/(a*b^2*e*(1 + m)) + ((A*
b - a*B)*(e*x)^(1 + m)*(c + d*x^2))/(2*a*b*e*(a + b*x^2)) + ((a*B*(b*c*(1 +
 m) - a*d*(3 + m)) + A*b*(a*d*(1 + m) + b*(c - c*m)))*(e*x)^(1 + m)*Hyperge
ometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(2*a^2*b^2*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 470

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[d*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(b*e*(m + n*(p
+ 1) + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(b*(m + n*(p
 + 1) + 1)), Int[(e*x)^m*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, m,
n, p}, x] && NeQ[b*c - a*d, 0] && NeQ[m + n*(p + 1) + 1, 0]
```

Rule 591

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
 a*f])
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)}{2abe\left(a+bx^2\right)} - \frac{\int \frac{(ex)^m\left(-c(Ab(1-m)+aB(1+m))+d(Ab(1+m)-aB(3+m))x^2\right)}{a+bx^2}\,dx}{2ab}\\
&= -\frac{d(Ab(1+m)-aB(3+m))(ex)^{1+m}}{2ab^2e(1+m)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)}{2abe\left(a+bx^2\right)}\\
&\quad + \frac{(aB(bc(1+m)-ad(3+m))+Ab(ad(1+m)+b(c-cm)))\int \frac{(ex)^m}{a+bx^2}\,dx}{2ab^2}\\
&= -\frac{d(Ab(1+m)-aB(3+m))(ex)^{1+m}}{2ab^2e(1+m)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)}{2abe\left(a+bx^2\right)}\\
&\quad + \frac{(aB(bc(1+m)-ad(3+m))+Ab(ad(1+m)+b(c-cm)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{bx^2}{a}\right)}{2a^2b^2e(1+m)}
\end{aligned}$$

Mathematica [A] (verified)

Time = 0.21 (sec) , antiderivative size = 108, normalized size of antiderivative = 0.63

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)}{(a+bx^2)^2} dx$$
$$= \frac{x(ex)^m \left(a^2Bd + a(bBc + Abd - 2aBd) \text{Hypergeometric2F1}\left(1, \frac{1+m}{2}, \frac{3+m}{2}, -\frac{bx^2}{a}\right) + (Ab - aB)(bc - ad) \text{I}\right.}{a^2b^2(1+m)}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2)*(c + d*x^2))/(a + b*x^2)^2,x]
```

```
[Out] (x*(e*x)^m*(a^2*B*d + a*(b*B*c + A*b*d - 2*a*B*d)*Hypergeometric2F1[1, (1 +
 m)/2, (3 + m)/2, -((b*x^2)/a)] + (A*b - a*B)*(b*c - a*d)*Hypergeometric2F1
[2, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)]))/(a^2*b^2*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (x^2B + A) (d\,x^2 + c)}{(b\,x^2 + a)^2} dx$$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a)^2,x)
```

```
[Out] int((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a)^2,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)}{(a+bx^2)^2} dx = \int \frac{(Bx^2+A)(dx^2+c)(ex)^m}{(bx^2+a)^2} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a)^2,x, algorithm="fricas")
```

```
[Out] integral((B*d*x^4 + (B*c + A*d)*x^2 + A*c)*(e*x)^m/(b^2*x^4 + 2*a*b*x^2 + a
^2), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 29.42 (sec) , antiderivative size = 2069, normalized size of antiderivative = 12.10

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)}{(a+bx^2)^2} dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)/(b*x**2+a)**2,x)
```

```
[Out] A*c*(-a*e**m*m**2*x**(m + 1)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/
2)*gamma(m/2 + 1/2)/(8*a**3*gamma(m/2 + 3/2) + 8*a**2*b*x**2*gamma(m/2 + 3/
2)) + 2*a*e**m*m*x**(m + 1)*gamma(m/2 + 1/2)/(8*a**3*gamma(m/2 + 3/2) + 8*a
**2*b*x**2*gamma(m/2 + 3/2)) + a*e**m*x**(m + 1)*lerchphi(b*x**2*exp_polar(
I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(8*a**3*gamma(m/2 + 3/2) + 8*a**2*b
*x**2*gamma(m/2 + 3/2)) + 2*a*e**m*x**(m + 1)*gamma(m/2 + 1/2)/(8*a**3*gamm
a(m/2 + 3/2) + 8*a**2*b*x**2*gamma(m/2 + 3/2)) - b*e**m*m**2*x**2*x**(m + 1
)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(8*a**3
*gamma(m/2 + 3/2) + 8*a**2*b*x**2*gamma(m/2 + 3/2)) + b*e**m*x**2*x**(m + 1
)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(8*a**3
*gamma(m/2 + 3/2) + 8*a**2*b*x**2*gamma(m/2 + 3/2))) + A*d*(-a*e**m*m**2*x*
*(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/
(8*a**3*gamma(m/2 + 5/2) + 8*a**2*b*x**2*gamma(m/2 + 5/2)) - 4*a*e**m*m*x**
(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(
8*a**3*gamma(m/2 + 5/2) + 8*a**2*b*x**2*gamma(m/2 + 5/2)) + 2*a*e**m*m*x**(
m + 3)*gamma(m/2 + 3/2)/(8*a**3*gamma(m/2 + 5/2) + 8*a**2*b*x**2*gamma(m/2
+ 5/2)) - 3*a*e**m*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3
/2)*gamma(m/2 + 3/2)/(8*a**3*gamma(m/2 + 5/2) + 8*a**2*b*x**2*gamma(m/2 + 5
/2)) + 6*a*e**m*x**(m + 3)*gamma(m/2 + 3/2)/(8*a**3*gamma(m/2 + 5/2) + 8*a*
*2*b*x**2*gamma(m/2 + 5/2)) - b*e**m*m**2*x**2*x**(m + 3)*lerchphi(b*x**2*e
xp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*a**3*gamma(m/2 + 5/2) +
 8*a**2*b*x**2*gamma(m/2 + 5/2)) - 4*b*e**m*m*x**2*x**(m + 3)*lerchphi(b*x*
*2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*a**3*gamma(m/2 + 5/
2) + 8*a**2*b*x**2*gamma(m/2 + 5/2)) - 3*b*e**m*x**2*x**(m + 3)*lerchphi(b*
x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*a**3*gamma(m/2 +
5/2) + 8*a**2*b*x**2*gamma(m/2 + 5/2))) + B*c*(-a*e**m*m**2*x**(m + 3)*lerc
hphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*a**3*gamma
(m/2 + 5/2) + 8*a**2*b*x**2*gamma(m/2 + 5/2)) - 4*a*e**m*m*x**(m + 3)*lerch
phi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*a**3*gamma(
m/2 + 5/2) + 8*a**2*b*x**2*gamma(m/2 + 5/2)) + 2*a*e**m*m*x**(m + 3)*gamma(
m/2 + 3/2)/(8*a**3*gamma(m/2 + 5/2) + 8*a**2*b*x**2*gamma(m/2 + 5/2)) - 3*a
*e**m*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2
 + 3/2)/(8*a**3*gamma(m/2 + 5/2) + 8*a**2*b*x**2*gamma(m/2 + 5/2)) + 6*a*e*
*m*x**(m + 3)*gamma(m/2 + 3/2)/(8*a**3*gamma(m/2 + 5/2) + 8*a**2*b*x**2*gam
ma(m/2 + 5/2)) - b*e**m*m**2*x**2*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi
)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*a**3*gamma(m/2 + 5/2) + 8*a**2*b*x**
2*gamma(m/2 + 5/2)) - 4*b*e**m*m*x**2*x**(m + 3)*lerchphi(b*x**2*exp_polar(
I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*a**3*gamma(m/2 + 5/2) + 8*a**2*b
*x**2*gamma(m/2 + 5/2)) - 3*b*e**m*x**2*x**(m + 3)*lerchphi(b*x**2*exp_pola
r(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*a**3*gamma(m/2 + 5/2) + 8*a**2
*b*x**2*gamma(m/2 + 5/2))) + B*d*(-a*e**m*m**2*x**(m + 5)*lerchphi(b*x**2*e
xp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(8*a**3*gamma(m/2 + 7/2) +
 8*a**2*b*x**2*gamma(m/2 + 7/2)) - 8*a*e**m*m*x**(m + 5)*lerchphi(b*x**2*ex
p_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(8*a**3*gamma(m/2 + 7/2) +
8*a**2*b*x**2*gamma(m/2 + 7/2)) + 2*a*e**m*m*x**(m + 5)*gamma(m/2 + 5/2)/(8
```

```
*a**3*gamma(m/2 + 7/2) + 8*a**2*b*x**2*gamma(m/2 + 7/2)) - 15*a*e**m*x**(m
+ 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(8*a
**3*gamma(m/2 + 7/2) + 8*a**2*b*x**2*gamma(m/2 + 7/2)) + 10*a*e**m*x**(m +
5)*gamma(m/2 + 5/2)/(8*a**3*gamma(m/2 + 7/2) + 8*a**2*b*x**2*gamma(m/2 + 7/
2)) - b*e**m*m**2*x**2*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2
 + 5/2)*gamma(m/2 + 5/2)/(8*a**3*gamma(m/2 + 7/2) + 8*a**2*b*x**2*gamma(m/2
 + 7/2)) - 8*b*e**m*m*x**2*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1,
 m/2 + 5/2)*gamma(m/2 + 5/2)/(8*a**3*gamma(m/2 + 7/2) + 8*a**2*b*x**2*gamma
(m/2 + 7/2)) - 15*b*e**m*x**2*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a,
 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(8*a**3*gamma(m/2 + 7/2) + 8*a**2*b*x**2*ga
mma(m/2 + 7/2)))
```

Maxima [F]

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)}{(a+bx^2)^2} \, dx = \int \frac{(Bx^2+A)(dx^2+c)(ex)^m}{(bx^2+a)^2} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a)^2,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)*(e*x)^m/(b*x^2 + a)^2, x)
```

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)}{(a+bx^2)^2} \, dx = \int \frac{(Bx^2+A)(dx^2+c)(ex)^m}{(bx^2+a)^2} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)*(e*x)^m/(b*x^2 + a)^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)}{(a+bx^2)^2} \, dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(d\,x^2+c)}{(b\,x^2+a)^2} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(c + d*x^2))/(a + b*x^2)^2,x)
[Out] int(((A + B*x^2)*(e*x)^m*(c + d*x^2))/(a + b*x^2)^2, x)
```

3.7 $\int \frac{(ex)^m (A+Bx^2)(c+dx^2)}{(a+bx^2)^3} dx$

Optimal result

Integrand size = 29, antiderivative size = 209

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)}{(a+bx^2)^3} dx = -\frac{(Ab(ad(1-m)-bc(3-m))-aB(bc(1+m)-ad(3+m)))(ex)^{1+m}}{8a^2b^2e(a+bx^2)} + \frac{(Ab-aB)(ex)^{1+m}(c+dx^2)}{4abe(a+bx^2)^2} + \frac{(Ab(1-m)(bc(3-m)+ad(1+m))+aB(1+m)(ad(3+m)+b(c-cm)))(ex)^{1+m}\,\text{Hypergeometric2F}}{8a^3b^2e(1+m)}$$

```
[Out] -1/8*(A*b*(a*d*(1-m)-b*c*(3-m))-a*B*(b*c*(1+m)-a*d*(3+m)))*(e*x)^(1+m)/a^2/
b^2/e/(b*x^2+a)+1/4*(A*b-B*a)*(e*x)^(1+m)*(d*x^2+c)/a/b/e/(b*x^2+a)^2+1/8*(
A*b*(1-m)*(b*c*(3-m)+a*d*(1+m))+a*B*(1+m)*(a*d*(3+m)+b*(-c*m+c)))*(e*x)^(1+
m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/a^3/b^2/e/(1+m)
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 209, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.103, Rules used

$= \{591, 468, 371\}$

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)}{(a+bx^2)^3}\,dx$$

$$= \frac{(ex)^{m+1}\,\text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{bx^2}{a}\right)(Ab(1-m)(ad(m+1)+bc(3-m))+aB(m+1)(ad(}{8a^3b^2e(m+1)}$$

$$- \frac{(ex)^{m+1}(Ab(ad(1-m)-bc(3-m))-aB(bc(m+1)-ad(m+3)))}{8a^2b^2e(a+bx^2)}$$

$$+ \frac{(c+dx^2)(ex)^{m+1}(Ab-aB)}{4abe(a+bx^2)^2}$$

```
[In] Int[((e*x)^m*(A + B*x^2)*(c + d*x^2))/(a + b*x^2)^3,x]
```

```
[Out] -1/8*((A*b*(a*d*(1 - m) - b*c*(3 - m)) - a*B*(b*c*(1 + m) - a*d*(3 + m)))*(
e*x)^(1 + m))/(a^2*b^2*e*(a + b*x^2)) + ((A*b - a*B)*(e*x)^(1 + m)*(c + d*x
^2))/(4*a*b*e*(a + b*x^2)^2) + ((A*b*(1 - m)*(b*c*(3 - m) + a*d*(1 + m)) +
a*B*(1 + m)*(a*d*(3 + m) + b*(c - c*m)))*(e*x)^(1 + m)*Hypergeometric2F1[1,
 (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(8*a^3*b^2*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 468

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(-(b*c - a*d))*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(a
*b*e*n*(p + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(a*b*n*
(p + 1)), Int[(e*x)^m*(a + b*x^n)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e,
m, n}, x] && NeQ[b*c - a*d, 0] && LtQ[p, -1] && (( !IntegerQ[p + 1/2] && Ne
Q[p, -5/4]) ||  !RationalQ[m] || (IGtQ[n, 0] && ILtQ[p + 1/2, 0] && LeQ[-1,
 m, (-n)*(p + 1)]))
```

Rule 591

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
```

```
a*f])
```

Rubi steps

$$\text{integral} = \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)}{4abe\left(a+bx^2\right)^2} - \frac{\int \frac{(ex)^m\left(-c(Ab(3-m)+aB(1+m))-d(Ab(1-m)+aB(3+m))x^2\right)}{\left(a+bx^2\right)^2}\,dx}{4ab}$$

$$= -\frac{(Ab(ad(1-m)-bc(3-m))-aB(bc(1+m)-ad(3+m)))(ex)^{1+m}}{8a^2b^2e\left(a+bx^2\right)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)}{4abe\left(a+bx^2\right)^2} - \frac{(bc(-1+m)(Ab(3-m)+aB(1+m))-ad(1+m)(Ab(1-m)+aB(3+m)))\int \frac{(ex)^m}{a+bx^2}\,dx}{8a^2b^2}$$

$$= -\frac{(Ab(ad(1-m)-bc(3-m))-aB(bc(1+m)-ad(3+m)))(ex)^{1+m}}{8a^2b^2e\left(a+bx^2\right)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)}{4abe\left(a+bx^2\right)^2} + \frac{(Ab(1-m)(bc(3-m)+ad(1+m))+aB(1+m)(bc(1-m)+ad(3+m)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2}\right.}{8a^3b^2e(1+m)}$$

Mathematica [A] (verified)

Time = 0.42 (sec) , antiderivative size = 133, normalized size of antiderivative = 0.64

$$\int \frac{(ex)^m\left(A+Bx^2\right)\left(c+dx^2\right)}{\left(a+bx^2\right)^3}\,dx = \frac{x(ex)^m\left(a^2Bd\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)+a(bBc+Abd-2aBd)\,\text{Hypergeometric2F1}\left(2,\right.\right.}{a^3b^2(1+m)}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2)*(c + d*x^2))/(a + b*x^2)^3,x]
```

```
[Out] (x*(e*x)^m*(a^2*B*d*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)
] + a*(b*B*c + A*b*d - 2*a*B*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2,
-((b*x^2)/a)] + (A*b - a*B)*(b*c - a*d)*Hypergeometric2F1[3, (1 + m)/2, (3
+ m)/2, -((b*x^2)/a)]))/(a^3*b^2*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (x^2B + A)(d\,x^2 + c)}{(b\,x^2 + a)^3} dx$$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a)^3,x)
```

```
[Out] int((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a)^3,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)}{(a + bx^2)^3} dx = \int \frac{(Bx^2 + A)(dx^2 + c)(ex)^m}{(bx^2 + a)^3} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a)^3,x, algorithm="fricas")
```

```
[Out] integral((B*d*x^4 + (B*c + A*d)*x^2 + A*c)*(e*x)^m/(b^3*x^6 + 3*a*b^2*x^4 +
 3*a^2*b*x^2 + a^3), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 96.01 (sec) , antiderivative size = 6411, normalized size of antiderivative = 30.67

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)}{(a + bx^2)^3} dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)/(b*x**2+a)**3,x)
```

```
[Out] A*c*(a**2*e**m*m**3*x**(m + 1)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 +
1/2)*gamma(m/2 + 1/2)/(32*a**5*gamma(m/2 + 3/2) + 64*a**4*b*x**2*gamma(m/2
+ 3/2) + 32*a**3*b**2*x**4*gamma(m/2 + 3/2)) - 3*a**2*e**m*m**2*x**(m + 1)*
lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*a**5*
gamma(m/2 + 3/2) + 64*a**4*b*x**2*gamma(m/2 + 3/2) + 32*a**3*b**2*x**4*gamm
a(m/2 + 3/2)) - 2*a**2*e**m*m**2*x**(m + 1)*gamma(m/2 + 1/2)/(32*a**5*gamma
(m/2 + 3/2) + 64*a**4*b*x**2*gamma(m/2 + 3/2) + 32*a**3*b**2*x**4*gamma(m/2
 + 3/2)) - a**2*e**m*m*x**(m + 1)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2
 + 1/2)*gamma(m/2 + 1/2)/(32*a**5*gamma(m/2 + 3/2) + 64*a**4*b*x**2*gamma(m
/2 + 3/2) + 32*a**3*b**2*x**4*gamma(m/2 + 3/2)) + 8*a**2*e**m*m*x**(m + 1)*
gamma(m/2 + 1/2)/(32*a**5*gamma(m/2 + 3/2) + 64*a**4*b*x**2*gamma(m/2 + 3/2
) + 32*a**3*b**2*x**4*gamma(m/2 + 3/2)) + 3*a**2*e**m*x**(m + 1)*lerchphi(b
*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*a**5*gamma(m/2
+ 3/2) + 64*a**4*b*x**2*gamma(m/2 + 3/2) + 32*a**3*b**2*x**4*gamma(m/2 + 3/
2)) + 10*a**2*e**m*x**(m + 1)*gamma(m/2 + 1/2)/(32*a**5*gamma(m/2 + 3/2) +
```

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64*a**4*b*x**2*gamma(m/2 + 3/2) + 32*a**3*b**2*x**4*gamma(m/2 + 3/2)) + 2*a
*b*e**m*m**3*x**2*x**(m + 1)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/
2)*gamma(m/2 + 1/2)/(32*a**5*gamma(m/2 + 3/2) + 64*a**4*b*x**2*gamma(m/2 +
3/2) + 32*a**3*b**2*x**4*gamma(m/2 + 3/2)) - 6*a*b*e**m*m**2*x**2*x**(m + 1
)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*a**
5*gamma(m/2 + 3/2) + 64*a**4*b*x**2*gamma(m/2 + 3/2) + 32*a**3*b**2*x**4*ga
mma(m/2 + 3/2)) - 2*a*b*e**m*m**2*x**2*x**(m + 1)*gamma(m/2 + 1/2)/(32*a**5
*gamma(m/2 + 3/2) + 64*a**4*b*x**2*gamma(m/2 + 3/2) + 32*a**3*b**2*x**4*gam
ma(m/2 + 3/2)) - 2*a*b*e**m*m*x**2*x**(m + 1)*lerchphi(b*x**2*exp_polar(I*p
i)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*a**5*gamma(m/2 + 3/2) + 64*a**4*b*
x**2*gamma(m/2 + 3/2) + 32*a**3*b**2*x**4*gamma(m/2 + 3/2)) + 4*a*b*e**m*m*
x**2*x**(m + 1)*gamma(m/2 + 1/2)/(32*a**5*gamma(m/2 + 3/2) + 64*a**4*b*x**2
*gamma(m/2 + 3/2) + 32*a**3*b**2*x**4*gamma(m/2 + 3/2)) + 6*a*b*e**m*x**2*x
**(m + 1)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)
/(32*a**5*gamma(m/2 + 3/2) + 64*a**4*b*x**2*gamma(m/2 + 3/2) + 32*a**3*b**2
*x**4*gamma(m/2 + 3/2)) + 6*a*b*e**m*x**2*x**(m + 1)*gamma(m/2 + 1/2)/(32*a
**5*gamma(m/2 + 3/2) + 64*a**4*b*x**2*gamma(m/2 + 3/2) + 32*a**3*b**2*x**4*
gamma(m/2 + 3/2)) + b**2*e**m*m**3*x**4*x**(m + 1)*lerchphi(b*x**2*exp_pola
r(I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*a**5*gamma(m/2 + 3/2) + 64*a*
*4*b*x**2*gamma(m/2 + 3/2) + 32*a**3*b**2*x**4*gamma(m/2 + 3/2)) - 3*b**2*e
**m*m**2*x**4*x**(m + 1)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*g
amma(m/2 + 1/2)/(32*a**5*gamma(m/2 + 3/2) + 64*a**4*b*x**2*gamma(m/2 + 3/2)
 + 32*a**3*b**2*x**4*gamma(m/2 + 3/2)) - b**2*e**m*m*x**4*x**(m + 1)*lerchp
hi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*a**5*gamma(
m/2 + 3/2) + 64*a**4*b*x**2*gamma(m/2 + 3/2) + 32*a**3*b**2*x**4*gamma(m/2
+ 3/2)) + 3*b**2*e**m*x**4*x**(m + 1)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1,
 m/2 + 1/2)*gamma(m/2 + 1/2)/(32*a**5*gamma(m/2 + 3/2) + 64*a**4*b*x**2*gam
ma(m/2 + 3/2) + 32*a**3*b**2*x**4*gamma(m/2 + 3/2))) + A*d*(a**2*e**m*m**3*
x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2
)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**
2*x**4*gamma(m/2 + 5/2)) + 3*a**2*e**m*m**2*x**(m + 3)*lerchphi(b*x**2*exp_
polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 6
4*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) - 2*a*
*2*e**m*m**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**
4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) - a**2*e**m
*m*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 +
3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*
b**2*x**4*gamma(m/2 + 5/2)) - 3*a**2*e**m*x**(m + 3)*lerchphi(b*x**2*exp_po
lar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*
a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) + 18*a**
2*e**m*x**(m + 3)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x*
*2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) + 2*a*b*e**m*m**3
*x**2*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2
 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a*
*3*b**2*x**4*gamma(m/2 + 5/2)) + 6*a*b*e**m*m**2*x**2*x**(m + 3)*lerchphi(b
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*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2
+ 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/
2)) - 2*a*b*e**m*m**2*x**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 +
 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2
)) - 2*a*b*e**m*m*x**2*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2
 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m
/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) - 4*a*b*e**m*m*x**2*x**(m +
 3)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 +
 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) - 6*a*b*e**m*x**2*x**(m + 3)*le
rchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*ga
mma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(
m/2 + 5/2)) + 6*a*b*e**m*x**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/
2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 +
5/2)) + b**2*e**m*m**3*x**4*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1
, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*ga
mma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) + 3*b**2*e**m*m**2*x**
4*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3
/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b
**2*x**4*gamma(m/2 + 5/2)) - b**2*e**m*m*x**4*x**(m + 3)*lerchphi(b*x**2*ex
p_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) +
 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) - 3*
b**2*e**m*x**4*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*
gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2
) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2))) + B*c*(a**2*e**m*m**3*x**(m + 3)*l
erchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*g
amma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma
(m/2 + 5/2)) + 3*a**2*e**m*m**2*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/
a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**
2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) - 2*a**2*e**m*m**2
*x**(m + 3)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gam
ma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) - a**2*e**m*m*x**(m + 3
)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**
5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*ga
mma(m/2 + 5/2)) - 3*a**2*e**m*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a,
 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*
gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) + 18*a**2*e**m*x**(m
 + 3)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2
 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) + 2*a*b*e**m*m**3*x**2*x**(m
+ 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*
a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4
*gamma(m/2 + 5/2)) + 6*a*b*e**m*m**2*x**2*x**(m + 3)*lerchphi(b*x**2*exp_po
lar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*
a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) - 2*a*b*
e**m*m**2*x**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a
**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) - 2*a*b*e
```

```
**m*m*x**2*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamm
a(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) +
32*a**3*b**2*x**4*gamma(m/2 + 5/2)) - 4*a*b*e**m*m*x**2*x**(m + 3)*gamma(m/
2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a
**3*b**2*x**4*gamma(m/2 + 5/2)) - 6*a*b*e**m*x**2*x**(m + 3)*lerchphi(b*x**
2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/
2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2))
 + 6*a*b*e**m*x**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 6
4*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) + b**2
*e**m*m**3*x**4*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)
*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/
2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) + 3*b**2*e**m*m**2*x**4*x**(m + 3)
*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5
*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gam
ma(m/2 + 5/2)) - b**2*e**m*m*x**4*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi
)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x
**2*gamma(m/2 + 5/2) + 32*a**3*b**2*x**4*gamma(m/2 + 5/2)) - 3*b**2*e**m*x*
*4*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 +
3/2)/(32*a**5*gamma(m/2 + 5/2) + 64*a**4*b*x**2*gamma(m/2 + 5/2) + 32*a**3*
b**2*x**4*gamma(m/2 + 5/2))) + B*d*(a**2*e**m*m**3*x**(m + 5)*lerchphi(b*x*
*2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(32*a**5*gamma(m/2 + 7
/2) + 64*a**4*b*x**2*gamma(m/2 + 7/2) + 32*a**3*b**2*x**4*gamma(m/2 + 7/2))
 + 9*a**2*e**m*m**2*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 +
5/2)*gamma(m/2 + 5/2)/(32*a**5*gamma(m/2 + 7/2) + 64*a**4*b*x**2*gamma(m/2
+ 7/2) + 32*a**3*b**2*x**4*gamma(m/2 + 7/2)) - 2*a**2*e**m*m**2*x**(m + 5)*
gamma(m/2 + 5/2)/(32*a**5*gamma(m/2 + 7/2) + 64*a**4*b*x**2*gamma(m/2 + 7/2
) + 32*a**3*b**2*x**4*gamma(m/2 + 7/2)) + 23*a**2*e**m*m*x**(m + 5)*lerchph
i(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(32*a**5*gamma(m
/2 + 7/2) + 64*a**4*b*x**2*gamma(m/2 + 7/2) + 32*a**3*b**2*x**4*gamma(m/2 +
 7/2)) - 8*a**2*e**m*m*x**(m + 5)*gamma(m/2 + 5/2)/(32*a**5*gamma(m/2 + 7/2
) + 64*a**4*b*x**2*gamma(m/2 + 7/2) + 32*a**3*b**2*x**4*gamma(m/2 + 7/2)) +
 15*a**2*e**m*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*g
amma(m/2 + 5/2)/(32*a**5*gamma(m/2 + 7/2) + 64*a**4*b*x**2*gamma(m/2 + 7/2)
 + 32*a**3*b**2*x**4*gamma(m/2 + 7/2)) + 10*a**2*e**m*x**(m + 5)*gamma(m/2
+ 5/2)/(32*a**5*gamma(m/2 + 7/2) + 64*a**4*b*x**2*gamma(m/2 + 7/2) + 32*a**
3*b**2*x**4*gamma(m/2 + 7/2)) + 2*a*b*e**m*m**3*x**2*x**(m + 5)*lerchphi(b*
x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(32*a**5*gamma(m/2 +
 7/2) + 64*a**4*b*x**2*gamma(m/2 + 7/2) + 32*a**3*b**2*x**4*gamma(m/2 + 7/2
)) + 18*a*b*e**m*m**2*x**2*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1,
 m/2 + 5/2)*gamma(m/2 + 5/2)/(32*a**5*gamma(m/2 + 7/2) + 64*a**4*b*x**2*gam
ma(m/2 + 7/2) + 32*a**3*b**2*x**4*gamma(m/2 + 7/2)) - 2*a*b*e**m*m**2*x**2*
x**(m + 5)*gamma(m/2 + 5/2)/(32*a**5*gamma(m/2 + 7/2) + 64*a**4*b*x**2*gamm
a(m/2 + 7/2) + 32*a**3*b**2*x**4*gamma(m/2 + 7/2)) + 46*a*b*e**m*m*x**2*x**
(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(
32*a**5*gamma(m/2 + 7/2) + 64*a**4*b*x**2*gamma(m/2 + 7/2) + 32*a**3*b**2*x
```

```
**4*gamma(m/2 + 7/2)) - 12*a*b*e**m*m*x**2*x**(m + 5)*gamma(m/2 + 5/2)/(32*
a**5*gamma(m/2 + 7/2) + 64*a**4*b*x**2*gamma(m/2 + 7/2) + 32*a**3*b**2*x**4
*gamma(m/2 + 7/2)) + 30*a*b*e**m*x**2*x**(m + 5)*lerchphi(b*x**2*exp_polar(
I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(32*a**5*gamma(m/2 + 7/2) + 64*a**4
*b*x**2*gamma(m/2 + 7/2) + 32*a**3*b**2*x**4*gamma(m/2 + 7/2)) - 10*a*b*e**
m*x**2*x**(m + 5)*gamma(m/2 + 5/2)/(32*a**5*gamma(m/2 + 7/2) + 64*a**4*b*x*
*2*gamma(m/2 + 7/2) + 32*a**3*b**2*x**4*gamma(m/2 + 7/2)) + b**2*e**m*m**3*
x**4*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2
+ 5/2)/(32*a**5*gamma(m/2 + 7/2) + 64*a**4*b*x**2*gamma(m/2 + 7/2) + 32*a**
3*b**2*x**4*gamma(m/2 + 7/2)) + 9*b**2*e**m*m**2*x**4*x**(m + 5)*lerchphi(b
*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(32*a**5*gamma(m/2
+ 7/2) + 64*a**4*b*x**2*gamma(m/2 + 7/2) + 32*a**3*b**2*x**4*gamma(m/2 + 7/
2)) + 23*b**2*e**m*m*x**4*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1,
m/2 + 5/2)*gamma(m/2 + 5/2)/(32*a**5*gamma(m/2 + 7/2) + 64*a**4*b*x**2*gamm
a(m/2 + 7/2) + 32*a**3*b**2*x**4*gamma(m/2 + 7/2)) + 15*b**2*e**m*x**4*x**(
m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(3
2*a**5*gamma(m/2 + 7/2) + 64*a**4*b*x**2*gamma(m/2 + 7/2) + 32*a**3*b**2*x*
*4*gamma(m/2 + 7/2)))
```

Maxima [F]

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)}{(a + bx^2)^3} \, dx = \int \frac{(Bx^2 + A)(dx^2 + c)(ex)^m}{(bx^2 + a)^3} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a)^3,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)*(e*x)^m/(b*x^2 + a)^3, x)
```

Giac [F]

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)}{(a + bx^2)^3} \, dx = \int \frac{(Bx^2 + A)(dx^2 + c)(ex)^m}{(bx^2 + a)^3} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)/(b*x^2+a)^3,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)*(e*x)^m/(b*x^2 + a)^3, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)}{(a+bx^2)^3}\,dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(d\,x^2+c)}{(b\,x^2+a)^3}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(c + d*x^2))/(a + b*x^2)^3,x)
[Out] int(((A + B*x^2)*(e*x)^m*(c + d*x^2))/(a + b*x^2)^3, x)
```

3.8 $\int (ex)^m (a+bx^2)^3 (A+Bx^2) (c+dx^2)^2 \, dx$

Optimal result

Integrand size = 31, antiderivative size = 292

$$
\begin{aligned}
&\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx \\
&= \frac{a^3Ac^2(ex)^{1+m}}{e(1+m)} + \frac{a^2c(3Abc+aBc+2aAd)(ex)^{3+m}}{e^3(3+m)} \\
&\quad + \frac{a(aBc(3bc+2ad)+A(3b^2c^2+6abcd+a^2d^2))\,(ex)^{5+m}}{e^5(5+m)} \\
&\quad + \frac{(aB(3b^2c^2+6abcd+a^2d^2)+Ab(b^2c^2+6abcd+3a^2d^2))\,(ex)^{7+m}}{e^7(7+m)} \\
&\quad + \frac{b(3a^2Bd^2+3abd(2Bc+Ad)+b^2c(Bc+2Ad))\,(ex)^{9+m}}{e^9(9+m)} \\
&\quad + \frac{b^2d(2bBc+Abd+3aBd)(ex)^{11+m}}{e^{11}(11+m)} + \frac{b^3Bd^2(ex)^{13+m}}{e^{13}(13+m)}
\end{aligned}
$$

```
[Out] a^3*A*c^2*(e*x)^(1+m)/e/(1+m)+a^2*c*(2*A*a*d+3*A*b*c+B*a*c)*(e*x)^(3+m)/e^3
/(3+m)+a*(a*B*c*(2*a*d+3*b*c)+A*(a^2*d^2+6*a*b*c*d+3*b^2*c^2))*(e*x)^(5+m)/
e^5/(5+m)+(a*B*(a^2*d^2+6*a*b*c*d+3*b^2*c^2)+A*b*(3*a^2*d^2+6*a*b*c*d+b^2*c
^2))*(e*x)^(7+m)/e^7/(7+m)+b*(3*a^2*B*d^2+3*a*b*d*(A*d+2*B*c)+b^2*c*(2*A*d+
B*c))*(e*x)^(9+m)/e^9/(9+m)+b^2*d*(A*b*d+3*B*a*d+2*B*b*c)*(e*x)^(11+m)/e^11
/(11+m)+b^3*B*d^2*(e*x)^(13+m)/e^13/(13+m)
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 292, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.032, Rules used = {584}

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx$$
$$= \frac{a^3Ac^2(ex)^{m+1}}{e(m+1)} + \frac{(ex)^{m+7}\left(Ab(3a^2d^2+6abcd+b^2c^2)+aB(a^2d^2+6abcd+3b^2c^2)\right)}{e^7(m+7)}$$
$$+ \frac{a(ex)^{m+5}\left(A(a^2d^2+6abcd+3b^2c^2)+aBc(2ad+3bc)\right)}{e^5(m+5)}$$
$$+ \frac{b(ex)^{m+9}\left(3a^2Bd^2+3abd(Ad+2Bc)+b^2c(2Ad+Bc)\right)}{e^9(m+9)}$$
$$+ \frac{a^2c(ex)^{m+3}(2aAd+aBc+3Abc)}{e^3(m+3)}$$
$$+ \frac{b^2d(ex)^{m+11}(3aBd+Abd+2bBc)}{e^{11}(m+11)} + \frac{b^3Bd^2(ex)^{m+13}}{e^{13}(m+13)}$$

```
[In] Int[(e*x)^m*(a + b*x^2)^3*(A + B*x^2)*(c + d*x^2)^2,x]
```

```
[Out] (a^3*A*c^2*(e*x)^(1 + m))/(e*(1 + m)) + (a^2*c*(3*A*b*c + a*B*c + 2*a*A*d)*
(e*x)^(3 + m))/(e^3*(3 + m)) + (a*(a*B*c*(3*b*c + 2*a*d) + A*(3*b^2*c^2 + 6
*a*b*c*d + a^2*d^2))*(e*x)^(5 + m))/(e^5*(5 + m)) + ((a*B*(3*b^2*c^2 + 6*a*
b*c*d + a^2*d^2) + A*b*(b^2*c^2 + 6*a*b*c*d + 3*a^2*d^2))*(e*x)^(7 + m))/(e
^7*(7 + m)) + (b*(3*a^2*B*d^2 + 3*a*b*d*(2*B*c + A*d) + b^2*c*(B*c + 2*A*d)
)*(e*x)^(9 + m))/(e^9*(9 + m)) + (b^2*d*(2*b*B*c + A*b*d + 3*a*B*d)*(e*x)^(
11 + m))/(e^11*(11 + m)) + (b^3*B*d^2*(e*x)^(13 + m))/(e^13*(13 + m))
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \int \left(a^3Ac^2(ex)^m + \frac{a^2c(3Abc+aBc+2aAd)(ex)^{2+m}}{e^2} + \frac{a(aBc(3bc+2ad)+A(3b^2c^2+6abcd+a^2d^2))\,(ex)^{4+m}}{e^4} + \frac{(aB(3b^2c^2+6abcd+a^2d^2)+Ab(b^2c^2+6abcd+3a^2d^2))\,(ex)^{6+m}}{e^6} + \frac{b(3a^2Bd^2+3abd(2Bc+Ad)+b^2c(Bc+2Ad))\,(ex)^{8+m}}{e^8} + \frac{b^2d(2bBc+Abd+3aBd)(ex)^{10+m}}{e^{10}} + \frac{b^3Bd^2(ex)^{12+m}}{e^{12}}\right) dx \\ &= \frac{a^3Ac^2(ex)^{1+m}}{e(1+m)} + \frac{a^2c(3Abc+aBc+2aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{a(aBc(3bc+2ad)+A(3b^2c^2+6abcd+a^2d^2))\,(ex)^{5+m}}{e^5(5+m)} + \frac{(aB(3b^2c^2+6abcd+a^2d^2)+Ab(b^2c^2+6abcd+3a^2d^2))\,(ex)^{7+m}}{e^7(7+m)} + \frac{b(3a^2Bd^2+3abd(2Bc+Ad)+b^2c(Bc+2Ad))\,(ex)^{9+m}}{e^9(9+m)} + \frac{b^2d(2bBc+Abd+3aBd)(ex)^{11+m}}{e^{11}(11+m)} + \frac{b^3Bd^2(ex)^{13+m}}{e^{13}(13+m)}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.70 (sec) , antiderivative size = 247, normalized size of antiderivative = 0.85

$$\begin{aligned}&\int (ex)^m\left(a+bx^2\right)^3\left(A+Bx^2\right)\left(c+dx^2\right)^2\,dx \\ &= x(ex)^m\left(\frac{a^3Ac^2}{1+m} + \frac{a^2c(3Abc+aBc+2aAd)x^2}{3+m} + \frac{a(aBc(3bc+2ad)+A(3b^2c^2+6abcd+a^2d^2))\,x^4}{5+m} + \frac{(aB(3b^2c^2+6abcd+a^2d^2)+Ab(b^2c^2+6abcd+3a^2d^2))\,x^6}{7+m} + \frac{b(3a^2Bd^2+3abd(2Bc+Ad)+b^2c(Bc+2Ad))\,x^8}{9+m} + \frac{b^2d(2bBc+Abd+3aBd)x^{10}}{11+m} + \frac{b^3Bd^2x^{12}}{13+m}\right)\end{aligned}$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)^3*(A + B*x^2)*(c + d*x^2)^2,x]
```

```
[Out] x*(e*x)^m*((a^3*A*c^2)/(1 + m) + (a^2*c*(3*A*b*c + a*B*c + 2*a*A*d)*x^2)/(3
 + m) + (a*(a*B*c*(3*b*c + 2*a*d) + A*(3*b^2*c^2 + 6*a*b*c*d + a^2*d^2))*x^
4)/(5 + m) + ((a*B*(3*b^2*c^2 + 6*a*b*c*d + a^2*d^2) + A*b*(b^2*c^2 + 6*a*b
*c*d + 3*a^2*d^2))*x^6)/(7 + m) + (b*(3*a^2*B*d^2 + 3*a*b*d*(2*B*c + A*d) +
 b^2*c*(B*c + 2*A*d))*x^8)/(9 + m) + (b^2*d*(2*b*B*c + A*b*d + 3*a*B*d)*x^1
0)/(11 + m) + (b^3*B*d^2*x^12)/(13 + m))
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 2442 vs. 2(292) = 584.

Time = 3.74 (sec) , antiderivative size = 2443, normalized size of antiderivative = 8.37

method	result	size
gosper	Expression too large to display	2443
risch	Expression too large to display	2443
parallelrisch	Expression too large to display	3284

```
[In] int((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c)^2,x,method=_RETURNVERBOSE)
```

```
[Out] x*(B*b^3*d^2*m^6*x^12+36*B*b^3*d^2*m^5*x^12+A*b^3*d^2*m^6*x^10+3*B*a*b^2*d^
2*m^6*x^10+2*B*b^3*c*d*m^6*x^10+505*B*b^3*d^2*m^4*x^12+38*A*b^3*d^2*m^5*x^1
0+114*B*a*b^2*d^2*m^5*x^10+76*B*b^3*c*d*m^5*x^10+3480*B*b^3*d^2*m^3*x^12+3*
A*a*b^2*d^2*m^6*x^8+2*A*b^3*c*d*m^6*x^8+555*A*b^3*d^2*m^4*x^10+3*B*a^2*b*d^
2*m^6*x^8+6*B*a*b^2*c*d*m^6*x^8+1665*B*a*b^2*d^2*m^4*x^10+B*b^3*c^2*m^6*x^8
+1110*B*b^3*c*d*m^4*x^10+12139*B*b^3*d^2*m^2*x^12+120*A*a*b^2*d^2*m^5*x^8+8
0*A*b^3*c*d*m^5*x^8+3940*A*b^3*d^2*m^3*x^10+120*B*a^2*b*d^2*m^5*x^8+240*B*a
*b^2*c*d*m^5*x^8+11820*B*a*b^2*d^2*m^3*x^10+40*B*b^3*c^2*m^5*x^8+7880*B*b^3
*c*d*m^3*x^10+19524*B*b^3*d^2*m*x^12+3*A*a^2*b*d^2*m^6*x^6+6*A*a*b^2*c*d*m^
6*x^6+1839*A*a*b^2*d^2*m^4*x^8+A*b^3*c^2*m^6*x^6+1226*A*b^3*c*d*m^4*x^8+140
39*A*b^3*d^2*m^2*x^10+B*a^3*d^2*m^6*x^6+6*B*a^2*b*c*d*m^6*x^6+1839*B*a^2*b*
d^2*m^4*x^8+3*B*a*b^2*c^2*m^6*x^6+3678*B*a*b^2*c*d*m^4*x^8+42117*B*a*b^2*d^
2*m^2*x^10+613*B*b^3*c^2*m^4*x^8+28078*B*b^3*c*d*m^2*x^10+10395*B*b^3*d^2*x
^12+126*A*a^2*b*d^2*m^5*x^6+252*A*a*b^2*c*d*m^5*x^6+13584*A*a*b^2*d^2*m^3*x
^8+42*A*b^3*c^2*m^5*x^6+9056*A*b^3*c*d*m^3*x^8+22902*A*b^3*d^2*m*x^10+42*B*
a^3*d^2*m^5*x^6+252*B*a^2*b*c*d*m^5*x^6+13584*B*a^2*b*d^2*m^3*x^8+126*B*a*b
^2*c^2*m^5*x^6+27168*B*a*b^2*c*d*m^3*x^8+68706*B*a*b^2*d^2*m*x^10+4528*B*b^
3*c^2*m^3*x^8+45804*B*b^3*c*d*m*x^10+A*a^3*d^2*m^6*x^4+6*A*a^2*b*c*d*m^6*x^
4+2037*A*a^2*b*d^2*m^4*x^6+3*A*a*b^2*c^2*m^6*x^4+4074*A*a*b^2*c*d*m^4*x^6+4
9881*A*a*b^2*d^2*m^2*x^8+679*A*b^3*c^2*m^4*x^6+33254*A*b^3*c*d*m^2*x^8+1228
5*A*b^3*d^2*x^10+2*B*a^3*c*d*m^6*x^4+679*B*a^3*d^2*m^4*x^6+3*B*a^2*b*c^2*m^
6*x^4+4074*B*a^2*b*c*d*m^4*x^6+49881*B*a^2*b*d^2*m^2*x^8+2037*B*a*b^2*c^2*m
^4*x^6+99762*B*a*b^2*c*d*m^2*x^8+36855*B*a*b^2*d^2*x^10+16627*B*b^3*c^2*m^2
*x^8+24570*B*b^3*c*d*x^10+44*A*a^3*d^2*m^5*x^4+264*A*a^2*b*c*d*m^5*x^4+1587
6*A*a^2*b*d^2*m^3*x^6+132*A*a*b^2*c^2*m^5*x^4+31752*A*a*b^2*c*d*m^3*x^6+830
```

```
64*A*a*b^2*d^2*m*x^8+5292*A*b^3*c^2*m^3*x^6+55376*A*b^3*c*d*m*x^8+88*B*a^3*
c*d*m^5*x^4+5292*B*a^3*d^2*m^3*x^6+132*B*a^2*b*c^2*m^5*x^4+31752*B*a^2*b*c*
d*m^3*x^6+83064*B*a^2*b*d^2*m*x^8+15876*B*a*b^2*c^2*m^3*x^6+166128*B*a*b^2*
c*d*m*x^8+27688*B*b^3*c^2*m*x^8+2*A*a^3*c*d*m^6*x^2+753*A*a^3*d^2*m^4*x^4+3
*A*a^2*b*c^2*m^6*x^2+4518*A*a^2*b*c*d*m^4*x^4+61005*A*a^2*b*d^2*m^2*x^6+225
9*A*a*b^2*c^2*m^4*x^4+122010*A*a*b^2*c*d*m^2*x^6+45045*A*a*b^2*d^2*x^8+2033
5*A*b^3*c^2*m^2*x^6+30030*A*b^3*c*d*x^8+B*a^3*c^2*m^6*x^2+1506*B*a^3*c*d*m^
4*x^4+20335*B*a^3*d^2*m^2*x^6+2259*B*a^2*b*c^2*m^4*x^4+122010*B*a^2*b*c*d*m
^2*x^6+45045*B*a^2*b*d^2*x^8+61005*B*a*b^2*c^2*m^2*x^6+90090*B*a*b^2*c*d*x^
8+15015*B*b^3*c^2*x^8+92*A*a^3*c*d*m^5*x^2+6280*A*a^3*d^2*m^3*x^4+138*A*a^2
*b*c^2*m^5*x^2+37680*A*a^2*b*c*d*m^3*x^4+104958*A*a^2*b*d^2*m*x^6+18840*A*a
*b^2*c^2*m^3*x^4+209916*A*a*b^2*c*d*m*x^6+34986*A*b^3*c^2*m*x^6+46*B*a^3*c^
2*m^5*x^2+12560*B*a^3*c*d*m^3*x^4+34986*B*a^3*d^2*m*x^6+18840*B*a^2*b*c^2*m
^3*x^4+209916*B*a^2*b*c*d*m*x^6+104958*B*a*b^2*c^2*m*x^6+A*a^3*c^2*m^6+1670
*A*a^3*c*d*m^4*x^2+25979*A*a^3*d^2*m^2*x^4+2505*A*a^2*b*c^2*m^4*x^2+155874*
A*a^2*b*c*d*m^2*x^4+57915*A*a^2*b*d^2*x^6+77937*A*a*b^2*c^2*m^2*x^4+115830*
A*a*b^2*c*d*x^6+19305*A*b^3*c^2*x^6+835*B*a^3*c^2*m^4*x^2+51958*B*a^3*c*d*m
^2*x^4+19305*B*a^3*d^2*x^6+77937*B*a^2*b*c^2*m^2*x^4+115830*B*a^2*b*c*d*x^6
+57915*B*a*b^2*c^2*x^6+48*A*a^3*c^2*m^5+15080*A*a^3*c*d*m^3*x^2+47436*A*a^3
*d^2*m*x^4+22620*A*a^2*b*c^2*m^3*x^2+284616*A*a^2*b*c*d*m*x^4+142308*A*a*b^
2*c^2*m*x^4+7540*B*a^3*c^2*m^3*x^2+94872*B*a^3*c*d*m*x^4+142308*B*a^2*b*c^2
*m*x^4+925*A*a^3*c^2*m^4+69518*A*a^3*c*d*m^2*x^2+27027*A*a^3*d^2*x^4+104277
*A*a^2*b*c^2*m^2*x^2+162162*A*a^2*b*c*d*x^4+81081*A*a*b^2*c^2*x^4+34759*B*a
^3*c^2*m^2*x^2+54054*B*a^3*c*d*x^4+81081*B*a^2*b*c^2*x^4+9120*A*a^3*c^2*m^3
+146108*A*a^3*c*d*m*x^2+219162*A*a^2*b*c^2*m*x^2+73054*B*a^3*c^2*m*x^2+4825
9*A*a^3*c^2*m^2+90090*A*a^3*c*d*x^2+135135*A*a^2*b*c^2*x^2+45045*B*a^3*c^2*
x^2+129072*A*a^3*c^2*m+135135*A*a^3*c^2)*(e*x)^m/(13+m)/(11+m)/(9+m)/(7+m)/
(5+m)/(3+m)/(1+m)
```

Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1711 vs. $2(292) = 584$.

Time = 0.30 (sec) , antiderivative size = 1711, normalized size of antiderivative = 5.86

$$\int (ex)^m \left(a + bx^2\right)^3 \left(A + Bx^2\right) \left(c + dx^2\right)^2 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="fricas")
```

```
[Out] ((B*b^3*d^2*m^6 + 36*B*b^3*d^2*m^5 + 505*B*b^3*d^2*m^4 + 3480*B*b^3*d^2*m^3
 + 12139*B*b^3*d^2*m^2 + 19524*B*b^3*d^2*m + 10395*B*b^3*d^2)*x^13 + ((2*B*
b^3*c*d + (3*B*a*b^2 + A*b^3)*d^2)*m^6 + 24570*B*b^3*c*d + 38*(2*B*b^3*c*d
+ (3*B*a*b^2 + A*b^3)*d^2)*m^5 + 555*(2*B*b^3*c*d + (3*B*a*b^2 + A*b^3)*d^2
)*m^4 + 3940*(2*B*b^3*c*d + (3*B*a*b^2 + A*b^3)*d^2)*m^3 + 12285*(3*B*a*b^2
 + A*b^3)*d^2 + 14039*(2*B*b^3*c*d + (3*B*a*b^2 + A*b^3)*d^2)*m^2 + 22902*(
```

```
2*B*b^3*c*d + (3*B*a*b^2 + A*b^3)*d^2)*m)*x^11 + ((B*b^3*c^2 + 2*(3*B*a*b^2
 + A*b^3)*c*d + 3*(B*a^2*b + A*a*b^2)*d^2)*m^6 + 15015*B*b^3*c^2 + 40*(B*b^
3*c^2 + 2*(3*B*a*b^2 + A*b^3)*c*d + 3*(B*a^2*b + A*a*b^2)*d^2)*m^5 + 613*(B
*b^3*c^2 + 2*(3*B*a*b^2 + A*b^3)*c*d + 3*(B*a^2*b + A*a*b^2)*d^2)*m^4 + 452
8*(B*b^3*c^2 + 2*(3*B*a*b^2 + A*b^3)*c*d + 3*(B*a^2*b + A*a*b^2)*d^2)*m^3 +
 30030*(3*B*a*b^2 + A*b^3)*c*d + 45045*(B*a^2*b + A*a*b^2)*d^2 + 16627*(B*b
^3*c^2 + 2*(3*B*a*b^2 + A*b^3)*c*d + 3*(B*a^2*b + A*a*b^2)*d^2)*m^2 + 27688
*(B*b^3*c^2 + 2*(3*B*a*b^2 + A*b^3)*c*d + 3*(B*a^2*b + A*a*b^2)*d^2)*m)*x^9
 + (((3*B*a*b^2 + A*b^3)*c^2 + 6*(B*a^2*b + A*a*b^2)*c*d + (B*a^3 + 3*A*a^2
*b)*d^2)*m^6 + 42*((3*B*a*b^2 + A*b^3)*c^2 + 6*(B*a^2*b + A*a*b^2)*c*d + (B
*a^3 + 3*A*a^2*b)*d^2)*m^5 + 679*((3*B*a*b^2 + A*b^3)*c^2 + 6*(B*a^2*b + A*
a*b^2)*c*d + (B*a^3 + 3*A*a^2*b)*d^2)*m^4 + 5292*((3*B*a*b^2 + A*b^3)*c^2 +
 6*(B*a^2*b + A*a*b^2)*c*d + (B*a^3 + 3*A*a^2*b)*d^2)*m^3 + 19305*(3*B*a*b^
2 + A*b^3)*c^2 + 115830*(B*a^2*b + A*a*b^2)*c*d + 19305*(B*a^3 + 3*A*a^2*b)
*d^2 + 20335*((3*B*a*b^2 + A*b^3)*c^2 + 6*(B*a^2*b + A*a*b^2)*c*d + (B*a^3
+ 3*A*a^2*b)*d^2)*m^2 + 34986*((3*B*a*b^2 + A*b^3)*c^2 + 6*(B*a^2*b + A*a*b
^2)*c*d + (B*a^3 + 3*A*a^2*b)*d^2)*m)*x^7 + ((A*a^3*d^2 + 3*(B*a^2*b + A*a*
b^2)*c^2 + 2*(B*a^3 + 3*A*a^2*b)*c*d)*m^6 + 27027*A*a^3*d^2 + 44*(A*a^3*d^2
 + 3*(B*a^2*b + A*a*b^2)*c^2 + 2*(B*a^3 + 3*A*a^2*b)*c*d)*m^5 + 753*(A*a^3*
d^2 + 3*(B*a^2*b + A*a*b^2)*c^2 + 2*(B*a^3 + 3*A*a^2*b)*c*d)*m^4 + 6280*(A*
a^3*d^2 + 3*(B*a^2*b + A*a*b^2)*c^2 + 2*(B*a^3 + 3*A*a^2*b)*c*d)*m^3 + 8108
1*(B*a^2*b + A*a*b^2)*c^2 + 54054*(B*a^3 + 3*A*a^2*b)*c*d + 25979*(A*a^3*d^
2 + 3*(B*a^2*b + A*a*b^2)*c^2 + 2*(B*a^3 + 3*A*a^2*b)*c*d)*m^2 + 47436*(A*a
^3*d^2 + 3*(B*a^2*b + A*a*b^2)*c^2 + 2*(B*a^3 + 3*A*a^2*b)*c*d)*m)*x^5 + ((
2*A*a^3*c*d + (B*a^3 + 3*A*a^2*b)*c^2)*m^6 + 90090*A*a^3*c*d + 46*(2*A*a^3*
c*d + (B*a^3 + 3*A*a^2*b)*c^2)*m^5 + 835*(2*A*a^3*c*d + (B*a^3 + 3*A*a^2*b)
*c^2)*m^4 + 7540*(2*A*a^3*c*d + (B*a^3 + 3*A*a^2*b)*c^2)*m^3 + 45045*(B*a^3
 + 3*A*a^2*b)*c^2 + 34759*(2*A*a^3*c*d + (B*a^3 + 3*A*a^2*b)*c^2)*m^2 + 730
54*(2*A*a^3*c*d + (B*a^3 + 3*A*a^2*b)*c^2)*m)*x^3 + (A*a^3*c^2*m^6 + 48*A*a
^3*c^2*m^5 + 925*A*a^3*c^2*m^4 + 9120*A*a^3*c^2*m^3 + 48259*A*a^3*c^2*m^2 +
 129072*A*a^3*c^2*m + 135135*A*a^3*c^2)*x)*(e*x)^m/(m^7 + 49*m^6 + 973*m^5
+ 10045*m^4 + 57379*m^3 + 177331*m^2 + 264207*m + 135135)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 11914 vs. $2(294) = 588$.

Time = 1.36 (sec) , antiderivative size = 11914, normalized size of antiderivative = 40.80

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**3*(B*x**2+A)*(d*x**2+c)**2,x)
```

```
[Out] Piecewise(((-A*a**3*c**2/(12*x**12) - A*a**3*c*d/(5*x**10) - A*a**3*d**2/(8
*x**8) - 3*A*a**2*b*c**2/(10*x**10) - 3*A*a**2*b*c*d/(4*x**8) - A*a**2*b*d*
```

```
*2/(2*x**6) - 3*A*a*b**2*c**2/(8*x**8) - A*a*b**2*c*d/x**6 - 3*A*a*b**2*d**
2/(4*x**4) - A*b**3*c**2/(6*x**6) - A*b**3*c*d/(2*x**4) - A*b**3*d**2/(2*x*
*2) - B*a**3*c**2/(10*x**10) - B*a**3*c*d/(4*x**8) - B*a**3*d**2/(6*x**6) -
 3*B*a**2*b*c**2/(8*x**8) - B*a**2*b*c*d/x**6 - 3*B*a**2*b*d**2/(4*x**4) -
B*a*b**2*c**2/(2*x**6) - 3*B*a*b**2*c*d/(2*x**4) - 3*B*a*b**2*d**2/(2*x**2)
 - B*b**3*c**2/(4*x**4) - B*b**3*c*d/x**2 + B*b**3*d**2*log(x))/e**13, Eq(m
, -13)), ((-A*a**3*c**2/(10*x**10) - A*a**3*c*d/(4*x**8) - A*a**3*d**2/(6*x
**6) - 3*A*a**2*b*c**2/(8*x**8) - A*a**2*b*c*d/x**6 - 3*A*a**2*b*d**2/(4*x*
*4) - A*a*b**2*c**2/(2*x**6) - 3*A*a*b**2*c*d/(2*x**4) - 3*A*a*b**2*d**2/(2
*x**2) - A*b**3*c**2/(4*x**4) - A*b**3*c*d/x**2 + A*b**3*d**2*log(x) - B*a*
*3*c**2/(8*x**8) - B*a**3*c*d/(3*x**6) - B*a**3*d**2/(4*x**4) - B*a**2*b*c*
*2/(2*x**6) - 3*B*a**2*b*c*d/(2*x**4) - 3*B*a**2*b*d**2/(2*x**2) - 3*B*a*b*
*2*c**2/(4*x**4) - 3*B*a*b**2*c*d/x**2 + 3*B*a*b**2*d**2*log(x) - B*b**3*c*
*2/(2*x**2) + 2*B*b**3*c*d*log(x) + B*b**3*d**2*x**2/2)/e**11, Eq(m, -11)),
 ((-A*a**3*c**2/(8*x**8) - A*a**3*c*d/(3*x**6) - A*a**3*d**2/(4*x**4) - A*a
**2*b*c**2/(2*x**6) - 3*A*a**2*b*c*d/(2*x**4) - 3*A*a**2*b*d**2/(2*x**2) -
3*A*a*b**2*c**2/(4*x**4) - 3*A*a*b**2*c*d/x**2 + 3*A*a*b**2*d**2*log(x) - A
*b**3*c**2/(2*x**2) + 2*A*b**3*c*d*log(x) + A*b**3*d**2*x**2/2 - B*a**3*c**
2/(6*x**6) - B*a**3*c*d/(2*x**4) - B*a**3*d**2/(2*x**2) - 3*B*a**2*b*c**2/(
4*x**4) - 3*B*a**2*b*c*d/x**2 + 3*B*a**2*b*d**2*log(x) - 3*B*a*b**2*c**2/(2
*x**2) + 6*B*a*b**2*c*d*log(x) + 3*B*a*b**2*d**2*x**2/2 + B*b**3*c**2*log(x
) + B*b**3*c*d*x**2 + B*b**3*d**2*x**4/4)/e**9, Eq(m, -9)), ((-A*a**3*c**2/
(6*x**6) - A*a**3*c*d/(2*x**4) - A*a**3*d**2/(2*x**2) - 3*A*a**2*b*c**2/(4*
x**4) - 3*A*a**2*b*c*d/x**2 + 3*A*a**2*b*d**2*log(x) - 3*A*a*b**2*c**2/(2*x
**2) + 6*A*a*b**2*c*d*log(x) + 3*A*a*b**2*d**2*x**2/2 + A*b**3*c**2*log(x)
+ A*b**3*c*d*x**2 + A*b**3*d**2*x**4/4 - B*a**3*c**2/(4*x**4) - B*a**3*c*d/
x**2 + B*a**3*d**2*log(x) - 3*B*a**2*b*c**2/(2*x**2) + 6*B*a**2*b*c*d*log(x
) + 3*B*a**2*b*d**2*x**2/2 + 3*B*a*b**2*c**2*log(x) + 3*B*a*b**2*c*d*x**2 +
 3*B*a*b**2*d**2*x**4/4 + B*b**3*c**2*x**2/2 + B*b**3*c*d*x**4/2 + B*b**3*d
**2*x**6/6)/e**7, Eq(m, -7)), ((-A*a**3*c**2/(4*x**4) - A*a**3*c*d/x**2 + A
*a**3*d**2*log(x) - 3*A*a**2*b*c**2/(2*x**2) + 6*A*a**2*b*c*d*log(x) + 3*A*
a**2*b*d**2*x**2/2 + 3*A*a*b**2*c**2*log(x) + 3*A*a*b**2*c*d*x**2 + 3*A*a*b
**2*d**2*x**4/4 + A*b**3*c**2*x**2/2 + A*b**3*c*d*x**4/2 + A*b**3*d**2*x**6
/6 - B*a**3*c**2/(2*x**2) + 2*B*a**3*c*d*log(x) + B*a**3*d**2*x**2/2 + 3*B*
a**2*b*c**2*log(x) + 3*B*a**2*b*c*d*x**2 + 3*B*a**2*b*d**2*x**4/4 + 3*B*a*b
**2*c**2*x**2/2 + 3*B*a*b**2*c*d*x**4/2 + B*a*b**2*d**2*x**6/2 + B*b**3*c**
2*x**4/4 + B*b**3*c*d*x**6/3 + B*b**3*d**2*x**8/8)/e**5, Eq(m, -5)), ((-A*a
**3*c**2/(2*x**2) + 2*A*a**3*c*d*log(x) + A*a**3*d**2*x**2/2 + 3*A*a**2*b*c
**2*log(x) + 3*A*a**2*b*c*d*x**2 + 3*A*a**2*b*d**2*x**4/4 + 3*A*a*b**2*c**2
*x**2/2 + 3*A*a*b**2*c*d*x**4/2 + A*a*b**2*d**2*x**6/2 + A*b**3*c**2*x**4/4
 + A*b**3*c*d*x**6/3 + A*b**3*d**2*x**8/8 + B*a**3*c**2*log(x) + B*a**3*c*d
*x**2 + B*a**3*d**2*x**4/4 + 3*B*a**2*b*c**2*x**2/2 + 3*B*a**2*b*c*d*x**4/2
 + B*a**2*b*d**2*x**6/2 + 3*B*a*b**2*c**2*x**4/4 + B*a*b**2*c*d*x**6 + 3*B*
a*b**2*d**2*x**8/8 + B*b**3*c**2*x**6/6 + B*b**3*c*d*x**8/4 + B*b**3*d**2*x
**10/10)/e**3, Eq(m, -3)), ((A*a**3*c**2*log(x) + A*a**3*c*d*x**2 + A*a**3*
```

d**2*x**4/4 + 3*A*a**2*b*c**2*x**2/2 + 3*A*a**2*b*c*d*x**4/2 + A*a**2*b*d**
2*x**6/2 + 3*A*a*b**2*c**2*x**4/4 + A*a*b**2*c*d*x**6 + 3*A*a*b**2*d**2*x**
8/8 + A*b**3*c**2*x**6/6 + A*b**3*c*d*x**8/4 + A*b**3*d**2*x**10/10 + B*a**
3*c**2*x**2/2 + B*a**3*c*d*x**4/2 + B*a**3*d**2*x**6/6 + 3*B*a**2*b*c**2*x*
*4/4 + B*a**2*b*c*d*x**6 + 3*B*a**2*b*d**2*x**8/8 + B*a*b**2*c**2*x**6/2 +
3*B*a*b**2*c*d*x**8/4 + 3*B*a*b**2*d**2*x**10/10 + B*b**3*c**2*x**8/8 + B*b
3*c*d*x10/5 + B*b**3*d**2*x**12/12)/e, Eq(m, -1)), (A*a**3*c**2*m**6*x*
(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2
 + 264207*m + 135135) + 48*A*a**3*c**2*m**5*x*(e*x)**m/(m**7 + 49*m**6 + 97
3*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 925*A
*a**3*c**2*m**4*x*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*
m**3 + 177331*m**2 + 264207*m + 135135) + 9120*A*a**3*c**2*m**3*x*(e*x)**m/
(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207
*m + 135135) + 48259*A*a**3*c**2*m**2*x*(e*x)**m/(m**7 + 49*m**6 + 973*m**5
 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 129072*A*a*
*3*c**2*m*x*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 +
 177331*m**2 + 264207*m + 135135) + 135135*A*a**3*c**2*x*(e*x)**m/(m**7 + 4
9*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 1351
35) + 2*A*a**3*c*d*m**6*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m*
*4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 92*A*a**3*c*d*m**5*x**
3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m*
*2 + 264207*m + 135135) + 1670*A*a**3*c*d*m**4*x**3*(e*x)**m/(m**7 + 49*m**
6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
 15080*A*a**3*c*d*m**3*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**
4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 69518*A*a**3*c*d*m**2*x
3*(e*x)m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*
m**2 + 264207*m + 135135) + 146108*A*a**3*c*d*m*x**3*(e*x)**m/(m**7 + 49*m*
*6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135)
+ 90090*A*a**3*c*d*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
57379*m**3 + 177331*m**2 + 264207*m + 135135) + A*a**3*d**2*m**6*x**5*(e*x)
m/(m7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 26
4207*m + 135135) + 44*A*a**3*d**2*m**5*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*
m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 753*A*a
3*d2*m**4*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379
*m**3 + 177331*m**2 + 264207*m + 135135) + 6280*A*a**3*d**2*m**3*x**5*(e*x)
m/(m7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 26
4207*m + 135135) + 25979*A*a**3*d**2*m**2*x**5*(e*x)**m/(m**7 + 49*m**6 + 9
73*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 4743
6*A*a**3*d**2*m*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 573
79*m**3 + 177331*m**2 + 264207*m + 135135) + 27027*A*a**3*d**2*x**5*(e*x)**
m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 2642
07*m + 135135) + 3*A*a**2*b*c**2*m**6*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m
5 + 10045*m4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 138*A*a*
*2*b*c**2*m**5*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 5737
9*m**3 + 177331*m**2 + 264207*m + 135135) + 2505*A*a**2*b*c**2*m**4*x**3*(e

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*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
 264207*m + 135135) + 22620*A*a**2*b*c**2*m**3*x**3*(e*x)**m/(m**7 + 49*m**
6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
 104277*A*a**2*b*c**2*m**2*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045
*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 219162*A*a**2*b*c**
2*m*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 17
7331*m**2 + 264207*m + 135135) + 135135*A*a**2*b*c**2*x**3*(e*x)**m/(m**7 +
 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 13
5135) + 6*A*a**2*b*c*d*m**6*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 1004
5*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 264*A*a**2*b*c*d*m
**5*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 17
7331*m**2 + 264207*m + 135135) + 4518*A*a**2*b*c*d*m**4*x**5*(e*x)**m/(m**7
 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m +
135135) + 37680*A*a**2*b*c*d*m**3*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5
+ 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 155874*A*a**
2*b*c*d*m**2*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*
m**3 + 177331*m**2 + 264207*m + 135135) + 284616*A*a**2*b*c*d*m*x**5*(e*x)*
*m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264
207*m + 135135) + 162162*A*a**2*b*c*d*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m
**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 3*A*a**2
*b*d**2*m**6*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*
m**3 + 177331*m**2 + 264207*m + 135135) + 126*A*a**2*b*d**2*m**5*x**7*(e*x)
**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 26
4207*m + 135135) + 2037*A*a**2*b*d**2*m**4*x**7*(e*x)**m/(m**7 + 49*m**6 +
973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 158
76*A*a**2*b*d**2*m**3*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4
 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 61005*A*a**2*b*d**2*m**2
*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 17733
1*m**2 + 264207*m + 135135) + 104958*A*a**2*b*d**2*m*x**7*(e*x)**m/(m**7 +
49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135
135) + 57915*A*a**2*b*d**2*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045
*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 3*A*a*b**2*c**2*m**
6*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 1773
31*m**2 + 264207*m + 135135) + 132*A*a*b**2*c**2*m**5*x**5*(e*x)**m/(m**7 +
 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 13
5135) + 2259*A*a*b**2*c**2*m**4*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 +
10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 18840*A*a*b**2
*c**2*m**3*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m*
*3 + 177331*m**2 + 264207*m + 135135) + 77937*A*a*b**2*c**2*m**2*x**5*(e*x)
**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 26
4207*m + 135135) + 142308*A*a*b**2*c**2*m*x**5*(e*x)**m/(m**7 + 49*m**6 + 9
73*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 8108
1*A*a*b**2*c**2*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 573
79*m**3 + 177331*m**2 + 264207*m + 135135) + 6*A*a*b**2*c*d*m**6*x**7*(e*x)
**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 26
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4207*m + 135135) + 252*A*a*b**2*c*d*m**5*x**7*(e*x)**m/(m**7 + 49*m**6 + 97
3*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 4074*
A*a*b**2*c*d*m**4*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 5
7379*m**3 + 177331*m**2 + 264207*m + 135135) + 31752*A*a*b**2*c*d*m**3*x**7
*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**
2 + 264207*m + 135135) + 122010*A*a*b**2*c*d*m**2*x**7*(e*x)**m/(m**7 + 49*
m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135
) + 209916*A*a*b**2*c*d*m*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*
m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 115830*A*a*b**2*c*d*
x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331
*m**2 + 264207*m + 135135) + 3*A*a*b**2*d**2*m**6*x**9*(e*x)**m/(m**7 + 49*
m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135
) + 120*A*a*b**2*d**2*m**5*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045
*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 1839*A*a*b**2*d**2*
m**4*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 1
77331*m**2 + 264207*m + 135135) + 13584*A*a*b**2*d**2*m**3*x**9*(e*x)**m/(m
7 + 49*m6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m
 + 135135) + 49881*A*a*b**2*d**2*m**2*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m
5 + 10045*m4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 83064*A*
a*b**2*d**2*m*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379
*m**3 + 177331*m**2 + 264207*m + 135135) + 45045*A*a*b**2*d**2*x**9*(e*x)**
m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 2642
07*m + 135135) + A*b**3*c**2*m**6*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5
+ 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 42*A*b**3*c*
*2*m**5*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3
+ 177331*m**2 + 264207*m + 135135) + 679*A*b**3*c**2*m**4*x**7*(e*x)**m/(m*
*7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m
+ 135135) + 5292*A*b**3*c**2*m**3*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5
+ 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 20335*A*b**3
*c**2*m**2*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m*
*3 + 177331*m**2 + 264207*m + 135135) + 34986*A*b**3*c**2*m*x**7*(e*x)**m/(
m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*
m + 135135) + 19305*A*b**3*c**2*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 +
10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 2*A*b**3*c*d*m
6*x9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 17
7331*m**2 + 264207*m + 135135) + 80*A*b**3*c*d*m**5*x**9*(e*x)**m/(m**7 + 4
9*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 1351
35) + 1226*A*b**3*c*d*m**4*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045
*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 9056*A*b**3*c*d*m**
3*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 1773
31*m**2 + 264207*m + 135135) + 33254*A*b**3*c*d*m**2*x**9*(e*x)**m/(m**7 +
49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135
135) + 55376*A*b**3*c*d*m*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*
m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 30030*A*b**3*c*d*x**
9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m*

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*2 + 264207*m + 135135) + A*b**3*d**2*m**6*x**11*(e*x)**m/(m**7 + 49*m**6 +
 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 38
*A*b**3*d**2*m**5*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
57379*m**3 + 177331*m**2 + 264207*m + 135135) + 555*A*b**3*d**2*m**4*x**11*
(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2
 + 264207*m + 135135) + 3940*A*b**3*d**2*m**3*x**11*(e*x)**m/(m**7 + 49*m**
6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
 14039*A*b**3*d**2*m**2*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m
**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 22902*A*b**3*d**2*m*x
**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331
*m**2 + 264207*m + 135135) + 12285*A*b**3*d**2*x**11*(e*x)**m/(m**7 + 49*m*
*6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135)
+ B*a**3*c**2*m**6*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
57379*m**3 + 177331*m**2 + 264207*m + 135135) + 46*B*a**3*c**2*m**5*x**3*(e
*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
 264207*m + 135135) + 835*B*a**3*c**2*m**4*x**3*(e*x)**m/(m**7 + 49*m**6 +
973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 754
0*B*a**3*c**2*m**3*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
57379*m**3 + 177331*m**2 + 264207*m + 135135) + 34759*B*a**3*c**2*m**2*x**3
*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**
2 + 264207*m + 135135) + 73054*B*a**3*c**2*m*x**3*(e*x)**m/(m**7 + 49*m**6
+ 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 4
5045*B*a**3*c**2*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57
379*m**3 + 177331*m**2 + 264207*m + 135135) + 2*B*a**3*c*d*m**6*x**5*(e*x)*
*m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264
207*m + 135135) + 88*B*a**3*c*d*m**5*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m*
*5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 1506*B*a*
*3*c*d*m**4*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m
**3 + 177331*m**2 + 264207*m + 135135) + 12560*B*a**3*c*d*m**3*x**5*(e*x)**
m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 2642
07*m + 135135) + 51958*B*a**3*c*d*m**2*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*
m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 94872*B
*a**3*c*d*m*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m
**3 + 177331*m**2 + 264207*m + 135135) + 54054*B*a**3*c*d*x**5*(e*x)**m/(m*
*7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m
+ 135135) + B*a**3*d**2*m**6*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 100
45*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 42*B*a**3*d**2*m*
*5*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177
331*m**2 + 264207*m + 135135) + 679*B*a**3*d**2*m**4*x**7*(e*x)**m/(m**7 +
49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135
135) + 5292*B*a**3*d**2*m**3*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 100
45*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 20335*B*a**3*d**2
*m**2*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 +
177331*m**2 + 264207*m + 135135) + 34986*B*a**3*d**2*m*x**7*(e*x)**m/(m**7
+ 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 1
```

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35135) + 19305*B*a**3*d**2*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045
*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 3*B*a**2*b*c**2*m**
6*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 1773
31*m**2 + 264207*m + 135135) + 132*B*a**2*b*c**2*m**5*x**5*(e*x)**m/(m**7 +
 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 13
5135) + 2259*B*a**2*b*c**2*m**4*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 +
10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 18840*B*a**2*b
*c**2*m**3*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m*
*3 + 177331*m**2 + 264207*m + 135135) + 77937*B*a**2*b*c**2*m**2*x**5*(e*x)
**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 26
4207*m + 135135) + 142308*B*a**2*b*c**2*m*x**5*(e*x)**m/(m**7 + 49*m**6 + 9
73*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 8108
1*B*a**2*b*c**2*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 573
79*m**3 + 177331*m**2 + 264207*m + 135135) + 6*B*a**2*b*c*d*m**6*x**7*(e*x)
**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 26
4207*m + 135135) + 252*B*a**2*b*c*d*m**5*x**7*(e*x)**m/(m**7 + 49*m**6 + 97
3*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 4074*
B*a**2*b*c*d*m**4*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 5
7379*m**3 + 177331*m**2 + 264207*m + 135135) + 31752*B*a**2*b*c*d*m**3*x**7
*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**
2 + 264207*m + 135135) + 122010*B*a**2*b*c*d*m**2*x**7*(e*x)**m/(m**7 + 49*
m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135
) + 209916*B*a**2*b*c*d*m*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*
m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 115830*B*a**2*b*c*d*
x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331
*m**2 + 264207*m + 135135) + 3*B*a**2*b*d**2*m**6*x**9*(e*x)**m/(m**7 + 49*
m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135
) + 120*B*a**2*b*d**2*m**5*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045
*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 1839*B*a**2*b*d**2*
m**4*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 1
77331*m**2 + 264207*m + 135135) + 13584*B*a**2*b*d**2*m**3*x**9*(e*x)**m/(m
**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m
 + 135135) + 49881*B*a**2*b*d**2*m**2*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m
**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 83064*B*
a**2*b*d**2*m*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379
*m**3 + 177331*m**2 + 264207*m + 135135) + 45045*B*a**2*b*d**2*x**9*(e*x)**
m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 2642
07*m + 135135) + 3*B*a*b**2*c**2*m**6*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m
**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 126*B*a*
b**2*c**2*m**5*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 5737
9*m**3 + 177331*m**2 + 264207*m + 135135) + 2037*B*a*b**2*c**2*m**4*x**7*(e
*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
 264207*m + 135135) + 15876*B*a*b**2*c**2*m**3*x**7*(e*x)**m/(m**7 + 49*m**
6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
 61005*B*a*b**2*c**2*m**2*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*
```

m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 104958*B*a*b**2*c**2
*m*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177
331*m**2 + 264207*m + 135135) + 57915*B*a*b**2*c**2*x**7*(e*x)**m/(m**7 + 4
9*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 1351
35) + 6*B*a*b**2*c*d*m**6*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*
m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 240*B*a*b**2*c*d*m**
5*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 1773
31*m**2 + 264207*m + 135135) + 3678*B*a*b**2*c*d*m**4*x**9*(e*x)**m/(m**7 +
 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 13
5135) + 27168*B*a*b**2*c*d*m**3*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 +
10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 99762*B*a*b**2
*c*d*m**2*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**
3 + 177331*m**2 + 264207*m + 135135) + 166128*B*a*b**2*c*d*m*x**9*(e*x)**m/
(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207
*m + 135135) + 90090*B*a*b**2*c*d*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5
 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 3*B*a*b**2*d
2*m6*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**
3 + 177331*m**2 + 264207*m + 135135) + 114*B*a*b**2*d**2*m**5*x**11*(e*x)**
m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 2642
07*m + 135135) + 1665*B*a*b**2*d**2*m**4*x**11*(e*x)**m/(m**7 + 49*m**6 + 9
73*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 1182
0*B*a*b**2*d**2*m**3*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4
 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 42117*B*a*b**2*d**2*m**2
*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 1773
31*m**2 + 264207*m + 135135) + 68706*B*a*b**2*d**2*m*x**11*(e*x)**m/(m**7 +
 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 13
5135) + 36855*B*a*b**2*d**2*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 100
45*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + B*b**3*c**2*m**6*
x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331
*m**2 + 264207*m + 135135) + 40*B*b**3*c**2*m**5*x**9*(e*x)**m/(m**7 + 49*m
6 + 973*m5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135)
 + 613*B*b**3*c**2*m**4*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m*
*4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 4528*B*b**3*c**2*m**3*
x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331
*m**2 + 264207*m + 135135) + 16627*B*b**3*c**2*m**2*x**9*(e*x)**m/(m**7 + 4
9*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 1351
35) + 27688*B*b**3*c**2*m*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*
m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 15015*B*b**3*c**2*x*
9(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m
2 + 264207*m + 135135) + 2*B*b3*c*d*m**6*x**11*(e*x)**m/(m**7 + 49*m**6
 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
76*B*b**3*c*d*m**5*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 1110*B*b**3*c*d*m**4*x**11
*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**
2 + 264207*m + 135135) + 7880*B*b**3*c*d*m**3*x**11*(e*x)**m/(m**7 + 49*m**

```
6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
 28078*B*b**3*c*d*m**2*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m*
*4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 45804*B*b**3*c*d*m*x**
11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m
**2 + 264207*m + 135135) + 24570*B*b**3*c*d*x**11*(e*x)**m/(m**7 + 49*m**6
+ 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + B
*b**3*d**2*m**6*x**13*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57
379*m**3 + 177331*m**2 + 264207*m + 135135) + 36*B*b**3*d**2*m**5*x**13*(e*
x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
264207*m + 135135) + 505*B*b**3*d**2*m**4*x**13*(e*x)**m/(m**7 + 49*m**6 +
973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 348
0*B*b**3*d**2*m**3*x**13*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 12139*B*b**3*d**2*m**2*x**
13*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m
**2 + 264207*m + 135135) + 19524*B*b**3*d**2*m*x**13*(e*x)**m/(m**7 + 49*m*
*6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135)
+ 10395*B*b**3*d**2*x**13*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4
+ 57379*m**3 + 177331*m**2 + 264207*m + 135135), True))
```

Maxima [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 550, normalized size of antiderivative = 1.88

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \frac{Bb^3d^2e^mx^{13}x^m}{m+13} + \frac{2\,Bb^3cde^mx^{11}x^m}{m+11} + \frac{3\,Bab^2d^2e^mx^{11}x^m}{m+11} + \frac{Ab^3d^2e^mx^{11}x^m}{m+11} + \frac{Bb^3c^2e^mx^9x^m}{m+9} + \frac{6\,Bab^2cde^mx^9x^m}{m+9} + \frac{2\,Ab^3cde^mx^9x^m}{m+9} + \frac{3\,Ba^2bd^2e^mx^9x^m}{m+9} + \frac{3\,Aab^2d^2e^mx^9x^m}{m+9} + \frac{3\,Bab^2c^2e^mx^7x^m}{m+7} + \frac{Ab^3c^2e^mx^7x^m}{m+7} + \frac{6\,Ba^2bcde^mx^7x^m}{m+7} + \frac{6\,Aab^2cde^mx^7x^m}{m+7} + \frac{Ba^3d^2e^mx^7x^m}{m+7} + \frac{3\,Aa^2bd^2e^mx^7x^m}{m+7} + \frac{3\,Ba^2bc^2e^mx^5x^m}{m+5} + \frac{3\,Aab^2c^2e^mx^5x^m}{m+5} + \frac{2\,Ba^3cde^mx^5x^m}{m+5} + \frac{6\,Aa^2bcde^mx^5x^m}{m+5} + \frac{Aa^3d^2e^mx^5x^m}{m+5} + \frac{Ba^3c^2e^mx^3x^m}{m+3} + \frac{3\,Aa^2bc^2e^mx^3x^m}{m+3} + \frac{2\,Aa^3cde^mx^3x^m}{m+3} + \frac{(ex)^{m+1}\,Aa^3c^2}{e(m+1)}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="maxima")
```

```
[Out] B*b^3*d^2*e^m*x^13*x^m/(m + 13) + 2*B*b^3*c*d*e^m*x^11*x^m/(m + 11) + 3*B*a
*b^2*d^2*e^m*x^11*x^m/(m + 11) + A*b^3*d^2*e^m*x^11*x^m/(m + 11) + B*b^3*c^
2*e^m*x^9*x^m/(m + 9) + 6*B*a*b^2*c*d*e^m*x^9*x^m/(m + 9) + 2*A*b^3*c*d*e^m
*x^9*x^m/(m + 9) + 3*B*a^2*b*d^2*e^m*x^9*x^m/(m + 9) + 3*A*a*b^2*d^2*e^m*x^
9*x^m/(m + 9) + 3*B*a*b^2*c^2*e^m*x^7*x^m/(m + 7) + A*b^3*c^2*e^m*x^7*x^m/(
m + 7) + 6*B*a^2*b*c*d*e^m*x^7*x^m/(m + 7) + 6*A*a*b^2*c*d*e^m*x^7*x^m/(m +
 7) + B*a^3*d^2*e^m*x^7*x^m/(m + 7) + 3*A*a^2*b*d^2*e^m*x^7*x^m/(m + 7) + 3
*B*a^2*b*c^2*e^m*x^5*x^m/(m + 5) + 3*A*a*b^2*c^2*e^m*x^5*x^m/(m + 5) + 2*B*
a^3*c*d*e^m*x^5*x^m/(m + 5) + 6*A*a^2*b*c*d*e^m*x^5*x^m/(m + 5) + A*a^3*d^2
*e^m*x^5*x^m/(m + 5) + B*a^3*c^2*e^m*x^3*x^m/(m + 3) + 3*A*a^2*b*c^2*e^m*x^
3*x^m/(m + 3) + 2*A*a^3*c*d*e^m*x^3*x^m/(m + 3) + (e*x)^(m + 1)*A*a^3*c^2/(
e*(m + 1))
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 3283 vs. $2(292) = 584$.

Time = 0.35 (sec) , antiderivative size = 3283, normalized size of antiderivative = 11.24

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*b^3*d^2*m^6*x^13 + 36*(e*x)^m*B*b^3*d^2*m^5*x^13 + 2*(e*x)^m*B*b
^3*c*d*m^6*x^11 + 3*(e*x)^m*B*a*b^2*d^2*m^6*x^11 + (e*x)^m*A*b^3*d^2*m^6*x^
11 + 505*(e*x)^m*B*b^3*d^2*m^4*x^13 + 76*(e*x)^m*B*b^3*c*d*m^5*x^11 + 114*(
e*x)^m*B*a*b^2*d^2*m^5*x^11 + 38*(e*x)^m*A*b^3*d^2*m^5*x^11 + 3480*(e*x)^m*
B*b^3*d^2*m^3*x^13 + (e*x)^m*B*b^3*c^2*m^6*x^9 + 6*(e*x)^m*B*a*b^2*c*d*m^6*
x^9 + 2*(e*x)^m*A*b^3*c*d*m^6*x^9 + 3*(e*x)^m*B*a^2*b*d^2*m^6*x^9 + 3*(e*x)
^m*A*a*b^2*d^2*m^6*x^9 + 1110*(e*x)^m*B*b^3*c*d*m^4*x^11 + 1665*(e*x)^m*B*a
*b^2*d^2*m^4*x^11 + 555*(e*x)^m*A*b^3*d^2*m^4*x^11 + 12139*(e*x)^m*B*b^3*d^
2*m^2*x^13 + 40*(e*x)^m*B*b^3*c^2*m^5*x^9 + 240*(e*x)^m*B*a*b^2*c*d*m^5*x^9
 + 80*(e*x)^m*A*b^3*c*d*m^5*x^9 + 120*(e*x)^m*B*a^2*b*d^2*m^5*x^9 + 120*(e*
x)^m*A*a*b^2*d^2*m^5*x^9 + 7880*(e*x)^m*B*b^3*c*d*m^3*x^11 + 11820*(e*x)^m*
B*a*b^2*d^2*m^3*x^11 + 3940*(e*x)^m*A*b^3*d^2*m^3*x^11 + 19524*(e*x)^m*B*b^
3*d^2*m*x^13 + 3*(e*x)^m*B*a*b^2*c^2*m^6*x^7 + (e*x)^m*A*b^3*c^2*m^6*x^7 +
6*(e*x)^m*B*a^2*b*c*d*m^6*x^7 + 6*(e*x)^m*A*a*b^2*c*d*m^6*x^7 + (e*x)^m*B*a
^3*d^2*m^6*x^7 + 3*(e*x)^m*A*a^2*b*d^2*m^6*x^7 + 613*(e*x)^m*B*b^3*c^2*m^4*
x^9 + 3678*(e*x)^m*B*a*b^2*c*d*m^4*x^9 + 1226*(e*x)^m*A*b^3*c*d*m^4*x^9 + 1
839*(e*x)^m*B*a^2*b*d^2*m^4*x^9 + 1839*(e*x)^m*A*a*b^2*d^2*m^4*x^9 + 28078*
(e*x)^m*B*b^3*c*d*m^2*x^11 + 42117*(e*x)^m*B*a*b^2*d^2*m^2*x^11 + 14039*(e*
x)^m*A*b^3*d^2*m^2*x^11 + 10395*(e*x)^m*B*b^3*d^2*x^13 + 126*(e*x)^m*B*a*b^
2*c^2*m^5*x^7 + 42*(e*x)^m*A*b^3*c^2*m^5*x^7 + 252*(e*x)^m*B*a^2*b*c*d*m^5*
x^7 + 252*(e*x)^m*A*a*b^2*c*d*m^5*x^7 + 42*(e*x)^m*B*a^3*d^2*m^5*x^7 + 126*
(e*x)^m*A*a^2*b*d^2*m^5*x^7 + 4528*(e*x)^m*B*b^3*c^2*m^3*x^9 + 27168*(e*x)^
m*B*a*b^2*c*d*m^3*x^9 + 9056*(e*x)^m*A*b^3*c*d*m^3*x^9 + 13584*(e*x)^m*B*a^
2*b*d^2*m^3*x^9 + 13584*(e*x)^m*A*a*b^2*d^2*m^3*x^9 + 45804*(e*x)^m*B*b^3*c
*d*m*x^11 + 68706*(e*x)^m*B*a*b^2*d^2*m*x^11 + 22902*(e*x)^m*A*b^3*d^2*m*x^
11 + 3*(e*x)^m*B*a^2*b*c^2*m^6*x^5 + 3*(e*x)^m*A*a*b^2*c^2*m^6*x^5 + 2*(e*x
)^m*B*a^3*c*d*m^6*x^5 + 6*(e*x)^m*A*a^2*b*c*d*m^6*x^5 + (e*x)^m*A*a^3*d^2*m
^6*x^5 + 2037*(e*x)^m*B*a*b^2*c^2*m^4*x^7 + 679*(e*x)^m*A*b^3*c^2*m^4*x^7 +
 4074*(e*x)^m*B*a^2*b*c*d*m^4*x^7 + 4074*(e*x)^m*A*a*b^2*c*d*m^4*x^7 + 679*
(e*x)^m*B*a^3*d^2*m^4*x^7 + 2037*(e*x)^m*A*a^2*b*d^2*m^4*x^7 + 16627*(e*x)^
m*B*b^3*c^2*m^2*x^9 + 99762*(e*x)^m*B*a*b^2*c*d*m^2*x^9 + 33254*(e*x)^m*A*b
^3*c*d*m^2*x^9 + 49881*(e*x)^m*B*a^2*b*d^2*m^2*x^9 + 49881*(e*x)^m*A*a*b^2*
d^2*m^2*x^9 + 24570*(e*x)^m*B*b^3*c*d*x^11 + 36855*(e*x)^m*B*a*b^2*d^2*x^11
 + 12285*(e*x)^m*A*b^3*d^2*x^11 + 132*(e*x)^m*B*a^2*b*c^2*m^5*x^5 + 132*(e*
x)^m*A*a*b^2*c^2*m^5*x^5 + 88*(e*x)^m*B*a^3*c*d*m^5*x^5 + 264*(e*x)^m*A*a^2
```

```
*b*c*d*m^5*x^5 + 44*(e*x)^m*A*a^3*d^2*m^5*x^5 + 15876*(e*x)^m*B*a*b^2*c^2*m
^3*x^7 + 5292*(e*x)^m*A*b^3*c^2*m^3*x^7 + 31752*(e*x)^m*B*a^2*b*c*d*m^3*x^7
 + 31752*(e*x)^m*A*a*b^2*c*d*m^3*x^7 + 5292*(e*x)^m*B*a^3*d^2*m^3*x^7 + 158
76*(e*x)^m*A*a^2*b*d^2*m^3*x^7 + 27688*(e*x)^m*B*b^3*c^2*m*x^9 + 166128*(e*
x)^m*B*a*b^2*c*d*m*x^9 + 55376*(e*x)^m*A*b^3*c*d*m*x^9 + 83064*(e*x)^m*B*a^
2*b*d^2*m*x^9 + 83064*(e*x)^m*A*a*b^2*d^2*m*x^9 + (e*x)^m*B*a^3*c^2*m^6*x^3
 + 3*(e*x)^m*A*a^2*b*c^2*m^6*x^3 + 2*(e*x)^m*A*a^3*c*d*m^6*x^3 + 2259*(e*x)
^m*B*a^2*b*c^2*m^4*x^5 + 2259*(e*x)^m*A*a*b^2*c^2*m^4*x^5 + 1506*(e*x)^m*B*
a^3*c*d*m^4*x^5 + 4518*(e*x)^m*A*a^2*b*c*d*m^4*x^5 + 753*(e*x)^m*A*a^3*d^2*
m^4*x^5 + 61005*(e*x)^m*B*a*b^2*c^2*m^2*x^7 + 20335*(e*x)^m*A*b^3*c^2*m^2*x
^7 + 122010*(e*x)^m*B*a^2*b*c*d*m^2*x^7 + 122010*(e*x)^m*A*a*b^2*c*d*m^2*x^
7 + 20335*(e*x)^m*B*a^3*d^2*m^2*x^7 + 61005*(e*x)^m*A*a^2*b*d^2*m^2*x^7 + 1
5015*(e*x)^m*B*b^3*c^2*x^9 + 90090*(e*x)^m*B*a*b^2*c*d*x^9 + 30030*(e*x)^m*
A*b^3*c*d*x^9 + 45045*(e*x)^m*B*a^2*b*d^2*x^9 + 45045*(e*x)^m*A*a*b^2*d^2*x
^9 + 46*(e*x)^m*B*a^3*c^2*m^5*x^3 + 138*(e*x)^m*A*a^2*b*c^2*m^5*x^3 + 92*(e
*x)^m*A*a^3*c*d*m^5*x^3 + 18840*(e*x)^m*B*a^2*b*c^2*m^3*x^5 + 18840*(e*x)^m
*A*a*b^2*c^2*m^3*x^5 + 12560*(e*x)^m*B*a^3*c*d*m^3*x^5 + 37680*(e*x)^m*A*a^
2*b*c*d*m^3*x^5 + 6280*(e*x)^m*A*a^3*d^2*m^3*x^5 + 104958*(e*x)^m*B*a*b^2*c
^2*m*x^7 + 34986*(e*x)^m*A*b^3*c^2*m*x^7 + 209916*(e*x)^m*B*a^2*b*c*d*m*x^7
 + 209916*(e*x)^m*A*a*b^2*c*d*m*x^7 + 34986*(e*x)^m*B*a^3*d^2*m*x^7 + 10495
8*(e*x)^m*A*a^2*b*d^2*m*x^7 + (e*x)^m*A*a^3*c^2*m^6*x + 835*(e*x)^m*B*a^3*c
^2*m^4*x^3 + 2505*(e*x)^m*A*a^2*b*c^2*m^4*x^3 + 1670*(e*x)^m*A*a^3*c*d*m^4*
x^3 + 77937*(e*x)^m*B*a^2*b*c^2*m^2*x^5 + 77937*(e*x)^m*A*a*b^2*c^2*m^2*x^5
 + 51958*(e*x)^m*B*a^3*c*d*m^2*x^5 + 155874*(e*x)^m*A*a^2*b*c*d*m^2*x^5 + 2
5979*(e*x)^m*A*a^3*d^2*m^2*x^5 + 57915*(e*x)^m*B*a*b^2*c^2*x^7 + 19305*(e*x
)^m*A*b^3*c^2*x^7 + 115830*(e*x)^m*B*a^2*b*c*d*x^7 + 115830*(e*x)^m*A*a*b^2
*c*d*x^7 + 19305*(e*x)^m*B*a^3*d^2*x^7 + 57915*(e*x)^m*A*a^2*b*d^2*x^7 + 48
*(e*x)^m*A*a^3*c^2*m^5*x + 7540*(e*x)^m*B*a^3*c^2*m^3*x^3 + 22620*(e*x)^m*A
*a^2*b*c^2*m^3*x^3 + 15080*(e*x)^m*A*a^3*c*d*m^3*x^3 + 142308*(e*x)^m*B*a^2
*b*c^2*m*x^5 + 142308*(e*x)^m*A*a*b^2*c^2*m*x^5 + 94872*(e*x)^m*B*a^3*c*d*m
*x^5 + 284616*(e*x)^m*A*a^2*b*c*d*m*x^5 + 47436*(e*x)^m*A*a^3*d^2*m*x^5 + 9
25*(e*x)^m*A*a^3*c^2*m^4*x + 34759*(e*x)^m*B*a^3*c^2*m^2*x^3 + 104277*(e*x)
^m*A*a^2*b*c^2*m^2*x^3 + 69518*(e*x)^m*A*a^3*c*d*m^2*x^3 + 81081*(e*x)^m*B*
a^2*b*c^2*x^5 + 81081*(e*x)^m*A*a*b^2*c^2*x^5 + 54054*(e*x)^m*B*a^3*c*d*x^5
 + 162162*(e*x)^m*A*a^2*b*c*d*x^5 + 27027*(e*x)^m*A*a^3*d^2*x^5 + 9120*(e*x
)^m*A*a^3*c^2*m^3*x + 73054*(e*x)^m*B*a^3*c^2*m*x^3 + 219162*(e*x)^m*A*a^2*
b*c^2*m*x^3 + 146108*(e*x)^m*A*a^3*c*d*m*x^3 + 48259*(e*x)^m*A*a^3*c^2*m^2*
x + 45045*(e*x)^m*B*a^3*c^2*x^3 + 135135*(e*x)^m*A*a^2*b*c^2*x^3 + 90090*(e
*x)^m*A*a^3*c*d*x^3 + 129072*(e*x)^m*A*a^3*c^2*m*x + 135135*(e*x)^m*A*a^3*c
^2*x)/(m^7 + 49*m^6 + 973*m^5 + 10045*m^4 + 57379*m^3 + 177331*m^2 + 264207
*m + 135135)
```

Mupad [B] (verification not implemented)

Time = 6.22 (sec) , antiderivative size = 694, normalized size of antiderivative = 2.38

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx$$
$$= \frac{x^7\,(e\,x)^m\,\left(B\,a^3\,d^2+6\,B\,a^2\,b\,c\,d+3\,A\,a^2\,b\,d^2+3\,B\,a\,b^2\,c^2+6\,A\,a\,b^2\,c\,d+A\,b^3\,c^2\right)\,\left(m^6+42\,m^5+679\,m^4+\dots\right.}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+\dots}$$
$$+\frac{a\,x^5\,(e\,x)^m\,\left(2\,B\,a^2\,c\,d+A\,a^2\,d^2+3\,B\,a\,b\,c^2+6\,A\,a\,b\,c\,d+3\,A\,b^2\,c^2\right)\,\left(m^6+44\,m^5+753\,m^4+6280\,m^3+\dots\right.}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135\dots}$$
$$+\frac{b\,x^9\,(e\,x)^m\,\left(3\,B\,a^2\,d^2+6\,B\,a\,b\,c\,d+3\,A\,a\,b\,d^2+B\,b^2\,c^2+2\,A\,b^2\,c\,d\right)\,\left(m^6+40\,m^5+613\,m^4+4528\,m^3+\dots\right.}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135\dots}$$
$$+\frac{A\,a^3\,c^2\,x\,(e\,x)^m\,\left(m^6+48\,m^5+925\,m^4+9120\,m^3+48259\,m^2+129072\,m+135135\right)}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135135}$$
$$+\frac{a^2\,c\,x^3\,(e\,x)^m\,\left(2\,A\,a\,d+3\,A\,b\,c+B\,a\,c\right)\,\left(m^6+46\,m^5+835\,m^4+7540\,m^3+34759\,m^2+73054\,m+4504\dots\right.}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135135}$$
$$+\frac{b^2\,d\,x^{11}\,(e\,x)^m\,\left(A\,b\,d+3\,B\,a\,d+2\,B\,b\,c\right)\,\left(m^6+38\,m^5+555\,m^4+3940\,m^3+14039\,m^2+22902\,m+122\dots\right.}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135135}$$
$$+\frac{B\,b^3\,d^2\,x^{13}\,(e\,x)^m\,\left(m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395\right)}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135135}$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^3*(c + d*x^2)^2,x)
```

```
[Out] (x^7*(e*x)^m*(A*b^3*c^2 + B*a^3*d^2 + 3*A*a^2*b*d^2 + 3*B*a*b^2*c^2 + 6*A*a
*b^2*c*d + 6*B*a^2*b*c*d)*(34986*m + 20335*m^2 + 5292*m^3 + 679*m^4 + 42*m^
5 + m^6 + 19305))/(264207*m + 177331*m^2 + 57379*m^3 + 10045*m^4 + 973*m^5
+ 49*m^6 + m^7 + 135135) + (a*x^5*(e*x)^m*(A*a^2*d^2 + 3*A*b^2*c^2 + 3*B*a*
b*c^2 + 2*B*a^2*c*d + 6*A*a*b*c*d)*(47436*m + 25979*m^2 + 6280*m^3 + 753*m^
4 + 44*m^5 + m^6 + 27027))/(264207*m + 177331*m^2 + 57379*m^3 + 10045*m^4 +
 973*m^5 + 49*m^6 + m^7 + 135135) + (b*x^9*(e*x)^m*(3*B*a^2*d^2 + B*b^2*c^2
 + 3*A*a*b*d^2 + 2*A*b^2*c*d + 6*B*a*b*c*d)*(27688*m + 16627*m^2 + 4528*m^3
 + 613*m^4 + 40*m^5 + m^6 + 15015))/(264207*m + 177331*m^2 + 57379*m^3 + 10
045*m^4 + 973*m^5 + 49*m^6 + m^7 + 135135) + (A*a^3*c^2*x*(e*x)^m*(129072*m
 + 48259*m^2 + 9120*m^3 + 925*m^4 + 48*m^5 + m^6 + 135135))/(264207*m + 177
331*m^2 + 57379*m^3 + 10045*m^4 + 973*m^5 + 49*m^6 + m^7 + 135135) + (a^2*c
*x^3*(e*x)^m*(2*A*a*d + 3*A*b*c + B*a*c)*(73054*m + 34759*m^2 + 7540*m^3 +
835*m^4 + 46*m^5 + m^6 + 45045))/(264207*m + 177331*m^2 + 57379*m^3 + 10045
*m^4 + 973*m^5 + 49*m^6 + m^7 + 135135) + (b^2*d*x^11*(e*x)^m*(A*b*d + 3*B*
a*d + 2*B*b*c)*(22902*m + 14039*m^2 + 3940*m^3 + 555*m^4 + 38*m^5 + m^6 + 1
2285))/(264207*m + 177331*m^2 + 57379*m^3 + 10045*m^4 + 973*m^5 + 49*m^6 +
m^7 + 135135) + (B*b^3*d^2*x^13*(e*x)^m*(19524*m + 12139*m^2 + 3480*m^3 + 5
05*m^4 + 36*m^5 + m^6 + 10395))/(264207*m + 177331*m^2 + 57379*m^3 + 10045*
m^4 + 973*m^5 + 49*m^6 + m^7 + 135135)
```

3.9 $\int (ex)^m (a+bx^2)^2 (A+Bx^2) (c+dx^2)^2 \, dx$

Optimal result

Integrand size = 31, antiderivative size = 216

$$\begin{aligned}\int (ex)^m (a+bx^2)^2 (A+Bx^2) (c+dx^2)^2 \, dx &= \frac{a^2Ac^2(ex)^{1+m}}{e(1+m)} + \frac{ac(aBc+2A(bc+ad))(ex)^{3+m}}{e^3(3+m)} \\ &+ \frac{(2aBc(bc+ad)+A(b^2c^2+4abcd+a^2d^2))(ex)^{5+m}}{e^5(5+m)} \\ &+ \frac{(a^2Bd^2+2abd(2Bc+Ad)+b^2c(Bc+2Ad))(ex)^{7+m}}{e^7(7+m)} \\ &+ \frac{bd(2bBc+Abd+2aBd)(ex)^{9+m}}{e^9(9+m)} + \frac{b^2Bd^2(ex)^{11+m}}{e^{11}(11+m)}\end{aligned}$$

```
[Out] a^2*A*c^2*(e*x)^(1+m)/e/(1+m)+a*c*(B*a*c+2*A*(a*d+b*c))*(e*x)^(3+m)/e^3/(3+
m)+(2*a*B*c*(a*d+b*c)+A*(a^2*d^2+4*a*b*c*d+b^2*c^2))*(e*x)^(5+m)/e^5/(5+m)+
(a^2*B*d^2+2*a*b*d*(A*d+2*B*c)+b^2*c*(2*A*d+B*c))*(e*x)^(7+m)/e^7/(7+m)+b*d
*(A*b*d+2*B*a*d+2*B*b*c)*(e*x)^(9+m)/e^9/(9+m)+b^2*B*d^2*(e*x)^(11+m)/e^11/
(11+m)
```

Rubi [A] (verified)

Time = 0.14 (sec) , antiderivative size = 216, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1, $\frac{\text{number of rules}}{\text{integrand size}} = 0.032$, Rules used

$= \{584\}$

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx$$
$$= \frac{(ex)^{m+5} \left(A(a^2d^2+4abcd+b^2c^2)+2aBc(ad+bc)\right)}{e^5(m+5)} + \frac{(ex)^{m+7} \left(a^2Bd^2+2abd(Ad+2Bc)+b^2c(2Ad+Bc)\right)}{e^7(m+7)} + \frac{a^2Ac^2(ex)^{m+1}}{e(m+1)} + \frac{bd(ex)^{m+9}(2aBd+Abd+2bBc)}{e^9(m+9)} + \frac{ac(ex)^{m+3}(2A(ad+bc)+aBc)}{e^3(m+3)} + \frac{b^2Bd^2(ex)^{m+11}}{e^{11}(m+11)}$$

```
[In] Int[(e*x)^m*(a + b*x^2)^2*(A + B*x^2)*(c + d*x^2)^2,x]
```

```
[Out] (a^2*A*c^2*(e*x)^(1 + m))/(e*(1 + m)) + (a*c*(a*B*c + 2*A*(b*c + a*d))*(e*x
)^(3 + m))/(e^3*(3 + m)) + ((2*a*B*c*(b*c + a*d) + A*(b^2*c^2 + 4*a*b*c*d +
 a^2*d^2))*(e*x)^(5 + m))/(e^5*(5 + m)) + ((a^2*B*d^2 + 2*a*b*d*(2*B*c + A*
d) + b^2*c*(B*c + 2*A*d))*(e*x)^(7 + m))/(e^7*(7 + m)) + (b*d*(2*b*B*c + A*
b*d + 2*a*B*d)*(e*x)^(9 + m))/(e^9*(9 + m)) + (b^2*B*d^2*(e*x)^(11 + m))/(e
^11*(11 + m))
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\text{integral} = \int \left(a^2Ac^2(ex)^m + \frac{ac(aBc+2A(bc+ad))(ex)^{2+m}}{e^2} + \frac{\left(2aBc(bc+ad)+A(b^2c^2+4abcd+a^2d^2)\right)(ex)^{4+m}}{e^4} + \frac{\left(a^2Bd^2+2abd(2Bc+Ad)+b^2c(Bc+2Ad)\right)(ex)^{6+m}}{e^6} + \frac{bd(2bBc+Abd+2aBd)(ex)^{8+m}}{e^8} + \frac{b^2Bd^2(ex)^{10+m}}{e^{10}}\right) dx$$
$$= \frac{a^2Ac^2(ex)^{1+m}}{e(1+m)} + \frac{ac(aBc+2A(bc+ad))(ex)^{3+m}}{e^3(3+m)} + \frac{\left(2aBc(bc+ad)+A(b^2c^2+4abcd+a^2d^2)\right)(ex)^{5+m}}{e^5(5+m)} + \frac{\left(a^2Bd^2+2abd(2Bc+Ad)+b^2c(Bc+2Ad)\right)(ex)^{7+m}}{e^7(7+m)} + \frac{bd(2bBc+Abd+2aBd)(ex)^{9+m}}{e^9(9+m)} + \frac{b^2Bd^2(ex)^{11+m}}{e^{11}(11+m)}$$

Mathematica [A] (verified)

Time = 0.28 (sec) , antiderivative size = 178, normalized size of antiderivative = 0.82

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^2 dx = x(ex)^m \left(\frac{a^2Ac^2}{1+m}+\frac{ac(aBc+2A(bc+ad))x^2}{3+m} + \frac{(2aBc(bc+ad)+A(b^2c^2+4abcd+a^2d^2))\,x^4}{5+m} + \frac{(a^2Bd^2+2abd(2Bc+Ad)+b^2c(Bc+2Ad))\,x^6}{7+m}+\frac{bd(2bBc+Abd+2aBd)x^8}{9+m} + \frac{b^2Bd^2x^{10}}{11+m}\right)$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)^2*(A + B*x^2)*(c + d*x^2)^2,x]
```

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

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 1470 vs. 2(216) = 432.

Time = 3.48 (sec) , antiderivative size = 1471, normalized size of antiderivative = 6.81

method	result	size
gosper	Expression too large to display	1471
risch	Expression too large to display	1471
parallelrisch	Expression too large to display	2011

```
[In] int((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c)^2,x,method=_RETURNVERBOSE)
```

```
[Out] x*(B*b^2*d^2*m^5*x^10+25*B*b^2*d^2*m^4*x^10+A*b^2*d^2*m^5*x^8+2*B*a*b*d^2*m
^5*x^8+2*B*b^2*c*d*m^5*x^8+230*B*b^2*d^2*m^3*x^10+27*A*b^2*d^2*m^4*x^8+54*B
*a*b*d^2*m^4*x^8+54*B*b^2*c*d*m^4*x^8+950*B*b^2*d^2*m^2*x^10+2*A*a*b*d^2*m^
5*x^6+2*A*b^2*c*d*m^5*x^6+262*A*b^2*d^2*m^3*x^8+B*a^2*d^2*m^5*x^6+4*B*a*b*c
*d*m^5*x^6+524*B*a*b*d^2*m^3*x^8+B*b^2*c^2*m^5*x^6+524*B*b^2*c*d*m^3*x^8+16
89*B*b^2*d^2*m*x^10+58*A*a*b*d^2*m^4*x^6+58*A*b^2*c*d*m^4*x^6+1122*A*b^2*d^
2*m^2*x^8+29*B*a^2*d^2*m^4*x^6+116*B*a*b*c*d*m^4*x^6+2244*B*a*b*d^2*m^2*x^8
+29*B*b^2*c^2*m^4*x^6+2244*B*b^2*c*d*m^2*x^8+945*B*b^2*d^2*x^10+A*a^2*d^2*m
^5*x^4+4*A*a*b*c*d*m^5*x^4+604*A*a*b*d^2*m^3*x^6+A*b^2*c^2*m^5*x^4+604*A*b^
```

```
2*c*d*m^3*x^6+2041*A*b^2*d^2*m*x^8+2*B*a^2*c*d*m^5*x^4+302*B*a^2*d^2*m^3*x^
6+2*B*a*b*c^2*m^5*x^4+1208*B*a*b*c*d*m^3*x^6+4082*B*a*b*d^2*m*x^8+302*B*b^2
*c^2*m^3*x^6+4082*B*b^2*c*d*m*x^8+31*A*a^2*d^2*m^4*x^4+124*A*a*b*c*d*m^4*x^
4+2732*A*a*b*d^2*m^2*x^6+31*A*b^2*c^2*m^4*x^4+2732*A*b^2*c*d*m^2*x^6+1155*A
*b^2*d^2*x^8+62*B*a^2*c*d*m^4*x^4+1366*B*a^2*d^2*m^2*x^6+62*B*a*b*c^2*m^4*x
^4+5464*B*a*b*c*d*m^2*x^6+2310*B*a*b*d^2*x^8+1366*B*b^2*c^2*m^2*x^6+2310*B*
b^2*c*d*x^8+2*A*a^2*c*d*m^5*x^2+350*A*a^2*d^2*m^3*x^4+2*A*a*b*c^2*m^5*x^2+1
400*A*a*b*c*d*m^3*x^4+5154*A*a*b*d^2*m*x^6+350*A*b^2*c^2*m^3*x^4+5154*A*b^2
*c*d*m*x^6+B*a^2*c^2*m^5*x^2+700*B*a^2*c*d*m^3*x^4+2577*B*a^2*d^2*m*x^6+700
*B*a*b*c^2*m^3*x^4+10308*B*a*b*c*d*m*x^6+2577*B*b^2*c^2*m*x^6+66*A*a^2*c*d*
m^4*x^2+1730*A*a^2*d^2*m^2*x^4+66*A*a*b*c^2*m^4*x^2+6920*A*a*b*c*d*m^2*x^4+
2970*A*a*b*d^2*x^6+1730*A*b^2*c^2*m^2*x^4+2970*A*b^2*c*d*x^6+33*B*a^2*c^2*m
^4*x^2+3460*B*a^2*c*d*m^2*x^4+1485*B*a^2*d^2*x^6+3460*B*a*b*c^2*m^2*x^4+594
0*B*a*b*c*d*x^6+1485*B*b^2*c^2*x^6+A*a^2*c^2*m^5+812*A*a^2*c*d*m^3*x^2+3489
*A*a^2*d^2*m*x^4+812*A*a*b*c^2*m^3*x^2+13956*A*a*b*c*d*m*x^4+3489*A*b^2*c^2
*m*x^4+406*B*a^2*c^2*m^3*x^2+6978*B*a^2*c*d*m*x^4+6978*B*a*b*c^2*m*x^4+35*A
*a^2*c^2*m^4+4524*A*a^2*c*d*m^2*x^2+2079*A*a^2*d^2*x^4+4524*A*a*b*c^2*m^2*x
^2+8316*A*a*b*c*d*x^4+2079*A*b^2*c^2*x^4+2262*B*a^2*c^2*m^2*x^2+4158*B*a^2*
c*d*x^4+4158*B*a*b*c^2*x^4+470*A*a^2*c^2*m^3+10706*A*a^2*c*d*m*x^2+10706*A*
a*b*c^2*m*x^2+5353*B*a^2*c^2*m*x^2+3010*A*a^2*c^2*m^2+6930*A*a^2*c*d*x^2+69
30*A*a*b*c^2*x^2+3465*B*a^2*c^2*x^2+9129*A*a^2*c^2*m+10395*A*a^2*c^2)*(e*x)
^m/(11+m)/(9+m)/(7+m)/(5+m)/(3+m)/(1+m)
```

Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1043 vs. $2(216) = 432$.

Time = 0.29 (sec) , antiderivative size = 1043, normalized size of antiderivative = 4.83

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="fricas")
```

```
[Out] ((B*b^2*d^2*m^5 + 25*B*b^2*d^2*m^4 + 230*B*b^2*d^2*m^3 + 950*B*b^2*d^2*m^2
+ 1689*B*b^2*d^2*m + 945*B*b^2*d^2)*x^11 + ((2*B*b^2*c*d + (2*B*a*b + A*b^2
)*d^2)*m^5 + 2310*B*b^2*c*d + 27*(2*B*b^2*c*d + (2*B*a*b + A*b^2)*d^2)*m^4
+ 262*(2*B*b^2*c*d + (2*B*a*b + A*b^2)*d^2)*m^3 + 1155*(2*B*a*b + A*b^2)*d^
2 + 1122*(2*B*b^2*c*d + (2*B*a*b + A*b^2)*d^2)*m^2 + 2041*(2*B*b^2*c*d + (2
*B*a*b + A*b^2)*d^2)*m)*x^9 + ((B*b^2*c^2 + 2*(2*B*a*b + A*b^2)*c*d + (B*a^
2 + 2*A*a*b)*d^2)*m^5 + 1485*B*b^2*c^2 + 29*(B*b^2*c^2 + 2*(2*B*a*b + A*b^2
)*c*d + (B*a^2 + 2*A*a*b)*d^2)*m^4 + 302*(B*b^2*c^2 + 2*(2*B*a*b + A*b^2)*c
*d + (B*a^2 + 2*A*a*b)*d^2)*m^3 + 2970*(2*B*a*b + A*b^2)*c*d + 1485*(B*a^2
+ 2*A*a*b)*d^2 + 1366*(B*b^2*c^2 + 2*(2*B*a*b + A*b^2)*c*d + (B*a^2 + 2*A*a
*b)*d^2)*m^2 + 2577*(B*b^2*c^2 + 2*(2*B*a*b + A*b^2)*c*d + (B*a^2 + 2*A*a*b
)*d^2)*m)*x^7 + ((A*a^2*d^2 + (2*B*a*b + A*b^2)*c^2 + 2*(B*a^2 + 2*A*a*b)*c
```

```
*d)*m^5 + 2079*A*a^2*d^2 + 31*(A*a^2*d^2 + (2*B*a*b + A*b^2)*c^2 + 2*(B*a^2
 + 2*A*a*b)*c*d)*m^4 + 350*(A*a^2*d^2 + (2*B*a*b + A*b^2)*c^2 + 2*(B*a^2 +
2*A*a*b)*c*d)*m^3 + 2079*(2*B*a*b + A*b^2)*c^2 + 4158*(B*a^2 + 2*A*a*b)*c*d
 + 1730*(A*a^2*d^2 + (2*B*a*b + A*b^2)*c^2 + 2*(B*a^2 + 2*A*a*b)*c*d)*m^2 +
 3489*(A*a^2*d^2 + (2*B*a*b + A*b^2)*c^2 + 2*(B*a^2 + 2*A*a*b)*c*d)*m)*x^5
+ ((2*A*a^2*c*d + (B*a^2 + 2*A*a*b)*c^2)*m^5 + 6930*A*a^2*c*d + 33*(2*A*a^2
*c*d + (B*a^2 + 2*A*a*b)*c^2)*m^4 + 406*(2*A*a^2*c*d + (B*a^2 + 2*A*a*b)*c^
2)*m^3 + 3465*(B*a^2 + 2*A*a*b)*c^2 + 2262*(2*A*a^2*c*d + (B*a^2 + 2*A*a*b)
*c^2)*m^2 + 5353*(2*A*a^2*c*d + (B*a^2 + 2*A*a*b)*c^2)*m)*x^3 + (A*a^2*c^2*
m^5 + 35*A*a^2*c^2*m^4 + 470*A*a^2*c^2*m^3 + 3010*A*a^2*c^2*m^2 + 9129*A*a^
2*c^2*m + 10395*A*a^2*c^2)*x)*(e*x)^m/(m^6 + 36*m^5 + 505*m^4 + 3480*m^3 +
12139*m^2 + 19524*m + 10395)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 6836 vs. $2(211) = 422$.

Time = 0.96 (sec) , antiderivative size = 6836, normalized size of antiderivative = 31.65

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**2*(B*x**2+A)*(d*x**2+c)**2,x)
```

```
[Out] Piecewise(((-A*a**2*c**2/(10*x**10) - A*a**2*c*d/(4*x**8) - A*a**2*d**2/(6*
x**6) - A*a*b*c**2/(4*x**8) - 2*A*a*b*c*d/(3*x**6) - A*a*b*d**2/(2*x**4) -
A*b**2*c**2/(6*x**6) - A*b**2*c*d/(2*x**4) - A*b**2*d**2/(2*x**2) - B*a**2*
c**2/(8*x**8) - B*a**2*c*d/(3*x**6) - B*a**2*d**2/(4*x**4) - B*a*b*c**2/(3*
x**6) - B*a*b*c*d/x**4 - B*a*b*d**2/x**2 - B*b**2*c**2/(4*x**4) - B*b**2*c*
d/x**2 + B*b**2*d**2*log(x))/e**11, Eq(m, -11)), ((-A*a**2*c**2/(8*x**8) -
A*a**2*c*d/(3*x**6) - A*a**2*d**2/(4*x**4) - A*a*b*c**2/(3*x**6) - A*a*b*c*
d/x**4 - A*a*b*d**2/x**2 - A*b**2*c**2/(4*x**4) - A*b**2*c*d/x**2 + A*b**2*
d**2*log(x) - B*a**2*c**2/(6*x**6) - B*a**2*c*d/(2*x**4) - B*a**2*d**2/(2*x
**2) - B*a*b*c**2/(2*x**4) - 2*B*a*b*c*d/x**2 + 2*B*a*b*d**2*log(x) - B*b**
2*c**2/(2*x**2) + 2*B*b**2*c*d*log(x) + B*b**2*d**2*x**2/2)/e**9, Eq(m, -9)
), ((-A*a**2*c**2/(6*x**6) - A*a**2*c*d/(2*x**4) - A*a**2*d**2/(2*x**2) - A
*a*b*c**2/(2*x**4) - 2*A*a*b*c*d/x**2 + 2*A*a*b*d**2*log(x) - A*b**2*c**2/(
2*x**2) + 2*A*b**2*c*d*log(x) + A*b**2*d**2*x**2/2 - B*a**2*c**2/(4*x**4) -
 B*a**2*c*d/x**2 + B*a**2*d**2*log(x) - B*a*b*c**2/x**2 + 4*B*a*b*c*d*log(x
) + B*a*b*d**2*x**2 + B*b**2*c**2*log(x) + B*b**2*c*d*x**2 + B*b**2*d**2*x*
*4/4)/e**7, Eq(m, -7)), ((-A*a**2*c**2/(4*x**4) - A*a**2*c*d/x**2 + A*a**2*
d**2*log(x) - A*a*b*c**2/x**2 + 4*A*a*b*c*d*log(x) + A*a*b*d**2*x**2 + A*b*
*2*c**2*log(x) + A*b**2*c*d*x**2 + A*b**2*d**2*x**4/4 - B*a**2*c**2/(2*x**2
) + 2*B*a**2*c*d*log(x) + B*a**2*d**2*x**2/2 + 2*B*a*b*c**2*log(x) + 2*B*a*
b*c*d*x**2 + B*a*b*d**2*x**4/2 + B*b**2*c**2*x**2/2 + B*b**2*c*d*x**4/2 + B
*b**2*d**2*x**6/6)/e**5, Eq(m, -5)), ((-A*a**2*c**2/(2*x**2) + 2*A*a**2*c*d
```

```
*log(x) + A*a**2*d**2*x**2/2 + 2*A*a*b*c**2*log(x) + 2*A*a*b*c*d*x**2 + A*a
*b*d**2*x**4/2 + A*b**2*c**2*x**2/2 + A*b**2*c*d*x**4/2 + A*b**2*d**2*x**6/
6 + B*a**2*c**2*log(x) + B*a**2*c*d*x**2 + B*a**2*d**2*x**4/4 + B*a*b*c**2*
x**2 + B*a*b*c*d*x**4 + B*a*b*d**2*x**6/3 + B*b**2*c**2*x**4/4 + B*b**2*c*d
*x**6/3 + B*b**2*d**2*x**8/8)/e**3, Eq(m, -3)), ((A*a**2*c**2*log(x) + A*a*
*2*c*d*x**2 + A*a**2*d**2*x**4/4 + A*a*b*c**2*x**2 + A*a*b*c*d*x**4 + A*a*b
*d**2*x**6/3 + A*b**2*c**2*x**4/4 + A*b**2*c*d*x**6/3 + A*b**2*d**2*x**8/8
+ B*a**2*c**2*x**2/2 + B*a**2*c*d*x**4/2 + B*a**2*d**2*x**6/6 + B*a*b*c**2*
x**4/2 + 2*B*a*b*c*d*x**6/3 + B*a*b*d**2*x**8/4 + B*b**2*c**2*x**6/6 + B*b*
*2*c*d*x**8/4 + B*b**2*d**2*x**10/10)/e, Eq(m, -1)), (A*a**2*c**2*m**5*x*(e
*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 1039
5) + 35*A*a**2*c**2*m**4*x*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3
+ 12139*m**2 + 19524*m + 10395) + 470*A*a**2*c**2*m**3*x*(e*x)**m/(m**6 + 3
6*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3010*A*a**2
*c**2*m**2*x*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
 19524*m + 10395) + 9129*A*a**2*c**2*m*x*(e*x)**m/(m**6 + 36*m**5 + 505*m**
4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 10395*A*a**2*c**2*x*(e*x)**
m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) +
2*A*a**2*c*d*m**5*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12
139*m**2 + 19524*m + 10395) + 66*A*a**2*c*d*m**4*x**3*(e*x)**m/(m**6 + 36*m
**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 812*A*a**2*c*d
*m**3*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1
9524*m + 10395) + 4524*A*a**2*c*d*m**2*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*
m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 10706*A*a**2*c*d*m*x**3*
(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10
395) + 6930*A*a**2*c*d*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3
 + 12139*m**2 + 19524*m + 10395) + A*a**2*d**2*m**5*x**5*(e*x)**m/(m**6 + 3
6*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 31*A*a**2*d
**2*m**4*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2
+ 19524*m + 10395) + 350*A*a**2*d**2*m**3*x**5*(e*x)**m/(m**6 + 36*m**5 + 5
05*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1730*A*a**2*d**2*m**2
*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*
m + 10395) + 3489*A*a**2*d**2*m*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 +
3480*m**3 + 12139*m**2 + 19524*m + 10395) + 2079*A*a**2*d**2*x**5*(e*x)**m/
(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 2*
A*a*b*c**2*m**5*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 1213
9*m**2 + 19524*m + 10395) + 66*A*a*b*c**2*m**4*x**3*(e*x)**m/(m**6 + 36*m**
5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 812*A*a*b*c**2*m
**3*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 195
24*m + 10395) + 4524*A*a*b*c**2*m**2*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m*
*4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 10706*A*a*b*c**2*m*x**3*(e
*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 1039
5) + 6930*A*a*b*c**2*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 +
 12139*m**2 + 19524*m + 10395) + 4*A*a*b*c*d*m**5*x**5*(e*x)**m/(m**6 + 36*
m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 124*A*a*b*c*d
```

```
*m**4*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1
9524*m + 10395) + 1400*A*a*b*c*d*m**3*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m
**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 6920*A*a*b*c*d*m**2*x**5*
(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10
395) + 13956*A*a*b*c*d*m*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m*
*3 + 12139*m**2 + 19524*m + 10395) + 8316*A*a*b*c*d*x**5*(e*x)**m/(m**6 + 3
6*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 2*A*a*b*d**
2*m**5*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
19524*m + 10395) + 58*A*a*b*d**2*m**4*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m
**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 604*A*a*b*d**2*m**3*x**7*
(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10
395) + 2732*A*a*b*d**2*m**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480
*m**3 + 12139*m**2 + 19524*m + 10395) + 5154*A*a*b*d**2*m*x**7*(e*x)**m/(m*
*6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 2970*
A*a*b*d**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**
2 + 19524*m + 10395) + A*b**2*c**2*m**5*x**5*(e*x)**m/(m**6 + 36*m**5 + 505
*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 31*A*b**2*c**2*m**4*x**
5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m +
10395) + 350*A*b**2*c**2*m**3*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 34
80*m**3 + 12139*m**2 + 19524*m + 10395) + 1730*A*b**2*c**2*m**2*x**5*(e*x)*
*m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) +
 3489*A*b**2*c**2*m*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 +
12139*m**2 + 19524*m + 10395) + 2079*A*b**2*c**2*x**5*(e*x)**m/(m**6 + 36*m
**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 2*A*b**2*c*d*m
**5*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 195
24*m + 10395) + 58*A*b**2*c*d*m**4*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4
 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 604*A*b**2*c*d*m**3*x**7*(e*
x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395
) + 2732*A*b**2*c*d*m**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m*
*3 + 12139*m**2 + 19524*m + 10395) + 5154*A*b**2*c*d*m*x**7*(e*x)**m/(m**6
+ 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 2970*A*b
**2*c*d*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
 19524*m + 10395) + A*b**2*d**2*m**5*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m*
*4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 27*A*b**2*d**2*m**4*x**9*(
e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 103
95) + 262*A*b**2*d**2*m**3*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*
m**3 + 12139*m**2 + 19524*m + 10395) + 1122*A*b**2*d**2*m**2*x**9*(e*x)**m/
(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 20
41*A*b**2*d**2*m*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 121
39*m**2 + 19524*m + 10395) + 1155*A*b**2*d**2*x**9*(e*x)**m/(m**6 + 36*m**5
 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + B*a**2*c**2*m**5*
x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m
 + 10395) + 33*B*a**2*c**2*m**4*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 +
3480*m**3 + 12139*m**2 + 19524*m + 10395) + 406*B*a**2*c**2*m**3*x**3*(e*x)
**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395)
```

+ 2262*B*a**2*c**2*m**2*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**
3 + 12139*m**2 + 19524*m + 10395) + 5353*B*a**2*c**2*m*x**3*(e*x)**m/(m**6
+ 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3465*B*a
2*c2*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2
+ 19524*m + 10395) + 2*B*a**2*c*d*m**5*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*
m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 62*B*a**2*c*d*m**4*x**5*
(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10
395) + 700*B*a**2*c*d*m**3*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*
m**3 + 12139*m**2 + 19524*m + 10395) + 3460*B*a**2*c*d*m**2*x**5*(e*x)**m/(
m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 697
8*B*a**2*c*d*m*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139
*m**2 + 19524*m + 10395) + 4158*B*a**2*c*d*x**5*(e*x)**m/(m**6 + 36*m**5 +
505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + B*a**2*d**2*m**5*x**
7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m +
10395) + 29*B*a**2*d**2*m**4*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 348
0*m**3 + 12139*m**2 + 19524*m + 10395) + 302*B*a**2*d**2*m**3*x**7*(e*x)**m
/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1
366*B*a**2*d**2*m**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 +
12139*m**2 + 19524*m + 10395) + 2577*B*a**2*d**2*m*x**7*(e*x)**m/(m**6 + 3
6*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1485*B*a**2
*d**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1
9524*m + 10395) + 2*B*a*b*c**2*m**5*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**
4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 62*B*a*b*c**2*m**4*x**5*(e*
x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395
) + 700*B*a*b*c**2*m**3*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**
3 + 12139*m**2 + 19524*m + 10395) + 3460*B*a*b*c**2*m**2*x**5*(e*x)**m/(m**
6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 6978*B
*a*b*c**2*m*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m*
*2 + 19524*m + 10395) + 4158*B*a*b*c**2*x**5*(e*x)**m/(m**6 + 36*m**5 + 505
*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 4*B*a*b*c*d*m**5*x**7*(
e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 103
95) + 116*B*a*b*c*d*m**4*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m*
*3 + 12139*m**2 + 19524*m + 10395) + 1208*B*a*b*c*d*m**3*x**7*(e*x)**m/(m**
6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 5464*B
*a*b*c*d*m**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*
m**2 + 19524*m + 10395) + 10308*B*a*b*c*d*m*x**7*(e*x)**m/(m**6 + 36*m**5 +
505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 5940*B*a*b*c*d*x**7
*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 1
0395) + 2*B*a*b*d**2*m**5*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m
3 + 12139*m2 + 19524*m + 10395) + 54*B*a*b*d**2*m**4*x**9*(e*x)**m/(m**
6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 524*B*
a*b*d**2*m**3*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*
m**2 + 19524*m + 10395) + 2244*B*a*b*d**2*m**2*x**9*(e*x)**m/(m**6 + 36*m**
5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 4082*B*a*b*d**2*
m*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524

```
*m + 10395) + 2310*B*a*b*d**2*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 34
80*m**3 + 12139*m**2 + 19524*m + 10395) + B*b**2*c**2*m**5*x**7*(e*x)**m/(m
**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 29*B
*b**2*c**2*m**4*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 1213
9*m**2 + 19524*m + 10395) + 302*B*b**2*c**2*m**3*x**7*(e*x)**m/(m**6 + 36*m
**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1366*B*b**2*c*
*2*m**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
 19524*m + 10395) + 2577*B*b**2*c**2*m*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*
m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1485*B*b**2*c**2*x**7*(e
*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 1039
5) + 2*B*b**2*c*d*m**5*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3
 + 12139*m**2 + 19524*m + 10395) + 54*B*b**2*c*d*m**4*x**9*(e*x)**m/(m**6 +
 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 524*B*b**
2*c*d*m**3*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**
2 + 19524*m + 10395) + 2244*B*b**2*c*d*m**2*x**9*(e*x)**m/(m**6 + 36*m**5 +
 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 4082*B*b**2*c*d*m*x
**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m
+ 10395) + 2310*B*b**2*c*d*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*
m**3 + 12139*m**2 + 19524*m + 10395) + B*b**2*d**2*m**5*x**11*(e*x)**m/(m**
6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 25*B*b
**2*d**2*m**4*x**11*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139
*m**2 + 19524*m + 10395) + 230*B*b**2*d**2*m**3*x**11*(e*x)**m/(m**6 + 36*m
**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 950*B*b**2*d**
2*m**2*x**11*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
 19524*m + 10395) + 1689*B*b**2*d**2*m*x**11*(e*x)**m/(m**6 + 36*m**5 + 505
*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 945*B*b**2*d**2*x**11*(
e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 103
95), True))
```

Maxima [A] (verification not implemented)

none

Time = 0.25 (sec) , antiderivative size = 396, normalized size of antiderivative = 1.83

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \frac{Bb^2d^2e^mx^{11}x^m}{m+11} + \frac{2\,Bb^2cde^mx^9x^m}{m+9} + \frac{2\,Babd^2e^mx^9x^m}{m+9} + \frac{Ab^2d^2e^mx^9x^m}{m+9} + \frac{Bb^2c^2e^mx^7x^m}{m+7} + \frac{4\,Babcde^mx^7x^m}{m+7} + \frac{2\,Ab^2cde^mx^7x^m}{m+7} + \frac{Ba^2d^2e^mx^7x^m}{m+7} + \frac{2\,Aabd^2e^mx^7x^m}{m+7} + \frac{2\,Babc^2e^mx^5x^m}{m+5} + \frac{Ab^2c^2e^mx^5x^m}{m+5} + \frac{2\,Ba^2cde^mx^5x^m}{m+5} + \frac{4\,Aabcde^mx^5x^m}{m+5} + \frac{Aa^2d^2e^mx^5x^m}{m+5} + \frac{Ba^2c^2e^mx^3x^m}{m+3} + \frac{2\,Aabc^2e^mx^3x^m}{m+3} + \frac{2\,Aa^2cde^mx^3x^m}{m+3} + \frac{(ex)^{m+1}\,Aa^2c^2}{e(m+1)}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="maxima")
```

```
[Out] B*b^2*d^2*e^m*x^11*x^m/(m + 11) + 2*B*b^2*c*d*e^m*x^9*x^m/(m + 9) + 2*B*a*b
*d^2*e^m*x^9*x^m/(m + 9) + A*b^2*d^2*e^m*x^9*x^m/(m + 9) + B*b^2*c^2*e^m*x^
7*x^m/(m + 7) + 4*B*a*b*c*d*e^m*x^7*x^m/(m + 7) + 2*A*b^2*c*d*e^m*x^7*x^m/(
m + 7) + B*a^2*d^2*e^m*x^7*x^m/(m + 7) + 2*A*a*b*d^2*e^m*x^7*x^m/(m + 7) +
2*B*a*b*c^2*e^m*x^5*x^m/(m + 5) + A*b^2*c^2*e^m*x^5*x^m/(m + 5) + 2*B*a^2*c
*d*e^m*x^5*x^m/(m + 5) + 4*A*a*b*c*d*e^m*x^5*x^m/(m + 5) + A*a^2*d^2*e^m*x^
5*x^m/(m + 5) + B*a^2*c^2*e^m*x^3*x^m/(m + 3) + 2*A*a*b*c^2*e^m*x^3*x^m/(m
+ 3) + 2*A*a^2*c*d*e^m*x^3*x^m/(m + 3) + (e*x)^(m + 1)*A*a^2*c^2/(e*(m + 1)
)
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 2010 vs. 2(216) = 432.

Time = 0.36 (sec) , antiderivative size = 2010, normalized size of antiderivative = 9.31

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*b^2*d^2*m^5*x^11 + 25*(e*x)^m*B*b^2*d^2*m^4*x^11 + 2*(e*x)^m*B*b
^2*c*d*m^5*x^9 + 2*(e*x)^m*B*a*b*d^2*m^5*x^9 + (e*x)^m*A*b^2*d^2*m^5*x^9 +
230*(e*x)^m*B*b^2*d^2*m^3*x^11 + 54*(e*x)^m*B*b^2*c*d*m^4*x^9 + 54*(e*x)^m*
B*a*b*d^2*m^4*x^9 + 27*(e*x)^m*A*b^2*d^2*m^4*x^9 + 950*(e*x)^m*B*b^2*d^2*m^
2*x^11 + (e*x)^m*B*b^2*c^2*m^5*x^7 + 4*(e*x)^m*B*a*b*c*d*m^5*x^7 + 2*(e*x)^
m*A*b^2*c*d*m^5*x^7 + (e*x)^m*B*a^2*d^2*m^5*x^7 + 2*(e*x)^m*A*a*b*d^2*m^5*x
^7 + 524*(e*x)^m*B*b^2*c*d*m^3*x^9 + 524*(e*x)^m*B*a*b*d^2*m^3*x^9 + 262*(e
*x)^m*A*b^2*d^2*m^3*x^9 + 1689*(e*x)^m*B*b^2*d^2*m*x^11 + 29*(e*x)^m*B*b^2*
c^2*m^4*x^7 + 116*(e*x)^m*B*a*b*c*d*m^4*x^7 + 58*(e*x)^m*A*b^2*c*d*m^4*x^7
+ 29*(e*x)^m*B*a^2*d^2*m^4*x^7 + 58*(e*x)^m*A*a*b*d^2*m^4*x^7 + 2244*(e*x)^
m*B*b^2*c*d*m^2*x^9 + 2244*(e*x)^m*B*a*b*d^2*m^2*x^9 + 1122*(e*x)^m*A*b^2*d
^2*m^2*x^9 + 945*(e*x)^m*B*b^2*d^2*x^11 + 2*(e*x)^m*B*a*b*c^2*m^5*x^5 + (e*
x)^m*A*b^2*c^2*m^5*x^5 + 2*(e*x)^m*B*a^2*c*d*m^5*x^5 + 4*(e*x)^m*A*a*b*c*d*
m^5*x^5 + (e*x)^m*A*a^2*d^2*m^5*x^5 + 302*(e*x)^m*B*b^2*c^2*m^3*x^7 + 1208*
(e*x)^m*B*a*b*c*d*m^3*x^7 + 604*(e*x)^m*A*b^2*c*d*m^3*x^7 + 302*(e*x)^m*B*a
^2*d^2*m^3*x^7 + 604*(e*x)^m*A*a*b*d^2*m^3*x^7 + 4082*(e*x)^m*B*b^2*c*d*m*x
^9 + 4082*(e*x)^m*B*a*b*d^2*m*x^9 + 2041*(e*x)^m*A*b^2*d^2*m*x^9 + 62*(e*x)
^m*B*a*b*c^2*m^4*x^5 + 31*(e*x)^m*A*b^2*c^2*m^4*x^5 + 62*(e*x)^m*B*a^2*c*d*
m^4*x^5 + 124*(e*x)^m*A*a*b*c*d*m^4*x^5 + 31*(e*x)^m*A*a^2*d^2*m^4*x^5 + 13
66*(e*x)^m*B*b^2*c^2*m^2*x^7 + 5464*(e*x)^m*B*a*b*c*d*m^2*x^7 + 2732*(e*x)^
m*A*b^2*c*d*m^2*x^7 + 1366*(e*x)^m*B*a^2*d^2*m^2*x^7 + 2732*(e*x)^m*A*a*b*d
^2*m^2*x^7 + 2310*(e*x)^m*B*b^2*c*d*x^9 + 2310*(e*x)^m*B*a*b*d^2*x^9 + 1155
*(e*x)^m*A*b^2*d^2*x^9 + (e*x)^m*B*a^2*c^2*m^5*x^3 + 2*(e*x)^m*A*a*b*c^2*m^
5*x^3 + 2*(e*x)^m*A*a^2*c*d*m^5*x^3 + 700*(e*x)^m*B*a*b*c^2*m^3*x^5 + 350*(
e*x)^m*A*b^2*c^2*m^3*x^5 + 700*(e*x)^m*B*a^2*c*d*m^3*x^5 + 1400*(e*x)^m*A*a
*b*c*d*m^3*x^5 + 350*(e*x)^m*A*a^2*d^2*m^3*x^5 + 2577*(e*x)^m*B*b^2*c^2*m*x
^7 + 10308*(e*x)^m*B*a*b*c*d*m*x^7 + 5154*(e*x)^m*A*b^2*c*d*m*x^7 + 2577*(e
*x)^m*B*a^2*d^2*m*x^7 + 5154*(e*x)^m*A*a*b*d^2*m*x^7 + 33*(e*x)^m*B*a^2*c^2
*m^4*x^3 + 66*(e*x)^m*A*a*b*c^2*m^4*x^3 + 66*(e*x)^m*A*a^2*c*d*m^4*x^3 + 34
60*(e*x)^m*B*a*b*c^2*m^2*x^5 + 1730*(e*x)^m*A*b^2*c^2*m^2*x^5 + 3460*(e*x)^
m*B*a^2*c*d*m^2*x^5 + 6920*(e*x)^m*A*a*b*c*d*m^2*x^5 + 1730*(e*x)^m*A*a^2*d
^2*m^2*x^5 + 1485*(e*x)^m*B*b^2*c^2*x^7 + 5940*(e*x)^m*B*a*b*c*d*x^7 + 2970
*(e*x)^m*A*b^2*c*d*x^7 + 1485*(e*x)^m*B*a^2*d^2*x^7 + 2970*(e*x)^m*A*a*b*d^
2*x^7 + (e*x)^m*A*a^2*c^2*m^5*x + 406*(e*x)^m*B*a^2*c^2*m^3*x^3 + 812*(e*x)
^m*A*a*b*c^2*m^3*x^3 + 812*(e*x)^m*A*a^2*c*d*m^3*x^3 + 6978*(e*x)^m*B*a*b*c
^2*m*x^5 + 3489*(e*x)^m*A*b^2*c^2*m*x^5 + 6978*(e*x)^m*B*a^2*c*d*m*x^5 + 13
956*(e*x)^m*A*a*b*c*d*m*x^5 + 3489*(e*x)^m*A*a^2*d^2*m*x^5 + 35*(e*x)^m*A*a
^2*c^2*m^4*x + 2262*(e*x)^m*B*a^2*c^2*m^2*x^3 + 4524*(e*x)^m*A*a*b*c^2*m^2*
x^3 + 4524*(e*x)^m*A*a^2*c*d*m^2*x^3 + 4158*(e*x)^m*B*a*b*c^2*x^5 + 2079*(e
*x)^m*A*b^2*c^2*x^5 + 4158*(e*x)^m*B*a^2*c*d*x^5 + 8316*(e*x)^m*A*a*b*c*d*x
^5 + 2079*(e*x)^m*A*a^2*d^2*x^5 + 470*(e*x)^m*A*a^2*c^2*m^3*x + 5353*(e*x)^
m*B*a^2*c^2*m*x^3 + 10706*(e*x)^m*A*a*b*c^2*m*x^3 + 10706*(e*x)^m*A*a^2*c*d
*m*x^3 + 3010*(e*x)^m*A*a^2*c^2*m^2*x + 3465*(e*x)^m*B*a^2*c^2*x^3 + 6930*(
e*x)^m*A*a*b*c^2*x^3 + 6930*(e*x)^m*A*a^2*c*d*x^3 + 9129*(e*x)^m*A*a^2*c^2*
m*x + 10395*(e*x)^m*A*a^2*c^2*x)/(m^6 + 36*m^5 + 505*m^4 + 3480*m^3 + 12139
```

```
*m^2 + 19524*m + 10395)
```

Mupad [B] (verification not implemented)

Time = 5.88 (sec) , antiderivative size = 499, normalized size of antiderivative = 2.31

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx$$
$$= \frac{x^5 (e\,x)^m \left(2\,B\,a^2\,c\,d+A\,a^2\,d^2+2\,B\,a\,b\,c^2+4\,A\,a\,b\,c\,d+A\,b^2\,c^2\right) \left(m^5+31\,m^4+350\,m^3+1730\,m^2+3489\right.}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+ \frac{x^7 (e\,x)^m \left(B\,a^2\,d^2+4\,B\,a\,b\,c\,d+2\,A\,a\,b\,d^2+B\,b^2\,c^2+2\,A\,b^2\,c\,d\right) \left(m^5+29\,m^4+302\,m^3+1366\,m^2+257\right.}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+ \frac{a\,c\,x^3 (e\,x)^m \left(2\,A\,a\,d+2\,A\,b\,c+B\,a\,c\right) \left(m^5+33\,m^4+406\,m^3+2262\,m^2+5353\,m+3465\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+ \frac{b\,d\,x^9 (e\,x)^m \left(A\,b\,d+2\,B\,a\,d+2\,B\,b\,c\right) \left(m^5+27\,m^4+262\,m^3+1122\,m^2+2041\,m+1155\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+ \frac{A\,a^2\,c^2\,x\,(e\,x)^m \left(m^5+35\,m^4+470\,m^3+3010\,m^2+9129\,m+10395\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+ \frac{B\,b^2\,d^2\,x^{11}\,(e\,x)^m \left(m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^2*(c + d*x^2)^2,x)
```

```
[Out] (x^5*(e*x)^m*(A*a^2*d^2 + A*b^2*c^2 + 2*B*a*b*c^2 + 2*B*a^2*c*d + 4*A*a*b*c
*d)*(3489*m + 1730*m^2 + 350*m^3 + 31*m^4 + m^5 + 2079))/(19524*m + 12139*m
^2 + 3480*m^3 + 505*m^4 + 36*m^5 + m^6 + 10395) + (x^7*(e*x)^m*(B*a^2*d^2 +
 B*b^2*c^2 + 2*A*a*b*d^2 + 2*A*b^2*c*d + 4*B*a*b*c*d)*(2577*m + 1366*m^2 +
302*m^3 + 29*m^4 + m^5 + 1485))/(19524*m + 12139*m^2 + 3480*m^3 + 505*m^4 +
 36*m^5 + m^6 + 10395) + (a*c*x^3*(e*x)^m*(2*A*a*d + 2*A*b*c + B*a*c)*(5353
*m + 2262*m^2 + 406*m^3 + 33*m^4 + m^5 + 3465))/(19524*m + 12139*m^2 + 3480
*m^3 + 505*m^4 + 36*m^5 + m^6 + 10395) + (b*d*x^9*(e*x)^m*(A*b*d + 2*B*a*d
+ 2*B*b*c)*(2041*m + 1122*m^2 + 262*m^3 + 27*m^4 + m^5 + 1155))/(19524*m +
12139*m^2 + 3480*m^3 + 505*m^4 + 36*m^5 + m^6 + 10395) + (A*a^2*c^2*x*(e*x)
^m*(9129*m + 3010*m^2 + 470*m^3 + 35*m^4 + m^5 + 10395))/(19524*m + 12139*m
^2 + 3480*m^3 + 505*m^4 + 36*m^5 + m^6 + 10395) + (B*b^2*d^2*x^11*(e*x)^m*(
1689*m + 950*m^2 + 230*m^3 + 25*m^4 + m^5 + 945))/(19524*m + 12139*m^2 + 34
80*m^3 + 505*m^4 + 36*m^5 + m^6 + 10395)
```

3.10 $\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx$

Optimal result

Integrand size = 29, antiderivative size = 144

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \frac{aAc^2(ex)^{1+m}}{e(1+m)} + \frac{c(Abc+aBc+2aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{(ad(2Bc+Ad)+bc(Bc+2Ad))(ex)^{5+m}}{e^5(5+m)} + \frac{d(2bBc+Abd+aBd)(ex)^{7+m}}{e^7(7+m)} + \frac{bBd^2(ex)^{9+m}}{e^9(9+m)}$$

```
[Out] a*A*c^2*(e*x)^(1+m)/e/(1+m)+c*(2*A*a*d+A*b*c+B*a*c)*(e*x)^(3+m)/e^3/(3+m)+(
a*d*(A*d+2*B*c)+b*c*(2*A*d+B*c))*(e*x)^(5+m)/e^5/(5+m)+d*(A*b*d+B*a*d+2*B*b
*c)*(e*x)^(7+m)/e^7/(7+m)+b*B*d^2*(e*x)^(9+m)/e^9/(9+m)
```

Rubi [A] (verified)

Time = 0.08 (sec) , antiderivative size = 144, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1, $\frac{\text{number of rules}}{\text{integrand size}} = 0.034$, Rules used = {584}

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \frac{d(ex)^{m+7}(aBd+Abd+2bBc)}{e^7(m+7)} + \frac{(ex)^{m+5}(ad(Ad+2Bc)+bc(2Ad+Bc))}{e^5(m+5)} + \frac{c(ex)^{m+3}(2aAd+aBc+Abc)}{e^3(m+3)} + \frac{aAc^2(ex)^{m+1}}{e(m+1)} + \frac{bBd^2(ex)^{m+9}}{e^9(m+9)}$$

```
[In] Int[(e*x)^m*(a + b*x^2)*(A + B*x^2)*(c + d*x^2)^2,x]
```

```
[Out] (a*A*c^2*(e*x)^(1 + m))/(e*(1 + m)) + (c*(A*b*c + a*B*c + 2*a*A*d)*(e*x)^(3
 + m))/(e^3*(3 + m)) + ((a*d*(2*B*c + A*d) + b*c*(B*c + 2*A*d))*(e*x)^(5 +
m))/(e^5*(5 + m)) + (d*(2*b*B*c + A*b*d + a*B*d)*(e*x)^(7 + m))/(e^7*(7 + m
)) + (b*B*d^2*(e*x)^(9 + m))/(e^9*(9 + m))
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\text{integral} = \int \left(aAc^2(ex)^m + \frac{c(Abc+aBc+2aAd)(ex)^{2+m}}{e^2} + \frac{(ad(2Bc+Ad)+bc(Bc+2Ad))(ex)^{4+m}}{e^4} + \frac{d(2bBc+Abd+aBd)(ex)^{6+m}}{e^6} + \frac{bBd^2(ex)^{8+m}}{e^8}\right) dx$$

$$= \frac{aAc^2(ex)^{1+m}}{e(1+m)} + \frac{c(Abc+aBc+2aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{(ad(2Bc+Ad)+bc(Bc+2Ad))(ex)^{5+m}}{e^5(5+m)} + \frac{d(2bBc+Abd+aBd)(ex)^{7+m}}{e^7(7+m)} + \frac{bBd^2(ex)^{9+m}}{e^9(9+m)}$$

Mathematica [A] (verified)

Time = 0.14 (sec) , antiderivative size = 113, normalized size of antiderivative = 0.78

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = x(ex)^m \left(\frac{aAc^2}{1+m} + \frac{c(Abc+aBc+2aAd)x^2}{3+m} + \frac{(ad(2Bc+Ad)+bc(Bc+2Ad))x^4}{5+m} + \frac{d(2bBc+Abd+aBd)x^6}{7+m} + \frac{bBd^2x^8}{9+m}\right)$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)*(A + B*x^2)*(c + d*x^2)^2,x]
```

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

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 710 vs. 2(144) = 288.

Time = 3.39 (sec) , antiderivative size = 711, normalized size of antiderivative = 4.94

method	result
gosper	$\frac{x(Bb\,d^2m^4x^8+16Bb\,d^2m^3x^8+Ab\,d^2m^4x^6+Ba\,d^2m^4x^6+2Bbcd\,m^4x^6+86Bb\,d^2m^2x^8+18Ab\,d^2m^3x^6+18Ba\,d^2m^3x^6+36Bbc}{}$
risch	$\frac{x(Bb\,d^2m^4x^8+16Bb\,d^2m^3x^8+Ab\,d^2m^4x^6+Ba\,d^2m^4x^6+2Bbcd\,m^4x^6+86Bb\,d^2m^2x^8+18Ab\,d^2m^3x^6+18Ba\,d^2m^3x^6+36Bbc}{}$
parallelrisch	Expression too large to display

```
[In] int((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c)^2,x,method=_RETURNVERBOSE)
```

```
[Out] x*(B*b*d^2*m^4*x^8+16*B*b*d^2*m^3*x^8+A*b*d^2*m^4*x^6+B*a*d^2*m^4*x^6+2*B*b
*c*d*m^4*x^6+86*B*b*d^2*m^2*x^8+18*A*b*d^2*m^3*x^6+18*B*a*d^2*m^3*x^6+36*B*
b*c*d*m^3*x^6+176*B*b*d^2*m*x^8+A*a*d^2*m^4*x^4+2*A*b*c*d*m^4*x^4+104*A*b*d
^2*m^2*x^6+2*B*a*c*d*m^4*x^4+104*B*a*d^2*m^2*x^6+B*b*c^2*m^4*x^4+208*B*b*c*
d*m^2*x^6+105*B*b*d^2*x^8+20*A*a*d^2*m^3*x^4+40*A*b*c*d*m^3*x^4+222*A*b*d^2
*m*x^6+40*B*a*c*d*m^3*x^4+222*B*a*d^2*m*x^6+20*B*b*c^2*m^3*x^4+444*B*b*c*d*
m*x^6+2*A*a*c*d*m^4*x^2+130*A*a*d^2*m^2*x^4+A*b*c^2*m^4*x^2+260*A*b*c*d*m^2
*x^4+135*A*b*d^2*x^6+B*a*c^2*m^4*x^2+260*B*a*c*d*m^2*x^4+135*B*a*d^2*x^6+13
0*B*b*c^2*m^2*x^4+270*B*b*c*d*x^6+44*A*a*c*d*m^3*x^2+300*A*a*d^2*m*x^4+22*A
*b*c^2*m^3*x^2+600*A*b*c*d*m*x^4+22*B*a*c^2*m^3*x^2+600*B*a*c*d*m*x^4+300*B
*b*c^2*m*x^4+A*a*c^2*m^4+328*A*a*c*d*m^2*x^2+189*A*a*d^2*x^4+164*A*b*c^2*m^
2*x^2+378*A*b*c*d*x^4+164*B*a*c^2*m^2*x^2+378*B*a*c*d*x^4+189*B*b*c^2*x^4+2
4*A*a*c^2*m^3+916*A*a*c*d*m*x^2+458*A*b*c^2*m*x^2+458*B*a*c^2*m*x^2+206*A*a
*c^2*m^2+630*A*a*c*d*x^2+315*A*b*c^2*x^2+315*B*a*c^2*x^2+744*A*a*c^2*m+945*
A*a*c^2)*(e*x)^m/(9+m)/(7+m)/(5+m)/(3+m)/(1+m)
```

Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 495 vs. 2(144) = 288.

Time = 0.27 (sec) , antiderivative size = 495, normalized size of antiderivative = 3.44

$$\int (ex)^m\left(a+bx^2\right)\left(A+Bx^2\right)\left(c+dx^2\right)^2\,dx$$
$$=\frac{((Bbd^2m^4+16\,Bbd^2m^3+86\,Bbd^2m^2+176\,Bbd^2m+105\,Bbd^2)x^9+((2\,Bbcd+(Ba+Ab)d^2)m^4+270}{}$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="fricas")
```

```
[Out] ((B*b*d^2*m^4 + 16*B*b*d^2*m^3 + 86*B*b*d^2*m^2 + 176*B*b*d^2*m + 105*B*b*d
^2)*x^9 + ((2*B*b*c*d + (B*a + A*b)*d^2)*m^4 + 270*B*b*c*d + 18*(2*B*b*c*d
+ (B*a + A*b)*d^2)*m^3 + 135*(B*a + A*b)*d^2 + 104*(2*B*b*c*d + (B*a + A*b)
```

```
*d^2)*m^2 + 222*(2*B*b*c*d + (B*a + A*b)*d^2)*m)*x^7 + ((B*b*c^2 + A*a*d^2
+ 2*(B*a + A*b)*c*d)*m^4 + 189*B*b*c^2 + 189*A*a*d^2 + 20*(B*b*c^2 + A*a*d^
2 + 2*(B*a + A*b)*c*d)*m^3 + 378*(B*a + A*b)*c*d + 130*(B*b*c^2 + A*a*d^2 +
 2*(B*a + A*b)*c*d)*m^2 + 300*(B*b*c^2 + A*a*d^2 + 2*(B*a + A*b)*c*d)*m)*x^
5 + ((2*A*a*c*d + (B*a + A*b)*c^2)*m^4 + 630*A*a*c*d + 22*(2*A*a*c*d + (B*a
 + A*b)*c^2)*m^3 + 315*(B*a + A*b)*c^2 + 164*(2*A*a*c*d + (B*a + A*b)*c^2)*
m^2 + 458*(2*A*a*c*d + (B*a + A*b)*c^2)*m)*x^3 + (A*a*c^2*m^4 + 24*A*a*c^2*
m^3 + 206*A*a*c^2*m^2 + 744*A*a*c^2*m + 945*A*a*c^2)*x)*(e*x)^m/(m^5 + 25*m
^4 + 230*m^3 + 950*m^2 + 1689*m + 945)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 3271 vs. $2(139) = 278$.

Time = 0.67 (sec) , antiderivative size = 3271, normalized size of antiderivative = 22.72

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)*(B*x**2+A)*(d*x**2+c)**2,x)
```

```
[Out] Piecewise(((-A*a*c**2/(8*x**8) - A*a*c*d/(3*x**6) - A*a*d**2/(4*x**4) - A*b
*c**2/(6*x**6) - A*b*c*d/(2*x**4) - A*b*d**2/(2*x**2) - B*a*c**2/(6*x**6) -
 B*a*c*d/(2*x**4) - B*a*d**2/(2*x**2) - B*b*c**2/(4*x**4) - B*b*c*d/x**2 +
B*b*d**2*log(x))/e**9, Eq(m, -9)), ((-A*a*c**2/(6*x**6) - A*a*c*d/(2*x**4)
- A*a*d**2/(2*x**2) - A*b*c**2/(4*x**4) - A*b*c*d/x**2 + A*b*d**2*log(x) -
B*a*c**2/(4*x**4) - B*a*c*d/x**2 + B*a*d**2*log(x) - B*b*c**2/(2*x**2) + 2*
B*b*c*d*log(x) + B*b*d**2*x**2/2)/e**7, Eq(m, -7)), ((-A*a*c**2/(4*x**4) -
A*a*c*d/x**2 + A*a*d**2*log(x) - A*b*c**2/(2*x**2) + 2*A*b*c*d*log(x) + A*b
*d**2*x**2/2 - B*a*c**2/(2*x**2) + 2*B*a*c*d*log(x) + B*a*d**2*x**2/2 + B*b
*c**2*log(x) + B*b*c*d*x**2 + B*b*d**2*x**4/4)/e**5, Eq(m, -5)), ((-A*a*c**
2/(2*x**2) + 2*A*a*c*d*log(x) + A*a*d**2*x**2/2 + A*b*c**2*log(x) + A*b*c*d
*x**2 + A*b*d**2*x**4/4 + B*a*c**2*log(x) + B*a*c*d*x**2 + B*a*d**2*x**4/4
+ B*b*c**2*x**2/2 + B*b*c*d*x**4/2 + B*b*d**2*x**6/6)/e**3, Eq(m, -3)), ((A
*a*c**2*log(x) + A*a*c*d*x**2 + A*a*d**2*x**4/4 + A*b*c**2*x**2/2 + A*b*c*d
*x**4/2 + A*b*d**2*x**6/6 + B*a*c**2*x**2/2 + B*a*c*d*x**4/2 + B*a*d**2*x**
6/6 + B*b*c**2*x**4/4 + B*b*c*d*x**6/3 + B*b*d**2*x**8/8)/e, Eq(m, -1)), (A
*a*c**2*m**4*x*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 94
5) + 24*A*a*c**2*m**3*x*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 16
89*m + 945) + 206*A*a*c**2*m**2*x*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950
*m**2 + 1689*m + 945) + 744*A*a*c**2*m*x*(e*x)**m/(m**5 + 25*m**4 + 230*m**
3 + 950*m**2 + 1689*m + 945) + 945*A*a*c**2*x*(e*x)**m/(m**5 + 25*m**4 + 23
0*m**3 + 950*m**2 + 1689*m + 945) + 2*A*a*c*d*m**4*x**3*(e*x)**m/(m**5 + 25
*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 44*A*a*c*d*m**3*x**3*(e*x)**m
/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 328*A*a*c*d*m**2*x
**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 916*A*
```

```
a*c*d*m*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945)
 + 630*A*a*c*d*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m
 + 945) + A*a*d**2*m**4*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2
 + 1689*m + 945) + 20*A*a*d**2*m**3*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**
3 + 950*m**2 + 1689*m + 945) + 130*A*a*d**2*m**2*x**5*(e*x)**m/(m**5 + 25*m
**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 300*A*a*d**2*m*x**5*(e*x)**m/(m
**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 189*A*a*d**2*x**5*(e*
x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + A*b*c**2*m**4
*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 22*A
*b*c**2*m**3*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m +
 945) + 164*A*b*c**2*m**2*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m*
*2 + 1689*m + 945) + 458*A*b*c**2*m*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**
3 + 950*m**2 + 1689*m + 945) + 315*A*b*c**2*x**3*(e*x)**m/(m**5 + 25*m**4 +
 230*m**3 + 950*m**2 + 1689*m + 945) + 2*A*b*c*d*m**4*x**5*(e*x)**m/(m**5 +
 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 40*A*b*c*d*m**3*x**5*(e*x)
**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 260*A*b*c*d*m**
2*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 600
*A*b*c*d*m*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 9
45) + 378*A*b*c*d*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 168
9*m + 945) + A*b*d**2*m**4*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m
**2 + 1689*m + 945) + 18*A*b*d**2*m**3*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*
m**3 + 950*m**2 + 1689*m + 945) + 104*A*b*d**2*m**2*x**7*(e*x)**m/(m**5 + 2
5*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 222*A*b*d**2*m*x**7*(e*x)**m
/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 135*A*b*d**2*x**7*
(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + B*a*c**2*m
**4*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 2
2*B*a*c**2*m**3*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*
m + 945) + 164*B*a*c**2*m**2*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950
*m**2 + 1689*m + 945) + 458*B*a*c**2*m*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*
m**3 + 950*m**2 + 1689*m + 945) + 315*B*a*c**2*x**3*(e*x)**m/(m**5 + 25*m**
4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 2*B*a*c*d*m**4*x**5*(e*x)**m/(m**
5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 40*B*a*c*d*m**3*x**5*(e
*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 260*B*a*c*d*
m**2*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) +
600*B*a*c*d*m*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m
+ 945) + 378*B*a*c*d*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 +
1689*m + 945) + B*a*d**2*m**4*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 95
0*m**2 + 1689*m + 945) + 18*B*a*d**2*m**3*x**7*(e*x)**m/(m**5 + 25*m**4 + 2
30*m**3 + 950*m**2 + 1689*m + 945) + 104*B*a*d**2*m**2*x**7*(e*x)**m/(m**5
+ 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 222*B*a*d**2*m*x**7*(e*x)
**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 135*B*a*d**2*x*
*7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + B*b*c**
2*m**4*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945)
+ 20*B*b*c**2*m**3*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 16
89*m + 945) + 130*B*b*c**2*m**2*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 +
```

```
950*m**2 + 1689*m + 945) + 300*B*b*c**2*m*x**5*(e*x)**m/(m**5 + 25*m**4 + 2
30*m**3 + 950*m**2 + 1689*m + 945) + 189*B*b*c**2*x**5*(e*x)**m/(m**5 + 25*
m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 2*B*b*c*d*m**4*x**7*(e*x)**m/(
m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 36*B*b*c*d*m**3*x**7
*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 208*B*b*c
*d*m**2*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945)
 + 444*B*b*c*d*m*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689
*m + 945) + 270*B*b*c*d*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2
 + 1689*m + 945) + B*b*d**2*m**4*x**9*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 +
 950*m**2 + 1689*m + 945) + 16*B*b*d**2*m**3*x**9*(e*x)**m/(m**5 + 25*m**4
+ 230*m**3 + 950*m**2 + 1689*m + 945) + 86*B*b*d**2*m**2*x**9*(e*x)**m/(m**
5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 176*B*b*d**2*m*x**9*(e*
x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 105*B*b*d**2*
x**9*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945), True))
```

Maxima [A] (verification not implemented)

none

Time = 0.23 (sec) , antiderivative size = 242, normalized size of antiderivative = 1.68

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \frac{Bbd^2e^mx^9x^m}{m+9} + \frac{2\,Bbcde^mx^7x^m}{m+7} + \frac{Bad^2e^mx^7x^m}{m+7} + \frac{Abd^2e^mx^7x^m}{m+7} + \frac{Bbc^2e^mx^5x^m}{m+5} + \frac{2\,Bacde^mx^5x^m}{m+5} + \frac{2\,Abcde^mx^5x^m}{m+5} + \frac{Aad^2e^mx^5x^m}{m+5} + \frac{Bac^2e^mx^3x^m}{m+3} + \frac{Abc^2e^mx^3x^m}{m+3} + \frac{2\,Aacde^mx^3x^m}{m+3} + \frac{(ex)^{m+1}\,Aac^2}{e(m+1)}$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="maxima")
```

```
[Out] B*b*d^2*e^m*x^9*x^m/(m + 9) + 2*B*b*c*d*e^m*x^7*x^m/(m + 7) + B*a*d^2*e^m*x
^7*x^m/(m + 7) + A*b*d^2*e^m*x^7*x^m/(m + 7) + B*b*c^2*e^m*x^5*x^m/(m + 5)
+ 2*B*a*c*d*e^m*x^5*x^m/(m + 5) + 2*A*b*c*d*e^m*x^5*x^m/(m + 5) + A*a*d^2*e
^m*x^5*x^m/(m + 5) + B*a*c^2*e^m*x^3*x^m/(m + 3) + A*b*c^2*e^m*x^3*x^m/(m +
 3) + 2*A*a*c*d*e^m*x^3*x^m/(m + 3) + (e*x)^(m + 1)*A*a*c^2/(e*(m + 1))
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1009 vs. 2(144) = 288.

Time = 0.33 (sec) , antiderivative size = 1009, normalized size of antiderivative = 7.01

$$\int (ex)^m (a+bx^2) (A+Bx^2) (c+dx^2)^2 \, dx = \frac{(ex)^m Bbd^2m^4x^9 + 16 (ex)^m Bbd^2m^3x^9 + 2 (ex)^m Bbcdm^4x^7 + (ex)^m Bad^2m^4x^7 + (ex)^m Abd^2m^4x^7 + 86}{}$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*b*d^2*m^4*x^9 + 16*(e*x)^m*B*b*d^2*m^3*x^9 + 2*(e*x)^m*B*b*c*d*m
^4*x^7 + (e*x)^m*B*a*d^2*m^4*x^7 + (e*x)^m*A*b*d^2*m^4*x^7 + 86*(e*x)^m*B*b
*d^2*m^2*x^9 + 36*(e*x)^m*B*b*c*d*m^3*x^7 + 18*(e*x)^m*B*a*d^2*m^3*x^7 + 18
*(e*x)^m*A*b*d^2*m^3*x^7 + 176*(e*x)^m*B*b*d^2*m*x^9 + (e*x)^m*B*b*c^2*m^4*
x^5 + 2*(e*x)^m*B*a*c*d*m^4*x^5 + 2*(e*x)^m*A*b*c*d*m^4*x^5 + (e*x)^m*A*a*d
^2*m^4*x^5 + 208*(e*x)^m*B*b*c*d*m^2*x^7 + 104*(e*x)^m*B*a*d^2*m^2*x^7 + 10
4*(e*x)^m*A*b*d^2*m^2*x^7 + 105*(e*x)^m*B*b*d^2*x^9 + 20*(e*x)^m*B*b*c^2*m^
3*x^5 + 40*(e*x)^m*B*a*c*d*m^3*x^5 + 40*(e*x)^m*A*b*c*d*m^3*x^5 + 20*(e*x)^
m*A*a*d^2*m^3*x^5 + 444*(e*x)^m*B*b*c*d*m*x^7 + 222*(e*x)^m*B*a*d^2*m*x^7 +
 222*(e*x)^m*A*b*d^2*m*x^7 + (e*x)^m*B*a*c^2*m^4*x^3 + (e*x)^m*A*b*c^2*m^4*
x^3 + 2*(e*x)^m*A*a*c*d*m^4*x^3 + 130*(e*x)^m*B*b*c^2*m^2*x^5 + 260*(e*x)^m
*B*a*c*d*m^2*x^5 + 260*(e*x)^m*A*b*c*d*m^2*x^5 + 130*(e*x)^m*A*a*d^2*m^2*x^
5 + 270*(e*x)^m*B*b*c*d*x^7 + 135*(e*x)^m*B*a*d^2*x^7 + 135*(e*x)^m*A*b*d^2
*x^7 + 22*(e*x)^m*B*a*c^2*m^3*x^3 + 22*(e*x)^m*A*b*c^2*m^3*x^3 + 44*(e*x)^m
*A*a*c*d*m^3*x^3 + 300*(e*x)^m*B*b*c^2*m*x^5 + 600*(e*x)^m*B*a*c*d*m*x^5 +
600*(e*x)^m*A*b*c*d*m*x^5 + 300*(e*x)^m*A*a*d^2*m*x^5 + (e*x)^m*A*a*c^2*m^4
*x + 164*(e*x)^m*B*a*c^2*m^2*x^3 + 164*(e*x)^m*A*b*c^2*m^2*x^3 + 328*(e*x)^
m*A*a*c*d*m^2*x^3 + 189*(e*x)^m*B*b*c^2*x^5 + 378*(e*x)^m*B*a*c*d*x^5 + 378
*(e*x)^m*A*b*c*d*x^5 + 189*(e*x)^m*A*a*d^2*x^5 + 24*(e*x)^m*A*a*c^2*m^3*x +
 458*(e*x)^m*B*a*c^2*m*x^3 + 458*(e*x)^m*A*b*c^2*m*x^3 + 916*(e*x)^m*A*a*c*
d*m*x^3 + 206*(e*x)^m*A*a*c^2*m^2*x + 315*(e*x)^m*B*a*c^2*x^3 + 315*(e*x)^m
*A*b*c^2*x^3 + 630*(e*x)^m*A*a*c*d*x^3 + 744*(e*x)^m*A*a*c^2*m*x + 945*(e*x
)^m*A*a*c^2*x)/(m^5 + 25*m^4 + 230*m^3 + 950*m^2 + 1689*m + 945)
```

Mupad [B] (verification not implemented)

Time = 5.60 (sec) , antiderivative size = 305, normalized size of antiderivative = 2.12

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx$$
$$= (e\,x)^m \left(\frac{x^5\,(A\,a\,d^2+B\,b\,c^2+2\,A\,b\,c\,d+2\,B\,a\,c\,d)\,\left(m^4+20\,m^3+130\,m^2+300\,m+189\right)}{m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945} + \frac{c\,x^3\,(2\,A\,a\,d+A\,b\,c+B\,a\,c)\,\left(m^4+22\,m^3+164\,m^2+458\,m+315\right)}{m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945} + \frac{d\,x^7\,(A\,b\,d+B\,a\,d+2\,B\,b\,c)\,\left(m^4+18\,m^3+104\,m^2+222\,m+135\right)}{m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945} + \frac{A\,a\,c^2\,x\,(m^4+24\,m^3+206\,m^2+744\,m+945)}{m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945} + \frac{B\,b\,d^2\,x^9\,(m^4+16\,m^3+86\,m^2+176\,m+105)}{m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945} \right)$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)*(c + d*x^2)^2,x)
```

```
[Out] (e*x)^m*((x^5*(A*a*d^2 + B*b*c^2 + 2*A*b*c*d + 2*B*a*c*d)*(300*m + 130*m^2
+ 20*m^3 + m^4 + 189))/(1689*m + 950*m^2 + 230*m^3 + 25*m^4 + m^5 + 945) +
(c*x^3*(2*A*a*d + A*b*c + B*a*c)*(458*m + 164*m^2 + 22*m^3 + m^4 + 315))/(1
689*m + 950*m^2 + 230*m^3 + 25*m^4 + m^5 + 945) + (d*x^7*(A*b*d + B*a*d + 2
*B*b*c)*(222*m + 104*m^2 + 18*m^3 + m^4 + 135))/(1689*m + 950*m^2 + 230*m^3
 + 25*m^4 + m^5 + 945) + (A*a*c^2*x*(744*m + 206*m^2 + 24*m^3 + m^4 + 945))
/(1689*m + 950*m^2 + 230*m^3 + 25*m^4 + m^5 + 945) + (B*b*d^2*x^9*(176*m +
86*m^2 + 16*m^3 + m^4 + 105))/(1689*m + 950*m^2 + 230*m^3 + 25*m^4 + m^5 +
945))
```

3.11 $\int (ex)^m (A+Bx^2) (c+dx^2)^2 \, dx$

Optimal result

Integrand size = 22, antiderivative size = 91

$$\int (ex)^m (A+Bx^2) (c+dx^2)^2 \, dx = \frac{Ac^2(ex)^{1+m}}{e(1+m)} + \frac{c(Bc+2Ad)(ex)^{3+m}}{e^3(3+m)} + \frac{d(2Bc+Ad)(ex)^{5+m}}{e^5(5+m)} + \frac{Bd^2(ex)^{7+m}}{e^7(7+m)}$$

```
[Out] A*c^2*(e*x)^(1+m)/e/(1+m)+c*(2*A*d+B*c)*(e*x)^(3+m)/e^3/(3+m)+d*(A*d+2*B*c)
*(e*x)^(5+m)/e^5/(5+m)+B*d^2*(e*x)^(7+m)/e^7/(7+m)
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 91, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.045, Rules used = {459}

$$\int (ex)^m (A+Bx^2) (c+dx^2)^2 \, dx = \frac{d(ex)^{m+5}(Ad+2Bc)}{e^5(m+5)} + \frac{c(ex)^{m+3}(2Ad+Bc)}{e^3(m+3)} + \frac{Ac^2(ex)^{m+1}}{e(m+1)} + \frac{Bd^2(ex)^{m+7}}{e^7(m+7)}$$

```
[In] Int[(e*x)^m*(A + B*x^2)*(c + d*x^2)^2,x]
```

```
[Out] (A*c^2*(e*x)^(1 + m))/(e*(1 + m)) + (c*(B*c + 2*A*d)*(e*x)^(3 + m))/(e^3*(3
 + m)) + (d*(2*B*c + A*d)*(e*x)^(5 + m))/(e^5*(5 + m)) + (B*d^2*(e*x)^(7 +
m))/(e^7*(7 + m))
```

Rule 459

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(e*x)^m*(a + b*x^n)^p*(c + d*x^
```

```
n)^q, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[b*c - a*d, 0] && IGt
Q[p, 0] && IGtQ[q, 0]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \int \left(Ac^2(ex)^m + \frac{c(Bc+2Ad)(ex)^{2+m}}{e^2} + \frac{d(2Bc+Ad)(ex)^{4+m}}{e^4} + \frac{Bd^2(ex)^{6+m}}{e^6}\right) dx \\ &= \frac{Ac^2(ex)^{1+m}}{e(1+m)} + \frac{c(Bc+2Ad)(ex)^{3+m}}{e^3(3+m)} + \frac{d(2Bc+Ad)(ex)^{5+m}}{e^5(5+m)} + \frac{Bd^2(ex)^{7+m}}{e^7(7+m)}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.06 (sec) , antiderivative size = 67, normalized size of antiderivative = 0.74

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = x(ex)^m \left(\frac{Ac^2}{1+m} + \frac{c(Bc+2Ad)x^2}{3+m} + \frac{d(2Bc+Ad)x^4}{5+m} + \frac{Bd^2x^6}{7+m}\right)$$

```
[In] Integrate[(e*x)^m*(A + B*x^2)*(c + d*x^2)^2,x]
[Out] x*(e*x)^m*((A*c^2)/(1 + m) + (c*(B*c + 2*A*d)*x^2)/(3 + m) + (d*(2*B*c + A*
d)*x^4)/(5 + m) + (B*d^2*x^6)/(7 + m))
```

Maple [A] (verified)

Time = 3.35 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.99

method	result
norman	$\frac{A\,c^2 x\,e^{m\ln(ex)}}{1+m}+\frac{B\,d^2x^7 e^{m\ln(ex)}}{7+m}+\frac{c(2Ad+Bc)x^3 e^{m\ln(ex)}}{3+m}+\frac{d(Ad+2Bc)x^5 e^{m\ln(ex)}}{5+m}$
gosper	$x\left(B\,d^2m^3x^6+9B\,d^2m^2x^6+A\,d^2m^3x^4+2Bcd\,m^3x^4+23m\,x^6B\,d^2+11A\,d^2m^2x^4+22Bcd\,m^2x^4+15B\,d^2x^6+2Acd\,m^3x^2+31A\,d^2\ldots\right.$
risch	$x\left(B\,d^2m^3x^6+9B\,d^2m^2x^6+A\,d^2m^3x^4+2Bcd\,m^3x^4+23m\,x^6B\,d^2+11A\,d^2m^2x^4+22Bcd\,m^2x^4+15B\,d^2x^6+2Acd\,m^3x^2+31A\,d^2\ldots\right.$
parallelrisch	$62B\,x^5(ex)^m cdm+2B\,x^5(ex)^m cd\,m^3+35B\,x^3(ex)^m c^2+105Ax(ex)^m c^2+22B\,x^5(ex)^m cd\,m^2+15B\,x^7(ex)^m d^2+21A\,x^5(ex)^m d^2\ldots$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^2,x,method=_RETURNVERBOSE)
[Out] A*c^2/(1+m)*x*exp(m*ln(e*x))+B*d^2/(7+m)*x^7*exp(m*ln(e*x))+c*(2*A*d+B*c)/(
3+m)*x^3*exp(m*ln(e*x))+d*(A*d+2*B*c)/(5+m)*x^5*exp(m*ln(e*x))
```

Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 217 vs. $2(91) = 182$.

Time = 0.29 (sec) , antiderivative size = 217, normalized size of antiderivative = 2.38

$$\int (ex)^m (A + Bx^2) (c + dx^2)^2 \, dx = \frac{((Bd^2m^3 + 9\,Bd^2m^2 + 23\,Bd^2m + 15\,Bd^2)x^7 + ((2\,Bcd + Ad^2)m^3 + 42\,Bcd + 21\,Ad^2 + 11\,(2\,Bcd + Ad^2}{}$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="fricas")
```

```
[Out] ((B*d^2*m^3 + 9*B*d^2*m^2 + 23*B*d^2*m + 15*B*d^2)*x^7 + ((2*B*c*d + A*d^2)
*m^3 + 42*B*c*d + 21*A*d^2 + 11*(2*B*c*d + A*d^2)*m^2 + 31*(2*B*c*d + A*d^2
)*m)*x^5 + ((B*c^2 + 2*A*c*d)*m^3 + 35*B*c^2 + 70*A*c*d + 13*(B*c^2 + 2*A*c
*d)*m^2 + 47*(B*c^2 + 2*A*c*d)*m)*x^3 + (A*c^2*m^3 + 15*A*c^2*m^2 + 71*A*c^
2*m + 105*A*c^2)*x)*(e*x)^m/(m^4 + 16*m^3 + 86*m^2 + 176*m + 105)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1096 vs. $2(82) = 164$.

Time = 0.44 (sec) , antiderivative size = 1096, normalized size of antiderivative = 12.04

$$\int (ex)^m (A + Bx^2) (c + dx^2)^2 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)**2,x)
```

```
[Out] Piecewise(((-A*c**2/(6*x**6) - A*c*d/(2*x**4) - A*d**2/(2*x**2) - B*c**2/(4
*x**4) - B*c*d/x**2 + B*d**2*log(x))/e**7, Eq(m, -7)), ((-A*c**2/(4*x**4) -
 A*c*d/x**2 + A*d**2*log(x) - B*c**2/(2*x**2) + 2*B*c*d*log(x) + B*d**2*x**
2/2)/e**5, Eq(m, -5)), ((-A*c**2/(2*x**2) + 2*A*c*d*log(x) + A*d**2*x**2/2
+ B*c**2*log(x) + B*c*d*x**2 + B*d**2*x**4/4)/e**3, Eq(m, -3)), ((A*c**2*lo
g(x) + A*c*d*x**2 + A*d**2*x**4/4 + B*c**2*x**2/2 + B*c*d*x**4/2 + B*d**2*x
**6/6)/e, Eq(m, -1)), (A*c**2*m**3*x*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 1
76*m + 105) + 15*A*c**2*m**2*x*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m +
 105) + 71*A*c**2*m*x*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 1
05*A*c**2*x*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 2*A*c*d*m**
3*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 26*A*c*d*m**2*x*
*3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 94*A*c*d*m*x**3*(e*x
)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 70*A*c*d*x**3*(e*x)**m/(m**
4 + 16*m**3 + 86*m**2 + 176*m + 105) + A*d**2*m**3*x**5*(e*x)**m/(m**4 + 16
*m**3 + 86*m**2 + 176*m + 105) + 11*A*d**2*m**2*x**5*(e*x)**m/(m**4 + 16*m*
*3 + 86*m**2 + 176*m + 105) + 31*A*d**2*m*x**5*(e*x)**m/(m**4 + 16*m**3 + 8
6*m**2 + 176*m + 105) + 21*A*d**2*x**5*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 +
```

```
176*m + 105) + B*c**2*m**3*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m
 + 105) + 13*B*c**2*m**2*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m +
105) + 47*B*c**2*m*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) +
 35*B*c**2*x**3*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 2*B*c*d
*m**3*x**5*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 22*B*c*d*m**
2*x**5*(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 62*B*c*d*m*x**5*
(e*x)**m/(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + 42*B*c*d*x**5*(e*x)**m/
(m**4 + 16*m**3 + 86*m**2 + 176*m + 105) + B*d**2*m**3*x**7*(e*x)**m/(m**4
+ 16*m**3 + 86*m**2 + 176*m + 105) + 9*B*d**2*m**2*x**7*(e*x)**m/(m**4 + 16
*m**3 + 86*m**2 + 176*m + 105) + 23*B*d**2*m*x**7*(e*x)**m/(m**4 + 16*m**3
+ 86*m**2 + 176*m + 105) + 15*B*d**2*x**7*(e*x)**m/(m**4 + 16*m**3 + 86*m**
2 + 176*m + 105), True))
```

Maxima [A] (verification not implemented)

none

Time = 0.22 (sec) , antiderivative size = 116, normalized size of antiderivative = 1.27

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \frac{Bd^2e^mx^7x^m}{m+7} + \frac{2\,Bcde^mx^5x^m}{m+5} + \frac{Ad^2e^mx^5x^m}{m+5} + \frac{Bc^2e^mx^3x^m}{m+3} + \frac{2\,Acde^mx^3x^m}{m+3} + \frac{(ex)^{m+1}\,Ac^2}{e(m+1)}$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="maxima")
```

```
[Out] B*d^2*e^m*x^7*x^m/(m + 7) + 2*B*c*d*e^m*x^5*x^m/(m + 5) + A*d^2*e^m*x^5*x^m
/(m + 5) + B*c^2*e^m*x^3*x^m/(m + 3) + 2*A*c*d*e^m*x^3*x^m/(m + 3) + (e*x)^
(m + 1)*A*c^2/(e*(m + 1))
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 380 vs. 2(91) = 182.

Time = 0.33 (sec) , antiderivative size = 380, normalized size of antiderivative = 4.18

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \frac{(ex)^m\,Bd^2m^3x^7 + 9\,(ex)^m\,Bd^2m^2x^7 + 2\,(ex)^m\,Bcdm^3x^5 + (ex)^m\,Ad^2m^3x^5 + 23\,(ex)^m\,Bd^2mx^7 + 22\,(ex)^m}{}$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*d^2*m^3*x^7 + 9*(e*x)^m*B*d^2*m^2*x^7 + 2*(e*x)^m*B*c*d*m^3*x^5
+ (e*x)^m*A*d^2*m^3*x^5 + 23*(e*x)^m*B*d^2*m*x^7 + 22*(e*x)^m*B*c*d*m^2*x^5
 + 11*(e*x)^m*A*d^2*m^2*x^5 + 15*(e*x)^m*B*d^2*x^7 + (e*x)^m*B*c^2*m^3*x^3
```

```
+ 2*(e*x)^m*A*c*d*m^3*x^3 + 62*(e*x)^m*B*c*d*m*x^5 + 31*(e*x)^m*A*d^2*m*x^5
 + 13*(e*x)^m*B*c^2*m^2*x^3 + 26*(e*x)^m*A*c*d*m^2*x^3 + 42*(e*x)^m*B*c*d*x
^5 + 21*(e*x)^m*A*d^2*x^5 + (e*x)^m*A*c^2*m^3*x + 47*(e*x)^m*B*c^2*m*x^3 +
94*(e*x)^m*A*c*d*m*x^3 + 15*(e*x)^m*A*c^2*m^2*x + 35*(e*x)^m*B*c^2*x^3 + 70
*(e*x)^m*A*c*d*x^3 + 71*(e*x)^m*A*c^2*m*x + 105*(e*x)^m*A*c^2*x)/(m^4 + 16*
m^3 + 86*m^2 + 176*m + 105)
```

Mupad [B] (verification not implemented)

Time = 5.48 (sec) , antiderivative size = 179, normalized size of antiderivative = 1.97

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = (e\,x)^m \left(\frac{B\,d^2\,x^7\,(m^3+9\,m^2+23\,m+15)}{m^4+16\,m^3+86\,m^2+176\,m+105} + \frac{A\,c^2\,x\,(m^3+15\,m^2+71\,m+105)}{m^4+16\,m^3+86\,m^2+176\,m+105} + \frac{c\,x^3\,(2\,A\,d+B\,c)\,(m^3+13\,m^2+47\,m+35)}{m^4+16\,m^3+86\,m^2+176\,m+105} + \frac{d\,x^5\,(A\,d+2\,B\,c)\,(m^3+11\,m^2+31\,m+21)}{m^4+16\,m^3+86\,m^2+176\,m+105}\right)$$

```
[In] int((A + B*x^2)*(e*x)^m*(c + d*x^2)^2,x)
```

```
[Out] (e*x)^m*((B*d^2*x^7*(23*m + 9*m^2 + m^3 + 15))/(176*m + 86*m^2 + 16*m^3 + m
^4 + 105) + (A*c^2*x*(71*m + 15*m^2 + m^3 + 105))/(176*m + 86*m^2 + 16*m^3
+ m^4 + 105) + (c*x^3*(2*A*d + B*c)*(47*m + 13*m^2 + m^3 + 35))/(176*m + 86
*m^2 + 16*m^3 + m^4 + 105) + (d*x^5*(A*d + 2*B*c)*(31*m + 11*m^2 + m^3 + 21
))/(176*m + 86*m^2 + 16*m^3 + m^4 + 105))
```

3.12 $\int \frac{(ex)^m(A+Bx^2)(c+dx^2)^2}{a+bx^2}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 178

$$\begin{aligned}\int \frac{(ex)^m(A+Bx^2)(c+dx^2)^2}{a+bx^2}\,dx &= \frac{(a^2Bd^2-abd(2Bc+Ad)+b^2c(Bc+2Ad))(ex)^{1+m}}{b^3e(1+m)}+\frac{d(2bBc+Abd-aBd)(ex)^{3+m}}{b^2e^3(3+m)}\\&\quad+\frac{Bd^2(ex)^{5+m}}{be^5(5+m)}+\frac{(Ab-aB)(bc-ad)^2(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{ab^3e(1+m)}\end{aligned}$$

```
[Out] (a^2*B*d^2-a*b*d*(A*d+2*B*c)+b^2*c*(2*A*d+B*c))*(e*x)^(1+m)/b^3/e/(1+m)+d*(
A*b*d-B*a*d+2*B*b*c)*(e*x)^(3+m)/b^2/e^3/(3+m)+B*d^2*(e*x)^(5+m)/b/e^5/(5+m
)+(A*b-B*a)*(-a*d+b*c)^2*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-
b*x^2/a)/a/b^3/e/(1+m)
```

Rubi [A] (verified)

Time = 0.12 (sec) , antiderivative size = 178, 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 = {584, 371}

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^2}{a+bx^2} \, dx$$
$$= \frac{(ex)^{m+1} (a^2Bd^2 - abd(Ad+2Bc) + b^2c(2Ad+Bc))}{b^3e(m+1)}$$
$$+ \frac{(ex)^{m+1}(Ab-aB)(bc-ad)^2 \text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{bx^2}{a}\right)}{ab^3e(m+1)}$$
$$+ \frac{d(ex)^{m+3}(-aBd+Abd+2bBc)}{b^2e^3(m+3)} + \frac{Bd^2(ex)^{m+5}}{be^5(m+5)}$$

```
[In] Int[((e*x)^m*(A + B*x^2)*(c + d*x^2)^2)/(a + b*x^2),x]
```

```
[Out] ((a^2*B*d^2 - a*b*d*(2*B*c + A*d) + b^2*c*(B*c + 2*A*d))*(e*x)^(1 + m))/(b^
3*e*(1 + m)) + (d*(2*b*B*c + A*b*d - a*B*d)*(e*x)^(3 + m))/(b^2*e^3*(3 + m)
) + (B*d^2*(e*x)^(5 + m))/(b*e^5*(5 + m)) + ((A*b - a*B)*(b*c - a*d)^2*(e*x
)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(a*b^3*
e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\text{integral} = \int \left(\frac{(a^2Bd^2 - abd(2Bc+Ad) + b^2c(Bc+2Ad))(ex)^m}{b^3} + \frac{d(2bBc+Abd-aBd)(ex)^{2+m}}{b^2e^2} + \frac{Bd^2(ex)^{4+m}}{be^4} + \frac{(Ab^3c^2 - ab^2Bc^2 - 2aAb^2cd + 2a^2bBcd + a^2Abd^2 - a^3Bd^2)(ex)^m}{b^3(a+bx^2)}\right) dx$$

$$= \frac{(a^2Bd^2 - abd(2Bc + Ad) + b^2c(Bc + 2Ad))\,(ex)^{1+m}}{b^3e(1+m)} + \frac{d(2bBc + Abd - aBd)(ex)^{3+m}}{b^2e^3(3+m)} + \frac{Bd^2(ex)^{5+m}}{be^5(5+m)} + \frac{((Ab - aB)(bc - ad)^2)\int \frac{(ex)^m}{a+bx^2}\,dx}{b^3}$$

$$= \frac{(a^2Bd^2 - abd(2Bc + Ad) + b^2c(Bc + 2Ad))\,(ex)^{1+m}}{b^3e(1+m)} + \frac{d(2bBc + Abd - aBd)(ex)^{3+m}}{b^2e^3(3+m)} + \frac{Bd^2(ex)^{5+m}}{be^5(5+m)} + \frac{(Ab - aB)(bc - ad)^2(ex)^{1+m}\,{}_2F_1\left(1, \frac{1+m}{2}; \frac{3+m}{2}; -\frac{bx^2}{a}\right)}{ab^3e(1+m)}$$

Mathematica [A] (verified)

Time = 0.24 (sec) , antiderivative size = 146, normalized size of antiderivative = 0.82

$$\int \frac{(ex)^m\,(A + Bx^2)\,(c + dx^2)^2}{a + bx^2}\,dx = \frac{x(ex)^m\left(\frac{a^2Bd^2 - abd(2Bc+Ad) + b^2c(Bc+2Ad)}{1+m} + \frac{bd(2bBc+Abd-aBd)x^2}{3+m} + \frac{b^2Bd^2x^4}{5+m} + \frac{(Ab-aB)(bc-ad)^2\,\text{Hypergeometric2F1}\left(1, \frac{1+m}{2},\right.}{a(1+m)}\right.}{b^3}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2)*(c + d*x^2)^2)/(a + b*x^2),x]
```

```
[Out] (x*(e*x)^m*((a^2*B*d^2 - a*b*d*(2*B*c + A*d) + b^2*c*(B*c + 2*A*d))/(1 + m)
 + (b*d*(2*b*B*c + A*b*d - a*B*d)*x^2)/(3 + m) + (b^2*B*d^2*x^4)/(5 + m) +
((A*b - a*B)*(b*c - a*d)^2*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*
x^2)/a)])/(a*(1 + m))))/b^3
```

Maple [F]

$$\int \frac{(ex)^m\,(x^2B + A)\,(d\,x^2 + c)^2}{b\,x^2 + a}dx$$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a),x)
```

```
[Out] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a),x)
```

Fricas [F]

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)^2}{a + bx^2} dx = \int \frac{(Bx^2 + A)(dx^2 + c)^2 (ex)^m}{bx^2 + a} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a),x, algorithm="fricas")
```

```
[Out] integral((B*d^2*x^6 + (2*B*c*d + A*d^2)*x^4 + A*c^2 + (B*c^2 + 2*A*c*d)*x^2
)*(e*x)^m/(b*x^2 + a), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 5.86 (sec) , antiderivative size = 649, normalized size of antiderivative = 3.65

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)^2}{a + bx^2}\,dx = \frac{Ac^2e^m m x^{m+1}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{1}{2}\right)\Gamma\left(\frac{m}{2} + \frac{1}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{3}{2}\right)} + \frac{Ac^2e^m x^{m+1}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{1}{2}\right)\Gamma\left(\frac{m}{2} + \frac{1}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{3}{2}\right)} + \frac{Acde^m m x^{m+3}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{3}{2}\right)\Gamma\left(\frac{m}{2} + \frac{3}{2}\right)}{2a\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)} + \frac{3Acde^m x^{m+3}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{3}{2}\right)\Gamma\left(\frac{m}{2} + \frac{3}{2}\right)}{2a\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)} + \frac{Ad^2e^m m x^{m+5}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{5}{2}\right)\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{7}{2}\right)} + \frac{5Ad^2e^m x^{m+5}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{5}{2}\right)\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{7}{2}\right)} + \frac{Bc^2e^m m x^{m+3}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{3}{2}\right)\Gamma\left(\frac{m}{2} + \frac{3}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)} + \frac{3Bc^2e^m x^{m+3}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{3}{2}\right)\Gamma\left(\frac{m}{2} + \frac{3}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)} + \frac{Bcde^m m x^{m+5}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{5}{2}\right)\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)}{2a\Gamma\left(\frac{m}{2} + \frac{7}{2}\right)} + \frac{5Bcde^m x^{m+5}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{5}{2}\right)\Gamma\left(\frac{m}{2} + \frac{5}{2}\right)}{2a\Gamma\left(\frac{m}{2} + \frac{7}{2}\right)} + \frac{Bd^2e^m m x^{m+7}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{7}{2}\right)\Gamma\left(\frac{m}{2} + \frac{7}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{9}{2}\right)} + \frac{7Bd^2e^m x^{m+7}\Phi\left(\frac{bx^2e^{i\pi}}{a}, 1, \frac{m}{2} + \frac{7}{2}\right)\Gamma\left(\frac{m}{2} + \frac{7}{2}\right)}{4a\Gamma\left(\frac{m}{2} + \frac{9}{2}\right)}$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)**2/(b*x**2+a),x)
```

```
[Out] A*c**2*e**m*m*x**(m + 1)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*g
amma(m/2 + 1/2)/(4*a*gamma(m/2 + 3/2)) + A*c**2*e**m*x**(m + 1)*lerchphi(b*
x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(4*a*gamma(m/2 + 3/2
)) + A*c*d*e**m*m*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/
2)*gamma(m/2 + 3/2)/(2*a*gamma(m/2 + 5/2)) + 3*A*c*d*e**m*x**(m + 3)*lerchp
```

```
hi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(2*a*gamma(m/2
+ 5/2)) + A*d**2*e**m*m*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/
2 + 5/2)*gamma(m/2 + 5/2)/(4*a*gamma(m/2 + 7/2)) + 5*A*d**2*e**m*x**(m + 5)
*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(4*a*gam
ma(m/2 + 7/2)) + B*c**2*e**m*m*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a
, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*a*gamma(m/2 + 5/2)) + 3*B*c**2*e**m*x**
(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(
4*a*gamma(m/2 + 5/2)) + B*c*d*e**m*m*x**(m + 5)*lerchphi(b*x**2*exp_polar(I
*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(2*a*gamma(m/2 + 7/2)) + 5*B*c*d*e**
m*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5
/2)/(2*a*gamma(m/2 + 7/2)) + B*d**2*e**m*m*x**(m + 7)*lerchphi(b*x**2*exp_p
olar(I*pi)/a, 1, m/2 + 7/2)*gamma(m/2 + 7/2)/(4*a*gamma(m/2 + 9/2)) + 7*B*d
**2*e**m*x**(m + 7)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 7/2)*gamma(
m/2 + 7/2)/(4*a*gamma(m/2 + 9/2))
```

Maxima [F]

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)^2}{a + bx^2} \, dx = \int \frac{(Bx^2 + A)(dx^2 + c)^2 (ex)^m}{bx^2 + a} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a),x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^2*(e*x)^m/(b*x^2 + a), x)
```

Giac [F]

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)^2}{a + bx^2} \, dx = \int \frac{(Bx^2 + A)(dx^2 + c)^2 (ex)^m}{bx^2 + a} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a),x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^2*(e*x)^m/(b*x^2 + a), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)^2}{a + bx^2} \, dx = \int \frac{(B\,x^2 + A)\,(e\,x)^m\,(d\,x^2 + c)^2}{b\,x^2 + a} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^2)/(a + b*x^2),x)
[Out] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^2)/(a + b*x^2), x)
```

3.13 $\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^2}{(a+bx^2)^2} \, dx$

Optimal result

Integrand size = 31, antiderivative size = 247

$$\begin{aligned}
&\int \frac{(ex)^m (A + Bx^2) (c + dx^2)^2}{(a + bx^2)^2} \, dx \\
&= -\frac{d(Ab(2bc(1 + m) - ad(3 + m)) - aB(2bc(3 + m) - ad(5 + m)))(ex)^{1+m}}{2ab^3e(1 + m)} \\
&\quad - \frac{d^2(Ab(3 + m) - aB(5 + m))(ex)^{3+m}}{2ab^2e^3(3 + m)} + \frac{(Ab - aB)(ex)^{1+m} (c + dx^2)^2}{2abe (a + bx^2)} \\
&\quad + \frac{(bc - ad)(aB(bc(1 + m) - ad(5 + m)) + Ab(ad(3 + m) + b(c - cm)))(ex)^{1+m} \text{Hypergeometric2F1} \left(1, \frac{1}{\ldots}\right.}{2a^2b^3e(1 + m)}
\end{aligned}$$

```
[Out] -1/2*d*(A*b*(2*b*c*(1+m)-a*d*(3+m))-a*B*(2*b*c*(3+m)-a*d*(5+m)))*(e*x)^(1+m
)/a/b^3/e/(1+m)-1/2*d^2*(A*b*(3+m)-a*B*(5+m))*(e*x)^(3+m)/a/b^2/e^3/(3+m)+1
/2*(A*b-B*a)*(e*x)^(1+m)*(d*x^2+c)^2/a/b/e/(b*x^2+a)+1/2*(-a*d+b*c)*(a*B*(b
*c*(1+m)-a*d*(5+m))+A*b*(a*d*(3+m)+b*(-c*m+c)))*(e*x)^(1+m)*hypergeom([1, 1
/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/a^2/b^3/e/(1+m)
```

Rubi [A] (verified)

Time = 0.28 (sec) , antiderivative size = 247, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used

$= \{591, 584, 371\}$

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)^2}{(a+bx^2)^2}\,dx$$
$$= \frac{(ex)^{m+1}(bc-ad)\,\text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{bx^2}{a}\right)(Ab(ad(m+3)+b(c-cm))+aB(bc(m+1)}{2a^2b^3e(m+1)}$$
$$- \frac{d(ex)^{m+1}(Ab(2bc(m+1)-ad(m+3))-aB(2bc(m+3)-ad(m+5)))}{2ab^3e(m+1)}$$
$$- \frac{d^2(ex)^{m+3}(Ab(m+3)-aB(m+5))}{2ab^2e^3(m+3)} + \frac{(c+dx^2)^2(ex)^{m+1}(Ab-aB)}{2abe(a+bx^2)}$$

```
[In] Int[((e*x)^m*(A + B*x^2)*(c + d*x^2)^2)/(a + b*x^2)^2,x]
```

```
[Out] -1/2*(d*(A*b*(2*b*c*(1 + m) - a*d*(3 + m)) - a*B*(2*b*c*(3 + m) - a*d*(5 +
m)))*(e*x)^(1 + m))/(a*b^3*e*(1 + m)) - (d^2*(A*b*(3 + m) - a*B*(5 + m))*(e
*x)^(3 + m))/(2*a*b^2*e^3*(3 + m)) + ((A*b - a*B)*(e*x)^(1 + m)*(c + d*x^2)
^2)/(2*a*b*e*(a + b*x^2)) + ((b*c - a*d)*(a*B*(b*c*(1 + m) - a*d*(5 + m)) +
 A*b*(a*d*(3 + m) + b*(c - c*m)))*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m
)/2, (3 + m)/2, -((b*x^2)/a)])/(2*a^2*b^3*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rule 591

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
 a*f])
```

Rubi steps

$$\text{integral} = \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^2}{2abe\left(a+bx^2\right)} - \frac{\int \frac{(ex)^m\left(c+dx^2\right)\left(-c(Ab(1-m)+aB(1+m))+d(Ab(3+m)-aB(5+m))x^2\right)}{a+bx^2}\,dx}{2ab}$$

$$= \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^2}{2abe\left(a+bx^2\right)} - \frac{\int \left(\frac{d(Ab(2bc(1+m)-ad(3+m))-aB(2bc(3+m)-ad(5+m)))(ex)^m}{b^2} + \frac{d^2(Ab(3+m)-aB(5+m))(ex)^{2+m}}{be^2} + \frac{(-Ab^3c^2-ab^2Bc^2-\cdots}{\cdots}\right.}{2ab}$$

$$= -\frac{d(Ab(2bc(1+m)-ad(3+m))-aB(2bc(3+m)-ad(5+m)))(ex)^{1+m}}{2ab^3e(1+m)} - \frac{d^2(Ab(3+m)-aB(5+m))(ex)^{3+m}}{2ab^2e^3(3+m)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^2}{2abe\left(a+bx^2\right)} - \frac{(-Ab^3c^2-ab^2Bc^2-2aAb^2cd+6a^2bBcd+3a^2Abd^2-5a^3Bd^2+Ab^3c^2m-ab^2Bc^2m-2aAb^2c\cdots}{2ab^3}$$

$$= -\frac{d(Ab(2bc(1+m)-ad(3+m))-aB(2bc(3+m)-ad(5+m)))(ex)^{1+m}}{2ab^3e(1+m)} - \frac{d^2(Ab(3+m)-aB(5+m))(ex)^{3+m}}{2ab^2e^3(3+m)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^2}{2abe\left(a+bx^2\right)} + \frac{(bc-ad)(Ab(bc(1-m)+ad(3+m))+aB(bc(1+m)-ad(5+m)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};\cdots\right.}{2a^2b^3e(1+m)}$$

Mathematica [A] (verified)

Time = 0.58 (sec) , antiderivative size = 156, normalized size of antiderivative = 0.63

$$\int \frac{(ex)^m\left(A+Bx^2\right)\left(c+dx^2\right)^2}{\left(a+bx^2\right)^2}\,dx = \frac{x(ex)^m\left(\frac{d(2bBc+Abd-2aBd)}{1+m} + \frac{bBd^2x^2}{3+m} + \frac{(bc-ad)(bBc+2Abd-3aBd)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{a(1+m)} + \frac{(Ab-aB)(bc-ad)^2\,\cdots}{\cdots}\right.}{b^3}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2)*(c + d*x^2)^2)/(a + b*x^2)^2,x]
```

```
[Out] (x*(e*x)^m*((d*(2*b*B*c + A*b*d - 2*a*B*d))/(1 + m) + (b*B*d^2*x^2)/(3 + m)
 + ((b*c - a*d)*(b*B*c + 2*A*b*d - 3*a*B*d)*Hypergeometric2F1[1, (1 + m)/2,
 (3 + m)/2, -((b*x^2)/a)])/(a*(1 + m)) + ((A*b - a*B)*(b*c - a*d)^2*Hyperge
ometric2F1[2, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(a^2*(1 + m))))/b^3
```

Maple [F]

$$\int \frac{(ex)^m (x^2B + A)(d\,x^2 + c)^2}{(b\,x^2 + a)^2} dx$$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a)^2,x)
[Out] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a)^2,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)^2}{(a + bx^2)^2} dx = \int \frac{(Bx^2 + A)(dx^2 + c)^2(ex)^m}{(bx^2 + a)^2} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a)^2,x, algorithm="fricas")
[Out] integral((B*d^2*x^6 + (2*B*c*d + A*d^2)*x^4 + A*c^2 + (B*c^2 + 2*A*c*d)*x^2
)*(e*x)^m/(b^2*x^4 + 2*a*b*x^2 + a^2), x)
```

Sympy [F]

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)^2}{(a + bx^2)^2} dx = \int \frac{(ex)^m (A + Bx^2)(c + dx^2)^2}{(a + bx^2)^2} dx$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)**2/(b*x**2+a)**2,x)
[Out] Integral((e*x)**m*(A + B*x**2)*(c + d*x**2)**2/(a + b*x**2)**2, x)
```

Maxima [F]

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)^2}{(a + bx^2)^2} dx = \int \frac{(Bx^2 + A)(dx^2 + c)^2(ex)^m}{(bx^2 + a)^2} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a)^2,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^2*(e*x)^m/(b*x^2 + a)^2, x)
```

Giac [F]

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)^2}{(a + bx^2)^2} \, dx = \int \frac{(Bx^2 + A)(dx^2 + c)^2 (ex)^m}{(bx^2 + a)^2} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^2*(e*x)^m/(b*x^2 + a)^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)^2}{(a + bx^2)^2} \, dx = \int \frac{(B\,x^2 + A)\,(e\,x)^m\,(d\,x^2 + c)^2}{(b\,x^2 + a)^2} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^2)/(a + b*x^2)^2,x)
[Out] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^2)/(a + b*x^2)^2, x)
```

3.14 $\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^2}{(a+bx^2)^3} \, dx$

Optimal result

Integrand size = 31, antiderivative size = 292

$$
\begin{aligned}
&\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^2}{(a+bx^2)^3} \, dx \\
&= \frac{d(bc(1+m)-ad(3+m))(Ab(1+m)-aB(5+m))(ex)^{1+m}}{8a^2b^3e(1+m)} \\
&\quad + \frac{(Ab-aB)(ex)^{1+m} (c+dx^2)^2}{4abe (a+bx^2)^2} \\
&\quad + \frac{(bc-ad)(ex)^{1+m} (c(Ab(3-m)+aB(1+m))-d(Ab(1+m)-aB(5+m))x^2)}{8a^2b^2e (a+bx^2)} \\
&\quad - \frac{(ad(bc(1+m)-ad(3+m))(Ab(1+m)-aB(5+m))-bc(Ab(3-m)+aB(1+m))(ad(1+m)+b(}{8a^3b^3e(1+m)}
\end{aligned}
$$

```
[Out] 1/8*d*(b*c*(1+m)-a*d*(3+m))*(A*b*(1+m)-a*B*(5+m))*(e*x)^(1+m)/a^2/b^3/e/(1+
m)+1/4*(A*b-B*a)*(e*x)^(1+m)*(d*x^2+c)^2/a/b/e/(b*x^2+a)^2+1/8*(-a*d+b*c)*(
e*x)^(1+m)*(c*(A*b*(3-m)+a*B*(1+m))-d*(A*b*(1+m)-a*B*(5+m))*x^2)/a^2/b^2/e/
(b*x^2+a)-1/8*(a*d*(b*c*(1+m)-a*d*(3+m))*(A*b*(1+m)-a*B*(5+m))-b*c*(A*b*(3-
m)+a*B*(1+m))*(a*d*(1+m)+b*(-c*m+c)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],
[3/2+1/2*m],-b*x^2/a)/a^3/b^3/e/(1+m)
```

Rubi [A] (verified)

Time = 0.27 (sec) , antiderivative size = 292, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {591, 470, 371}

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)^2}{(a+bx^2)^3}\,dx =$$

$$-\frac{(ex)^{m+1}\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)(ad(Ab(m+1)-aB(m+5))(bc(m+1)-ad(m+3)}{8a^3b^3e(m+1)}$$

$$+\frac{d(ex)^{m+1}(Ab(m+1)-aB(m+5))(bc(m+1)-ad(m+3))}{8a^2b^3e(m+1)}$$

$$+\frac{(ex)^{m+1}(bc-ad)\left(c(aB(m+1)+Ab(3-m))-dx^2(Ab(m+1)-aB(m+5))\right)}{8a^2b^2e\,(a+bx^2)}$$

$$+\frac{(c+dx^2)^2\,(ex)^{m+1}(Ab-aB)}{4abe\,(a+bx^2)^2}$$

```
[In] Int[((e*x)^m*(A + B*x^2)*(c + d*x^2)^2)/(a + b*x^2)^3,x]
```

```
[Out] (d*(b*c*(1 + m) - a*d*(3 + m))*(A*b*(1 + m) - a*B*(5 + m))*(e*x)^(1 + m))/(
8*a^2*b^3*e*(1 + m)) + ((A*b - a*B)*(e*x)^(1 + m)*(c + d*x^2)^2)/(4*a*b*e*(
a + b*x^2)^2) + ((b*c - a*d)*(e*x)^(1 + m)*(c*(A*b*(3 - m) + a*B*(1 + m)) -
 d*(A*b*(1 + m) - a*B*(5 + m))*x^2))/(8*a^2*b^2*e*(a + b*x^2)) - ((a*d*(b*c
*(1 + m) - a*d*(3 + m))*(A*b*(1 + m) - a*B*(5 + m)) - b*c*(A*b*(3 - m) + a*
B*(1 + m))*(a*d*(1 + m) + b*(c - c*m)))*(e*x)^(1 + m)*Hypergeometric2F1[1,
(1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(8*a^3*b^3*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 470

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[d*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(b*e*(m + n*(p
+ 1) + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(b*(m + n*(p
 + 1) + 1)), Int[(e*x)^m*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, m,
n, p}, x] && NeQ[b*c - a*d, 0] && NeQ[m + n*(p + 1) + 1, 0]
```

Rule 591

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
```

```
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
 a*f])
```

Rubi steps

$$\text{integral} = \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^2}{4abe\left(a+bx^2\right)^2} - \frac{\int \frac{(ex)^m(c+dx^2)(-c(Ab(3-m)+aB(1+m))+d(Ab(1+m)-aB(5+m))x^2)}{(a+bx^2)^2}\,dx}{4ab}$$

$$= \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^2}{4abe\left(a+bx^2\right)^2} + \frac{(bc-ad)(ex)^{1+m}\left(c(Ab(3-m)+aB(1+m))-d(Ab(1+m)-aB(5+m))x^2\right)}{8a^2b^2e\left(a+bx^2\right)} + \frac{\int \frac{(ex)^m(c(Ab(3-m)+aB(1+m))(bc(1-m)+ad(1+m))+d(bc(1+m)-ad(3+m))(Ab(1+m)-aB(5+m))x^2)}{a+bx^2}\,dx}{8a^2b^2}$$

$$= \frac{d(bc(1+m)-ad(3+m))(Ab(1+m)-aB(5+m))(ex)^{1+m}}{8a^2b^3e(1+m)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^2}{4abe\left(a+bx^2\right)^2} + \frac{(bc-ad)(ex)^{1+m}\left(c(Ab(3-m)+aB(1+m))-d(Ab(1+m)-aB(5+m))x^2\right)}{8a^2b^2e\left(a+bx^2\right)} - \frac{\left(\frac{ad(bc(1+m)-ad(3+m))(Ab(1+m)-aB(5+m))}{b}-c(Ab(3-m)+aB(1+m))(ad(1+m)+b(c-cm))\right)\int}{8a^2b^2}$$

$$= \frac{d(bc(1+m)-ad(3+m))(Ab(1+m)-aB(5+m))(ex)^{1+m}}{8a^2b^3e(1+m)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^2}{4abe\left(a+bx^2\right)^2} + \frac{(bc-ad)(ex)^{1+m}\left(c(Ab(3-m)+aB(1+m))-d(Ab(1+m)-aB(5+m))x^2\right)}{8a^2b^2e\left(a+bx^2\right)} - \frac{\left(\frac{ad(bc(1+m)-ad(3+m))(Ab(1+m)-aB(5+m))}{b}-c(Ab(3-m)+aB(1+m))(ad(1+m)+b(c-cm))\right)(}{8a^3b^2e(1+m)}$$

Mathematica [A] (verified)

Time = 0.74 (sec) , antiderivative size = 165, normalized size of antiderivative = 0.57

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)^2}{(a + bx^2)^3} \, dx$$
$$= \frac{x(ex)^m \left(Bd^2 + \frac{d(2bBc+Abd-3aBd) \text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{a} + \frac{(bc-ad)(bBc+2Abd-3aBd) \text{Hypergeometric2F1}\left(2,\frac{1+m}{2}\right.}{a^2}\right.}{b^3(1+m)}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2)*(c + d*x^2)^2)/(a + b*x^2)^3,x]
```

```
[Out] (x*(e*x)^m*(B*d^2 + (d*(2*b*B*c + A*b*d - 3*a*B*d)*Hypergeometric2F1[1, (1
+ m)/2, (3 + m)/2, -((b*x^2)/a)])/a + ((b*c - a*d)*(b*B*c + 2*A*b*d - 3*a*B
*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/a^2 + ((A*b -
 a*B)*(b*c - a*d)^2*Hypergeometric2F1[3, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)
])/a^3))/(b^3*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (x^2 B + A) (d\,x^2 + c)^2}{(b\,x^2 + a)^3} dx$$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a)^3,x)
```

```
[Out] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a)^3,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)^2}{(a + bx^2)^3} \, dx = \int \frac{(Bx^2 + A)(dx^2 + c)^2 (ex)^m}{(bx^2 + a)^3} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a)^3,x, algorithm="fricas")
```

```
[Out] integral((B*d^2*x^6 + (2*B*c*d + A*d^2)*x^4 + A*c^2 + (B*c^2 + 2*A*c*d)*x^2
)*(e*x)^m/(b^3*x^6 + 3*a*b^2*x^4 + 3*a^2*b*x^2 + a^3), x)
```

Sympy [F]

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^2}{(a+bx^2)^3} dx = \int \frac{(ex)^m (A+Bx^2) (c+dx^2)^2}{(a+bx^2)^3} dx$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)**2/(b*x**2+a)**3,x)
[Out] Integral((e*x)**m*(A + B*x**2)*(c + d*x**2)**2/(a + b*x**2)**3, x)
```

Maxima [F]

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^2}{(a+bx^2)^3} dx = \int \frac{(Bx^2+A)(dx^2+c)^2(ex)^m}{(bx^2+a)^3} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a)^3,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^2*(e*x)^m/(b*x^2 + a)^3, x)
```

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^2}{(a+bx^2)^3} dx = \int \frac{(Bx^2+A)(dx^2+c)^2(ex)^m}{(bx^2+a)^3} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^2/(b*x^2+a)^3,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^2*(e*x)^m/(b*x^2 + a)^3, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^2}{(a+bx^2)^3} dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(d\,x^2+c)^2}{(b\,x^2+a)^3} dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^2)/(a + b*x^2)^3,x)
[Out] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^2)/(a + b*x^2)^3, x)
```

3.15 $\int (ex)^m (a+bx^2)^3 (A+Bx^2) (c+dx^2)^3 \, dx$

Optimal result

Integrand size = 31, antiderivative size = 379

$$\begin{aligned}
&\int (ex)^m (a+bx^2)^3 (A+Bx^2) (c+dx^2)^3 \, dx \\
&= \frac{a^3Ac^3(ex)^{1+m}}{e(1+m)} + \frac{a^2c^2(aBc+3A(bc+ad))(ex)^{3+m}}{e^3(3+m)} \\
&+ \frac{3ac(aBc(bc+ad)+A(b^2c^2+3abcd+a^2d^2))\,(ex)^{5+m}}{e^5(5+m)} \\
&+ \frac{(3aBc(b^2c^2+3abcd+a^2d^2)+A(b^3c^3+9ab^2c^2d+9a^2bcd^2+a^3d^3))\,(ex)^{7+m}}{e^7(7+m)} \\
&+ \frac{(a^3Bd^3+9ab^2cd(Bc+Ad)+3a^2bd^2(3Bc+Ad)+b^3c^2(Bc+3Ad))\,(ex)^{9+m}}{e^9(9+m)} \\
&+ \frac{3bd(a^2Bd^2+b^2c(Bc+Ad)+abd(3Bc+Ad))\,(ex)^{11+m}}{e^{11}(11+m)} \\
&+ \frac{b^2d^2(3bBc+Abd+3aBd)(ex)^{13+m}}{e^{13}(13+m)} + \frac{b^3Bd^3(ex)^{15+m}}{e^{15}(15+m)}
\end{aligned}$$

```
[Out] a^3*A*c^3*(e*x)^(1+m)/e/(1+m)+a^2*c^2*(B*a*c+3*A*(a*d+b*c))*(e*x)^(3+m)/e^3
/(3+m)+3*a*c*(a*B*c*(a*d+b*c)+A*(a^2*d^2+3*a*b*c*d+b^2*c^2))*(e*x)^(5+m)/e^
5/(5+m)+(3*a*B*c*(a^2*d^2+3*a*b*c*d+b^2*c^2)+A*(a^3*d^3+9*a^2*b*c*d^2+9*a*b
^2*c^2*d+b^3*c^3))*(e*x)^(7+m)/e^7/(7+m)+(a^3*B*d^3+9*a*b^2*c*d*(A*d+B*c)+3
*a^2*b*d^2*(A*d+3*B*c)+b^3*c^2*(3*A*d+B*c))*(e*x)^(9+m)/e^9/(9+m)+3*b*d*(a^
2*B*d^2+b^2*c*(A*d+B*c)+a*b*d*(A*d+3*B*c))*(e*x)^(11+m)/e^11/(11+m)+b^2*d^2
*(A*b*d+3*B*a*d+3*B*b*c)*(e*x)^(13+m)/e^13/(13+m)+b^3*B*d^3*(e*x)^(15+m)/e^
15/(15+m)
```

Rubi [A] (verified)

Time = 0.27 (sec) , antiderivative size = 379, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.032, Rules used = {584}

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx$$
$$= \frac{a^3Ac^3(ex)^{m+1}}{e(m+1)} + \frac{3ac(ex)^{m+5}\left(A(a^2d^2+3abcd+b^2c^2)+aBc(ad+bc)\right)}{e^5(m+5)}$$
$$+ \frac{3bd(ex)^{m+11}\left(a^2Bd^2+abd(Ad+3Bc)+b^2c(Ad+Bc)\right)}{e^{11}(m+11)}$$
$$+ \frac{a^2c^2(ex)^{m+3}(3A(ad+bc)+aBc)}{e^3(m+3)}$$
$$+ \frac{(ex)^{m+9}\left(a^3Bd^3+3a^2bd^2(Ad+3Bc)+9ab^2cd(Ad+Bc)+b^3c^2(3Ad+Bc)\right)}{e^9(m+9)}$$
$$+ \frac{(ex)^{m+7}\left(3aBc(a^2d^2+3abcd+b^2c^2)+A(a^3d^3+9a^2bcd^2+9ab^2c^2d+b^3c^3)\right)}{e^7(m+7)}$$
$$+ \frac{b^2d^2(ex)^{m+13}(3aBd+Abd+3bBc)}{e^{13}(m+13)} + \frac{b^3Bd^3(ex)^{m+15}}{e^{15}(m+15)}$$

```
[In] Int[(e*x)^m*(a + b*x^2)^3*(A + B*x^2)*(c + d*x^2)^3,x]
```

```
[Out] (a^3*A*c^3*(e*x)^(1 + m))/(e*(1 + m)) + (a^2*c^2*(a*B*c + 3*A*(b*c + a*d))*
(e*x)^(3 + m))/(e^3*(3 + m)) + (3*a*c*(a*B*c*(b*c + a*d) + A*(b^2*c^2 + 3*a
*b*c*d + a^2*d^2))*(e*x)^(5 + m))/(e^5*(5 + m)) + ((3*a*B*c*(b^2*c^2 + 3*a*
b*c*d + a^2*d^2) + A*(b^3*c^3 + 9*a*b^2*c^2*d + 9*a^2*b*c*d^2 + a^3*d^3))*(
e*x)^(7 + m))/(e^7*(7 + m)) + ((a^3*B*d^3 + 9*a*b^2*c*d*(B*c + A*d) + 3*a^2
*b*d^2*(3*B*c + A*d) + b^3*c^2*(B*c + 3*A*d))*(e*x)^(9 + m))/(e^9*(9 + m))
+ (3*b*d*(a^2*B*d^2 + b^2*c*(B*c + A*d) + a*b*d*(3*B*c + A*d))*(e*x)^(11 +
m))/(e^11*(11 + m)) + (b^2*d^2*(3*b*B*c + A*b*d + 3*a*B*d)*(e*x)^(13 + m))/
(e^13*(13 + m)) + (b^3*B*d^3*(e*x)^(15 + m))/(e^15*(15 + m))
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\text{integral} = \int \left(a^3Ac^3(ex)^m + \frac{a^2c^2(aBc+3A(bc+ad))(ex)^{2+m}}{e^2} + \frac{3ac(aBc(bc+ad)+A(b^2c^2+3abcd+a^2d^2))\,(ex)^{4+m}}{e^4} + \frac{(3aBc(b^2c^2+3abcd+a^2d^2)+A(b^3c^3+9ab^2c^2d+9a^2bcd^2+a^3d^3))\,(ex)^{6+m}}{e^6} + \frac{(a^3Bd^3+9ab^2cd(Bc+Ad)+3a^2bd^2(3Bc+Ad)+b^3c^2(Bc+3Ad))\,(ex)^{8+m}}{e^8} + \frac{3bd(a^2Bd^2+b^2c(Bc+Ad)+abd(3Bc+Ad))\,(ex)^{10+m}}{e^{10}} + \frac{b^2d^2(3bBc+Abd+3aBd)(ex)^{12+m}}{e^{12}} + \frac{b^3Bd^3(ex)^{14+m}}{e^{14}}\right) dx$$

$$= \frac{a^3Ac^3(ex)^{1+m}}{e(1+m)} + \frac{a^2c^2(aBc+3A(bc+ad))(ex)^{3+m}}{e^3(3+m)} + \frac{3ac(aBc(bc+ad)+A(b^2c^2+3abcd+a^2d^2))\,(ex)^{5+m}}{e^5(5+m)} + \frac{(3aBc(b^2c^2+3abcd+a^2d^2)+A(b^3c^3+9ab^2c^2d+9a^2bcd^2+a^3d^3))\,(ex)^{7+m}}{e^7(7+m)} + \frac{(a^3Bd^3+9ab^2cd(Bc+Ad)+3a^2bd^2(3Bc+Ad)+b^3c^2(Bc+3Ad))\,(ex)^{9+m}}{e^9(9+m)} + \frac{3bd(a^2Bd^2+b^2c(Bc+Ad)+abd(3Bc+Ad))\,(ex)^{11+m}}{e^{11}(11+m)} + \frac{b^2d^2(3bBc+Abd+3aBd)(ex)^{13+m}}{e^{13}(13+m)} + \frac{b^3Bd^3(ex)^{15+m}}{e^{15}(15+m)}$$

Mathematica [A] (verified)

Time = 0.96 (sec) , antiderivative size = 327, normalized size of antiderivative = 0.86

$$\int (ex)^m\left(a+bx^2\right)^3\left(A+Bx^2\right)\left(c+dx^2\right)^3\,dx = x(ex)^m\left(\frac{a^3Ac^3}{1+m}+\frac{a^2c^2(aBc+3A(bc+ad))x^2}{3+m}+\frac{3ac(aBc(bc+ad)+A(b^2c^2+3abcd+a^2d^2))\,x^4}{5+m}+\frac{(3aBc(b^2c^2+3abcd+a^2d^2)+A(b^3c^3+9ab^2c^2d+9a^2bcd^2+a^3d^3))\,x^6}{7+m}+\frac{(a^3Bd^3+9ab^2cd(Bc+Ad)+3a^2bd^2(3Bc+Ad)+b^3c^2(Bc+3Ad))\,x^8}{9+m}+\frac{3bd(a^2Bd^2+b^2c(Bc+Ad)+abd(3Bc+Ad))\,x^{10}}{11+m}+\frac{b^2d^2(3bBc+Abd+3aBd)x^{12}}{13+m}+\frac{b^3Bd^3x^{14}}{15+m}\right)$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)^3*(A + B*x^2)*(c + d*x^2)^3,x]
```

```
[Out] x*(e*x)^m*((a^3*A*c^3)/(1 + m) + (a^2*c^2*(a*B*c + 3*A*(b*c + a*d))*x^2)/(3
 + m) + (3*a*c*(a*B*c*(b*c + a*d) + A*(b^2*c^2 + 3*a*b*c*d + a^2*d^2))*x^4)
/(5 + m) + ((3*a*B*c*(b^2*c^2 + 3*a*b*c*d + a^2*d^2) + A*(b^3*c^3 + 9*a*b^2
*c^2*d + 9*a^2*b*c*d^2 + a^3*d^3))*x^6)/(7 + m) + ((a^3*B*d^3 + 9*a*b^2*c*d
*(B*c + A*d) + 3*a^2*b*d^2*(3*B*c + A*d) + b^3*c^2*(B*c + 3*A*d))*x^8)/(9 +
 m) + (3*b*d*(a^2*B*d^2 + b^2*c*(B*c + A*d) + a*b*d*(3*B*c + A*d))*x^10)/(1
1 + m) + (b^2*d^2*(3*b*B*c + A*b*d + 3*a*B*d)*x^12)/(13 + m) + (b^3*B*d^3*x
^14)/(15 + m))
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 3952 vs. 2(379) = 758.

Time = 3.96 (sec) , antiderivative size = 3953, normalized size of antiderivative = 10.43

method	result	size
gosper	Expression too large to display	3953
risch	Expression too large to display	3953
parallelrisch	Expression too large to display	5235

```
[In] int((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c)^3,x,method=_RETURNVERBOSE)
```

```
[Out] x*(B*b^3*d^3*m^7*x^14+49*B*b^3*d^3*m^6*x^14+A*b^3*d^3*m^7*x^12+3*B*a*b^2*d^
3*m^7*x^12+3*B*b^3*c*d^2*m^7*x^12+973*B*b^3*d^3*m^5*x^14+51*A*b^3*d^3*m^6*x
```

^12+153*B*a*b^2*d^3*m^6*x^12+153*B*b^3*c*d^2*m^6*x^12+10045*B*b^3*d^3*m^4*x
^14+3*A*a*b^2*d^3*m^7*x^10+3*A*b^3*c*d^2*m^7*x^10+1045*A*b^3*d^3*m^5*x^12+3
*B*a^2*b*d^3*m^7*x^10+9*B*a*b^2*c*d^2*m^7*x^10+3135*B*a*b^2*d^3*m^5*x^12+3*
B*b^3*c^2*d*m^7*x^10+3135*B*b^3*c*d^2*m^5*x^12+57379*B*b^3*d^3*m^3*x^14+159
*A*a*b^2*d^3*m^6*x^10+159*A*b^3*c*d^2*m^6*x^10+11055*A*b^3*d^3*m^4*x^12+159
*B*a^2*b*d^3*m^6*x^10+477*B*a*b^2*c*d^2*m^6*x^10+33165*B*a*b^2*d^3*m^4*x^12
+159*B*b^3*c^2*d*m^6*x^10+33165*B*b^3*c*d^2*m^4*x^12+177331*B*b^3*d^3*m^2*x
^14+3*A*a^2*b*d^3*m^7*x^8+9*A*a*b^2*c*d^2*m^7*x^8+3375*A*a*b^2*d^3*m^5*x^10
+3*A*b^3*c^2*d*m^7*x^8+3375*A*b^3*c*d^2*m^5*x^10+64339*A*b^3*d^3*m^3*x^12+B
*a^3*d^3*m^7*x^8+9*B*a^2*b*c*d^2*m^7*x^8+3375*B*a^2*b*d^3*m^5*x^10+9*B*a*b^
2*c^2*d*m^7*x^8+10125*B*a*b^2*c*d^2*m^5*x^10+193017*B*a*b^2*d^3*m^3*x^12+B*
b^3*c^3*m^7*x^8+3375*B*b^3*c^2*d*m^5*x^10+193017*B*b^3*c*d^2*m^3*x^12+26420
7*B*b^3*d^3*m*x^14+165*A*a^2*b*d^3*m^6*x^8+495*A*a*b^2*c*d^2*m^6*x^8+36795*
A*a*b^2*d^3*m^4*x^10+165*A*b^3*c^2*d*m^6*x^8+36795*A*b^3*c*d^2*m^4*x^10+201
609*A*b^3*d^3*m^2*x^12+55*B*a^3*d^3*m^6*x^8+495*B*a^2*b*c*d^2*m^6*x^8+36795
*B*a^2*b*d^3*m^4*x^10+495*B*a*b^2*c^2*d*m^6*x^8+110385*B*a*b^2*c*d^2*m^4*x^
10+604827*B*a*b^2*d^3*m^2*x^12+55*B*b^3*c^3*m^6*x^8+36795*B*b^3*c^2*d*m^4*x
^10+604827*B*b^3*c*d^2*m^2*x^12+135135*B*b^3*d^3*x^14+A*a^3*d^3*m^7*x^6+9*A
*a^2*b*c*d^2*m^7*x^6+3639*A*a^2*b*d^3*m^5*x^8+9*A*a*b^2*c^2*d*m^7*x^6+10917
*A*a*b^2*c*d^2*m^5*x^8+219417*A*a*b^2*d^3*m^3*x^10+A*b^3*c^3*m^7*x^6+3639*A
*b^3*c^2*d*m^5*x^8+219417*A*b^3*c*d^2*m^3*x^10+303255*A*b^3*d^3*m*x^12+3*B*
a^3*c*d^2*m^7*x^6+1213*B*a^3*d^3*m^5*x^8+9*B*a^2*b*c^2*d*m^7*x^6+10917*B*a^
2*b*c*d^2*m^5*x^8+219417*B*a^2*b*d^3*m^3*x^10+3*B*a*b^2*c^3*m^7*x^6+10917*B
*a*b^2*c^2*d*m^5*x^8+658251*B*a*b^2*c*d^2*m^3*x^10+909765*B*a*b^2*d^3*m*x^1
2+1213*B*b^3*c^3*m^5*x^8+219417*B*b^3*c^2*d*m^3*x^10+909765*B*b^3*c*d^2*m*x
^12+57*A*a^3*d^3*m^6*x^6+513*A*a^2*b*c*d^2*m^6*x^6+41169*A*a^2*b*d^3*m^4*x^
8+513*A*a*b^2*c^2*d*m^6*x^6+123507*A*a*b^2*c*d^2*m^4*x^8+700461*A*a*b^2*d^3
*m^2*x^10+57*A*b^3*c^3*m^6*x^6+41169*A*b^3*c^2*d*m^4*x^8+700461*A*b^3*c*d^2
*m^2*x^10+155925*A*b^3*d^3*x^12+171*B*a^3*c*d^2*m^6*x^6+13723*B*a^3*d^3*m^4
*x^8+513*B*a^2*b*c^2*d*m^6*x^6+123507*B*a^2*b*c*d^2*m^4*x^8+700461*B*a^2*b*
d^3*m^2*x^10+171*B*a*b^2*c^3*m^6*x^6+123507*B*a*b^2*c^2*d*m^4*x^8+2101383*B
*a*b^2*c*d^2*m^2*x^10+467775*B*a*b^2*d^3*x^12+13723*B*b^3*c^3*m^4*x^8+70046
1*B*b^3*c^2*d*m^2*x^10+467775*B*b^3*c*d^2*x^12+3*A*a^3*c*d^2*m^7*x^4+1309*A
*a^3*d^3*m^5*x^6+9*A*a^2*b*c^2*d*m^7*x^4+11781*A*a^2*b*c*d^2*m^5*x^6+253641
*A*a^2*b*d^3*m^3*x^8+3*A*a*b^2*c^3*m^7*x^4+11781*A*a*b^2*c^2*d*m^5*x^6+7609
23*A*a*b^2*c*d^2*m^3*x^8+1067445*A*a*b^2*d^3*m*x^10+1309*A*b^3*c^3*m^5*x^6+
253641*A*b^3*c^2*d*m^3*x^8+1067445*A*b^3*c*d^2*m*x^10+3*B*a^3*c^2*d*m^7*x^4
+3927*B*a^3*c*d^2*m^5*x^6+84547*B*a^3*d^3*m^3*x^8+3*B*a^2*b*c^3*m^7*x^4+117
81*B*a^2*b*c^2*d*m^5*x^6+760923*B*a^2*b*c*d^2*m^3*x^8+1067445*B*a^2*b*d^3*m
*x^10+3927*B*a*b^2*c^3*m^5*x^6+760923*B*a*b^2*c^2*d*m^3*x^8+3202335*B*a*b^2
*c*d^2*m*x^10+84547*B*b^3*c^3*m^3*x^8+1067445*B*b^3*c^2*d*m*x^10+177*A*a^3*
c*d^2*m^6*x^4+15477*A*a^3*d^3*m^4*x^6+531*A*a^2*b*c^2*d*m^6*x^4+139293*A*a^
2*b*c*d^2*m^4*x^6+831279*A*a^2*b*d^3*m^2*x^8+177*A*a*b^2*c^3*m^6*x^4+139293
*A*a*b^2*c^2*d*m^4*x^6+2493837*A*a*b^2*c*d^2*m^2*x^8+552825*A*a*b^2*d^3*x^1
0+15477*A*b^3*c^3*m^4*x^6+831279*A*b^3*c^2*d*m^2*x^8+552825*A*b^3*c*d^2*x^1

```
0+177*B*a^3*c^2*d*m^6*x^4+46431*B*a^3*c*d^2*m^4*x^6+277093*B*a^3*d^3*m^2*x^
8+177*B*a^2*b*c^3*m^6*x^4+139293*B*a^2*b*c^2*d*m^4*x^6+2493837*B*a^2*b*c*d^
2*m^2*x^8+552825*B*a^2*b*d^3*x^10+46431*B*a*b^2*c^3*m^4*x^6+2493837*B*a*b^2
*c^2*d*m^2*x^8+1658475*B*a*b^2*c*d^2*x^10+277093*B*b^3*c^3*m^2*x^8+552825*B
*b^3*c^2*d*x^10+3*A*a^3*c^2*d*m^7*x^2+4239*A*a^3*c*d^2*m^5*x^4+99715*A*a^3*
d^3*m^3*x^6+3*A*a^2*b*c^3*m^7*x^2+12717*A*a^2*b*c^2*d*m^5*x^4+897435*A*a^2*
b*c*d^2*m^3*x^6+1291005*A*a^2*b*d^3*m*x^8+4239*A*a*b^2*c^3*m^5*x^4+897435*A
*a*b^2*c^2*d*m^3*x^6+3873015*A*a*b^2*c*d^2*m*x^8+99715*A*b^3*c^3*m^3*x^6+12
91005*A*b^3*c^2*d*m*x^8+B*a^3*c^3*m^7*x^2+4239*B*a^3*c^2*d*m^5*x^4+299145*B
*a^3*c*d^2*m^3*x^6+430335*B*a^3*d^3*m*x^8+4239*B*a^2*b*c^3*m^5*x^4+897435*B
*a^2*b*c^2*d*m^3*x^6+3873015*B*a^2*b*c*d^2*m*x^8+299145*B*a*b^2*c^3*m^3*x^6
+3873015*B*a*b^2*c^2*d*m*x^8+430335*B*b^3*c^3*m*x^8+183*A*a^3*c^2*d*m^6*x^2
+52725*A*a^3*c*d^2*m^4*x^4+340011*A*a^3*d^3*m^2*x^6+183*A*a^2*b*c^3*m^6*x^2
+158175*A*a^2*b*c^2*d*m^4*x^4+3060099*A*a^2*b*c*d^2*m^2*x^6+675675*A*a^2*b*
d^3*x^8+52725*A*a*b^2*c^3*m^4*x^4+3060099*A*a*b^2*c^2*d*m^2*x^6+2027025*A*a
*b^2*c*d^2*x^8+340011*A*b^3*c^3*m^2*x^6+675675*A*b^3*c^2*d*x^8+61*B*a^3*c^3
*m^6*x^2+52725*B*a^3*c^2*d*m^4*x^4+1020033*B*a^3*c*d^2*m^2*x^6+225225*B*a^3
*d^3*x^8+52725*B*a^2*b*c^3*m^4*x^4+3060099*B*a^2*b*c^2*d*m^2*x^6+2027025*B*
a^2*b*c*d^2*x^8+1020033*B*a*b^2*c^3*m^2*x^6+2027025*B*a*b^2*c^2*d*x^8+22522
5*B*b^3*c^3*x^8+A*a^3*c^3*m^7+4575*A*a^3*c^2*d*m^5*x^2+360537*A*a^3*c*d^2*m
^3*x^4+544095*A*a^3*d^3*m*x^6+4575*A*a^2*b*c^3*m^5*x^2+1081611*A*a^2*b*c^2*
d*m^3*x^4+4896855*A*a^2*b*c*d^2*m*x^6+360537*A*a*b^2*c^3*m^3*x^4+4896855*A*
a*b^2*c^2*d*m*x^6+544095*A*b^3*c^3*m*x^6+1525*B*a^3*c^3*m^5*x^2+360537*B*a^
3*c^2*d*m^3*x^4+1632285*B*a^3*c*d^2*m*x^6+360537*B*a^2*b*c^3*m^3*x^4+489685
5*B*a^2*b*c^2*d*m*x^6+1632285*B*a*b^2*c^3*m*x^6+63*A*a^3*c^3*m^6+60195*A*a^
3*c^2*d*m^4*x^2+1311363*A*a^3*c*d^2*m^2*x^4+289575*A*a^3*d^3*x^6+60195*A*a^
2*b*c^3*m^4*x^2+3934089*A*a^2*b*c^2*d*m^2*x^4+2606175*A*a^2*b*c*d^2*x^6+131
1363*A*a*b^2*c^3*m^2*x^4+2606175*A*a*b^2*c^2*d*x^6+289575*A*b^3*c^3*x^6+200
65*B*a^3*c^3*m^4*x^2+1311363*B*a^3*c^2*d*m^2*x^4+868725*B*a^3*c*d^2*x^6+131
1363*B*a^2*b*c^3*m^2*x^4+2606175*B*a^2*b*c^2*d*x^6+868725*B*a*b^2*c^3*x^6+1
645*A*a^3*c^3*m^5+443577*A*a^3*c^2*d*m^3*x^2+2215701*A*a^3*c*d^2*m*x^4+4435
77*A*a^2*b*c^3*m^3*x^2+6647103*A*a^2*b*c^2*d*m*x^4+2215701*A*a*b^2*c^3*m*x^
4+147859*B*a^3*c^3*m^3*x^2+2215701*B*a^3*c^2*d*m*x^4+2215701*B*a^2*b*c^3*m*
x^4+22995*A*a^3*c^3*m^4+1783317*A*a^3*c^2*d*m^2*x^2+1216215*A*a^3*c*d^2*x^4
+1783317*A*a^2*b*c^3*m^2*x^2+3648645*A*a^2*b*c^2*d*x^4+1216215*A*a*b^2*c^3*
x^4+594439*B*a^3*c^3*m^2*x^2+1216215*B*a^3*c^2*d*x^4+1216215*B*a^2*b*c^3*x^
4+185059*A*a^3*c^3*m^3+3422565*A*a^3*c^2*d*m*x^2+3422565*A*a^2*b*c^3*m*x^2+
1140855*B*a^3*c^3*m*x^2+852957*A*a^3*c^3*m^2+2027025*A*a^3*c^2*d*x^2+202702
5*A*a^2*b*c^3*x^2+675675*B*a^3*c^3*x^2+2071215*A*a^3*c^3*m+2027025*A*a^3*c^
3)*(e*x)^m/(1+m)/(3+m)/(5+m)/(7+m)/(9+m)/(11+m)/(13+m)/(15+m)
```

Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 2657 vs. 2(379) = 758.

Time = 0.32 (sec) , antiderivative size = 2657, normalized size of antiderivative = 7.01

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="fricas")
[Out] ((B*b^3*d^3*m^7 + 49*B*b^3*d^3*m^6 + 973*B*b^3*d^3*m^5 + 10045*B*b^3*d^3*m^
4 + 57379*B*b^3*d^3*m^3 + 177331*B*b^3*d^3*m^2 + 264207*B*b^3*d^3*m + 13513
5*B*b^3*d^3)*x^15 + ((3*B*b^3*c*d^2 + (3*B*a*b^2 + A*b^3)*d^3)*m^7 + 467775
*B*b^3*c*d^2 + 51*(3*B*b^3*c*d^2 + (3*B*a*b^2 + A*b^3)*d^3)*m^6 + 1045*(3*B
*b^3*c*d^2 + (3*B*a*b^2 + A*b^3)*d^3)*m^5 + 11055*(3*B*b^3*c*d^2 + (3*B*a*b
^2 + A*b^3)*d^3)*m^4 + 155925*(3*B*a*b^2 + A*b^3)*d^3 + 64339*(3*B*b^3*c*d^
2 + (3*B*a*b^2 + A*b^3)*d^3)*m^3 + 201609*(3*B*b^3*c*d^2 + (3*B*a*b^2 + A*b
^3)*d^3)*m^2 + 303255*(3*B*b^3*c*d^2 + (3*B*a*b^2 + A*b^3)*d^3)*m)*x^13 + 3
*((B*b^3*c^2*d + (3*B*a*b^2 + A*b^3)*c*d^2 + (B*a^2*b + A*a*b^2)*d^3)*m^7 +
 184275*B*b^3*c^2*d + 53*(B*b^3*c^2*d + (3*B*a*b^2 + A*b^3)*c*d^2 + (B*a^2*
b + A*a*b^2)*d^3)*m^6 + 1125*(B*b^3*c^2*d + (3*B*a*b^2 + A*b^3)*c*d^2 + (B*
a^2*b + A*a*b^2)*d^3)*m^5 + 12265*(B*b^3*c^2*d + (3*B*a*b^2 + A*b^3)*c*d^2
+ (B*a^2*b + A*a*b^2)*d^3)*m^4 + 184275*(3*B*a*b^2 + A*b^3)*c*d^2 + 184275*
(B*a^2*b + A*a*b^2)*d^3 + 73139*(B*b^3*c^2*d + (3*B*a*b^2 + A*b^3)*c*d^2 +
(B*a^2*b + A*a*b^2)*d^3)*m^3 + 233487*(B*b^3*c^2*d + (3*B*a*b^2 + A*b^3)*c*
d^2 + (B*a^2*b + A*a*b^2)*d^3)*m^2 + 355815*(B*b^3*c^2*d + (3*B*a*b^2 + A*b
^3)*c*d^2 + (B*a^2*b + A*a*b^2)*d^3)*m)*x^11 + ((B*b^3*c^3 + 3*(3*B*a*b^2 +
 A*b^3)*c^2*d + 9*(B*a^2*b + A*a*b^2)*c*d^2 + (B*a^3 + 3*A*a^2*b)*d^3)*m^7
+ 225225*B*b^3*c^3 + 55*(B*b^3*c^3 + 3*(3*B*a*b^2 + A*b^3)*c^2*d + 9*(B*a^2
*b + A*a*b^2)*c*d^2 + (B*a^3 + 3*A*a^2*b)*d^3)*m^6 + 1213*(B*b^3*c^3 + 3*(3
*B*a*b^2 + A*b^3)*c^2*d + 9*(B*a^2*b + A*a*b^2)*c*d^2 + (B*a^3 + 3*A*a^2*b)
*d^3)*m^5 + 13723*(B*b^3*c^3 + 3*(3*B*a*b^2 + A*b^3)*c^2*d + 9*(B*a^2*b + A
*a*b^2)*c*d^2 + (B*a^3 + 3*A*a^2*b)*d^3)*m^4 + 675675*(3*B*a*b^2 + A*b^3)*c
^2*d + 2027025*(B*a^2*b + A*a*b^2)*c*d^2 + 225225*(B*a^3 + 3*A*a^2*b)*d^3 +
 84547*(B*b^3*c^3 + 3*(3*B*a*b^2 + A*b^3)*c^2*d + 9*(B*a^2*b + A*a*b^2)*c*d
^2 + (B*a^3 + 3*A*a^2*b)*d^3)*m^3 + 277093*(B*b^3*c^3 + 3*(3*B*a*b^2 + A*b^
3)*c^2*d + 9*(B*a^2*b + A*a*b^2)*c*d^2 + (B*a^3 + 3*A*a^2*b)*d^3)*m^2 + 430
335*(B*b^3*c^3 + 3*(3*B*a*b^2 + A*b^3)*c^2*d + 9*(B*a^2*b + A*a*b^2)*c*d^2
+ (B*a^3 + 3*A*a^2*b)*d^3)*m)*x^9 + ((A*a^3*d^3 + (3*B*a*b^2 + A*b^3)*c^3 +
 9*(B*a^2*b + A*a*b^2)*c^2*d + 3*(B*a^3 + 3*A*a^2*b)*c*d^2)*m^7 + 289575*A*
a^3*d^3 + 57*(A*a^3*d^3 + (3*B*a*b^2 + A*b^3)*c^3 + 9*(B*a^2*b + A*a*b^2)*c
^2*d + 3*(B*a^3 + 3*A*a^2*b)*c*d^2)*m^6 + 1309*(A*a^3*d^3 + (3*B*a*b^2 + A*
b^3)*c^3 + 9*(B*a^2*b + A*a*b^2)*c^2*d + 3*(B*a^3 + 3*A*a^2*b)*c*d^2)*m^5 +
 15477*(A*a^3*d^3 + (3*B*a*b^2 + A*b^3)*c^3 + 9*(B*a^2*b + A*a*b^2)*c^2*d +
 3*(B*a^3 + 3*A*a^2*b)*c*d^2)*m^4 + 289575*(3*B*a*b^2 + A*b^3)*c^3 + 260617
```

```
5*(B*a^2*b + A*a*b^2)*c^2*d + 868725*(B*a^3 + 3*A*a^2*b)*c*d^2 + 99715*(A*a
^3*d^3 + (3*B*a*b^2 + A*b^3)*c^3 + 9*(B*a^2*b + A*a*b^2)*c^2*d + 3*(B*a^3 +
 3*A*a^2*b)*c*d^2)*m^3 + 340011*(A*a^3*d^3 + (3*B*a*b^2 + A*b^3)*c^3 + 9*(B
*a^2*b + A*a*b^2)*c^2*d + 3*(B*a^3 + 3*A*a^2*b)*c*d^2)*m^2 + 544095*(A*a^3*
d^3 + (3*B*a*b^2 + A*b^3)*c^3 + 9*(B*a^2*b + A*a*b^2)*c^2*d + 3*(B*a^3 + 3*
A*a^2*b)*c*d^2)*m)*x^7 + 3*((A*a^3*c*d^2 + (B*a^2*b + A*a*b^2)*c^3 + (B*a^3
 + 3*A*a^2*b)*c^2*d)*m^7 + 405405*A*a^3*c*d^2 + 59*(A*a^3*c*d^2 + (B*a^2*b
+ A*a*b^2)*c^3 + (B*a^3 + 3*A*a^2*b)*c^2*d)*m^6 + 1413*(A*a^3*c*d^2 + (B*a^
2*b + A*a*b^2)*c^3 + (B*a^3 + 3*A*a^2*b)*c^2*d)*m^5 + 17575*(A*a^3*c*d^2 +
(B*a^2*b + A*a*b^2)*c^3 + (B*a^3 + 3*A*a^2*b)*c^2*d)*m^4 + 405405*(B*a^2*b
+ A*a*b^2)*c^3 + 405405*(B*a^3 + 3*A*a^2*b)*c^2*d + 120179*(A*a^3*c*d^2 + (
B*a^2*b + A*a*b^2)*c^3 + (B*a^3 + 3*A*a^2*b)*c^2*d)*m^3 + 437121*(A*a^3*c*d
^2 + (B*a^2*b + A*a*b^2)*c^3 + (B*a^3 + 3*A*a^2*b)*c^2*d)*m^2 + 738567*(A*a
^3*c*d^2 + (B*a^2*b + A*a*b^2)*c^3 + (B*a^3 + 3*A*a^2*b)*c^2*d)*m)*x^5 + ((
3*A*a^3*c^2*d + (B*a^3 + 3*A*a^2*b)*c^3)*m^7 + 2027025*A*a^3*c^2*d + 61*(3*
A*a^3*c^2*d + (B*a^3 + 3*A*a^2*b)*c^3)*m^6 + 1525*(3*A*a^3*c^2*d + (B*a^3 +
 3*A*a^2*b)*c^3)*m^5 + 20065*(3*A*a^3*c^2*d + (B*a^3 + 3*A*a^2*b)*c^3)*m^4
+ 675675*(B*a^3 + 3*A*a^2*b)*c^3 + 147859*(3*A*a^3*c^2*d + (B*a^3 + 3*A*a^2
*b)*c^3)*m^3 + 594439*(3*A*a^3*c^2*d + (B*a^3 + 3*A*a^2*b)*c^3)*m^2 + 11408
55*(3*A*a^3*c^2*d + (B*a^3 + 3*A*a^2*b)*c^3)*m)*x^3 + (A*a^3*c^3*m^7 + 63*A
*a^3*c^3*m^6 + 1645*A*a^3*c^3*m^5 + 22995*A*a^3*c^3*m^4 + 185059*A*a^3*c^3*
m^3 + 852957*A*a^3*c^3*m^2 + 2071215*A*a^3*c^3*m + 2027025*A*a^3*c^3)*x)*(e
*x)^m/(m^8 + 64*m^7 + 1708*m^6 + 24640*m^5 + 208054*m^4 + 1038016*m^3 + 292
4172*m^2 + 4098240*m + 2027025)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 20086 vs. $2(377) = 754$.

Time = 1.93 (sec) , antiderivative size = 20086, normalized size of antiderivative = 53.00

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**3*(B*x**2+A)*(d*x**2+c)**3,x)
```

```
[Out] Piecewise(((-A*a**3*c**3/(14*x**14) - A*a**3*c**2*d/(4*x**12) - 3*A*a**3*c*
d**2/(10*x**10) - A*a**3*d**3/(8*x**8) - A*a**2*b*c**3/(4*x**12) - 9*A*a**2
*b*c**2*d/(10*x**10) - 9*A*a**2*b*c*d**2/(8*x**8) - A*a**2*b*d**3/(2*x**6)
- 3*A*a*b**2*c**3/(10*x**10) - 9*A*a*b**2*c**2*d/(8*x**8) - 3*A*a*b**2*c*d*
*2/(2*x**6) - 3*A*a*b**2*d**3/(4*x**4) - A*b**3*c**3/(8*x**8) - A*b**3*c**2
*d/(2*x**6) - 3*A*b**3*c*d**2/(4*x**4) - A*b**3*d**3/(2*x**2) - B*a**3*c**3
/(12*x**12) - 3*B*a**3*c**2*d/(10*x**10) - 3*B*a**3*c*d**2/(8*x**8) - B*a**
3*d**3/(6*x**6) - 3*B*a**2*b*c**3/(10*x**10) - 9*B*a**2*b*c**2*d/(8*x**8) -
 3*B*a**2*b*c*d**2/(2*x**6) - 3*B*a**2*b*d**3/(4*x**4) - 3*B*a*b**2*c**3/(8
*x**8) - 3*B*a*b**2*c**2*d/(2*x**6) - 9*B*a*b**2*c*d**2/(4*x**4) - 3*B*a*b*
```

```
*2*d**3/(2*x**2) - B*b**3*c**3/(6*x**6) - 3*B*b**3*c**2*d/(4*x**4) - 3*B*b*
*3*c*d**2/(2*x**2) + B*b**3*d**3*log(x))/e**15, Eq(m, -15)), ((-A*a**3*c**3
/(12*x**12) - 3*A*a**3*c**2*d/(10*x**10) - 3*A*a**3*c*d**2/(8*x**8) - A*a**
3*d**3/(6*x**6) - 3*A*a**2*b*c**3/(10*x**10) - 9*A*a**2*b*c**2*d/(8*x**8) -
 3*A*a**2*b*c*d**2/(2*x**6) - 3*A*a**2*b*d**3/(4*x**4) - 3*A*a*b**2*c**3/(8
*x**8) - 3*A*a*b**2*c**2*d/(2*x**6) - 9*A*a*b**2*c*d**2/(4*x**4) - 3*A*a*b*
*2*d**3/(2*x**2) - A*b**3*c**3/(6*x**6) - 3*A*b**3*c**2*d/(4*x**4) - 3*A*b*
*3*c*d**2/(2*x**2) + A*b**3*d**3*log(x) - B*a**3*c**3/(10*x**10) - 3*B*a**3
*c**2*d/(8*x**8) - B*a**3*c*d**2/(2*x**6) - B*a**3*d**3/(4*x**4) - 3*B*a**2
*b*c**3/(8*x**8) - 3*B*a**2*b*c**2*d/(2*x**6) - 9*B*a**2*b*c*d**2/(4*x**4)
 - 3*B*a**2*b*d**3/(2*x**2) - B*a*b**2*c**3/(2*x**6) - 9*B*a*b**2*c**2*d/(4*
x**4) - 9*B*a*b**2*c*d**2/(2*x**2) + 3*B*a*b**2*d**3*log(x) - B*b**3*c**3/(
4*x**4) - 3*B*b**3*c**2*d/(2*x**2) + 3*B*b**3*c*d**2*log(x) + B*b**3*d**3*x
**2/2)/e**13, Eq(m, -13)), ((-A*a**3*c**3/(10*x**10) - 3*A*a**3*c**2*d/(8*x
**8) - A*a**3*c*d**2/(2*x**6) - A*a**3*d**3/(4*x**4) - 3*A*a**2*b*c**3/(8*x
**8) - 3*A*a**2*b*c**2*d/(2*x**6) - 9*A*a**2*b*c*d**2/(4*x**4) - 3*A*a**2*b
*d**3/(2*x**2) - A*a*b**2*c**3/(2*x**6) - 9*A*a*b**2*c**2*d/(4*x**4) - 9*A*
a*b**2*c*d**2/(2*x**2) + 3*A*a*b**2*d**3*log(x) - A*b**3*c**3/(4*x**4) - 3*
A*b**3*c**2*d/(2*x**2) + 3*A*b**3*c*d**2*log(x) + A*b**3*d**3*x**2/2 - B*a*
*3*c**3/(8*x**8) - B*a**3*c**2*d/(2*x**6) - 3*B*a**3*c*d**2/(4*x**4) - B*a*
*3*d**3/(2*x**2) - B*a**2*b*c**3/(2*x**6) - 9*B*a**2*b*c**2*d/(4*x**4) - 9*
B*a**2*b*c*d**2/(2*x**2) + 3*B*a**2*b*d**3*log(x) - 3*B*a*b**2*c**3/(4*x**4
) - 9*B*a*b**2*c**2*d/(2*x**2) + 9*B*a*b**2*c*d**2*log(x) + 3*B*a*b**2*d**3
*x**2/2 - B*b**3*c**3/(2*x**2) + 3*B*b**3*c**2*d*log(x) + 3*B*b**3*c*d**2*x
**2/2 + B*b**3*d**3*x**4/4)/e**11, Eq(m, -11)), ((-A*a**3*c**3/(8*x**8) - A
*a**3*c**2*d/(2*x**6) - 3*A*a**3*c*d**2/(4*x**4) - A*a**3*d**3/(2*x**2) - A
*a**2*b*c**3/(2*x**6) - 9*A*a**2*b*c**2*d/(4*x**4) - 9*A*a**2*b*c*d**2/(2*x
**2) + 3*A*a**2*b*d**3*log(x) - 3*A*a*b**2*c**3/(4*x**4) - 9*A*a*b**2*c**2*
d/(2*x**2) + 9*A*a*b**2*c*d**2*log(x) + 3*A*a*b**2*d**3*x**2/2 - A*b**3*c**
3/(2*x**2) + 3*A*b**3*c**2*d*log(x) + 3*A*b**3*c*d**2*x**2/2 + A*b**3*d**3*
x**4/4 - B*a**3*c**3/(6*x**6) - 3*B*a**3*c**2*d/(4*x**4) - 3*B*a**3*c*d**2/
(2*x**2) + B*a**3*d**3*log(x) - 3*B*a**2*b*c**3/(4*x**4) - 9*B*a**2*b*c**2*
d/(2*x**2) + 9*B*a**2*b*c*d**2*log(x) + 3*B*a**2*b*d**3*x**2/2 - 3*B*a*b**2
*c**3/(2*x**2) + 9*B*a*b**2*c**2*d*log(x) + 9*B*a*b**2*c*d**2*x**2/2 + 3*B*
a*b**2*d**3*x**4/4 + B*b**3*c**3*log(x) + 3*B*b**3*c**2*d*x**2/2 + 3*B*b**3
*c*d**2*x**4/4 + B*b**3*d**3*x**6/6)/e**9, Eq(m, -9)), ((-A*a**3*c**3/(6*x*
*6) - 3*A*a**3*c**2*d/(4*x**4) - 3*A*a**3*c*d**2/(2*x**2) + A*a**3*d**3*log
(x) - 3*A*a**2*b*c**3/(4*x**4) - 9*A*a**2*b*c**2*d/(2*x**2) + 9*A*a**2*b*c*
d**2*log(x) + 3*A*a**2*b*d**3*x**2/2 - 3*A*a*b**2*c**3/(2*x**2) + 9*A*a*b**
2*c**2*d*log(x) + 9*A*a*b**2*c*d**2*x**2/2 + 3*A*a*b**2*d**3*x**4/4 + A*b**
3*c**3*log(x) + 3*A*b**3*c**2*d*x**2/2 + 3*A*b**3*c*d**2*x**4/4 + A*b**3*d*
*3*x**6/6 - B*a**3*c**3/(4*x**4) - 3*B*a**3*c**2*d/(2*x**2) + 3*B*a**3*c*d*
*2*log(x) + B*a**3*d**3*x**2/2 - 3*B*a**2*b*c**3/(2*x**2) + 9*B*a**2*b*c**2
*d*log(x) + 9*B*a**2*b*c*d**2*x**2/2 + 3*B*a**2*b*d**3*x**4/4 + 3*B*a*b**2*
c**3*log(x) + 9*B*a*b**2*c**2*d*x**2/2 + 9*B*a*b**2*c*d**2*x**4/4 + B*a*b**
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2*d**3*x**6/2 + B*b**3*c**3*x**2/2 + 3*B*b**3*c**2*d*x**4/4 + B*b**3*c*d**2
*x**6/2 + B*b**3*d**3*x**8/8)/e**7, Eq(m, -7)), ((-A*a**3*c**3/(4*x**4) - 3
*A*a**3*c**2*d/(2*x**2) + 3*A*a**3*c*d**2*log(x) + A*a**3*d**3*x**2/2 - 3*A
*a**2*b*c**3/(2*x**2) + 9*A*a**2*b*c**2*d*log(x) + 9*A*a**2*b*c*d**2*x**2/2
 + 3*A*a**2*b*d**3*x**4/4 + 3*A*a*b**2*c**3*log(x) + 9*A*a*b**2*c**2*d*x**2
/2 + 9*A*a*b**2*c*d**2*x**4/4 + A*a*b**2*d**3*x**6/2 + A*b**3*c**3*x**2/2 +
 3*A*b**3*c**2*d*x**4/4 + A*b**3*c*d**2*x**6/2 + A*b**3*d**3*x**8/8 - B*a**
3*c**3/(2*x**2) + 3*B*a**3*c**2*d*log(x) + 3*B*a**3*c*d**2*x**2/2 + B*a**3*
d**3*x**4/4 + 3*B*a**2*b*c**3*log(x) + 9*B*a**2*b*c**2*d*x**2/2 + 9*B*a**2*
b*c*d**2*x**4/4 + B*a**2*b*d**3*x**6/2 + 3*B*a*b**2*c**3*x**2/2 + 9*B*a*b**
2*c**2*d*x**4/4 + 3*B*a*b**2*c*d**2*x**6/2 + 3*B*a*b**2*d**3*x**8/8 + B*b**
3*c**3*x**4/4 + B*b**3*c**2*d*x**6/2 + 3*B*b**3*c*d**2*x**8/8 + B*b**3*d**3
*x**10/10)/e**5, Eq(m, -5)), ((-A*a**3*c**3/(2*x**2) + 3*A*a**3*c**2*d*log(
x) + 3*A*a**3*c*d**2*x**2/2 + A*a**3*d**3*x**4/4 + 3*A*a**2*b*c**3*log(x) +
 9*A*a**2*b*c**2*d*x**2/2 + 9*A*a**2*b*c*d**2*x**4/4 + A*a**2*b*d**3*x**6/2
 + 3*A*a*b**2*c**3*x**2/2 + 9*A*a*b**2*c**2*d*x**4/4 + 3*A*a*b**2*c*d**2*x*
*6/2 + 3*A*a*b**2*d**3*x**8/8 + A*b**3*c**3*x**4/4 + A*b**3*c**2*d*x**6/2 +
 3*A*b**3*c*d**2*x**8/8 + A*b**3*d**3*x**10/10 + B*a**3*c**3*log(x) + 3*B*a
**3*c**2*d*x**2/2 + 3*B*a**3*c*d**2*x**4/4 + B*a**3*d**3*x**6/6 + 3*B*a**2*
b*c**3*x**2/2 + 9*B*a**2*b*c**2*d*x**4/4 + 3*B*a**2*b*c*d**2*x**6/2 + 3*B*a
**2*b*d**3*x**8/8 + 3*B*a*b**2*c**3*x**4/4 + 3*B*a*b**2*c**2*d*x**6/2 + 9*B
*a*b**2*c*d**2*x**8/8 + 3*B*a*b**2*d**3*x**10/10 + B*b**3*c**3*x**6/6 + 3*B
*b**3*c**2*d*x**8/8 + 3*B*b**3*c*d**2*x**10/10 + B*b**3*d**3*x**12/12)/e**3
, Eq(m, -3)), ((A*a**3*c**3*log(x) + 3*A*a**3*c**2*d*x**2/2 + 3*A*a**3*c*d*
*2*x**4/4 + A*a**3*d**3*x**6/6 + 3*A*a**2*b*c**3*x**2/2 + 9*A*a**2*b*c**2*d
*x**4/4 + 3*A*a**2*b*c*d**2*x**6/2 + 3*A*a**2*b*d**3*x**8/8 + 3*A*a*b**2*c*
*3*x**4/4 + 3*A*a*b**2*c**2*d*x**6/2 + 9*A*a*b**2*c*d**2*x**8/8 + 3*A*a*b**
2*d**3*x**10/10 + A*b**3*c**3*x**6/6 + 3*A*b**3*c**2*d*x**8/8 + 3*A*b**3*c*
d**2*x**10/10 + A*b**3*d**3*x**12/12 + B*a**3*c**3*x**2/2 + 3*B*a**3*c**2*d
*x**4/4 + B*a**3*c*d**2*x**6/2 + B*a**3*d**3*x**8/8 + 3*B*a**2*b*c**3*x**4/
4 + 3*B*a**2*b*c**2*d*x**6/2 + 9*B*a**2*b*c*d**2*x**8/8 + 3*B*a**2*b*d**3*x
**10/10 + B*a*b**2*c**3*x**6/2 + 9*B*a*b**2*c**2*d*x**8/8 + 9*B*a*b**2*c*d*
*2*x**10/10 + B*a*b**2*d**3*x**12/4 + B*b**3*c**3*x**8/8 + 3*B*b**3*c**2*d*
x**10/10 + B*b**3*c*d**2*x**12/4 + B*b**3*d**3*x**14/14)/e, Eq(m, -1)), (A*
a**3*c**3*m**7*x*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054
*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 63*A*a**3*c**3
*m**6*x*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1
038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1645*A*a**3*c**3*m**5*x
*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*
m**3 + 2924172*m**2 + 4098240*m + 2027025) + 22995*A*a**3*c**3*m**4*x*(e*x)
**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 +
 2924172*m**2 + 4098240*m + 2027025) + 185059*A*a**3*c**3*m**3*x*(e*x)**m/(
m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924
172*m**2 + 4098240*m + 2027025) + 852957*A*a**3*c**3*m**2*x*(e*x)**m/(m**8
+ 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m
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**2 + 4098240*m + 2027025) + 2071215*A*a**3*c**3*m*x*(e*x)**m/(m**8 + 64*m*
*7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4
098240*m + 2027025) + 2027025*A*a**3*c**3*x*(e*x)**m/(m**8 + 64*m**7 + 1708
*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m
+ 2027025) + 3*A*a**3*c**2*d*m**7*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6
 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 202
7025) + 183*A*a**3*c**2*d*m**6*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 +
24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 202702
5) + 4575*A*a**3*c**2*d*m**5*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24
640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025)
 + 60195*A*a**3*c**2*d*m**4*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 246
40*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025)
+ 443577*A*a**3*c**2*d*m**3*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 246
40*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025)
+ 1783317*A*a**3*c**2*d*m**2*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24
640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025)
 + 3422565*A*a**3*c**2*d*m*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 2464
0*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) +
 2027025*A*a**3*c**2*d*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m*
*5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3*A
*a**3*c*d**2*m**7*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 +
208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 177*A*a*
*3*c*d**2*m**6*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208
054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 4239*A*a**3
*c*d**2*m**5*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 20805
4*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 52725*A*a**3*
c*d**2*m**4*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054
*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 360537*A*a**3*
c*d**2*m**3*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054
*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1311363*A*a**3
*c*d**2*m**2*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 20805
4*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2215701*A*a**
3*c*d**2*m*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*
m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1216215*A*a**3*
c*d**2*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4
 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + A*a**3*d**3*m**7*x*
*7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 103801
6*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 57*A*a**3*d**3*m**6*x**7*(e*
x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
 + 2924172*m**2 + 4098240*m + 2027025) + 1309*A*a**3*d**3*m**5*x**7*(e*x)**
m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2
924172*m**2 + 4098240*m + 2027025) + 15477*A*a**3*d**3*m**4*x**7*(e*x)**m/(
m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924
172*m**2 + 4098240*m + 2027025) + 99715*A*a**3*d**3*m**3*x**7*(e*x)**m/(m**
8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172
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*m**2 + 4098240*m + 2027025) + 340011*A*a**3*d**3*m**2*x**7*(e*x)**m/(m**8
+ 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m
**2 + 4098240*m + 2027025) + 544095*A*a**3*d**3*m*x**7*(e*x)**m/(m**8 + 64*
m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 +
 4098240*m + 2027025) + 289575*A*a**3*d**3*x**7*(e*x)**m/(m**8 + 64*m**7 +
1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 409824
0*m + 2027025) + 3*A*a**2*b*c**3*m**7*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*
m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m +
 2027025) + 183*A*a**2*b*c**3*m**6*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**
6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 20
27025) + 4575*A*a**2*b*c**3*m**5*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6
+ 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027
025) + 60195*A*a**2*b*c**3*m**4*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 +
 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 20270
25) + 443577*A*a**2*b*c**3*m**3*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 +
 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 20270
25) + 1783317*A*a**2*b*c**3*m**2*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6
+ 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027
025) + 3422565*A*a**2*b*c**3*m*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 +
24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 202702
5) + 2027025*A*a**2*b*c**3*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 2464
0*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) +
 9*A*a**2*b*c**2*d*m**7*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m
**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 53
1*A*a**2*b*c**2*d*m**6*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m*
*5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 127
17*A*a**2*b*c**2*d*m**5*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m
**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 15
8175*A*a**2*b*c**2*d*m**4*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640
*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) +
1081611*A*a**2*b*c**2*d*m**3*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24
640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025)
 + 3934089*A*a**2*b*c**2*d*m**2*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 +
 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 20270
25) + 6647103*A*a**2*b*c**2*d*m*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 +
 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 20270
25) + 3648645*A*a**2*b*c**2*d*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 2
4640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025
) + 9*A*a**2*b*c*d**2*m**7*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 2464
0*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) +
 513*A*a**2*b*c*d**2*m**6*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640
*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) +
11781*A*a**2*b*c*d**2*m**5*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 2464
0*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) +
 139293*A*a**2*b*c*d**2*m**4*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24
```

640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025)
 + 897435*A*a**2*b*c*d**2*m**3*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 +
24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 202702
5) + 3060099*A*a**2*b*c*d**2*m**2*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6
 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 202
7025) + 4896855*A*a**2*b*c*d**2*m*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6
 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 202
7025) + 2606175*A*a**2*b*c*d**2*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 +
 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 20270
25) + 3*A*a**2*b*d**3*m**7*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 2464
0*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) +
 165*A*a**2*b*d**3*m**6*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m
5 + 208054*m4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 36
39*A*a**2*b*d**3*m**5*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**
5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 4116
9*A*a**2*b*d**3*m**4*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5
 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 25364
1*A*a**2*b*d**3*m**3*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5
 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 83127
9*A*a**2*b*d**3*m**2*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5
 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 12910
05*A*a**2*b*d**3*m*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 +
 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 675675*
A*a**2*b*d**3*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 2080
54*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3*A*a*b**2*c
3*m7*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m*
*4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 177*A*a*b**2*c**3
*m**6*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4
+ 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 4239*A*a*b**2*c**3*m
5*x5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 +
1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 52725*A*a*b**2*c**3*m*
*4*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1
038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 360537*A*a*b**2*c**3*m*
*3*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1
038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1311363*A*a*b**2*c**3*m
2*x5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 +
1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2215701*A*a*b**2*c**3*
m*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10
38016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1216215*A*a*b**2*c**3*x*
5(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 103801
6*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 9*A*a*b**2*c**2*d*m**7*x**7*
(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m
3 + 2924172*m2 + 4098240*m + 2027025) + 513*A*a*b**2*c**2*d*m**6*x**7*(
e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m*
*3 + 2924172*m**2 + 4098240*m + 2027025) + 11781*A*a*b**2*c**2*d*m**5*x**7*

(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m
3 + 2924172*m2 + 4098240*m + 2027025) + 139293*A*a*b**2*c**2*d*m**4*x**
7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016
*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 897435*A*a*b**2*c**2*d*m**3*x
7*(e*x)m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10380
16*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3060099*A*a*b**2*c**2*d*m**
2*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10
38016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 4896855*A*a*b**2*c**2*d*
m*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10
38016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2606175*A*a*b**2*c**2*d*
x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038
016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 9*A*a*b**2*c*d**2*m**7*x**
9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016
*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 495*A*a*b**2*c*d**2*m**6*x**9
*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*
m**3 + 2924172*m**2 + 4098240*m + 2027025) + 10917*A*a*b**2*c*d**2*m**5*x**
9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016
*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 123507*A*a*b**2*c*d**2*m**4*x
9*(e*x)m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10380
16*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 760923*A*a*b**2*c*d**2*m**3
*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 103
8016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2493837*A*a*b**2*c*d**2*m
2*x9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 +
1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3873015*A*a*b**2*c*d**
2*m*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 +
1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2027025*A*a*b**2*c*d**
2*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10
38016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3*A*a*b**2*d**3*m**7*x**
11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 103801
6*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 159*A*a*b**2*d**3*m**6*x**11
*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*
m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3375*A*a*b**2*d**3*m**5*x**11*
(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m
3 + 2924172*m2 + 4098240*m + 2027025) + 36795*A*a*b**2*d**3*m**4*x**11*
(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m
3 + 2924172*m2 + 4098240*m + 2027025) + 219417*A*a*b**2*d**3*m**3*x**11
*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*
m**3 + 2924172*m**2 + 4098240*m + 2027025) + 700461*A*a*b**2*d**3*m**2*x**1
1*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016
*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1067445*A*a*b**2*d**3*m*x**11
*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*
m**3 + 2924172*m**2 + 4098240*m + 2027025) + 552825*A*a*b**2*d**3*x**11*(e*
x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
 + 2924172*m**2 + 4098240*m + 2027025) + A*b**3*c**3*m**7*x**7*(e*x)**m/(m*
*8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 292417

2*m**2 + 4098240*m + 2027025) + 57*A*b**3*c**3*m**6*x**7*(e*x)**m/(m**8 + 6
4*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2
 + 4098240*m + 2027025) + 1309*A*b**3*c**3*m**5*x**7*(e*x)**m/(m**8 + 64*m*
*7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4
098240*m + 2027025) + 15477*A*b**3*c**3*m**4*x**7*(e*x)**m/(m**8 + 64*m**7
 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098
240*m + 2027025) + 99715*A*b**3*c**3*m**3*x**7*(e*x)**m/(m**8 + 64*m**7 + 1
708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240
*m + 2027025) + 340011*A*b**3*c**3*m**2*x**7*(e*x)**m/(m**8 + 64*m**7 + 170
8*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m
 + 2027025) + 544095*A*b**3*c**3*m*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**
6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 20
27025) + 289575*A*b**3*c**3*x**7*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 246
40*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025)
 + 3*A*b**3*c**2*d*m**7*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m*
*5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 165
*A*b**3*c**2*d*m**6*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5
 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3639*A
*b**3*c**2*d*m**5*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 +
208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 41169*A*
b**3*c**2*d*m**4*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 2
08054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 253641*A*
b**3*c**2*d*m**3*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 2
08054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 831279*A*
b**3*c**2*d*m**2*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 2
08054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1291005*A
*b**3*c**2*d*m*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208
054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 675675*A*b*
*3*c**2*d*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m
4 + 1038016*m3 + 2924172*m**2 + 4098240*m + 2027025) + 3*A*b**3*c*d**2*
m**7*x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4
 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 159*A*b**3*c*d**2*m*
*6*x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 +
1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3375*A*b**3*c*d**2*m**
5*x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1
038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 36795*A*b**3*c*d**2*m**
4*x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1
038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 219417*A*b**3*c*d**2*m*
*3*x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 +
1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 700461*A*b**3*c*d**2*m
2*x11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 +
 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1067445*A*b**3*c*d**2
*m*x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 +
1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 552825*A*b**3*c*d**2*x
11*(e*x)m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038

016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + A*b**3*d**3*m**7*x**13*(e*
x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
 + 2924172*m**2 + 4098240*m + 2027025) + 51*A*b**3*d**3*m**6*x**13*(e*x)**m
/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 29
24172*m**2 + 4098240*m + 2027025) + 1045*A*b**3*d**3*m**5*x**13*(e*x)**m/(m
8 + 64*m7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 29241
72*m**2 + 4098240*m + 2027025) + 11055*A*b**3*d**3*m**4*x**13*(e*x)**m/(m**
8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172
*m**2 + 4098240*m + 2027025) + 64339*A*b**3*d**3*m**3*x**13*(e*x)**m/(m**8
+ 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m
2 + 4098240*m + 2027025) + 201609*A*b3*d**3*m**2*x**13*(e*x)**m/(m**8 +
 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m*
*2 + 4098240*m + 2027025) + 303255*A*b**3*d**3*m*x**13*(e*x)**m/(m**8 + 64*
m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 +
 4098240*m + 2027025) + 155925*A*b**3*d**3*x**13*(e*x)**m/(m**8 + 64*m**7 +
 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 40982
40*m + 2027025) + B*a**3*c**3*m**7*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**
6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 20
27025) + 61*B*a**3*c**3*m**6*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24
640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025)
 + 1525*B*a**3*c**3*m**5*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*
m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2
0065*B*a**3*c**3*m**4*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**
5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1478
59*B*a**3*c**3*m**3*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5
+ 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 594439
*B*a**3*c**3*m**2*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 +
208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1140855*
B*a**3*c**3*m*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 2080
54*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 675675*B*a**
3*c**3*x**3*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4
 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3*B*a**3*c**2*d*m**
7*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10
38016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 177*B*a**3*c**2*d*m**6*x
5*(e*x)m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10380
16*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 4239*B*a**3*c**2*d*m**5*x**
5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016
*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 52725*B*a**3*c**2*d*m**4*x**5
*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*
m**3 + 2924172*m**2 + 4098240*m + 2027025) + 360537*B*a**3*c**2*d*m**3*x**5
*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*
m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1311363*B*a**3*c**2*d*m**2*x**
5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016
*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2215701*B*a**3*c**2*d*m*x**5*
(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m

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**3 + 2924172*m**2 + 4098240*m + 2027025) + 1216215*B*a**3*c**2*d*x**5*(e*x
)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
+ 2924172*m**2 + 4098240*m + 2027025) + 3*B*a**3*c*d**2*m**7*x**7*(e*x)**m/
(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 292
4172*m**2 + 4098240*m + 2027025) + 171*B*a**3*c*d**2*m**6*x**7*(e*x)**m/(m*
*8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 292417
2*m**2 + 4098240*m + 2027025) + 3927*B*a**3*c*d**2*m**5*x**7*(e*x)**m/(m**8
 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*
m**2 + 4098240*m + 2027025) + 46431*B*a**3*c*d**2*m**4*x**7*(e*x)**m/(m**8
+ 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m
**2 + 4098240*m + 2027025) + 299145*B*a**3*c*d**2*m**3*x**7*(e*x)**m/(m**8
+ 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m
**2 + 4098240*m + 2027025) + 1020033*B*a**3*c*d**2*m**2*x**7*(e*x)**m/(m**8
 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*
m**2 + 4098240*m + 2027025) + 1632285*B*a**3*c*d**2*m*x**7*(e*x)**m/(m**8 +
 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m*
*2 + 4098240*m + 2027025) + 868725*B*a**3*c*d**2*x**7*(e*x)**m/(m**8 + 64*m
**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 +
4098240*m + 2027025) + B*a**3*d**3*m**7*x**9*(e*x)**m/(m**8 + 64*m**7 + 170
8*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m
 + 2027025) + 55*B*a**3*d**3*m**6*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6
 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 202
7025) + 1213*B*a**3*d**3*m**5*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 2
4640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025
) + 13723*B*a**3*d**3*m**4*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 2464
0*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) +
 84547*B*a**3*d**3*m**3*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m
**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 27
7093*B*a**3*d**3*m**2*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**
5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 4303
35*B*a**3*d**3*m*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 2
08054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 225225*B*
a**3*d**3*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m
**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3*B*a**2*b*c**3*
m**7*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 +
 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 177*B*a**2*b*c**3*m**
6*x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10
38016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 4239*B*a**2*b*c**3*m**5*
x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038
016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 52725*B*a**2*b*c**3*m**4*x
**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10380
16*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 360537*B*a**2*b*c**3*m**3*x
**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10380
16*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1311363*B*a**2*b*c**3*m**2*
x**5*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038
```

016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2215701*B*a**2*b*c**3*m*x*
5(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 103801
6*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1216215*B*a**2*b*c**3*x**5*(
e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m*
*3 + 2924172*m**2 + 4098240*m + 2027025) + 9*B*a**2*b*c**2*d*m**7*x**7*(e*x
)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
+ 2924172*m**2 + 4098240*m + 2027025) + 513*B*a**2*b*c**2*d*m**6*x**7*(e*x)
m/(m8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 +
 2924172*m**2 + 4098240*m + 2027025) + 11781*B*a**2*b*c**2*d*m**5*x**7*(e*x
)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
+ 2924172*m**2 + 4098240*m + 2027025) + 139293*B*a**2*b*c**2*d*m**4*x**7*(e
*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**
3 + 2924172*m**2 + 4098240*m + 2027025) + 897435*B*a**2*b*c**2*d*m**3*x**7*
(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m
3 + 2924172*m2 + 4098240*m + 2027025) + 3060099*B*a**2*b*c**2*d*m**2*x*
7(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 103801
6*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 4896855*B*a**2*b*c**2*d*m*x*
7(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 103801
6*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2606175*B*a**2*b*c**2*d*x**7
*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*
m**3 + 2924172*m**2 + 4098240*m + 2027025) + 9*B*a**2*b*c*d**2*m**7*x**9*(e
*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**
3 + 2924172*m**2 + 4098240*m + 2027025) + 495*B*a**2*b*c*d**2*m**6*x**9*(e*
x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
 + 2924172*m**2 + 4098240*m + 2027025) + 10917*B*a**2*b*c*d**2*m**5*x**9*(e
*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**
3 + 2924172*m**2 + 4098240*m + 2027025) + 123507*B*a**2*b*c*d**2*m**4*x**9*
(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m
3 + 2924172*m2 + 4098240*m + 2027025) + 760923*B*a**2*b*c*d**2*m**3*x**
9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016
*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2493837*B*a**2*b*c*d**2*m**2*
x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038
016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3873015*B*a**2*b*c*d**2*m*
x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038
016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2027025*B*a**2*b*c*d**2*x*
9(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 103801
6*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3*B*a**2*b*d**3*m**7*x**11*(
e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m*
*3 + 2924172*m**2 + 4098240*m + 2027025) + 159*B*a**2*b*d**3*m**6*x**11*(e*
x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
 + 2924172*m**2 + 4098240*m + 2027025) + 3375*B*a**2*b*d**3*m**5*x**11*(e*x
)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
+ 2924172*m**2 + 4098240*m + 2027025) + 36795*B*a**2*b*d**3*m**4*x**11*(e*x
)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
+ 2924172*m**2 + 4098240*m + 2027025) + 219417*B*a**2*b*d**3*m**3*x**11*(e*

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x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
 + 2924172*m**2 + 4098240*m + 2027025) + 700461*B*a**2*b*d**3*m**2*x**11*(e
*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**
3 + 2924172*m**2 + 4098240*m + 2027025) + 1067445*B*a**2*b*d**3*m*x**11*(e*
x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
 + 2924172*m**2 + 4098240*m + 2027025) + 552825*B*a**2*b*d**3*x**11*(e*x)**
m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2
924172*m**2 + 4098240*m + 2027025) + 3*B*a*b**2*c**3*m**7*x**7*(e*x)**m/(m*
*8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 292417
2*m**2 + 4098240*m + 2027025) + 171*B*a*b**2*c**3*m**6*x**7*(e*x)**m/(m**8
+ 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m
**2 + 4098240*m + 2027025) + 3927*B*a*b**2*c**3*m**5*x**7*(e*x)**m/(m**8 +
64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**
2 + 4098240*m + 2027025) + 46431*B*a*b**2*c**3*m**4*x**7*(e*x)**m/(m**8 + 6
4*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2
 + 4098240*m + 2027025) + 299145*B*a*b**2*c**3*m**3*x**7*(e*x)**m/(m**8 + 6
4*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2
 + 4098240*m + 2027025) + 1020033*B*a*b**2*c**3*m**2*x**7*(e*x)**m/(m**8 +
64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**
2 + 4098240*m + 2027025) + 1632285*B*a*b**2*c**3*m*x**7*(e*x)**m/(m**8 + 64
*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2
+ 4098240*m + 2027025) + 868725*B*a*b**2*c**3*x**7*(e*x)**m/(m**8 + 64*m**7
 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 409
8240*m + 2027025) + 9*B*a*b**2*c**2*d*m**7*x**9*(e*x)**m/(m**8 + 64*m**7 +
1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 409824
0*m + 2027025) + 495*B*a*b**2*c**2*d*m**6*x**9*(e*x)**m/(m**8 + 64*m**7 + 1
708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240
*m + 2027025) + 10917*B*a*b**2*c**2*d*m**5*x**9*(e*x)**m/(m**8 + 64*m**7 +
1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 409824
0*m + 2027025) + 123507*B*a*b**2*c**2*d*m**4*x**9*(e*x)**m/(m**8 + 64*m**7
+ 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098
240*m + 2027025) + 760923*B*a*b**2*c**2*d*m**3*x**9*(e*x)**m/(m**8 + 64*m**
7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 40
98240*m + 2027025) + 2493837*B*a*b**2*c**2*d*m**2*x**9*(e*x)**m/(m**8 + 64*
m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 +
 4098240*m + 2027025) + 3873015*B*a*b**2*c**2*d*m*x**9*(e*x)**m/(m**8 + 64*
m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 +
 4098240*m + 2027025) + 2027025*B*a*b**2*c**2*d*x**9*(e*x)**m/(m**8 + 64*m*
*7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4
098240*m + 2027025) + 9*B*a*b**2*c*d**2*m**7*x**11*(e*x)**m/(m**8 + 64*m**7
 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 409
8240*m + 2027025) + 477*B*a*b**2*c*d**2*m**6*x**11*(e*x)**m/(m**8 + 64*m**7
 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 409
8240*m + 2027025) + 10125*B*a*b**2*c*d**2*m**5*x**11*(e*x)**m/(m**8 + 64*m*
*7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4
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098240*m + 2027025) + 110385*B*a*b**2*c*d**2*m**4*x**11*(e*x)**m/(m**8 + 64
*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2
+ 4098240*m + 2027025) + 658251*B*a*b**2*c*d**2*m**3*x**11*(e*x)**m/(m**8 +
 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m*
*2 + 4098240*m + 2027025) + 2101383*B*a*b**2*c*d**2*m**2*x**11*(e*x)**m/(m*
*8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 292417
2*m**2 + 4098240*m + 2027025) + 3202335*B*a*b**2*c*d**2*m*x**11*(e*x)**m/(m
**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 29241
72*m**2 + 4098240*m + 2027025) + 1658475*B*a*b**2*c*d**2*x**11*(e*x)**m/(m*
*8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 292417
2*m**2 + 4098240*m + 2027025) + 3*B*a*b**2*d**3*m**7*x**13*(e*x)**m/(m**8 +
 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m*
*2 + 4098240*m + 2027025) + 153*B*a*b**2*d**3*m**6*x**13*(e*x)**m/(m**8 + 6
4*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2
 + 4098240*m + 2027025) + 3135*B*a*b**2*d**3*m**5*x**13*(e*x)**m/(m**8 + 64
*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2
+ 4098240*m + 2027025) + 33165*B*a*b**2*d**3*m**4*x**13*(e*x)**m/(m**8 + 64
*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2
+ 4098240*m + 2027025) + 193017*B*a*b**2*d**3*m**3*x**13*(e*x)**m/(m**8 + 6
4*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2
 + 4098240*m + 2027025) + 604827*B*a*b**2*d**3*m**2*x**13*(e*x)**m/(m**8 +
64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**
2 + 4098240*m + 2027025) + 909765*B*a*b**2*d**3*m*x**13*(e*x)**m/(m**8 + 64
*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2
+ 4098240*m + 2027025) + 467775*B*a*b**2*d**3*x**13*(e*x)**m/(m**8 + 64*m**
7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 40
98240*m + 2027025) + B*b**3*c**3*m**7*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*
m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m +
 2027025) + 55*B*b**3*c**3*m**6*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 +
 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 20270
25) + 1213*B*b**3*c**3*m**5*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 246
40*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025)
+ 13723*B*b**3*c**3*m**4*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*
m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 8
4547*B*b**3*c**3*m**3*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**
5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 2770
93*B*b**3*c**3*m**2*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5
+ 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 430335
*B*b**3*c**3*m*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208
054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 225225*B*b*
*3*c**3*x**9*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**
4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3*B*b**3*c**2*d*m*
*7*x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 +
1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 159*B*b**3*c**2*d*m**6
*x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10
```

```
38016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3375*B*b**3*c**2*d*m**5*
x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 103
8016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 36795*B*b**3*c**2*d*m**4*
x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 103
8016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 219417*B*b**3*c**2*d*m**3
*x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10
38016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 700461*B*b**3*c**2*d*m**
2*x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1
038016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 1067445*B*b**3*c**2*d*m
*x**11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 10
38016*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 552825*B*b**3*c**2*d*x**
11*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 103801
6*m**3 + 2924172*m**2 + 4098240*m + 2027025) + 3*B*b**3*c*d**2*m**7*x**13*(
e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m*
*3 + 2924172*m**2 + 4098240*m + 2027025) + 153*B*b**3*c*d**2*m**6*x**13*(e*
x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
 + 2924172*m**2 + 4098240*m + 2027025) + 3135*B*b**3*c*d**2*m**5*x**13*(e*x
)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
+ 2924172*m**2 + 4098240*m + 2027025) + 33165*B*b**3*c*d**2*m**4*x**13*(e*x
)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
+ 2924172*m**2 + 4098240*m + 2027025) + 193017*B*b**3*c*d**2*m**3*x**13*(e*
x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
 + 2924172*m**2 + 4098240*m + 2027025) + 604827*B*b**3*c*d**2*m**2*x**13*(e
*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**
3 + 2924172*m**2 + 4098240*m + 2027025) + 909765*B*b**3*c*d**2*m*x**13*(e*x
)**m/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3
+ 2924172*m**2 + 4098240*m + 2027025) + 467775*B*b**3*c*d**2*x**13*(e*x)**m
/(m**8 + 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 29
24172*m**2 + 4098240*m + 2027025) + B*b**3*d**3*m**7*x**15*(e*x)**m/(m**8 +
 64*m**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m*
*2 + 4098240*m + 2027025) + 49*B*b**3*d**3*m**6*x**15*(e*x)**m/(m**8 + 64*m
**7 + 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 +
4098240*m + 2027025) + 973*B*b**3*d**3*m**5*x**15*(e*x)**m/(m**8 + 64*m**7
+ 1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098
240*m + 2027025) + 10045*B*b**3*d**3*m**4*x**15*(e*x)**m/(m**8 + 64*m**7 +
1708*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 409824
0*m + 2027025) + 57379*B*b**3*d**3*m**3*x**15*(e*x)**m/(m**8 + 64*m**7 + 17
08*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*
m + 2027025) + 177331*B*b**3*d**3*m**2*x**15*(e*x)**m/(m**8 + 64*m**7 + 170
8*m**6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m
 + 2027025) + 264207*B*b**3*d**3*m*x**15*(e*x)**m/(m**8 + 64*m**7 + 1708*m*
*6 + 24640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2
027025) + 135135*B*b**3*d**3*x**15*(e*x)**m/(m**8 + 64*m**7 + 1708*m**6 + 2
4640*m**5 + 208054*m**4 + 1038016*m**3 + 2924172*m**2 + 4098240*m + 2027025
), True))
```

Maxima [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 762 vs. 2(379) = 758.

Time = 0.29 (sec) , antiderivative size = 762, normalized size of antiderivative = 2.01

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \,dx = \frac{Bb^3d^3e^m x^{15}x^m}{m+15} + \frac{3\,Bb^3cd^2e^m x^{13}x^m}{m+13} + \frac{3\,Bab^2d^3e^m x^{13}x^m}{m+13} + \frac{Ab^3d^3e^m x^{13}x^m}{m+13} + \frac{3\,Bb^3c^2de^m x^{11}x^m}{m+11} + \frac{9\,Bab^2cd^2e^m x^{11}x^m}{m+11} + \frac{3\,Ab^3cd^2e^m x^{11}x^m}{m+11} + \frac{3\,Ba^2bd^3e^m x^{11}x^m}{m+11} + \frac{3\,Aab^2d^3e^m x^{11}x^m}{m+11} + \frac{Bb^3c^3e^m x^9x^m}{m+9} + \frac{9\,Bab^2c^2de^m x^9x^m}{m+9} + \frac{3\,Ab^3c^2de^m x^9x^m}{m+9} + \frac{9\,Ba^2bcd^2e^m x^9x^m}{m+9} + \frac{9\,Aab^2cd^2e^m x^9x^m}{m+9} + \frac{Ba^3d^3e^m x^9x^m}{m+9} + \frac{3\,Aa^2bd^3e^m x^9x^m}{m+9} + \frac{3\,Bab^2c^3e^m x^7x^m}{m+7} + \frac{Ab^3c^3e^m x^7x^m}{m+7} + \frac{9\,Ba^2bc^2de^m x^7x^m}{m+7} + \frac{9\,Aab^2c^2de^m x^7x^m}{m+7} + \frac{3\,Ba^3cd^2e^m x^7x^m}{m+7} + \frac{9\,Aa^2bcd^2e^m x^7x^m}{m+7} + \frac{Aa^3d^3e^m x^7x^m}{m+7} + \frac{3\,Ba^2bc^3e^m x^5x^m}{m+5} + \frac{3\,Aab^2c^3e^m x^5x^m}{m+5} + \frac{3\,Ba^3c^2de^m x^5x^m}{m+5} + \frac{9\,Aa^2bc^2de^m x^5x^m}{m+5} + \frac{3\,Aa^3cd^2e^m x^5x^m}{m+5} + \frac{Ba^3c^3e^m x^3x^m}{m+3} + \frac{3\,Aa^2bc^3e^m x^3x^m}{m+3} + \frac{3\,Aa^3c^2de^m x^3x^m}{m+3} + \frac{(ex)^{m+1}Aa^3c^3}{e(m+1)}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="maxima")
```

```
[Out] B*b^3*d^3*e^m*x^15*x^m/(m + 15) + 3*B*b^3*c*d^2*e^m*x^13*x^m/(m + 13) + 3*B
*a*b^2*d^3*e^m*x^13*x^m/(m + 13) + A*b^3*d^3*e^m*x^13*x^m/(m + 13) + 3*B*b^
3*c^2*d*e^m*x^11*x^m/(m + 11) + 9*B*a*b^2*c*d^2*e^m*x^11*x^m/(m + 11) + 3*A
*b^3*c*d^2*e^m*x^11*x^m/(m + 11) + 3*B*a^2*b*d^3*e^m*x^11*x^m/(m + 11) + 3*
```

```
A*a*b^2*d^3*e^m*x^11*x^m/(m + 11) + B*b^3*c^3*e^m*x^9*x^m/(m + 9) + 9*B*a*b
^2*c^2*d*e^m*x^9*x^m/(m + 9) + 3*A*b^3*c^2*d*e^m*x^9*x^m/(m + 9) + 9*B*a^2*
b*c*d^2*e^m*x^9*x^m/(m + 9) + 9*A*a*b^2*c*d^2*e^m*x^9*x^m/(m + 9) + B*a^3*d
^3*e^m*x^9*x^m/(m + 9) + 3*A*a^2*b*d^3*e^m*x^9*x^m/(m + 9) + 3*B*a*b^2*c^3*
e^m*x^7*x^m/(m + 7) + A*b^3*c^3*e^m*x^7*x^m/(m + 7) + 9*B*a^2*b*c^2*d*e^m*x
^7*x^m/(m + 7) + 9*A*a*b^2*c^2*d*e^m*x^7*x^m/(m + 7) + 3*B*a^3*c*d^2*e^m*x^
7*x^m/(m + 7) + 9*A*a^2*b*c*d^2*e^m*x^7*x^m/(m + 7) + A*a^3*d^3*e^m*x^7*x^m
/(m + 7) + 3*B*a^2*b*c^3*e^m*x^5*x^m/(m + 5) + 3*A*a*b^2*c^3*e^m*x^5*x^m/(m
 + 5) + 3*B*a^3*c^2*d*e^m*x^5*x^m/(m + 5) + 9*A*a^2*b*c^2*d*e^m*x^5*x^m/(m
+ 5) + 3*A*a^3*c*d^2*e^m*x^5*x^m/(m + 5) + B*a^3*c^3*e^m*x^3*x^m/(m + 3) +
3*A*a^2*b*c^3*e^m*x^3*x^m/(m + 3) + 3*A*a^3*c^2*d*e^m*x^3*x^m/(m + 3) + (e*
x)^(m + 1)*A*a^3*c^3/(e*(m + 1))
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 5234 vs. 2(379) = 758.

Time = 0.41 (sec) , antiderivative size = 5234, normalized size of antiderivative = 13.81

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*b^3*d^3*m^7*x^15 + 49*(e*x)^m*B*b^3*d^3*m^6*x^15 + 3*(e*x)^m*B*b
^3*c*d^2*m^7*x^13 + 3*(e*x)^m*B*a*b^2*d^3*m^7*x^13 + (e*x)^m*A*b^3*d^3*m^7*
x^13 + 973*(e*x)^m*B*b^3*d^3*m^5*x^15 + 153*(e*x)^m*B*b^3*c*d^2*m^6*x^13 +
153*(e*x)^m*B*a*b^2*d^3*m^6*x^13 + 51*(e*x)^m*A*b^3*d^3*m^6*x^13 + 10045*(e
*x)^m*B*b^3*d^3*m^4*x^15 + 3*(e*x)^m*B*b^3*c^2*d*m^7*x^11 + 9*(e*x)^m*B*a*b
^2*c*d^2*m^7*x^11 + 3*(e*x)^m*A*b^3*c*d^2*m^7*x^11 + 3*(e*x)^m*B*a^2*b*d^3*
m^7*x^11 + 3*(e*x)^m*A*a*b^2*d^3*m^7*x^11 + 3135*(e*x)^m*B*b^3*c*d^2*m^5*x^
13 + 3135*(e*x)^m*B*a*b^2*d^3*m^5*x^13 + 1045*(e*x)^m*A*b^3*d^3*m^5*x^13 +
57379*(e*x)^m*B*b^3*d^3*m^3*x^15 + 159*(e*x)^m*B*b^3*c^2*d*m^6*x^11 + 477*(
e*x)^m*B*a*b^2*c*d^2*m^6*x^11 + 159*(e*x)^m*A*b^3*c*d^2*m^6*x^11 + 159*(e*x
)^m*B*a^2*b*d^3*m^6*x^11 + 159*(e*x)^m*A*a*b^2*d^3*m^6*x^11 + 33165*(e*x)^m
*B*b^3*c*d^2*m^4*x^13 + 33165*(e*x)^m*B*a*b^2*d^3*m^4*x^13 + 11055*(e*x)^m*
A*b^3*d^3*m^4*x^13 + 177331*(e*x)^m*B*b^3*d^3*m^2*x^15 + (e*x)^m*B*b^3*c^3*
m^7*x^9 + 9*(e*x)^m*B*a*b^2*c^2*d*m^7*x^9 + 3*(e*x)^m*A*b^3*c^2*d*m^7*x^9 +
 9*(e*x)^m*B*a^2*b*c*d^2*m^7*x^9 + 9*(e*x)^m*A*a*b^2*c*d^2*m^7*x^9 + (e*x)^
m*B*a^3*d^3*m^7*x^9 + 3*(e*x)^m*A*a^2*b*d^3*m^7*x^9 + 3375*(e*x)^m*B*b^3*c^
2*d*m^5*x^11 + 10125*(e*x)^m*B*a*b^2*c*d^2*m^5*x^11 + 3375*(e*x)^m*A*b^3*c*
d^2*m^5*x^11 + 3375*(e*x)^m*B*a^2*b*d^3*m^5*x^11 + 3375*(e*x)^m*A*a*b^2*d^3
*m^5*x^11 + 193017*(e*x)^m*B*b^3*c*d^2*m^3*x^13 + 193017*(e*x)^m*B*a*b^2*d^
3*m^3*x^13 + 64339*(e*x)^m*A*b^3*d^3*m^3*x^13 + 264207*(e*x)^m*B*b^3*d^3*m*
x^15 + 55*(e*x)^m*B*b^3*c^3*m^6*x^9 + 495*(e*x)^m*B*a*b^2*c^2*d*m^6*x^9 + 1
65*(e*x)^m*A*b^3*c^2*d*m^6*x^9 + 495*(e*x)^m*B*a^2*b*c*d^2*m^6*x^9 + 495*(e
```

*x)^m*A*a*b^2*c*d^2*m^6*x^9 + 55*(e*x)^m*B*a^3*d^3*m^6*x^9 + 165*(e*x)^m*A*
a^2*b*d^3*m^6*x^9 + 36795*(e*x)^m*B*b^3*c^2*d*m^4*x^11 + 110385*(e*x)^m*B*a
*b^2*c*d^2*m^4*x^11 + 36795*(e*x)^m*A*b^3*c*d^2*m^4*x^11 + 36795*(e*x)^m*B*
a^2*b*d^3*m^4*x^11 + 36795*(e*x)^m*A*a*b^2*d^3*m^4*x^11 + 604827*(e*x)^m*B*
b^3*c*d^2*m^2*x^13 + 604827*(e*x)^m*B*a*b^2*d^3*m^2*x^13 + 201609*(e*x)^m*A
*b^3*d^3*m^2*x^13 + 135135*(e*x)^m*B*b^3*d^3*x^15 + 3*(e*x)^m*B*a*b^2*c^3*m
^7*x^7 + (e*x)^m*A*b^3*c^3*m^7*x^7 + 9*(e*x)^m*B*a^2*b*c^2*d*m^7*x^7 + 9*(e
*x)^m*A*a*b^2*c^2*d*m^7*x^7 + 3*(e*x)^m*B*a^3*c*d^2*m^7*x^7 + 9*(e*x)^m*A*a
^2*b*c*d^2*m^7*x^7 + (e*x)^m*A*a^3*d^3*m^7*x^7 + 1213*(e*x)^m*B*b^3*c^3*m^5
x^9 + 10917(e*x)^m*B*a*b^2*c^2*d*m^5*x^9 + 3639*(e*x)^m*A*b^3*c^2*d*m^5*x
^9 + 10917*(e*x)^m*B*a^2*b*c*d^2*m^5*x^9 + 10917*(e*x)^m*A*a*b^2*c*d^2*m^5*
x^9 + 1213*(e*x)^m*B*a^3*d^3*m^5*x^9 + 3639*(e*x)^m*A*a^2*b*d^3*m^5*x^9 + 2
19417*(e*x)^m*B*b^3*c^2*d*m^3*x^11 + 658251*(e*x)^m*B*a*b^2*c*d^2*m^3*x^11
+ 219417*(e*x)^m*A*b^3*c*d^2*m^3*x^11 + 219417*(e*x)^m*B*a^2*b*d^3*m^3*x^11
+ 219417*(e*x)^m*A*a*b^2*d^3*m^3*x^11 + 909765*(e*x)^m*B*b^3*c*d^2*m*x^13
+ 909765*(e*x)^m*B*a*b^2*d^3*m*x^13 + 303255*(e*x)^m*A*b^3*d^3*m*x^13 + 171
*(e*x)^m*B*a*b^2*c^3*m^6*x^7 + 57*(e*x)^m*A*b^3*c^3*m^6*x^7 + 513*(e*x)^m*B
*a^2*b*c^2*d*m^6*x^7 + 513*(e*x)^m*A*a*b^2*c^2*d*m^6*x^7 + 171*(e*x)^m*B*a^
3*c*d^2*m^6*x^7 + 513*(e*x)^m*A*a^2*b*c*d^2*m^6*x^7 + 57*(e*x)^m*A*a^3*d^3*
m^6*x^7 + 13723*(e*x)^m*B*b^3*c^3*m^4*x^9 + 123507*(e*x)^m*B*a*b^2*c^2*d*m^
4*x^9 + 41169*(e*x)^m*A*b^3*c^2*d*m^4*x^9 + 123507*(e*x)^m*B*a^2*b*c*d^2*m^
4*x^9 + 123507*(e*x)^m*A*a*b^2*c*d^2*m^4*x^9 + 13723*(e*x)^m*B*a^3*d^3*m^4*
x^9 + 41169*(e*x)^m*A*a^2*b*d^3*m^4*x^9 + 700461*(e*x)^m*B*b^3*c^2*d*m^2*x^
11 + 2101383*(e*x)^m*B*a*b^2*c*d^2*m^2*x^11 + 700461*(e*x)^m*A*b^3*c*d^2*m^
2*x^11 + 700461*(e*x)^m*B*a^2*b*d^3*m^2*x^11 + 700461*(e*x)^m*A*a*b^2*d^3*m
^2*x^11 + 467775*(e*x)^m*B*b^3*c*d^2*x^13 + 467775*(e*x)^m*B*a*b^2*d^3*x^13
+ 155925*(e*x)^m*A*b^3*d^3*x^13 + 3*(e*x)^m*B*a^2*b*c^3*m^7*x^5 + 3*(e*x)^
m*A*a*b^2*c^3*m^7*x^5 + 3*(e*x)^m*B*a^3*c^2*d*m^7*x^5 + 9*(e*x)^m*A*a^2*b*c
^2*d*m^7*x^5 + 3*(e*x)^m*A*a^3*c*d^2*m^7*x^5 + 3927*(e*x)^m*B*a*b^2*c^3*m^5
x^7 + 1309(e*x)^m*A*b^3*c^3*m^5*x^7 + 11781*(e*x)^m*B*a^2*b*c^2*d*m^5*x^7
+ 11781*(e*x)^m*A*a*b^2*c^2*d*m^5*x^7 + 3927*(e*x)^m*B*a^3*c*d^2*m^5*x^7 +
11781*(e*x)^m*A*a^2*b*c*d^2*m^5*x^7 + 1309*(e*x)^m*A*a^3*d^3*m^5*x^7 + 845
47*(e*x)^m*B*b^3*c^3*m^3*x^9 + 760923*(e*x)^m*B*a*b^2*c^2*d*m^3*x^9 + 25364
1*(e*x)^m*A*b^3*c^2*d*m^3*x^9 + 760923*(e*x)^m*B*a^2*b*c*d^2*m^3*x^9 + 7609
23*(e*x)^m*A*a*b^2*c*d^2*m^3*x^9 + 84547*(e*x)^m*B*a^3*d^3*m^3*x^9 + 253641
*(e*x)^m*A*a^2*b*d^3*m^3*x^9 + 1067445*(e*x)^m*B*b^3*c^2*d*m*x^11 + 3202335
*(e*x)^m*B*a*b^2*c*d^2*m*x^11 + 1067445*(e*x)^m*A*b^3*c*d^2*m*x^11 + 106744
5*(e*x)^m*B*a^2*b*d^3*m*x^11 + 1067445*(e*x)^m*A*a*b^2*d^3*m*x^11 + 177*(e*
x)^m*B*a^2*b*c^3*m^6*x^5 + 177*(e*x)^m*A*a*b^2*c^3*m^6*x^5 + 177*(e*x)^m*B*
a^3*c^2*d*m^6*x^5 + 531*(e*x)^m*A*a^2*b*c^2*d*m^6*x^5 + 177*(e*x)^m*A*a^3*c
*d^2*m^6*x^5 + 46431*(e*x)^m*B*a*b^2*c^3*m^4*x^7 + 15477*(e*x)^m*A*b^3*c^3*
m^4*x^7 + 139293*(e*x)^m*B*a^2*b*c^2*d*m^4*x^7 + 139293*(e*x)^m*A*a*b^2*c^2
*d*m^4*x^7 + 46431*(e*x)^m*B*a^3*c*d^2*m^4*x^7 + 139293*(e*x)^m*A*a^2*b*c*d
^2*m^4*x^7 + 15477*(e*x)^m*A*a^3*d^3*m^4*x^7 + 277093*(e*x)^m*B*b^3*c^3*m^2
x^9 + 2493837(e*x)^m*B*a*b^2*c^2*d*m^2*x^9 + 831279*(e*x)^m*A*b^3*c^2*d*m

^2*x^9 + 2493837*(e*x)^m*B*a^2*b*c*d^2*m^2*x^9 + 2493837*(e*x)^m*A*a*b^2*c*d^2*m^2*x^9 + 277093*(e*x)^m*B*a^3*d^3*m^2*x^9 + 831279*(e*x)^m*A*a^2*b*d^3*m^2*x^9 + 552825*(e*x)^m*B*b^3*c^2*d*x^11 + 1658475*(e*x)^m*B*a*b^2*c*d^2*x^11 + 552825*(e*x)^m*A*b^3*c*d^2*x^11 + 552825*(e*x)^m*B*a^2*b*d^3*x^11 + 552825*(e*x)^m*A*a*b^2*d^3*x^11 + (e*x)^m*B*a^3*c^3*m^7*x^3 + 3*(e*x)^m*A*a^2*b*c^3*m^7*x^3 + 3*(e*x)^m*A*a^3*c^2*d*m^7*x^3 + 4239*(e*x)^m*B*a^2*b*c^3*m^5*x^5 + 4239*(e*x)^m*A*a*b^2*c^3*m^5*x^5 + 4239*(e*x)^m*B*a^3*c^2*d*m^5*x^5 + 12717*(e*x)^m*A*a^2*b*c^2*d*m^5*x^5 + 4239*(e*x)^m*A*a^3*c*d^2*m^5*x^5 + 299145*(e*x)^m*B*a*b^2*c^3*m^3*x^7 + 99715*(e*x)^m*A*b^3*c^3*m^3*x^7 + 897435*(e*x)^m*B*a^2*b*c^2*d*m^3*x^7 + 897435*(e*x)^m*A*a*b^2*c^2*d*m^3*x^7 + 299145*(e*x)^m*B*a^3*c*d^2*m^3*x^7 + 897435*(e*x)^m*A*a^2*b*c*d^2*m^3*x^7 + 99715*(e*x)^m*A*a^3*d^3*m^3*x^7 + 430335*(e*x)^m*B*b^3*c^3*m*x^9 + 3873015*(e*x)^m*B*a*b^2*c^2*d*m*x^9 + 1291005*(e*x)^m*A*b^3*c^2*d*m*x^9 + 3873015*(e*x)^m*B*a^2*b*c*d^2*m*x^9 + 3873015*(e*x)^m*A*a*b^2*c*d^2*m*x^9 + 430335*(e*x)^m*B*a^3*d^3*m*x^9 + 1291005*(e*x)^m*A*a^2*b*d^3*m*x^9 + 61*(e*x)^m*B*a^3*c^3*m^6*x^3 + 183*(e*x)^m*A*a^2*b*c^3*m^6*x^3 + 183*(e*x)^m*A*a^3*c^2*d*m^6*x^3 + 52725*(e*x)^m*B*a^2*b*c^3*m^4*x^5 + 52725*(e*x)^m*A*a*b^2*c^3*m^4*x^5 + 52725*(e*x)^m*B*a^3*c^2*d*m^4*x^5 + 158175*(e*x)^m*A*a^2*b*c^2*d*m^4*x^5 + 52725*(e*x)^m*A*a^3*c*d^2*m^4*x^5 + 1020033*(e*x)^m*B*a*b^2*c^3*m^2*x^7 + 340011*(e*x)^m*A*b^3*c^3*m^2*x^7 + 3060099*(e*x)^m*B*a^2*b*c^2*d*m^2*x^7 + 3060099*(e*x)^m*A*a*b^2*c^2*d*m^2*x^7 + 1020033*(e*x)^m*B*a^3*c*d^2*m^2*x^7 + 3060099*(e*x)^m*A*a^2*b*c*d^2*m^2*x^7 + 340011*(e*x)^m*A*a^3*d^3*m^2*x^7 + 225225*(e*x)^m*B*b^3*c^3*x^9 + 2027025*(e*x)^m*B*a*b^2*c^2*d*x^9 + 675675*(e*x)^m*A*b^3*c^2*d*x^9 + 2027025*(e*x)^m*B*a^2*b*c*d^2*x^9 + 2027025*(e*x)^m*A*a*b^2*c*d^2*x^9 + 225225*(e*x)^m*B*a^3*d^3*x^9 + 675675*(e*x)^m*A*a^2*b*d^3*x^9 + (e*x)^m*A*a^3*c^3*m^7*x + 1525*(e*x)^m*B*a^3*c^3*m^5*x^3 + 4575*(e*x)^m*A*a^2*b*c^3*m^5*x^3 + 4575*(e*x)^m*A*a^3*c^2*d*m^5*x^3 + 360537*(e*x)^m*B*a^2*b*c^3*m^3*x^5 + 360537*(e*x)^m*A*a*b^2*c^3*m^3*x^5 + 360537*(e*x)^m*B*a^3*c^2*d*m^3*x^5 + 1081611*(e*x)^m*A*a^2*b*c^2*d*m^3*x^5 + 360537*(e*x)^m*A*a^3*c*d^2*m^3*x^5 + 1632285*(e*x)^m*B*a*b^2*c^3*m*x^7 + 544095*(e*x)^m*A*b^3*c^3*m*x^7 + 4896855*(e*x)^m*B*a^2*b*c^2*d*m*x^7 + 4896855*(e*x)^m*A*a*b^2*c^2*d*m*x^7 + 1632285*(e*x)^m*B*a^3*c*d^2*m*x^7 + 4896855*(e*x)^m*A*a^2*b*c*d^2*m*x^7 + 544095*(e*x)^m*A*a^3*d^3*m*x^7 + 63*(e*x)^m*A*a^3*c^3*m^6*x + 20065*(e*x)^m*B*a^3*c^3*m^4*x^3 + 60195*(e*x)^m*A*a^2*b*c^3*m^4*x^3 + 60195*(e*x)^m*A*a^3*c^2*d*m^4*x^3 + 1311363*(e*x)^m*B*a^2*b*c^3*m^2*x^5 + 1311363*(e*x)^m*A*a*b^2*c^3*m^2*x^5 + 1311363*(e*x)^m*B*a^3*c^2*d*m^2*x^5 + 3934089*(e*x)^m*A*a^2*b*c^2*d*m^2*x^5 + 1311363*(e*x)^m*A*a^3*c*d^2*m^2*x^5 + 868725*(e*x)^m*B*a*b^2*c^3*x^7 + 289575*(e*x)^m*A*b^3*c^3*x^7 + 2606175*(e*x)^m*B*a^2*b*c^2*d*x^7 + 2606175*(e*x)^m*A*a*b^2*c^2*d*x^7 + 868725*(e*x)^m*B*a^3*c*d^2*x^7 + 2606175*(e*x)^m*A*a^2*b*c*d^2*x^7 + 289575*(e*x)^m*A*a^3*d^3*x^7 + 1645*(e*x)^m*A*a^3*c^3*m^5*x + 147859*(e*x)^m*B*a^3*c^3*m^3*x^3 + 443577*(e*x)^m*A*a^2*b*c^3*m^3*x^3 + 443577*(e*x)^m*A*a^3*c^2*d*m^3*x^3 + 2215701*(e*x)^m*B*a^2*b*c^3*m*x^5 + 2215701*(e*x)^m*A*a*b^2*c^3*m*x^5 + 2215701*(e*x)^m*B*a^3*c^2*d*m*x^5 + 6647103*(e*x)^m*A*a^2*b*c^2*d*m*x^5 + 2215701*(e*x)^m*A*a^3*c*d^2*m*x^5 + 22995*(e*x)^m*A*a^3*c^

```
3*m^4*x + 594439*(e*x)^m*B*a^3*c^3*m^2*x^3 + 1783317*(e*x)^m*A*a^2*b*c^3*m^
2*x^3 + 1783317*(e*x)^m*A*a^3*c^2*d*m^2*x^3 + 1216215*(e*x)^m*B*a^2*b*c^3*x
^5 + 1216215*(e*x)^m*A*a*b^2*c^3*x^5 + 1216215*(e*x)^m*B*a^3*c^2*d*x^5 + 36
48645*(e*x)^m*A*a^2*b*c^2*d*x^5 + 1216215*(e*x)^m*A*a^3*c*d^2*x^5 + 185059*
(e*x)^m*A*a^3*c^3*m^3*x + 1140855*(e*x)^m*B*a^3*c^3*m*x^3 + 3422565*(e*x)^m
*A*a^2*b*c^3*m*x^3 + 3422565*(e*x)^m*A*a^3*c^2*d*m*x^3 + 852957*(e*x)^m*A*a
^3*c^3*m^2*x + 675675*(e*x)^m*B*a^3*c^3*x^3 + 2027025*(e*x)^m*A*a^2*b*c^3*x
^3 + 2027025*(e*x)^m*A*a^3*c^2*d*x^3 + 2071215*(e*x)^m*A*a^3*c^3*m*x + 2027
025*(e*x)^m*A*a^3*c^3*x)/(m^8 + 64*m^7 + 1708*m^6 + 24640*m^5 + 208054*m^4
+ 1038016*m^3 + 2924172*m^2 + 4098240*m + 2027025)
```

Mupad [B] (verification not implemented)

Time = 6.61 (sec) , antiderivative size = 933, normalized size of antiderivative = 2.46

$$\int (ex)^m \left(a+bx^2\right)^3 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx$$
$$= \frac{x^7\,(e\,x)^m\,(3\,B\,a^3\,c\,d^2+A\,a^3\,d^3+9\,B\,a^2\,b\,c^2\,d+9\,A\,a^2\,b\,c\,d^2+3\,B\,a\,b^2\,c^3+9\,A\,a\,b^2\,c^2\,d+A\,b^3\,c^3)\,(m^7+5}{m^8+64\,m^7+1708\,m^6+24640\,m^5+208054\,m^4+1038016\,m^3+}$$
$$+\frac{x^9\,(e\,x)^m\,(B\,a^3\,d^3+9\,B\,a^2\,b\,c\,d^2+3\,A\,a^2\,b\,d^3+9\,B\,a\,b^2\,c^2\,d+9\,A\,a\,b^2\,c\,d^2+B\,b^3\,c^3+3\,A\,b^3\,c^2\,d)\,(m^7+}{m^8+64\,m^7+1708\,m^6+24640\,m^5+208054\,m^4+1038016\,m^3}$$
$$+\frac{B\,b^3\,d^3\,x^{15}\,(e\,x)^m\,(m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135135)}{m^8+64\,m^7+1708\,m^6+24640\,m^5+208054\,m^4+1038016\,m^3+2924172\,m^2+4098240\,m+2027025}$$
$$+\frac{3\,a\,c\,x^5\,(e\,x)^m\,(B\,a^2\,c\,d+A\,a^2\,d^2+B\,a\,b\,c^2+3\,A\,a\,b\,c\,d+A\,b^2\,c^2)\,(m^7+59\,m^6+1413\,m^5+17575\,m^4}{m^8+64\,m^7+1708\,m^6+24640\,m^5+208054\,m^4+1038016\,m^3+2924172\,m^2}$$
$$+\frac{3\,b\,d\,x^{11}\,(e\,x)^m\,(B\,a^2\,d^2+3\,B\,a\,b\,c\,d+A\,a\,b\,d^2+B\,b^2\,c^2+A\,b^2\,c\,d)\,(m^7+53\,m^6+1125\,m^5+12265\,m^4}{m^8+64\,m^7+1708\,m^6+24640\,m^5+208054\,m^4+1038016\,m^3+2924172\,m^2}$$
$$+\frac{a^2\,c^2\,x^3\,(e\,x)^m\,(3\,A\,a\,d+3\,A\,b\,c+B\,a\,c)\,(m^7+61\,m^6+1525\,m^5+20065\,m^4+147859\,m^3+594439\,m^2}{m^8+64\,m^7+1708\,m^6+24640\,m^5+208054\,m^4+1038016\,m^3+2924172\,m^2+4098240\,m}$$
$$+\frac{b^2\,d^2\,x^{13}\,(e\,x)^m\,(A\,b\,d+3\,B\,a\,d+3\,B\,b\,c)\,(m^7+51\,m^6+1045\,m^5+11055\,m^4+64339\,m^3+201609\,m^2}{m^8+64\,m^7+1708\,m^6+24640\,m^5+208054\,m^4+1038016\,m^3+2924172\,m^2+4098240\,m}$$
$$+\frac{A\,a^3\,c^3\,x\,(e\,x)^m\,(m^7+63\,m^6+1645\,m^5+22995\,m^4+185059\,m^3+852957\,m^2+2071215\,m+2027025}{m^8+64\,m^7+1708\,m^6+24640\,m^5+208054\,m^4+1038016\,m^3+2924172\,m^2+4098240\,m+2027025}$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^3*(c + d*x^2)^3,x)
```

```
[Out] (x^7*(e*x)^m*(A*a^3*d^3 + A*b^3*c^3 + 3*B*a*b^2*c^3 + 3*B*a^3*c*d^2 + 9*A*a
*b^2*c^2*d + 9*A*a^2*b*c*d^2 + 9*B*a^2*b*c^2*d)*(544095*m + 340011*m^2 + 99
715*m^3 + 15477*m^4 + 1309*m^5 + 57*m^6 + m^7 + 289575))/(4098240*m + 29241
72*m^2 + 1038016*m^3 + 208054*m^4 + 24640*m^5 + 1708*m^6 + 64*m^7 + m^8 + 2
027025) + (x^9*(e*x)^m*(B*a^3*d^3 + B*b^3*c^3 + 3*A*a^2*b*d^3 + 3*A*b^3*c^2
*d + 9*A*a*b^2*c*d^2 + 9*B*a*b^2*c^2*d + 9*B*a^2*b*c*d^2)*(430335*m + 27709
3*m^2 + 84547*m^3 + 13723*m^4 + 1213*m^5 + 55*m^6 + m^7 + 225225))/(4098240
*m + 2924172*m^2 + 1038016*m^3 + 208054*m^4 + 24640*m^5 + 1708*m^6 + 64*m^7
 + m^8 + 2027025) + (B*b^3*d^3*x^15*(e*x)^m*(264207*m + 177331*m^2 + 57379*
```

```
m^3 + 10045*m^4 + 973*m^5 + 49*m^6 + m^7 + 135135))/(4098240*m + 2924172*m^
2 + 1038016*m^3 + 208054*m^4 + 24640*m^5 + 1708*m^6 + 64*m^7 + m^8 + 202702
5) + (3*a*c*x^5*(e*x)^m*(A*a^2*d^2 + A*b^2*c^2 + B*a*b*c^2 + B*a^2*c*d + 3*
A*a*b*c*d)*(738567*m + 437121*m^2 + 120179*m^3 + 17575*m^4 + 1413*m^5 + 59*
m^6 + m^7 + 405405))/(4098240*m + 2924172*m^2 + 1038016*m^3 + 208054*m^4 +
24640*m^5 + 1708*m^6 + 64*m^7 + m^8 + 2027025) + (3*b*d*x^11*(e*x)^m*(B*a^2
*d^2 + B*b^2*c^2 + A*a*b*d^2 + A*b^2*c*d + 3*B*a*b*c*d)*(355815*m + 233487*
m^2 + 73139*m^3 + 12265*m^4 + 1125*m^5 + 53*m^6 + m^7 + 184275))/(4098240*m
 + 2924172*m^2 + 1038016*m^3 + 208054*m^4 + 24640*m^5 + 1708*m^6 + 64*m^7 +
 m^8 + 2027025) + (a^2*c^2*x^3*(e*x)^m*(3*A*a*d + 3*A*b*c + B*a*c)*(1140855
*m + 594439*m^2 + 147859*m^3 + 20065*m^4 + 1525*m^5 + 61*m^6 + m^7 + 675675
))/(4098240*m + 2924172*m^2 + 1038016*m^3 + 208054*m^4 + 24640*m^5 + 1708*m
^6 + 64*m^7 + m^8 + 2027025) + (b^2*d^2*x^13*(e*x)^m*(A*b*d + 3*B*a*d + 3*B
*b*c)*(303255*m + 201609*m^2 + 64339*m^3 + 11055*m^4 + 1045*m^5 + 51*m^6 +
m^7 + 155925))/(4098240*m + 2924172*m^2 + 1038016*m^3 + 208054*m^4 + 24640*
m^5 + 1708*m^6 + 64*m^7 + m^8 + 2027025) + (A*a^3*c^3*x*(e*x)^m*(2071215*m
+ 852957*m^2 + 185059*m^3 + 22995*m^4 + 1645*m^5 + 63*m^6 + m^7 + 2027025))
/(4098240*m + 2924172*m^2 + 1038016*m^3 + 208054*m^4 + 24640*m^5 + 1708*m^6
 + 64*m^7 + m^8 + 2027025)
```

3.16 $\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx$

Optimal result

Integrand size = 31, antiderivative size = 284

$$\begin{aligned}
&\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx \\
&= \frac{a^2Ac^3(ex)^{1+m}}{e(1+m)} + \frac{ac^2(2Abc+aBc+3aAd)(ex)^{3+m}}{e^3(3+m)} \\
&\quad + \frac{c(aBc(2bc+3ad)+A(b^2c^2+6abcd+3a^2d^2))\,(ex)^{5+m}}{e^5(5+m)} \\
&\quad + \frac{(6abcd(Bc+Ad)+a^2d^2(3Bc+Ad)+b^2c^2(Bc+3Ad))\,(ex)^{7+m}}{e^7(7+m)} \\
&\quad + \frac{d(a^2Bd^2+3b^2c(Bc+Ad)+2abd(3Bc+Ad))\,(ex)^{9+m}}{e^9(9+m)} \\
&\quad + \frac{bd^2(3bBc+Abd+2aBd)(ex)^{11+m}}{e^{11}(11+m)} + \frac{b^2Bd^3(ex)^{13+m}}{e^{13}(13+m)}
\end{aligned}$$

```
[Out] a^2*A*c^3*(e*x)^(1+m)/e/(1+m)+a*c^2*(3*A*a*d+2*A*b*c+B*a*c)*(e*x)^(3+m)/e^3
/(3+m)+c*(a*B*c*(3*a*d+2*b*c)+A*(3*a^2*d^2+6*a*b*c*d+b^2*c^2))*(e*x)^(5+m)/
e^5/(5+m)+(6*a*b*c*d*(A*d+B*c)+a^2*d^2*(A*d+3*B*c)+b^2*c^2*(3*A*d+B*c))*(e*
x)^(7+m)/e^7/(7+m)+d*(a^2*B*d^2+3*b^2*c*(A*d+B*c)+2*a*b*d*(A*d+3*B*c))*(e*x
)^(9+m)/e^9/(9+m)+b*d^2*(A*b*d+2*B*a*d+3*B*b*c)*(e*x)^(11+m)/e^11/(11+m)+b^
2*B*d^3*(e*x)^(13+m)/e^13/(13+m)
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 284, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.032, Rules used = {584}

$$
\begin{aligned}
&\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx \\
&= \frac{(ex)^{m+7} \left(a^2d^2(Ad+3Bc)+6abcd(Ad+Bc)+b^2c^2(3Ad+Bc)\right)}{e^7(m+7)} \\
&\quad + \frac{c(ex)^{m+5} \left(A(3a^2d^2+6abcd+b^2c^2)+aBc(3ad+2bc)\right)}{e^5(m+5)} \\
&\quad + \frac{d(ex)^{m+9} \left(a^2Bd^2+2abd(Ad+3Bc)+3b^2c(Ad+Bc)\right)}{e^9(m+9)} \\
&\quad + \frac{a^2Ac^3(ex)^{m+1}}{e(m+1)} + \frac{ac^2(ex)^{m+3}(3aAd+aBc+2Abc)}{e^3(m+3)} \\
&\quad + \frac{bd^2(ex)^{m+11}(2aBd+Abd+3bBc)}{e^{11}(m+11)} + \frac{b^2Bd^3(ex)^{m+13}}{e^{13}(m+13)}
\end{aligned}
$$

```
[In] Int[(e*x)^m*(a + b*x^2)^2*(A + B*x^2)*(c + d*x^2)^3,x]
```

```
[Out] (a^2*A*c^3*(e*x)^(1 + m))/(e*(1 + m)) + (a*c^2*(2*A*b*c + a*B*c + 3*a*A*d)*
(e*x)^(3 + m))/(e^3*(3 + m)) + (c*(a*B*c*(2*b*c + 3*a*d) + A*(b^2*c^2 + 6*a
*b*c*d + 3*a^2*d^2))*(e*x)^(5 + m))/(e^5*(5 + m)) + ((6*a*b*c*d*(B*c + A*d)
 + a^2*d^2*(3*B*c + A*d) + b^2*c^2*(B*c + 3*A*d))*(e*x)^(7 + m))/(e^7*(7 +
m)) + (d*(a^2*B*d^2 + 3*b^2*c*(B*c + A*d) + 2*a*b*d*(3*B*c + A*d))*(e*x)^(9
 + m))/(e^9*(9 + m)) + (b*d^2*(3*b*B*c + A*b*d + 2*a*B*d)*(e*x)^(11 + m))/(
e^11*(11 + m)) + (b^2*B*d^3*(e*x)^(13 + m))/(e^13*(13 + m))
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\text{integral} = \int \left(a^2Ac^3(ex)^m + \frac{ac^2(2Abc+aBc+3aAd)(ex)^{2+m}}{e^2} + \frac{c(aBc(2bc+3ad)+A(b^2c^2+6abcd+3a^2d^2))\,(ex)^{4+m}}{e^4} + \frac{(6abcd(Bc+Ad)+a^2d^2(3Bc+Ad)+b^2c^2(Bc+3Ad))\,(ex)^{6+m}}{e^6} + \frac{d(a^2Bd^2+3b^2c(Bc+Ad)+2abd(3Bc+Ad))\,(ex)^{8+m}}{e^8} + \frac{bd^2(3bBc+Abd+2aBd)(ex)^{10+m}}{e^{10}} + \frac{b^2Bd^3(ex)^{12+m}}{e^{12}}\right) dx$$

$$= \frac{a^2Ac^3(ex)^{1+m}}{e(1+m)} + \frac{ac^2(2Abc+aBc+3aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{c(aBc(2bc+3ad)+A(b^2c^2+6abcd+3a^2d^2))\,(ex)^{5+m}}{e^5(5+m)} + \frac{(6abcd(Bc+Ad)+a^2d^2(3Bc+Ad)+b^2c^2(Bc+3Ad))\,(ex)^{7+m}}{e^7(7+m)} + \frac{d(a^2Bd^2+3b^2c(Bc+Ad)+2abd(3Bc+Ad))\,(ex)^{9+m}}{e^9(9+m)} + \frac{bd^2(3bBc+Abd+2aBd)(ex)^{11+m}}{e^{11}(11+m)} + \frac{b^2Bd^3(ex)^{13+m}}{e^{13}(13+m)}$$

Mathematica [A] (verified)

Time = 0.61 (sec) , antiderivative size = 239, normalized size of antiderivative = 0.84

$$\int (ex)^m\left(a+bx^2\right)^2\left(A+Bx^2\right)\left(c+dx^2\right)^3\,dx = x(ex)^m\left(\frac{a^2Ac^3}{1+m} + \frac{ac^2(2Abc+aBc+3aAd)x^2}{3+m} + \frac{c(aBc(2bc+3ad)+A(b^2c^2+6abcd+3a^2d^2))\,x^4}{5+m} + \frac{(6abcd(Bc+Ad)+a^2d^2(3Bc+Ad)+b^2c^2(Bc+3Ad))\,x^6}{7+m} + \frac{d(a^2Bd^2+3b^2c(Bc+Ad)+2abd(3Bc+Ad))\,x^8}{9+m} + \frac{bd^2(3bBc+Abd+2aBd)x^{10}}{11+m} + \frac{b^2Bd^3x^{12}}{13+m}\right)$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)^2*(A + B*x^2)*(c + d*x^2)^3,x]
```

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

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 2442 vs. 2(284) = 568.

Time = 3.63 (sec) , antiderivative size = 2443, normalized size of antiderivative = 8.60

method	result	size
gosper	Expression too large to display	2443
risch	Expression too large to display	2443
parallelrisch	Expression too large to display	3284

```
[In] int((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c)^3,x,method=_RETURNVERBOSE)
```

```
[Out] x*(B*b^2*d^3*m^6*x^12+36*B*b^2*d^3*m^5*x^12+A*b^2*d^3*m^6*x^10+2*B*a*b*d^3*
m^6*x^10+3*B*b^2*c*d^2*m^6*x^10+505*B*b^2*d^3*m^4*x^12+38*A*b^2*d^3*m^5*x^1
0+76*B*a*b*d^3*m^5*x^10+114*B*b^2*c*d^2*m^5*x^10+3480*B*b^2*d^3*m^3*x^12+2*
A*a*b*d^3*m^6*x^8+3*A*b^2*c*d^2*m^6*x^8+555*A*b^2*d^3*m^4*x^10+B*a^2*d^3*m^
6*x^8+6*B*a*b*c*d^2*m^6*x^8+1110*B*a*b*d^3*m^4*x^10+3*B*b^2*c^2*d*m^6*x^8+1
665*B*b^2*c*d^2*m^4*x^10+12139*B*b^2*d^3*m^2*x^12+80*A*a*b*d^3*m^5*x^8+120*
A*b^2*c*d^2*m^5*x^8+3940*A*b^2*d^3*m^3*x^10+40*B*a^2*d^3*m^5*x^8+240*B*a*b*
c*d^2*m^5*x^8+7880*B*a*b*d^3*m^3*x^10+120*B*b^2*c^2*d*m^5*x^8+11820*B*b^2*c
*d^2*m^3*x^10+19524*B*b^2*d^3*m*x^12+A*a^2*d^3*m^6*x^6+6*A*a*b*c*d^2*m^6*x^
6+1226*A*a*b*d^3*m^4*x^8+3*A*b^2*c^2*d*m^6*x^6+1839*A*b^2*c*d^2*m^4*x^8+140
39*A*b^2*d^3*m^2*x^10+3*B*a^2*c*d^2*m^6*x^6+613*B*a^2*d^3*m^4*x^8+6*B*a*b*c
^2*d*m^6*x^6+3678*B*a*b*c*d^2*m^4*x^8+28078*B*a*b*d^3*m^2*x^10+B*b^2*c^3*m^
6*x^6+1839*B*b^2*c^2*d*m^4*x^8+42117*B*b^2*c*d^2*m^2*x^10+10395*B*b^2*d^3*x
^12+42*A*a^2*d^3*m^5*x^6+252*A*a*b*c*d^2*m^5*x^6+9056*A*a*b*d^3*m^3*x^8+126
*A*b^2*c^2*d*m^5*x^6+13584*A*b^2*c*d^2*m^3*x^8+22902*A*b^2*d^3*m*x^10+126*B
*a^2*c*d^2*m^5*x^6+4528*B*a^2*d^3*m^3*x^8+252*B*a*b*c^2*d*m^5*x^6+27168*B*a
*b*c*d^2*m^3*x^8+45804*B*a*b*d^3*m*x^10+42*B*b^2*c^3*m^5*x^6+13584*B*b^2*c^
2*d*m^3*x^8+68706*B*b^2*c*d^2*m*x^10+3*A*a^2*c*d^2*m^6*x^4+679*A*a^2*d^3*m^
4*x^6+6*A*a*b*c^2*d*m^6*x^4+4074*A*a*b*c*d^2*m^4*x^6+33254*A*a*b*d^3*m^2*x^
8+A*b^2*c^3*m^6*x^4+2037*A*b^2*c^2*d*m^4*x^6+49881*A*b^2*c*d^2*m^2*x^8+1228
5*A*b^2*d^3*x^10+3*B*a^2*c^2*d*m^6*x^4+2037*B*a^2*c*d^2*m^4*x^6+16627*B*a^2
*d^3*m^2*x^8+2*B*a*b*c^3*m^6*x^4+4074*B*a*b*c^2*d*m^4*x^6+99762*B*a*b*c*d^2
*m^2*x^8+24570*B*a*b*d^3*x^10+679*B*b^2*c^3*m^4*x^6+49881*B*b^2*c^2*d*m^2*x
^8+36855*B*b^2*c*d^2*x^10+132*A*a^2*c*d^2*m^5*x^4+5292*A*a^2*d^3*m^3*x^6+26
4*A*a*b*c^2*d*m^5*x^4+31752*A*a*b*c*d^2*m^3*x^6+55376*A*a*b*d^3*m*x^8+44*A*
```

```
b^2*c^3*m^5*x^4+15876*A*b^2*c^2*d*m^3*x^6+83064*A*b^2*c*d^2*m*x^8+132*B*a^2
*c^2*d*m^5*x^4+15876*B*a^2*c*d^2*m^3*x^6+27688*B*a^2*d^3*m*x^8+88*B*a*b*c^3
*m^5*x^4+31752*B*a*b*c^2*d*m^3*x^6+166128*B*a*b*c*d^2*m*x^8+5292*B*b^2*c^3*
m^3*x^6+83064*B*b^2*c^2*d*m*x^8+3*A*a^2*c^2*d*m^6*x^2+2259*A*a^2*c*d^2*m^4*
x^4+20335*A*a^2*d^3*m^2*x^6+2*A*a*b*c^3*m^6*x^2+4518*A*a*b*c^2*d*m^4*x^4+12
2010*A*a*b*c*d^2*m^2*x^6+30030*A*a*b*d^3*x^8+753*A*b^2*c^3*m^4*x^4+61005*A*
b^2*c^2*d*m^2*x^6+45045*A*b^2*c*d^2*x^8+B*a^2*c^3*m^6*x^2+2259*B*a^2*c^2*d*
m^4*x^4+61005*B*a^2*c*d^2*m^2*x^6+15015*B*a^2*d^3*x^8+1506*B*a*b*c^3*m^4*x^
4+122010*B*a*b*c^2*d*m^2*x^6+90090*B*a*b*c*d^2*x^8+20335*B*b^2*c^3*m^2*x^6+
45045*B*b^2*c^2*d*x^8+138*A*a^2*c^2*d*m^5*x^2+18840*A*a^2*c*d^2*m^3*x^4+349
86*A*a^2*d^3*m*x^6+92*A*a*b*c^3*m^5*x^2+37680*A*a*b*c^2*d*m^3*x^4+209916*A*
a*b*c*d^2*m*x^6+6280*A*b^2*c^3*m^3*x^4+104958*A*b^2*c^2*d*m*x^6+46*B*a^2*c^
3*m^5*x^2+18840*B*a^2*c^2*d*m^3*x^4+104958*B*a^2*c*d^2*m*x^6+12560*B*a*b*c^
3*m^3*x^4+209916*B*a*b*c^2*d*m*x^6+34986*B*b^2*c^3*m*x^6+A*a^2*c^3*m^6+2505
*A*a^2*c^2*d*m^4*x^2+77937*A*a^2*c*d^2*m^2*x^4+19305*A*a^2*d^3*x^6+1670*A*a
*b*c^3*m^4*x^2+155874*A*a*b*c^2*d*m^2*x^4+115830*A*a*b*c*d^2*x^6+25979*A*b^
2*c^3*m^2*x^4+57915*A*b^2*c^2*d*x^6+835*B*a^2*c^3*m^4*x^2+77937*B*a^2*c^2*d
*m^2*x^4+57915*B*a^2*c*d^2*x^6+51958*B*a*b*c^3*m^2*x^4+115830*B*a*b*c^2*d*x
^6+19305*B*b^2*c^3*x^6+48*A*a^2*c^3*m^5+22620*A*a^2*c^2*d*m^3*x^2+142308*A*
a^2*c*d^2*m*x^4+15080*A*a*b*c^3*m^3*x^2+284616*A*a*b*c^2*d*m*x^4+47436*A*b^
2*c^3*m*x^4+7540*B*a^2*c^3*m^3*x^2+142308*B*a^2*c^2*d*m*x^4+94872*B*a*b*c^3
*m*x^4+925*A*a^2*c^3*m^4+104277*A*a^2*c^2*d*m^2*x^2+81081*A*a^2*c*d^2*x^4+6
9518*A*a*b*c^3*m^2*x^2+162162*A*a*b*c^2*d*x^4+27027*A*b^2*c^3*x^4+34759*B*a
^2*c^3*m^2*x^2+81081*B*a^2*c^2*d*x^4+54054*B*a*b*c^3*x^4+9120*A*a^2*c^3*m^3
+219162*A*a^2*c^2*d*m*x^2+146108*A*a*b*c^3*m*x^2+73054*B*a^2*c^3*m*x^2+4825
9*A*a^2*c^3*m^2+135135*A*a^2*c^2*d*x^2+90090*A*a*b*c^3*x^2+45045*B*a^2*c^3*
x^2+129072*A*a^2*c^3*m+135135*A*a^2*c^3)*(e*x)^m/(13+m)/(11+m)/(9+m)/(7+m)/
(5+m)/(3+m)/(1+m)
```

Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1690 vs. $2(284) = 568$.

Time = 0.28 (sec) , antiderivative size = 1690, normalized size of antiderivative = 5.95

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="fricas")
```

```
[Out] ((B*b^2*d^3*m^6 + 36*B*b^2*d^3*m^5 + 505*B*b^2*d^3*m^4 + 3480*B*b^2*d^3*m^3
 + 12139*B*b^2*d^3*m^2 + 19524*B*b^2*d^3*m + 10395*B*b^2*d^3)*x^13 + ((3*B*
b^2*c*d^2 + (2*B*a*b + A*b^2)*d^3)*m^6 + 36855*B*b^2*c*d^2 + 38*(3*B*b^2*c*
d^2 + (2*B*a*b + A*b^2)*d^3)*m^5 + 555*(3*B*b^2*c*d^2 + (2*B*a*b + A*b^2)*d
^3)*m^4 + 12285*(2*B*a*b + A*b^2)*d^3 + 3940*(3*B*b^2*c*d^2 + (2*B*a*b + A*
b^2)*d^3)*m^3 + 14039*(3*B*b^2*c*d^2 + (2*B*a*b + A*b^2)*d^3)*m^2 + 22902*(
```

```
3*B*b^2*c*d^2 + (2*B*a*b + A*b^2)*d^3)*m)*x^11 + ((3*B*b^2*c^2*d + 3*(2*B*a
*b + A*b^2)*c*d^2 + (B*a^2 + 2*A*a*b)*d^3)*m^6 + 45045*B*b^2*c^2*d + 40*(3*
B*b^2*c^2*d + 3*(2*B*a*b + A*b^2)*c*d^2 + (B*a^2 + 2*A*a*b)*d^3)*m^5 + 613*
(3*B*b^2*c^2*d + 3*(2*B*a*b + A*b^2)*c*d^2 + (B*a^2 + 2*A*a*b)*d^3)*m^4 + 4
5045*(2*B*a*b + A*b^2)*c*d^2 + 15015*(B*a^2 + 2*A*a*b)*d^3 + 4528*(3*B*b^2*
c^2*d + 3*(2*B*a*b + A*b^2)*c*d^2 + (B*a^2 + 2*A*a*b)*d^3)*m^3 + 16627*(3*B
*b^2*c^2*d + 3*(2*B*a*b + A*b^2)*c*d^2 + (B*a^2 + 2*A*a*b)*d^3)*m^2 + 27688
*(3*B*b^2*c^2*d + 3*(2*B*a*b + A*b^2)*c*d^2 + (B*a^2 + 2*A*a*b)*d^3)*m)*x^9
 + ((B*b^2*c^3 + A*a^2*d^3 + 3*(2*B*a*b + A*b^2)*c^2*d + 3*(B*a^2 + 2*A*a*b
)*c*d^2)*m^6 + 19305*B*b^2*c^3 + 19305*A*a^2*d^3 + 42*(B*b^2*c^3 + A*a^2*d^
3 + 3*(2*B*a*b + A*b^2)*c^2*d + 3*(B*a^2 + 2*A*a*b)*c*d^2)*m^5 + 679*(B*b^2
*c^3 + A*a^2*d^3 + 3*(2*B*a*b + A*b^2)*c^2*d + 3*(B*a^2 + 2*A*a*b)*c*d^2)*m
^4 + 57915*(2*B*a*b + A*b^2)*c^2*d + 57915*(B*a^2 + 2*A*a*b)*c*d^2 + 5292*(
B*b^2*c^3 + A*a^2*d^3 + 3*(2*B*a*b + A*b^2)*c^2*d + 3*(B*a^2 + 2*A*a*b)*c*d
^2)*m^3 + 20335*(B*b^2*c^3 + A*a^2*d^3 + 3*(2*B*a*b + A*b^2)*c^2*d + 3*(B*a
^2 + 2*A*a*b)*c*d^2)*m^2 + 34986*(B*b^2*c^3 + A*a^2*d^3 + 3*(2*B*a*b + A*b^
2)*c^2*d + 3*(B*a^2 + 2*A*a*b)*c*d^2)*m)*x^7 + ((3*A*a^2*c*d^2 + (2*B*a*b +
 A*b^2)*c^3 + 3*(B*a^2 + 2*A*a*b)*c^2*d)*m^6 + 81081*A*a^2*c*d^2 + 44*(3*A*
a^2*c*d^2 + (2*B*a*b + A*b^2)*c^3 + 3*(B*a^2 + 2*A*a*b)*c^2*d)*m^5 + 753*(3
*A*a^2*c*d^2 + (2*B*a*b + A*b^2)*c^3 + 3*(B*a^2 + 2*A*a*b)*c^2*d)*m^4 + 270
27*(2*B*a*b + A*b^2)*c^3 + 81081*(B*a^2 + 2*A*a*b)*c^2*d + 6280*(3*A*a^2*c*
d^2 + (2*B*a*b + A*b^2)*c^3 + 3*(B*a^2 + 2*A*a*b)*c^2*d)*m^3 + 25979*(3*A*a
^2*c*d^2 + (2*B*a*b + A*b^2)*c^3 + 3*(B*a^2 + 2*A*a*b)*c^2*d)*m^2 + 47436*(
3*A*a^2*c*d^2 + (2*B*a*b + A*b^2)*c^3 + 3*(B*a^2 + 2*A*a*b)*c^2*d)*m)*x^5 +
 ((3*A*a^2*c^2*d + (B*a^2 + 2*A*a*b)*c^3)*m^6 + 135135*A*a^2*c^2*d + 46*(3*
A*a^2*c^2*d + (B*a^2 + 2*A*a*b)*c^3)*m^5 + 835*(3*A*a^2*c^2*d + (B*a^2 + 2*
A*a*b)*c^3)*m^4 + 45045*(B*a^2 + 2*A*a*b)*c^3 + 7540*(3*A*a^2*c^2*d + (B*a^
2 + 2*A*a*b)*c^3)*m^3 + 34759*(3*A*a^2*c^2*d + (B*a^2 + 2*A*a*b)*c^3)*m^2 +
 73054*(3*A*a^2*c^2*d + (B*a^2 + 2*A*a*b)*c^3)*m)*x^3 + (A*a^2*c^3*m^6 + 48
*A*a^2*c^3*m^5 + 925*A*a^2*c^3*m^4 + 9120*A*a^2*c^3*m^3 + 48259*A*a^2*c^3*m
^2 + 129072*A*a^2*c^3*m + 135135*A*a^2*c^3)*x)*(e*x)^m/(m^7 + 49*m^6 + 973*
m^5 + 10045*m^4 + 57379*m^3 + 177331*m^2 + 264207*m + 135135)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 11914 vs. $2(284) = 568$.

Time = 1.33 (sec) , antiderivative size = 11914, normalized size of antiderivative = 41.95

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**2*(B*x**2+A)*(d*x**2+c)**3,x)
```

```
[Out] Piecewise(((-A*a**2*c**3/(12*x**12) - 3*A*a**2*c**2*d/(10*x**10) - 3*A*a**2
*c*d**2/(8*x**8) - A*a**2*d**3/(6*x**6) - A*a*b*c**3/(5*x**10) - 3*A*a*b*c*
```

```
*2*d/(4*x**8) - A*a*b*c*d**2/x**6 - A*a*b*d**3/(2*x**4) - A*b**2*c**3/(8*x*
*8) - A*b**2*c**2*d/(2*x**6) - 3*A*b**2*c*d**2/(4*x**4) - A*b**2*d**3/(2*x*
*2) - B*a**2*c**3/(10*x**10) - 3*B*a**2*c**2*d/(8*x**8) - B*a**2*c*d**2/(2*
x**6) - B*a**2*d**3/(4*x**4) - B*a*b*c**3/(4*x**8) - B*a*b*c**2*d/x**6 - 3*
B*a*b*c*d**2/(2*x**4) - B*a*b*d**3/x**2 - B*b**2*c**3/(6*x**6) - 3*B*b**2*c
**2*d/(4*x**4) - 3*B*b**2*c*d**2/(2*x**2) + B*b**2*d**3*log(x))/e**13, Eq(m
, -13)), ((-A*a**2*c**3/(10*x**10) - 3*A*a**2*c**2*d/(8*x**8) - A*a**2*c*d*
*2/(2*x**6) - A*a**2*d**3/(4*x**4) - A*a*b*c**3/(4*x**8) - A*a*b*c**2*d/x**
6 - 3*A*a*b*c*d**2/(2*x**4) - A*a*b*d**3/x**2 - A*b**2*c**3/(6*x**6) - 3*A*
b**2*c**2*d/(4*x**4) - 3*A*b**2*c*d**2/(2*x**2) + A*b**2*d**3*log(x) - B*a*
*2*c**3/(8*x**8) - B*a**2*c**2*d/(2*x**6) - 3*B*a**2*c*d**2/(4*x**4) - B*a*
*2*d**3/(2*x**2) - B*a*b*c**3/(3*x**6) - 3*B*a*b*c**2*d/(2*x**4) - 3*B*a*b*
c*d**2/x**2 + 2*B*a*b*d**3*log(x) - B*b**2*c**3/(4*x**4) - 3*B*b**2*c**2*d/
(2*x**2) + 3*B*b**2*c*d**2*log(x) + B*b**2*d**3*x**2/2)/e**11, Eq(m, -11)),
 ((-A*a**2*c**3/(8*x**8) - A*a**2*c**2*d/(2*x**6) - 3*A*a**2*c*d**2/(4*x**4
) - A*a**2*d**3/(2*x**2) - A*a*b*c**3/(3*x**6) - 3*A*a*b*c**2*d/(2*x**4) -
3*A*a*b*c*d**2/x**2 + 2*A*a*b*d**3*log(x) - A*b**2*c**3/(4*x**4) - 3*A*b**2
*c**2*d/(2*x**2) + 3*A*b**2*c*d**2*log(x) + A*b**2*d**3*x**2/2 - B*a**2*c**
3/(6*x**6) - 3*B*a**2*c**2*d/(4*x**4) - 3*B*a**2*c*d**2/(2*x**2) + B*a**2*d
**3*log(x) - B*a*b*c**3/(2*x**4) - 3*B*a*b*c**2*d/x**2 + 6*B*a*b*c*d**2*log
(x) + B*a*b*d**3*x**2 - B*b**2*c**3/(2*x**2) + 3*B*b**2*c**2*d*log(x) + 3*B
*b**2*c*d**2*x**2/2 + B*b**2*d**3*x**4/4)/e**9, Eq(m, -9)), ((-A*a**2*c**3/
(6*x**6) - 3*A*a**2*c**2*d/(4*x**4) - 3*A*a**2*c*d**2/(2*x**2) + A*a**2*d**
3*log(x) - A*a*b*c**3/(2*x**4) - 3*A*a*b*c**2*d/x**2 + 6*A*a*b*c*d**2*log(x
) + A*a*b*d**3*x**2 - A*b**2*c**3/(2*x**2) + 3*A*b**2*c**2*d*log(x) + 3*A*b
**2*c*d**2*x**2/2 + A*b**2*d**3*x**4/4 - B*a**2*c**3/(4*x**4) - 3*B*a**2*c*
*2*d/(2*x**2) + 3*B*a**2*c*d**2*log(x) + B*a**2*d**3*x**2/2 - B*a*b*c**3/x*
*2 + 6*B*a*b*c**2*d*log(x) + 3*B*a*b*c*d**2*x**2 + B*a*b*d**3*x**4/2 + B*b*
*2*c**3*log(x) + 3*B*b**2*c**2*d*x**2/2 + 3*B*b**2*c*d**2*x**4/4 + B*b**2*d
**3*x**6/6)/e**7, Eq(m, -7)), ((-A*a**2*c**3/(4*x**4) - 3*A*a**2*c**2*d/(2*
x**2) + 3*A*a**2*c*d**2*log(x) + A*a**2*d**3*x**2/2 - A*a*b*c**3/x**2 + 6*A
*a*b*c**2*d*log(x) + 3*A*a*b*c*d**2*x**2 + A*a*b*d**3*x**4/2 + A*b**2*c**3*
log(x) + 3*A*b**2*c**2*d*x**2/2 + 3*A*b**2*c*d**2*x**4/4 + A*b**2*d**3*x**6
/6 - B*a**2*c**3/(2*x**2) + 3*B*a**2*c**2*d*log(x) + 3*B*a**2*c*d**2*x**2/2
 + B*a**2*d**3*x**4/4 + 2*B*a*b*c**3*log(x) + 3*B*a*b*c**2*d*x**2 + 3*B*a*b
*c*d**2*x**4/2 + B*a*b*d**3*x**6/3 + B*b**2*c**3*x**2/2 + 3*B*b**2*c**2*d*x
**4/4 + B*b**2*c*d**2*x**6/2 + B*b**2*d**3*x**8/8)/e**5, Eq(m, -5)), ((-A*a
**2*c**3/(2*x**2) + 3*A*a**2*c**2*d*log(x) + 3*A*a**2*c*d**2*x**2/2 + A*a**
2*d**3*x**4/4 + 2*A*a*b*c**3*log(x) + 3*A*a*b*c**2*d*x**2 + 3*A*a*b*c*d**2*
x**4/2 + A*a*b*d**3*x**6/3 + A*b**2*c**3*x**2/2 + 3*A*b**2*c**2*d*x**4/4 +
A*b**2*c*d**2*x**6/2 + A*b**2*d**3*x**8/8 + B*a**2*c**3*log(x) + 3*B*a**2*c
**2*d*x**2/2 + 3*B*a**2*c*d**2*x**4/4 + B*a**2*d**3*x**6/6 + B*a*b*c**3*x**
2 + 3*B*a*b*c**2*d*x**4/2 + B*a*b*c*d**2*x**6 + B*a*b*d**3*x**8/4 + B*b**2*
c**3*x**4/4 + B*b**2*c**2*d*x**6/2 + 3*B*b**2*c*d**2*x**8/8 + B*b**2*d**3*x
**10/10)/e**3, Eq(m, -3)), ((A*a**2*c**3*log(x) + 3*A*a**2*c**2*d*x**2/2 +
```

```
3*A*a**2*c*d**2*x**4/4 + A*a**2*d**3*x**6/6 + A*a*b*c**3*x**2 + 3*A*a*b*c**
2*d*x**4/2 + A*a*b*c*d**2*x**6 + A*a*b*d**3*x**8/4 + A*b**2*c**3*x**4/4 + A
*b**2*c**2*d*x**6/2 + 3*A*b**2*c*d**2*x**8/8 + A*b**2*d**3*x**10/10 + B*a**
2*c**3*x**2/2 + 3*B*a**2*c**2*d*x**4/4 + B*a**2*c*d**2*x**6/2 + B*a**2*d**3
*x**8/8 + B*a*b*c**3*x**4/2 + B*a*b*c**2*d*x**6 + 3*B*a*b*c*d**2*x**8/4 + B
*a*b*d**3*x**10/5 + B*b**2*c**3*x**6/6 + 3*B*b**2*c**2*d*x**8/8 + 3*B*b**2*
c*d**2*x**10/10 + B*b**2*d**3*x**12/12)/e, Eq(m, -1)), (A*a**2*c**3*m**6*x*
(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2
 + 264207*m + 135135) + 48*A*a**2*c**3*m**5*x*(e*x)**m/(m**7 + 49*m**6 + 97
3*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 925*A
*a**2*c**3*m**4*x*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*
m**3 + 177331*m**2 + 264207*m + 135135) + 9120*A*a**2*c**3*m**3*x*(e*x)**m/
(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207
*m + 135135) + 48259*A*a**2*c**3*m**2*x*(e*x)**m/(m**7 + 49*m**6 + 973*m**5
 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 129072*A*a*
*2*c**3*m*x*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 +
 177331*m**2 + 264207*m + 135135) + 135135*A*a**2*c**3*x*(e*x)**m/(m**7 + 4
9*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 1351
35) + 3*A*a**2*c**2*d*m**6*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045
*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 138*A*a**2*c**2*d*m
**5*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 17
7331*m**2 + 264207*m + 135135) + 2505*A*a**2*c**2*d*m**4*x**3*(e*x)**m/(m**
7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m +
 135135) + 22620*A*a**2*c**2*d*m**3*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**
5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 104277*A*a
**2*c**2*d*m**2*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 573
79*m**3 + 177331*m**2 + 264207*m + 135135) + 219162*A*a**2*c**2*d*m*x**3*(e
*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
 264207*m + 135135) + 135135*A*a**2*c**2*d*x**3*(e*x)**m/(m**7 + 49*m**6 +
973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 3*A
*a**2*c*d**2*m**6*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 5
7379*m**3 + 177331*m**2 + 264207*m + 135135) + 132*A*a**2*c*d**2*m**5*x**5*
(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2
 + 264207*m + 135135) + 2259*A*a**2*c*d**2*m**4*x**5*(e*x)**m/(m**7 + 49*m*
*6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135)
+ 18840*A*a**2*c*d**2*m**3*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045
*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 77937*A*a**2*c*d**2
*m**2*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 +
177331*m**2 + 264207*m + 135135) + 142308*A*a**2*c*d**2*m*x**5*(e*x)**m/(m*
*7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m
+ 135135) + 81081*A*a**2*c*d**2*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 +
10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + A*a**2*d**3*m*
*6*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177
331*m**2 + 264207*m + 135135) + 42*A*a**2*d**3*m**5*x**7*(e*x)**m/(m**7 + 4
9*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 1351
```

```
35) + 679*A*a**2*d**3*m**4*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045
*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 5292*A*a**2*d**3*m*
*3*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177
331*m**2 + 264207*m + 135135) + 20335*A*a**2*d**3*m**2*x**7*(e*x)**m/(m**7
+ 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 1
35135) + 34986*A*a**2*d**3*m*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 100
45*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 19305*A*a**2*d**3
*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 17733
1*m**2 + 264207*m + 135135) + 2*A*a*b*c**3*m**6*x**3*(e*x)**m/(m**7 + 49*m*
*6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135)
+ 92*A*a*b*c**3*m**5*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4
+ 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 1670*A*a*b*c**3*m**4*x**3
*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**
2 + 264207*m + 135135) + 15080*A*a*b*c**3*m**3*x**3*(e*x)**m/(m**7 + 49*m**
6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
 69518*A*a*b*c**3*m**2*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**
4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 146108*A*a*b*c**3*m*x**
3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m*
*2 + 264207*m + 135135) + 90090*A*a*b*c**3*x**3*(e*x)**m/(m**7 + 49*m**6 +
973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 6*A
*a*b*c**2*d*m**6*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57
379*m**3 + 177331*m**2 + 264207*m + 135135) + 264*A*a*b*c**2*d*m**5*x**5*(e
*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
 264207*m + 135135) + 4518*A*a*b*c**2*d*m**4*x**5*(e*x)**m/(m**7 + 49*m**6
+ 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 3
7680*A*a*b*c**2*d*m**3*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**
4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 155874*A*a*b*c**2*d*m**
2*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 1773
31*m**2 + 264207*m + 135135) + 284616*A*a*b*c**2*d*m*x**5*(e*x)**m/(m**7 +
49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135
135) + 162162*A*a*b*c**2*d*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045
*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 6*A*a*b*c*d**2*m**6
*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 17733
1*m**2 + 264207*m + 135135) + 252*A*a*b*c*d**2*m**5*x**7*(e*x)**m/(m**7 + 4
9*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 1351
35) + 4074*A*a*b*c*d**2*m**4*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 100
45*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 31752*A*a*b*c*d**
2*m**3*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 +
 177331*m**2 + 264207*m + 135135) + 122010*A*a*b*c*d**2*m**2*x**7*(e*x)**m/
(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207
*m + 135135) + 209916*A*a*b*c*d**2*m*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m*
*5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 115830*A*
a*b*c*d**2*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m*
*3 + 177331*m**2 + 264207*m + 135135) + 2*A*a*b*d**3*m**6*x**9*(e*x)**m/(m*
*7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m
```

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+ 135135) + 80*A*a*b*d**3*m**5*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 1
0045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 1226*A*a*b*d**3
*m**4*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 +
177331*m**2 + 264207*m + 135135) + 9056*A*a*b*d**3*m**3*x**9*(e*x)**m/(m**7
 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m +
135135) + 33254*A*a*b*d**3*m**2*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 +
10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 55376*A*a*b*d*
*3*m*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 1
77331*m**2 + 264207*m + 135135) + 30030*A*a*b*d**3*x**9*(e*x)**m/(m**7 + 49
*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 13513
5) + A*b**2*c**3*m**6*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4
 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 44*A*b**2*c**3*m**5*x**5
*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**
2 + 264207*m + 135135) + 753*A*b**2*c**3*m**4*x**5*(e*x)**m/(m**7 + 49*m**6
 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
6280*A*b**2*c**3*m**3*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4
 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 25979*A*b**2*c**3*m**2*x
**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*
m**2 + 264207*m + 135135) + 47436*A*b**2*c**3*m*x**5*(e*x)**m/(m**7 + 49*m*
*6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135)
+ 27027*A*b**2*c**3*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 3*A*b**2*c**2*d*m**6*x**7*
(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2
 + 264207*m + 135135) + 126*A*b**2*c**2*d*m**5*x**7*(e*x)**m/(m**7 + 49*m**
6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
 2037*A*b**2*c**2*d*m**4*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m
**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 15876*A*b**2*c**2*d*m
**3*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 17
7331*m**2 + 264207*m + 135135) + 61005*A*b**2*c**2*d*m**2*x**7*(e*x)**m/(m*
*7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m
+ 135135) + 104958*A*b**2*c**2*d*m*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5
 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 57915*A*b**
2*c**2*d*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3
 + 177331*m**2 + 264207*m + 135135) + 3*A*b**2*c*d**2*m**6*x**9*(e*x)**m/(m
**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m
 + 135135) + 120*A*b**2*c*d**2*m**5*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**
5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 1839*A*b**
2*c*d**2*m**4*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379
*m**3 + 177331*m**2 + 264207*m + 135135) + 13584*A*b**2*c*d**2*m**3*x**9*(e
*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
 264207*m + 135135) + 49881*A*b**2*c*d**2*m**2*x**9*(e*x)**m/(m**7 + 49*m**
6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
 83064*A*b**2*c*d**2*m*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**
4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 45045*A*b**2*c*d**2*x**
9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m*
```

*2 + 264207*m + 135135) + A*b**2*d**3*m**6*x**11*(e*x)**m/(m**7 + 49*m**6 +
973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 38
*A*b**2*d**3*m**5*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
57379*m**3 + 177331*m**2 + 264207*m + 135135) + 555*A*b**2*d**3*m**4*x**11*
(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2
+ 264207*m + 135135) + 3940*A*b**2*d**3*m**3*x**11*(e*x)**m/(m**7 + 49*m**
6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
14039*A*b**2*d**3*m**2*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m
4 + 57379*m3 + 177331*m**2 + 264207*m + 135135) + 22902*A*b**2*d**3*m*x
11*(e*x)m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331
*m**2 + 264207*m + 135135) + 12285*A*b**2*d**3*x**11*(e*x)**m/(m**7 + 49*m*
*6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135)
+ B*a**2*c**3*m**6*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
57379*m**3 + 177331*m**2 + 264207*m + 135135) + 46*B*a**2*c**3*m**5*x**3*(e
*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
264207*m + 135135) + 835*B*a**2*c**3*m**4*x**3*(e*x)**m/(m**7 + 49*m**6 +
973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 754
0*B*a**2*c**3*m**3*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
57379*m**3 + 177331*m**2 + 264207*m + 135135) + 34759*B*a**2*c**3*m**2*x**3
*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**
2 + 264207*m + 135135) + 73054*B*a**2*c**3*m*x**3*(e*x)**m/(m**7 + 49*m**6
+ 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 4
5045*B*a**2*c**3*x**3*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57
379*m**3 + 177331*m**2 + 264207*m + 135135) + 3*B*a**2*c**2*d*m**6*x**5*(e*
x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
264207*m + 135135) + 132*B*a**2*c**2*d*m**5*x**5*(e*x)**m/(m**7 + 49*m**6 +
973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 22
59*B*a**2*c**2*d*m**4*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4
+ 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 18840*B*a**2*c**2*d*m**3
*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 17733
1*m**2 + 264207*m + 135135) + 77937*B*a**2*c**2*d*m**2*x**5*(e*x)**m/(m**7
+ 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 1
35135) + 142308*B*a**2*c**2*d*m*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 +
10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 81081*B*a**2*c
2*d*x5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 +
177331*m**2 + 264207*m + 135135) + 3*B*a**2*c*d**2*m**6*x**7*(e*x)**m/(m**7
+ 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m +
135135) + 126*B*a**2*c*d**2*m**5*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 +
10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 2037*B*a**2*c
*d**2*m**4*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m*
*3 + 177331*m**2 + 264207*m + 135135) + 15876*B*a**2*c*d**2*m**3*x**7*(e*x)
m/(m7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 26
4207*m + 135135) + 61005*B*a**2*c*d**2*m**2*x**7*(e*x)**m/(m**7 + 49*m**6 +
973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 10
4958*B*a**2*c*d**2*m*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4

+ 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 57915*B*a**2*c*d**2*x**7*
(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2
 + 264207*m + 135135) + B*a**2*d**3*m**6*x**9*(e*x)**m/(m**7 + 49*m**6 + 97
3*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 40*B*
a**2*d**3*m**5*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 5737
9*m**3 + 177331*m**2 + 264207*m + 135135) + 613*B*a**2*d**3*m**4*x**9*(e*x)
m/(m7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 26
4207*m + 135135) + 4528*B*a**2*d**3*m**3*x**9*(e*x)**m/(m**7 + 49*m**6 + 97
3*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 16627
*B*a**2*d**3*m**2*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 5
7379*m**3 + 177331*m**2 + 264207*m + 135135) + 27688*B*a**2*d**3*m*x**9*(e*
x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
264207*m + 135135) + 15015*B*a**2*d**3*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*
m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 2*B*a*b
*c**3*m**6*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m*
*3 + 177331*m**2 + 264207*m + 135135) + 88*B*a*b*c**3*m**5*x**5*(e*x)**m/(m
7 + 49*m6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m
 + 135135) + 1506*B*a*b*c**3*m**4*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5
+ 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 12560*B*a*b*
c**3*m**3*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**
3 + 177331*m**2 + 264207*m + 135135) + 51958*B*a*b*c**3*m**2*x**5*(e*x)**m/
(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207
*m + 135135) + 94872*B*a*b*c**3*m*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5
+ 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 54054*B*a*b*
c**3*x**5*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 1
77331*m**2 + 264207*m + 135135) + 6*B*a*b*c**2*d*m**6*x**7*(e*x)**m/(m**7 +
 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 13
5135) + 252*B*a*b*c**2*d*m**5*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10
045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 4074*B*a*b*c**2*
d*m**4*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 +
 177331*m**2 + 264207*m + 135135) + 31752*B*a*b*c**2*d*m**3*x**7*(e*x)**m/(
m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*
m + 135135) + 122010*B*a*b*c**2*d*m**2*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*
m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 209916*
B*a*b*c**2*d*m*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 5737
9*m**3 + 177331*m**2 + 264207*m + 135135) + 115830*B*a*b*c**2*d*x**7*(e*x)*
*m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264
207*m + 135135) + 6*B*a*b*c*d**2*m**6*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m
5 + 10045*m4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 240*B*a*
b*c*d**2*m**5*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379
*m**3 + 177331*m**2 + 264207*m + 135135) + 3678*B*a*b*c*d**2*m**4*x**9*(e*x
)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 2
64207*m + 135135) + 27168*B*a*b*c*d**2*m**3*x**9*(e*x)**m/(m**7 + 49*m**6 +
 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 99
762*B*a*b*c*d**2*m**2*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4

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 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 166128*B*a*b*c*d**2*m*x*
*9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m
**2 + 264207*m + 135135) + 90090*B*a*b*c*d**2*x**9*(e*x)**m/(m**7 + 49*m**6
 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
2*B*a*b*d**3*m**6*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
57379*m**3 + 177331*m**2 + 264207*m + 135135) + 76*B*a*b*d**3*m**5*x**11*(e
*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
 264207*m + 135135) + 1110*B*a*b*d**3*m**4*x**11*(e*x)**m/(m**7 + 49*m**6 +
 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 78
80*B*a*b*d**3*m**3*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 28078*B*a*b*d**3*m**2*x**1
1*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m*
*2 + 264207*m + 135135) + 45804*B*a*b*d**3*m*x**11*(e*x)**m/(m**7 + 49*m**6
 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
24570*B*a*b*d**3*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 5
7379*m**3 + 177331*m**2 + 264207*m + 135135) + B*b**2*c**3*m**6*x**7*(e*x)*
*m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264
207*m + 135135) + 42*B*b**2*c**3*m**5*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m
**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 679*B*b*
*2*c**3*m**4*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*
m**3 + 177331*m**2 + 264207*m + 135135) + 5292*B*b**2*c**3*m**3*x**7*(e*x)*
*m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264
207*m + 135135) + 20335*B*b**2*c**3*m**2*x**7*(e*x)**m/(m**7 + 49*m**6 + 97
3*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 34986
*B*b**2*c**3*m*x**7*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 5737
9*m**3 + 177331*m**2 + 264207*m + 135135) + 19305*B*b**2*c**3*x**7*(e*x)**m
/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 26420
7*m + 135135) + 3*B*b**2*c**2*d*m**6*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m*
*5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 120*B*b**
2*c**2*d*m**5*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379
*m**3 + 177331*m**2 + 264207*m + 135135) + 1839*B*b**2*c**2*d*m**4*x**9*(e*
x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
264207*m + 135135) + 13584*B*b**2*c**2*d*m**3*x**9*(e*x)**m/(m**7 + 49*m**6
 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) +
49881*B*b**2*c**2*d*m**2*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m
**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 83064*B*b**2*c**2*d*m
*x**9*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 17733
1*m**2 + 264207*m + 135135) + 45045*B*b**2*c**2*d*x**9*(e*x)**m/(m**7 + 49*
m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135
) + 3*B*b**2*c*d**2*m**6*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*
m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 114*B*b**2*c*d**2*m*
*5*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 17
7331*m**2 + 264207*m + 135135) + 1665*B*b**2*c*d**2*m**4*x**11*(e*x)**m/(m*
*7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m
+ 135135) + 11820*B*b**2*c*d**2*m**3*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m
```

```
**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 42117*B*
b**2*c*d**2*m**2*x**11*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 5
7379*m**3 + 177331*m**2 + 264207*m + 135135) + 68706*B*b**2*c*d**2*m*x**11*
(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2
 + 264207*m + 135135) + 36855*B*b**2*c*d**2*x**11*(e*x)**m/(m**7 + 49*m**6
+ 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + B
*b**2*d**3*m**6*x**13*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57
379*m**3 + 177331*m**2 + 264207*m + 135135) + 36*B*b**2*d**3*m**5*x**13*(e*
x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 +
264207*m + 135135) + 505*B*b**2*d**3*m**4*x**13*(e*x)**m/(m**7 + 49*m**6 +
973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 348
0*B*b**2*d**3*m**3*x**13*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 +
 57379*m**3 + 177331*m**2 + 264207*m + 135135) + 12139*B*b**2*d**3*m**2*x**
13*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m
**2 + 264207*m + 135135) + 19524*B*b**2*d**3*m*x**13*(e*x)**m/(m**7 + 49*m*
*6 + 973*m**5 + 10045*m**4 + 57379*m**3 + 177331*m**2 + 264207*m + 135135)
+ 10395*B*b**2*d**3*x**13*(e*x)**m/(m**7 + 49*m**6 + 973*m**5 + 10045*m**4
+ 57379*m**3 + 177331*m**2 + 264207*m + 135135), True))
```

Maxima [A] (verification not implemented)

none

Time = 0.27 (sec) , antiderivative size = 550, normalized size of antiderivative = 1.94

$$\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \frac{Bb^2d^3e^mx^{13}x^m}{m+13} + \frac{3\,Bb^2cd^2e^mx^{11}x^m}{m+11} + \frac{2\,Babd^3e^mx^{11}x^m}{m+11} + \frac{Ab^2d^3e^mx^{11}x^m}{m+11} + \frac{3\,Bb^2c^2de^mx^9x^m}{m+9} + \frac{6\,Babcd^2e^mx^9x^m}{m+9} + \frac{3\,Ab^2cd^2e^mx^9x^m}{m+9} + \frac{Ba^2d^3e^mx^9x^m}{m+9} + \frac{2\,Aabd^3e^mx^9x^m}{m+9} + \frac{Bb^2c^3e^mx^7x^m}{m+7} + \frac{6\,Babc^2de^mx^7x^m}{m+7} + \frac{3\,Ab^2c^2de^mx^7x^m}{m+7} + \frac{3\,Ba^2cd^2e^mx^7x^m}{m+7} + \frac{6\,Aabcd^2e^mx^7x^m}{m+7} + \frac{Aa^2d^3e^mx^7x^m}{m+7} + \frac{2\,Babc^3e^mx^5x^m}{m+5} + \frac{Ab^2c^3e^mx^5x^m}{m+5} + \frac{3\,Ba^2c^2de^mx^5x^m}{m+5} + \frac{6\,Aabc^2de^mx^5x^m}{m+5} + \frac{3\,Aa^2cd^2e^mx^5x^m}{m+5} + \frac{Ba^2c^3e^mx^3x^m}{m+3} + \frac{2\,Aabc^3e^mx^3x^m}{m+3} + \frac{3\,Aa^2c^2de^mx^3x^m}{m+3} + \frac{(ex)^{m+1}\,Aa^2c^3}{e(m+1)}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="maxima")
```

```
[Out] B*b^2*d^3*e^m*x^13*x^m/(m + 13) + 3*B*b^2*c*d^2*e^m*x^11*x^m/(m + 11) + 2*B
*a*b*d^3*e^m*x^11*x^m/(m + 11) + A*b^2*d^3*e^m*x^11*x^m/(m + 11) + 3*B*b^2*
c^2*d*e^m*x^9*x^m/(m + 9) + 6*B*a*b*c*d^2*e^m*x^9*x^m/(m + 9) + 3*A*b^2*c*d
^2*e^m*x^9*x^m/(m + 9) + B*a^2*d^3*e^m*x^9*x^m/(m + 9) + 2*A*a*b*d^3*e^m*x^
9*x^m/(m + 9) + B*b^2*c^3*e^m*x^7*x^m/(m + 7) + 6*B*a*b*c^2*d*e^m*x^7*x^m/(
m + 7) + 3*A*b^2*c^2*d*e^m*x^7*x^m/(m + 7) + 3*B*a^2*c*d^2*e^m*x^7*x^m/(m +
 7) + 6*A*a*b*c*d^2*e^m*x^7*x^m/(m + 7) + A*a^2*d^3*e^m*x^7*x^m/(m + 7) + 2
*B*a*b*c^3*e^m*x^5*x^m/(m + 5) + A*b^2*c^3*e^m*x^5*x^m/(m + 5) + 3*B*a^2*c^
2*d*e^m*x^5*x^m/(m + 5) + 6*A*a*b*c^2*d*e^m*x^5*x^m/(m + 5) + 3*A*a^2*c*d^2
*e^m*x^5*x^m/(m + 5) + B*a^2*c^3*e^m*x^3*x^m/(m + 3) + 2*A*a*b*c^3*e^m*x^3*
x^m/(m + 3) + 3*A*a^2*c^2*d*e^m*x^3*x^m/(m + 3) + (e*x)^(m + 1)*A*a^2*c^3/(
e*(m + 1))
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 3283 vs. $2(284) = 568$.

Time = 0.37 (sec) , antiderivative size = 3283, normalized size of antiderivative = 11.56

$$\int (ex)^m (a + bx^2)^2 (A + Bx^2) (c + dx^2)^3 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*b^2*d^3*m^6*x^13 + 36*(e*x)^m*B*b^2*d^3*m^5*x^13 + 3*(e*x)^m*B*b
^2*c*d^2*m^6*x^11 + 2*(e*x)^m*B*a*b*d^3*m^6*x^11 + (e*x)^m*A*b^2*d^3*m^6*x^
11 + 505*(e*x)^m*B*b^2*d^3*m^4*x^13 + 114*(e*x)^m*B*b^2*c*d^2*m^5*x^11 + 76
*(e*x)^m*B*a*b*d^3*m^5*x^11 + 38*(e*x)^m*A*b^2*d^3*m^5*x^11 + 3480*(e*x)^m*
B*b^2*d^3*m^3*x^13 + 3*(e*x)^m*B*b^2*c^2*d*m^6*x^9 + 6*(e*x)^m*B*a*b*c*d^2*
m^6*x^9 + 3*(e*x)^m*A*b^2*c*d^2*m^6*x^9 + (e*x)^m*B*a^2*d^3*m^6*x^9 + 2*(e*
x)^m*A*a*b*d^3*m^6*x^9 + 1665*(e*x)^m*B*b^2*c*d^2*m^4*x^11 + 1110*(e*x)^m*B
*a*b*d^3*m^4*x^11 + 555*(e*x)^m*A*b^2*d^3*m^4*x^11 + 12139*(e*x)^m*B*b^2*d^
3*m^2*x^13 + 120*(e*x)^m*B*b^2*c^2*d*m^5*x^9 + 240*(e*x)^m*B*a*b*c*d^2*m^5*
x^9 + 120*(e*x)^m*A*b^2*c*d^2*m^5*x^9 + 40*(e*x)^m*B*a^2*d^3*m^5*x^9 + 80*(
e*x)^m*A*a*b*d^3*m^5*x^9 + 11820*(e*x)^m*B*b^2*c*d^2*m^3*x^11 + 7880*(e*x)^
m*B*a*b*d^3*m^3*x^11 + 3940*(e*x)^m*A*b^2*d^3*m^3*x^11 + 19524*(e*x)^m*B*b^
2*d^3*m*x^13 + (e*x)^m*B*b^2*c^3*m^6*x^7 + 6*(e*x)^m*B*a*b*c^2*d*m^6*x^7 +
3*(e*x)^m*A*b^2*c^2*d*m^6*x^7 + 3*(e*x)^m*B*a^2*c*d^2*m^6*x^7 + 6*(e*x)^m*A
*a*b*c*d^2*m^6*x^7 + (e*x)^m*A*a^2*d^3*m^6*x^7 + 1839*(e*x)^m*B*b^2*c^2*d*m
^4*x^9 + 3678*(e*x)^m*B*a*b*c*d^2*m^4*x^9 + 1839*(e*x)^m*A*b^2*c*d^2*m^4*x^
9 + 613*(e*x)^m*B*a^2*d^3*m^4*x^9 + 1226*(e*x)^m*A*a*b*d^3*m^4*x^9 + 42117*
(e*x)^m*B*b^2*c*d^2*m^2*x^11 + 28078*(e*x)^m*B*a*b*d^3*m^2*x^11 + 14039*(e*
x)^m*A*b^2*d^3*m^2*x^11 + 10395*(e*x)^m*B*b^2*d^3*x^13 + 42*(e*x)^m*B*b^2*c
^3*m^5*x^7 + 252*(e*x)^m*B*a*b*c^2*d*m^5*x^7 + 126*(e*x)^m*A*b^2*c^2*d*m^5*
x^7 + 126*(e*x)^m*B*a^2*c*d^2*m^5*x^7 + 252*(e*x)^m*A*a*b*c*d^2*m^5*x^7 + 4
2*(e*x)^m*A*a^2*d^3*m^5*x^7 + 13584*(e*x)^m*B*b^2*c^2*d*m^3*x^9 + 27168*(e*
x)^m*B*a*b*c*d^2*m^3*x^9 + 13584*(e*x)^m*A*b^2*c*d^2*m^3*x^9 + 4528*(e*x)^m
*B*a^2*d^3*m^3*x^9 + 9056*(e*x)^m*A*a*b*d^3*m^3*x^9 + 68706*(e*x)^m*B*b^2*c
*d^2*m*x^11 + 45804*(e*x)^m*B*a*b*d^3*m*x^11 + 22902*(e*x)^m*A*b^2*d^3*m*x^
11 + 2*(e*x)^m*B*a*b*c^3*m^6*x^5 + (e*x)^m*A*b^2*c^3*m^6*x^5 + 3*(e*x)^m*B*
a^2*c^2*d*m^6*x^5 + 6*(e*x)^m*A*a*b*c^2*d*m^6*x^5 + 3*(e*x)^m*A*a^2*c*d^2*m
^6*x^5 + 679*(e*x)^m*B*b^2*c^3*m^4*x^7 + 4074*(e*x)^m*B*a*b*c^2*d*m^4*x^7 +
 2037*(e*x)^m*A*b^2*c^2*d*m^4*x^7 + 2037*(e*x)^m*B*a^2*c*d^2*m^4*x^7 + 4074
*(e*x)^m*A*a*b*c*d^2*m^4*x^7 + 679*(e*x)^m*A*a^2*d^3*m^4*x^7 + 49881*(e*x)^
m*B*b^2*c^2*d*m^2*x^9 + 99762*(e*x)^m*B*a*b*c*d^2*m^2*x^9 + 49881*(e*x)^m*A
*b^2*c*d^2*m^2*x^9 + 16627*(e*x)^m*B*a^2*d^3*m^2*x^9 + 33254*(e*x)^m*A*a*b*
d^3*m^2*x^9 + 36855*(e*x)^m*B*b^2*c*d^2*x^11 + 24570*(e*x)^m*B*a*b*d^3*x^11
 + 12285*(e*x)^m*A*b^2*d^3*x^11 + 88*(e*x)^m*B*a*b*c^3*m^5*x^5 + 44*(e*x)^m
*A*b^2*c^3*m^5*x^5 + 132*(e*x)^m*B*a^2*c^2*d*m^5*x^5 + 264*(e*x)^m*A*a*b*c^
```

2*d*m^5*x^5 + 132*(e*x)^m*A*a^2*c*d^2*m^5*x^5 + 5292*(e*x)^m*B*b^2*c^3*m^3*
x^7 + 31752*(e*x)^m*B*a*b*c^2*d*m^3*x^7 + 15876*(e*x)^m*A*b^2*c^2*d*m^3*x^7
 + 15876*(e*x)^m*B*a^2*c*d^2*m^3*x^7 + 31752*(e*x)^m*A*a*b*c*d^2*m^3*x^7 +
5292*(e*x)^m*A*a^2*d^3*m^3*x^7 + 83064*(e*x)^m*B*b^2*c^2*d*m*x^9 + 166128*(
e*x)^m*B*a*b*c*d^2*m*x^9 + 83064*(e*x)^m*A*b^2*c*d^2*m*x^9 + 27688*(e*x)^m*
B*a^2*d^3*m*x^9 + 55376*(e*x)^m*A*a*b*d^3*m*x^9 + (e*x)^m*B*a^2*c^3*m^6*x^3
 + 2*(e*x)^m*A*a*b*c^3*m^6*x^3 + 3*(e*x)^m*A*a^2*c^2*d*m^6*x^3 + 1506*(e*x)
^m*B*a*b*c^3*m^4*x^5 + 753*(e*x)^m*A*b^2*c^3*m^4*x^5 + 2259*(e*x)^m*B*a^2*c
^2*d*m^4*x^5 + 4518*(e*x)^m*A*a*b*c^2*d*m^4*x^5 + 2259*(e*x)^m*A*a^2*c*d^2*
m^4*x^5 + 20335*(e*x)^m*B*b^2*c^3*m^2*x^7 + 122010*(e*x)^m*B*a*b*c^2*d*m^2*
x^7 + 61005*(e*x)^m*A*b^2*c^2*d*m^2*x^7 + 61005*(e*x)^m*B*a^2*c*d^2*m^2*x^7
 + 122010*(e*x)^m*A*a*b*c*d^2*m^2*x^7 + 20335*(e*x)^m*A*a^2*d^3*m^2*x^7 + 4
5045*(e*x)^m*B*b^2*c^2*d*x^9 + 90090*(e*x)^m*B*a*b*c*d^2*x^9 + 45045*(e*x)^
m*A*b^2*c*d^2*x^9 + 15015*(e*x)^m*B*a^2*d^3*x^9 + 30030*(e*x)^m*A*a*b*d^3*x
^9 + 46*(e*x)^m*B*a^2*c^3*m^5*x^3 + 92*(e*x)^m*A*a*b*c^3*m^5*x^3 + 138*(e*x
)^m*A*a^2*c^2*d*m^5*x^3 + 12560*(e*x)^m*B*a*b*c^3*m^3*x^5 + 6280*(e*x)^m*A*
b^2*c^3*m^3*x^5 + 18840*(e*x)^m*B*a^2*c^2*d*m^3*x^5 + 37680*(e*x)^m*A*a*b*c
^2*d*m^3*x^5 + 18840*(e*x)^m*A*a^2*c*d^2*m^3*x^5 + 34986*(e*x)^m*B*b^2*c^3*
m*x^7 + 209916*(e*x)^m*B*a*b*c^2*d*m*x^7 + 104958*(e*x)^m*A*b^2*c^2*d*m*x^7
 + 104958*(e*x)^m*B*a^2*c*d^2*m*x^7 + 209916*(e*x)^m*A*a*b*c*d^2*m*x^7 + 34
986*(e*x)^m*A*a^2*d^3*m*x^7 + (e*x)^m*A*a^2*c^3*m^6*x + 835*(e*x)^m*B*a^2*c
^3*m^4*x^3 + 1670*(e*x)^m*A*a*b*c^3*m^4*x^3 + 2505*(e*x)^m*A*a^2*c^2*d*m^4*
x^3 + 51958*(e*x)^m*B*a*b*c^3*m^2*x^5 + 25979*(e*x)^m*A*b^2*c^3*m^2*x^5 + 7
7937*(e*x)^m*B*a^2*c^2*d*m^2*x^5 + 155874*(e*x)^m*A*a*b*c^2*d*m^2*x^5 + 779
37*(e*x)^m*A*a^2*c*d^2*m^2*x^5 + 19305*(e*x)^m*B*b^2*c^3*x^7 + 115830*(e*x)
^m*B*a*b*c^2*d*x^7 + 57915*(e*x)^m*A*b^2*c^2*d*x^7 + 57915*(e*x)^m*B*a^2*c*
d^2*x^7 + 115830*(e*x)^m*A*a*b*c*d^2*x^7 + 19305*(e*x)^m*A*a^2*d^3*x^7 + 48
*(e*x)^m*A*a^2*c^3*m^5*x + 7540*(e*x)^m*B*a^2*c^3*m^3*x^3 + 15080*(e*x)^m*A
*a*b*c^3*m^3*x^3 + 22620*(e*x)^m*A*a^2*c^2*d*m^3*x^3 + 94872*(e*x)^m*B*a*b*
c^3*m*x^5 + 47436*(e*x)^m*A*b^2*c^3*m*x^5 + 142308*(e*x)^m*B*a^2*c^2*d*m*x^
5 + 284616*(e*x)^m*A*a*b*c^2*d*m*x^5 + 142308*(e*x)^m*A*a^2*c*d^2*m*x^5 + 9
25*(e*x)^m*A*a^2*c^3*m^4*x + 34759*(e*x)^m*B*a^2*c^3*m^2*x^3 + 69518*(e*x)^
m*A*a*b*c^3*m^2*x^3 + 104277*(e*x)^m*A*a^2*c^2*d*m^2*x^3 + 54054*(e*x)^m*B*
a*b*c^3*x^5 + 27027*(e*x)^m*A*b^2*c^3*x^5 + 81081*(e*x)^m*B*a^2*c^2*d*x^5 +
 162162*(e*x)^m*A*a*b*c^2*d*x^5 + 81081*(e*x)^m*A*a^2*c*d^2*x^5 + 9120*(e*x
)^m*A*a^2*c^3*m^3*x + 73054*(e*x)^m*B*a^2*c^3*m*x^3 + 146108*(e*x)^m*A*a*b*
c^3*m*x^3 + 219162*(e*x)^m*A*a^2*c^2*d*m*x^3 + 48259*(e*x)^m*A*a^2*c^3*m^2*
x + 45045*(e*x)^m*B*a^2*c^3*x^3 + 90090*(e*x)^m*A*a*b*c^3*x^3 + 135135*(e*x
)^m*A*a^2*c^2*d*x^3 + 129072*(e*x)^m*A*a^2*c^3*m*x + 135135*(e*x)^m*A*a^2*c
^3*x)/(m^7 + 49*m^6 + 973*m^5 + 10045*m^4 + 57379*m^3 + 177331*m^2 + 264207
*m + 135135)

Mupad [B] (verification not implemented)

Time = 6.26 (sec) , antiderivative size = 694, normalized size of antiderivative = 2.44

$$
\begin{aligned}
&\int (ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx \\
&= \frac{x^7\,(e\,x)^m\,(3\,B\,a^2\,c\,d^2+A\,a^2\,d^3+6\,B\,a\,b\,c^2\,d+6\,A\,a\,b\,c\,d^2+B\,b^2\,c^3+3\,A\,b^2\,c^2\,d)\,\left(m^6+42\,m^5+679\,m^4+\cdots\right.}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+\cdots} \\
&+ \frac{c\,x^5\,(e\,x)^m\,(3\,B\,a^2\,c\,d+3\,A\,a^2\,d^2+2\,B\,a\,b\,c^2+6\,A\,a\,b\,c\,d+A\,b^2\,c^2)\,\left(m^6+44\,m^5+753\,m^4+6280\,m^3+\cdots\right.}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135\cdots} \\
&+ \frac{d\,x^9\,(e\,x)^m\,(B\,a^2\,d^2+6\,B\,a\,b\,c\,d+2\,A\,a\,b\,d^2+3\,B\,b^2\,c^2+3\,A\,b^2\,c\,d)\,\left(m^6+40\,m^5+613\,m^4+4528\,m^3+\cdots\right.}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135\cdots} \\
&+ \frac{A\,a^2\,c^3\,x\,(e\,x)^m\,\left(m^6+48\,m^5+925\,m^4+9120\,m^3+48259\,m^2+129072\,m+135135\right)}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135135} \\
&+ \frac{a\,c^2\,x^3\,(e\,x)^m\,(3\,A\,a\,d+2\,A\,b\,c+B\,a\,c)\,\left(m^6+46\,m^5+835\,m^4+7540\,m^3+34759\,m^2+73054\,m+4504\cdots\right.}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135135} \\
&+ \frac{b\,d^2\,x^{11}\,(e\,x)^m\,(A\,b\,d+2\,B\,a\,d+3\,B\,b\,c)\,\left(m^6+38\,m^5+555\,m^4+3940\,m^3+14039\,m^2+22902\,m+122\cdots\right.}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135135} \\
&+ \frac{B\,b^2\,d^3\,x^{13}\,(e\,x)^m\,\left(m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395\right)}{m^7+49\,m^6+973\,m^5+10045\,m^4+57379\,m^3+177331\,m^2+264207\,m+135135}
\end{aligned}
$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^2*(c + d*x^2)^3,x)
```

```
[Out] (x^7*(e*x)^m*(A*a^2*d^3 + B*b^2*c^3 + 3*A*b^2*c^2*d + 3*B*a^2*c*d^2 + 6*A*a
*b*c*d^2 + 6*B*a*b*c^2*d)*(34986*m + 20335*m^2 + 5292*m^3 + 679*m^4 + 42*m^
5 + m^6 + 19305))/(264207*m + 177331*m^2 + 57379*m^3 + 10045*m^4 + 973*m^5
+ 49*m^6 + m^7 + 135135) + (c*x^5*(e*x)^m*(3*A*a^2*d^2 + A*b^2*c^2 + 2*B*a*
b*c^2 + 3*B*a^2*c*d + 6*A*a*b*c*d)*(47436*m + 25979*m^2 + 6280*m^3 + 753*m^
4 + 44*m^5 + m^6 + 27027))/(264207*m + 177331*m^2 + 57379*m^3 + 10045*m^4 +
 973*m^5 + 49*m^6 + m^7 + 135135) + (d*x^9*(e*x)^m*(B*a^2*d^2 + 3*B*b^2*c^2
 + 2*A*a*b*d^2 + 3*A*b^2*c*d + 6*B*a*b*c*d)*(27688*m + 16627*m^2 + 4528*m^3
 + 613*m^4 + 40*m^5 + m^6 + 15015))/(264207*m + 177331*m^2 + 57379*m^3 + 10
045*m^4 + 973*m^5 + 49*m^6 + m^7 + 135135) + (A*a^2*c^3*x*(e*x)^m*(129072*m
 + 48259*m^2 + 9120*m^3 + 925*m^4 + 48*m^5 + m^6 + 135135))/(264207*m + 177
331*m^2 + 57379*m^3 + 10045*m^4 + 973*m^5 + 49*m^6 + m^7 + 135135) + (a*c^2
*x^3*(e*x)^m*(3*A*a*d + 2*A*b*c + B*a*c)*(73054*m + 34759*m^2 + 7540*m^3 +
835*m^4 + 46*m^5 + m^6 + 45045))/(264207*m + 177331*m^2 + 57379*m^3 + 10045
*m^4 + 973*m^5 + 49*m^6 + m^7 + 135135) + (b*d^2*x^11*(e*x)^m*(A*b*d + 2*B*
a*d + 3*B*b*c)*(22902*m + 14039*m^2 + 3940*m^3 + 555*m^4 + 38*m^5 + m^6 + 1
2285))/(264207*m + 177331*m^2 + 57379*m^3 + 10045*m^4 + 973*m^5 + 49*m^6 +
m^7 + 135135) + (B*b^2*d^3*x^13*(e*x)^m*(19524*m + 12139*m^2 + 3480*m^3 + 5
05*m^4 + 36*m^5 + m^6 + 10395))/(264207*m + 177331*m^2 + 57379*m^3 + 10045*
m^4 + 973*m^5 + 49*m^6 + m^7 + 135135)
```

3.17 $\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx$

Optimal result

Integrand size = 29, antiderivative size = 189

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \frac{aAc^3(ex)^{1+m}}{e(1+m)} + \frac{c^2(Abc+aBc+3aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{c(3ad(Bc+Ad)+bc(Bc+3Ad))(ex)^{5+m}}{e^5(5+m)} + \frac{d(3bc(Bc+Ad)+ad(3Bc+Ad))(ex)^{7+m}}{e^7(7+m)} + \frac{d^2(3bBc+Abd+aBd)(ex)^{9+m}}{e^9(9+m)} + \frac{bBd^3(ex)^{11+m}}{e^{11}(11+m)}$$

```
[Out] a*A*c^3*(e*x)^(1+m)/e/(1+m)+c^2*(3*A*a*d+A*b*c+B*a*c)*(e*x)^(3+m)/e^3/(3+m)
+c*(3*a*d*(A*d+B*c)+b*c*(3*A*d+B*c))*(e*x)^(5+m)/e^5/(5+m)+d*(3*b*c*(A*d+B*
c)+a*d*(A*d+3*B*c))*(e*x)^(7+m)/e^7/(7+m)+d^2*(A*b*d+B*a*d+3*B*b*c)*(e*x)^(
9+m)/e^9/(9+m)+b*B*d^3*(e*x)^(11+m)/e^11/(11+m)
```

Rubi [A] (verified)

Time = 0.12 (sec) , antiderivative size = 189, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1, $\frac{\text{number of rules}}{\text{integrand size}} = 0.034$, Rules used

$= \{584\}$

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \frac{c^2(ex)^{m+3}(3aAd+aBc+Abc)}{e^3(m+3)} + \frac{d^2(ex)^{m+9}(aBd+Abd+3bBc)}{e^9(m+9)} + \frac{d(ex)^{m+7}(ad(Ad+3Bc)+3bc(Ad+Bc))}{e^7(m+7)} + \frac{c(ex)^{m+5}(3ad(Ad+Bc)+bc(3Ad+Bc))}{e^5(m+5)} + \frac{aAc^3(ex)^{m+1}}{e(m+1)} + \frac{bBd^3(ex)^{m+11}}{e^{11}(m+11)}$$

```
[In] Int[(e*x)^m*(a + b*x^2)*(A + B*x^2)*(c + d*x^2)^3,x]
```

```
[Out] (a*A*c^3*(e*x)^(1 + m))/(e*(1 + m)) + (c^2*(A*b*c + a*B*c + 3*a*A*d)*(e*x)^
(3 + m))/(e^3*(3 + m)) + (c*(3*a*d*(B*c + A*d) + b*c*(B*c + 3*A*d))*(e*x)^(
5 + m))/(e^5*(5 + m)) + (d*(3*b*c*(B*c + A*d) + a*d*(3*B*c + A*d))*(e*x)^(7
 + m))/(e^7*(7 + m)) + (d^2*(3*b*B*c + A*b*d + a*B*d)*(e*x)^(9 + m))/(e^9*(
9 + m)) + (b*B*d^3*(e*x)^(11 + m))/(e^11*(11 + m))
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\begin{aligned} \text{integral} &= \int \left(aAc^3(ex)^m + \frac{c^2(Abc+aBc+3aAd)(ex)^{2+m}}{e^2} + \frac{c(3ad(Bc+Ad)+bc(Bc+3Ad))(ex)^{4+m}}{e^4} + \frac{d(3bc(Bc+Ad)+ad(3Bc+Ad))(ex)^{6+m}}{e^6} + \frac{d^2(3bBc+Abd+aBd)(ex)^{8+m}}{e^8} + \frac{bBd^3(ex)^{10+m}}{e^{10}}\right) dx \\ &= \frac{aAc^3(ex)^{1+m}}{e(1+m)} + \frac{c^2(Abc+aBc+3aAd)(ex)^{3+m}}{e^3(3+m)} + \frac{c(3ad(Bc+Ad)+bc(Bc+3Ad))(ex)^{5+m}}{e^5(5+m)} + \frac{d(3bc(Bc+Ad)+ad(3Bc+Ad))(ex)^{7+m}}{e^7(7+m)} + \frac{d^2(3bBc+Abd+aBd)(ex)^{9+m}}{e^9(9+m)} + \frac{bBd^3(ex)^{11+m}}{e^{11}(11+m)} \end{aligned}$$

Mathematica [A] (verified)

Time = 0.43 (sec) , antiderivative size = 151, normalized size of antiderivative = 0.80

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = x(ex)^m \left(\frac{aAc^3}{1+m} + \frac{c^2(Abc+aBc+3aAd)x^2}{3+m} + \frac{c(3ad(Bc+Ad)+bc(Bc+3Ad))x^4}{5+m} + \frac{d(3bc(Bc+Ad)+ad(3Bc+Ad))x^6}{7+m} + \frac{d^2(3bBc+Abd+aBd)x^8}{9+m} + \frac{bBd^3x^{10}}{11+m}\right)$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)*(A + B*x^2)*(c + d*x^2)^3,x]
```

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

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 1228 vs. 2(189) = 378.

Time = 3.47 (sec) , antiderivative size = 1229, normalized size of antiderivative = 6.50

method	result	size
gosper	Expression too large to display	1229
risch	Expression too large to display	1229
parallelrisch	Expression too large to display	1709

```
[In] int((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c)^3,x,method=_RETURNVERBOSE)
```

```
[Out] x*(B*b*d^3*m^5*x^10+25*B*b*d^3*m^4*x^10+A*b*d^3*m^5*x^8+B*a*d^3*m^5*x^8+3*B
*b*c*d^2*m^5*x^8+230*B*b*d^3*m^3*x^10+27*A*b*d^3*m^4*x^8+27*B*a*d^3*m^4*x^8
+81*B*b*c*d^2*m^4*x^8+950*B*b*d^3*m^2*x^10+A*a*d^3*m^5*x^6+3*A*b*c*d^2*m^5*
x^6+262*A*b*d^3*m^3*x^8+3*B*a*c*d^2*m^5*x^6+262*B*a*d^3*m^3*x^8+3*B*b*c^2*d
*m^5*x^6+786*B*b*c*d^2*m^3*x^8+1689*B*b*d^3*m*x^10+29*A*a*d^3*m^4*x^6+87*A*
b*c*d^2*m^4*x^6+1122*A*b*d^3*m^2*x^8+87*B*a*c*d^2*m^4*x^6+1122*B*a*d^3*m^2*
x^8+87*B*b*c^2*d*m^4*x^6+3366*B*b*c*d^2*m^2*x^8+945*B*b*d^3*x^10+3*A*a*c*d^
2*m^5*x^4+302*A*a*d^3*m^3*x^6+3*A*b*c^2*d*m^5*x^4+906*A*b*c*d^2*m^3*x^6+204
1*A*b*d^3*m*x^8+3*B*a*c^2*d*m^5*x^4+906*B*a*c*d^2*m^3*x^6+2041*B*a*d^3*m*x^
8+B*b*c^3*m^5*x^4+906*B*b*c^2*d*m^3*x^6+6123*B*b*c*d^2*m*x^8+93*A*a*c*d^2*m
^4*x^4+1366*A*a*d^3*m^2*x^6+93*A*b*c^2*d*m^4*x^4+4098*A*b*c*d^2*m^2*x^6+115
5*A*b*d^3*x^8+93*B*a*c^2*d*m^4*x^4+4098*B*a*c*d^2*m^2*x^6+1155*B*a*d^3*x^8+
```

```
31*B*b*c^3*m^4*x^4+4098*B*b*c^2*d*m^2*x^6+3465*B*b*c*d^2*x^8+3*A*a*c^2*d*m^
5*x^2+1050*A*a*c*d^2*m^3*x^4+2577*A*a*d^3*m*x^6+A*b*c^3*m^5*x^2+1050*A*b*c^
2*d*m^3*x^4+7731*A*b*c*d^2*m*x^6+B*a*c^3*m^5*x^2+1050*B*a*c^2*d*m^3*x^4+773
1*B*a*c*d^2*m*x^6+350*B*b*c^3*m^3*x^4+7731*B*b*c^2*d*m*x^6+99*A*a*c^2*d*m^4
*x^2+5190*A*a*c*d^2*m^2*x^4+1485*A*a*d^3*x^6+33*A*b*c^3*m^4*x^2+5190*A*b*c^
2*d*m^2*x^4+4455*A*b*c*d^2*x^6+33*B*a*c^3*m^4*x^2+5190*B*a*c^2*d*m^2*x^4+44
55*B*a*c*d^2*x^6+1730*B*b*c^3*m^2*x^4+4455*B*b*c^2*d*x^6+A*a*c^3*m^5+1218*A
*a*c^2*d*m^3*x^2+10467*A*a*c*d^2*m*x^4+406*A*b*c^3*m^3*x^2+10467*A*b*c^2*d*
m*x^4+406*B*a*c^3*m^3*x^2+10467*B*a*c^2*d*m*x^4+3489*B*b*c^3*m*x^4+35*A*a*c
^3*m^4+6786*A*a*c^2*d*m^2*x^2+6237*A*a*c*d^2*x^4+2262*A*b*c^3*m^2*x^2+6237*
A*b*c^2*d*x^4+2262*B*a*c^3*m^2*x^2+6237*B*a*c^2*d*x^4+2079*B*b*c^3*x^4+470*
A*a*c^3*m^3+16059*A*a*c^2*d*m*x^2+5353*A*b*c^3*m*x^2+5353*B*a*c^3*m*x^2+301
0*A*a*c^3*m^2+10395*A*a*c^2*d*x^2+3465*A*b*c^3*x^2+3465*B*a*c^3*x^2+9129*A*
a*c^3*m+10395*A*a*c^3)*(e*x)^m/(11+m)/(9+m)/(7+m)/(5+m)/(3+m)/(1+m)
```

Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 837 vs. 2(189) = 378.

Time = 0.28 (sec) , antiderivative size = 837, normalized size of antiderivative = 4.43

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^3 dx = \frac{((Bbd^3m^5+25\,Bbd^3m^4+230\,Bbd^3m^3+950\,Bbd^3m^2+1689\,Bbd^3m+945\,Bbd^3)x^{11}+((3\,Bbcd^2+(Ba+\cdots}{\cdots}$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="fricas")
```

```
[Out] ((B*b*d^3*m^5 + 25*B*b*d^3*m^4 + 230*B*b*d^3*m^3 + 950*B*b*d^3*m^2 + 1689*B
*b*d^3*m + 945*B*b*d^3)*x^11 + ((3*B*b*c*d^2 + (B*a + A*b)*d^3)*m^5 + 3465*
B*b*c*d^2 + 27*(3*B*b*c*d^2 + (B*a + A*b)*d^3)*m^4 + 1155*(B*a + A*b)*d^3 +
 262*(3*B*b*c*d^2 + (B*a + A*b)*d^3)*m^3 + 1122*(3*B*b*c*d^2 + (B*a + A*b)*
d^3)*m^2 + 2041*(3*B*b*c*d^2 + (B*a + A*b)*d^3)*m)*x^9 + ((3*B*b*c^2*d + A*
a*d^3 + 3*(B*a + A*b)*c*d^2)*m^5 + 4455*B*b*c^2*d + 1485*A*a*d^3 + 29*(3*B*
b*c^2*d + A*a*d^3 + 3*(B*a + A*b)*c*d^2)*m^4 + 4455*(B*a + A*b)*c*d^2 + 302
*(3*B*b*c^2*d + A*a*d^3 + 3*(B*a + A*b)*c*d^2)*m^3 + 1366*(3*B*b*c^2*d + A*
a*d^3 + 3*(B*a + A*b)*c*d^2)*m^2 + 2577*(3*B*b*c^2*d + A*a*d^3 + 3*(B*a + A
*b)*c*d^2)*m)*x^7 + ((B*b*c^3 + 3*A*a*c*d^2 + 3*(B*a + A*b)*c^2*d)*m^5 + 20
79*B*b*c^3 + 6237*A*a*c*d^2 + 31*(B*b*c^3 + 3*A*a*c*d^2 + 3*(B*a + A*b)*c^2
*d)*m^4 + 6237*(B*a + A*b)*c^2*d + 350*(B*b*c^3 + 3*A*a*c*d^2 + 3*(B*a + A*
b)*c^2*d)*m^3 + 1730*(B*b*c^3 + 3*A*a*c*d^2 + 3*(B*a + A*b)*c^2*d)*m^2 + 34
89*(B*b*c^3 + 3*A*a*c*d^2 + 3*(B*a + A*b)*c^2*d)*m)*x^5 + ((3*A*a*c^2*d + (
B*a + A*b)*c^3)*m^5 + 10395*A*a*c^2*d + 33*(3*A*a*c^2*d + (B*a + A*b)*c^3)*
m^4 + 3465*(B*a + A*b)*c^3 + 406*(3*A*a*c^2*d + (B*a + A*b)*c^3)*m^3 + 2262
*(3*A*a*c^2*d + (B*a + A*b)*c^3)*m^2 + 5353*(3*A*a*c^2*d + (B*a + A*b)*c^3)
*m)*x^3 + (A*a*c^3*m^5 + 35*A*a*c^3*m^4 + 470*A*a*c^3*m^3 + 3010*A*a*c^3*m^
```

```
2 + 9129*A*a*c^3*m + 10395*A*a*c^3)*x)*(e*x)^m/(m^6 + 36*m^5 + 505*m^4 + 34
80*m^3 + 12139*m^2 + 19524*m + 10395)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 5992 vs. 2(184) = 368.

Time = 0.94 (sec) , antiderivative size = 5992, normalized size of antiderivative = 31.70

$$\int (ex)^m \left(a+bx^2\right) \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)*(B*x**2+A)*(d*x**2+c)**3,x)
```

```
[Out] Piecewise(((-A*a*c**3/(10*x**10) - 3*A*a*c**2*d/(8*x**8) - A*a*c*d**2/(2*x*
*6) - A*a*d**3/(4*x**4) - A*b*c**3/(8*x**8) - A*b*c**2*d/(2*x**6) - 3*A*b*c
*d**2/(4*x**4) - A*b*d**3/(2*x**2) - B*a*c**3/(8*x**8) - B*a*c**2*d/(2*x**6
) - 3*B*a*c*d**2/(4*x**4) - B*a*d**3/(2*x**2) - B*b*c**3/(6*x**6) - 3*B*b*c
**2*d/(4*x**4) - 3*B*b*c*d**2/(2*x**2) + B*b*d**3*log(x))/e**11, Eq(m, -11)
), ((-A*a*c**3/(8*x**8) - A*a*c**2*d/(2*x**6) - 3*A*a*c*d**2/(4*x**4) - A*a
*d**3/(2*x**2) - A*b*c**3/(6*x**6) - 3*A*b*c**2*d/(4*x**4) - 3*A*b*c*d**2/(
2*x**2) + A*b*d**3*log(x) - B*a*c**3/(6*x**6) - 3*B*a*c**2*d/(4*x**4) - 3*B
*a*c*d**2/(2*x**2) + B*a*d**3*log(x) - B*b*c**3/(4*x**4) - 3*B*b*c**2*d/(2*
x**2) + 3*B*b*c*d**2*log(x) + B*b*d**3*x**2/2)/e**9, Eq(m, -9)), ((-A*a*c**
3/(6*x**6) - 3*A*a*c**2*d/(4*x**4) - 3*A*a*c*d**2/(2*x**2) + A*a*d**3*log(x
) - A*b*c**3/(4*x**4) - 3*A*b*c**2*d/(2*x**2) + 3*A*b*c*d**2*log(x) + A*b*d
**3*x**2/2 - B*a*c**3/(4*x**4) - 3*B*a*c**2*d/(2*x**2) + 3*B*a*c*d**2*log(x
) + B*a*d**3*x**2/2 - B*b*c**3/(2*x**2) + 3*B*b*c**2*d*log(x) + 3*B*b*c*d**
2*x**2/2 + B*b*d**3*x**4/4)/e**7, Eq(m, -7)), ((-A*a*c**3/(4*x**4) - 3*A*a*
c**2*d/(2*x**2) + 3*A*a*c*d**2*log(x) + A*a*d**3*x**2/2 - A*b*c**3/(2*x**2)
 + 3*A*b*c**2*d*log(x) + 3*A*b*c*d**2*x**2/2 + A*b*d**3*x**4/4 - B*a*c**3/(
2*x**2) + 3*B*a*c**2*d*log(x) + 3*B*a*c*d**2*x**2/2 + B*a*d**3*x**4/4 + B*b
*c**3*log(x) + 3*B*b*c**2*d*x**2/2 + 3*B*b*c*d**2*x**4/4 + B*b*d**3*x**6/6)
/e**5, Eq(m, -5)), ((-A*a*c**3/(2*x**2) + 3*A*a*c**2*d*log(x) + 3*A*a*c*d**
2*x**2/2 + A*a*d**3*x**4/4 + A*b*c**3*log(x) + 3*A*b*c**2*d*x**2/2 + 3*A*b*
c*d**2*x**4/4 + A*b*d**3*x**6/6 + B*a*c**3*log(x) + 3*B*a*c**2*d*x**2/2 + 3
*B*a*c*d**2*x**4/4 + B*a*d**3*x**6/6 + B*b*c**3*x**2/2 + 3*B*b*c**2*d*x**4/
4 + B*b*c*d**2*x**6/2 + B*b*d**3*x**8/8)/e**3, Eq(m, -3)), ((A*a*c**3*log(x
) + 3*A*a*c**2*d*x**2/2 + 3*A*a*c*d**2*x**4/4 + A*a*d**3*x**6/6 + A*b*c**3*
x**2/2 + 3*A*b*c**2*d*x**4/4 + A*b*c*d**2*x**6/2 + A*b*d**3*x**8/8 + B*a*c*
*3*x**2/2 + 3*B*a*c**2*d*x**4/4 + B*a*c*d**2*x**6/2 + B*a*d**3*x**8/8 + B*b
*c**3*x**4/4 + B*b*c**2*d*x**6/2 + 3*B*b*c*d**2*x**8/8 + B*b*d**3*x**10/10)
/e, Eq(m, -1)), (A*a*c**3*m**5*x*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480
*m**3 + 12139*m**2 + 19524*m + 10395) + 35*A*a*c**3*m**4*x*(e*x)**m/(m**6 +
 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 470*A*a*c
**3*m**3*x*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1
```

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9524*m + 10395) + 3010*A*a*c**3*m**2*x*(e*x)**m/(m**6 + 36*m**5 + 505*m**4
+ 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 9129*A*a*c**3*m*x*(e*x)**m/(m
**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1039
5*A*a*c**3*x*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
 19524*m + 10395) + 3*A*a*c**2*d*m**5*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m
**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 99*A*a*c**2*d*m**4*x**3*(
e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 103
95) + 1218*A*a*c**2*d*m**3*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*
m**3 + 12139*m**2 + 19524*m + 10395) + 6786*A*a*c**2*d*m**2*x**3*(e*x)**m/(
m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 160
59*A*a*c**2*d*m*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 1213
9*m**2 + 19524*m + 10395) + 10395*A*a*c**2*d*x**3*(e*x)**m/(m**6 + 36*m**5
+ 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3*A*a*c*d**2*m**5*
x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m
 + 10395) + 93*A*a*c*d**2*m**4*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3
480*m**3 + 12139*m**2 + 19524*m + 10395) + 1050*A*a*c*d**2*m**3*x**5*(e*x)*
*m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) +
 5190*A*a*c*d**2*m**2*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3
+ 12139*m**2 + 19524*m + 10395) + 10467*A*a*c*d**2*m*x**5*(e*x)**m/(m**6 +
36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 6237*A*a*c
*d**2*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1
9524*m + 10395) + A*a*d**3*m**5*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 +
3480*m**3 + 12139*m**2 + 19524*m + 10395) + 29*A*a*d**3*m**4*x**7*(e*x)**m/
(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 30
2*A*a*d**3*m**3*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 1213
9*m**2 + 19524*m + 10395) + 1366*A*a*d**3*m**2*x**7*(e*x)**m/(m**6 + 36*m**
5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 2577*A*a*d**3*m*
x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m
 + 10395) + 1485*A*a*d**3*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m
**3 + 12139*m**2 + 19524*m + 10395) + A*b*c**3*m**5*x**3*(e*x)**m/(m**6 + 3
6*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 33*A*b*c**3
*m**4*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1
9524*m + 10395) + 406*A*b*c**3*m**3*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**
4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 2262*A*b*c**3*m**2*x**3*(e*
x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395
) + 5353*A*b*c**3*m*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 +
12139*m**2 + 19524*m + 10395) + 3465*A*b*c**3*x**3*(e*x)**m/(m**6 + 36*m**5
 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3*A*b*c**2*d*m**5
*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*
m + 10395) + 93*A*b*c**2*d*m**4*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 +
3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1050*A*b*c**2*d*m**3*x**5*(e*x)
**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395)
+ 5190*A*b*c**2*d*m**2*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3
 + 12139*m**2 + 19524*m + 10395) + 10467*A*b*c**2*d*m*x**5*(e*x)**m/(m**6 +
 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 6237*A*b*
```

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c**2*d*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
19524*m + 10395) + 3*A*b*c*d**2*m**5*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m*
*4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 87*A*b*c*d**2*m**4*x**7*(e
*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 1039
5) + 906*A*b*c*d**2*m**3*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m*
*3 + 12139*m**2 + 19524*m + 10395) + 4098*A*b*c*d**2*m**2*x**7*(e*x)**m/(m*
*6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 7731*
A*b*c*d**2*m*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m
**2 + 19524*m + 10395) + 4455*A*b*c*d**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 50
5*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + A*b*d**3*m**5*x**9*(e*
x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395
) + 27*A*b*d**3*m**4*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 +
 12139*m**2 + 19524*m + 10395) + 262*A*b*d**3*m**3*x**9*(e*x)**m/(m**6 + 36
*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1122*A*b*d**
3*m**2*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 +
19524*m + 10395) + 2041*A*b*d**3*m*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4
 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 1155*A*b*d**3*x**9*(e*x)**m/
(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + B*
a*c**3*m**5*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m*
*2 + 19524*m + 10395) + 33*B*a*c**3*m**4*x**3*(e*x)**m/(m**6 + 36*m**5 + 50
5*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 406*B*a*c**3*m**3*x**3
*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 1
0395) + 2262*B*a*c**3*m**2*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*
m**3 + 12139*m**2 + 19524*m + 10395) + 5353*B*a*c**3*m*x**3*(e*x)**m/(m**6
+ 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3465*B*a
*c**3*x**3*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1
9524*m + 10395) + 3*B*a*c**2*d*m**5*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**
4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 93*B*a*c**2*d*m**4*x**5*(e*
x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395
) + 1050*B*a*c**2*d*m**3*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m*
*3 + 12139*m**2 + 19524*m + 10395) + 5190*B*a*c**2*d*m**2*x**5*(e*x)**m/(m*
*6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 10467
*B*a*c**2*d*m*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*
m**2 + 19524*m + 10395) + 6237*B*a*c**2*d*x**5*(e*x)**m/(m**6 + 36*m**5 + 5
05*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3*B*a*c*d**2*m**5*x**
7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m +
10395) + 87*B*a*c*d**2*m**4*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480
*m**3 + 12139*m**2 + 19524*m + 10395) + 906*B*a*c*d**2*m**3*x**7*(e*x)**m/(
m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 409
8*B*a*c*d**2*m**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12
139*m**2 + 19524*m + 10395) + 7731*B*a*c*d**2*m*x**7*(e*x)**m/(m**6 + 36*m*
*5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 4455*B*a*c*d**2
*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*
m + 10395) + B*a*d**3*m**5*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*
m**3 + 12139*m**2 + 19524*m + 10395) + 27*B*a*d**3*m**4*x**9*(e*x)**m/(m**6
```

+ 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 262*B*a
*d**3*m**3*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**
2 + 19524*m + 10395) + 1122*B*a*d**3*m**2*x**9*(e*x)**m/(m**6 + 36*m**5 + 5
05*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 2041*B*a*d**3*m*x**9*
(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10
395) + 1155*B*a*d**3*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 +
 12139*m**2 + 19524*m + 10395) + B*b*c**3*m**5*x**5*(e*x)**m/(m**6 + 36*m**
5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 31*B*b*c**3*m**4
*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*
m + 10395) + 350*B*b*c**3*m**3*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3
480*m**3 + 12139*m**2 + 19524*m + 10395) + 1730*B*b*c**3*m**2*x**5*(e*x)**m
/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3
489*B*b*c**3*m*x**5*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139
*m**2 + 19524*m + 10395) + 2079*B*b*c**3*x**5*(e*x)**m/(m**6 + 36*m**5 + 50
5*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 3*B*b*c**2*d*m**5*x**7
*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 1
0395) + 87*B*b*c**2*d*m**4*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*
m**3 + 12139*m**2 + 19524*m + 10395) + 906*B*b*c**2*d*m**3*x**7*(e*x)**m/(m
6 + 36*m5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 4098
*B*b*c**2*d*m**2*x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 121
39*m**2 + 19524*m + 10395) + 7731*B*b*c**2*d*m*x**7*(e*x)**m/(m**6 + 36*m**
5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 4455*B*b*c**2*d*
x**7*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m
 + 10395) + 3*B*b*c*d**2*m**5*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 34
80*m**3 + 12139*m**2 + 19524*m + 10395) + 81*B*b*c*d**2*m**4*x**9*(e*x)**m/
(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 78
6*B*b*c*d**2*m**3*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12
139*m**2 + 19524*m + 10395) + 3366*B*b*c*d**2*m**2*x**9*(e*x)**m/(m**6 + 36
*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 6123*B*b*c*d
2*m*x9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1
9524*m + 10395) + 3465*B*b*c*d**2*x**9*(e*x)**m/(m**6 + 36*m**5 + 505*m**4
+ 3480*m**3 + 12139*m**2 + 19524*m + 10395) + B*b*d**3*m**5*x**11*(e*x)**m/
(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 25
*B*b*d**3*m**4*x**11*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 1213
9*m**2 + 19524*m + 10395) + 230*B*b*d**3*m**3*x**11*(e*x)**m/(m**6 + 36*m**
5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395) + 950*B*b*d**3*m**
2*x**11*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 1952
4*m + 10395) + 1689*B*b*d**3*m*x**11*(e*x)**m/(m**6 + 36*m**5 + 505*m**4 +
3480*m**3 + 12139*m**2 + 19524*m + 10395) + 945*B*b*d**3*x**11*(e*x)**m/(m*
*6 + 36*m**5 + 505*m**4 + 3480*m**3 + 12139*m**2 + 19524*m + 10395), True))

Maxima [A] (verification not implemented)

none

Time = 0.24 (sec) , antiderivative size = 338, normalized size of antiderivative = 1.79

$$\int (ex)^m \left(a+bx^2\right)\left(A+Bx^2\right)\left(c+dx^2\right)^3\,dx = \frac{Bbd^3e^mx^{11}x^m}{m+11} + \frac{3\,Bbcd^2e^mx^9x^m}{m+9} + \frac{Bad^3e^mx^9x^m}{m+9} + \frac{Abd^3e^mx^9x^m}{m+9} + \frac{3\,Bbc^2de^mx^7x^m}{m+7} + \frac{3\,Bacd^2e^mx^7x^m}{m+7} + \frac{3\,Abcd^2e^mx^7x^m}{m+7} + \frac{Aad^3e^mx^7x^m}{m+7} + \frac{Bbc^3e^mx^5x^m}{m+5} + \frac{3\,Bac^2de^mx^5x^m}{m+5} + \frac{3\,Abc^2de^mx^5x^m}{m+5} + \frac{3\,Aacd^2e^mx^5x^m}{m+5} + \frac{Bac^3e^mx^3x^m}{m+3} + \frac{Abc^3e^mx^3x^m}{m+3} + \frac{3\,Aac^2de^mx^3x^m}{m+3} + \frac{(ex)^{m+1}\,Aac^3}{e(m+1)}$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="maxima")
```

```
[Out] B*b*d^3*e^m*x^11*x^m/(m + 11) + 3*B*b*c*d^2*e^m*x^9*x^m/(m + 9) + B*a*d^3*e
^m*x^9*x^m/(m + 9) + A*b*d^3*e^m*x^9*x^m/(m + 9) + 3*B*b*c^2*d*e^m*x^7*x^m/
(m + 7) + 3*B*a*c*d^2*e^m*x^7*x^m/(m + 7) + 3*A*b*c*d^2*e^m*x^7*x^m/(m + 7)
 + A*a*d^3*e^m*x^7*x^m/(m + 7) + B*b*c^3*e^m*x^5*x^m/(m + 5) + 3*B*a*c^2*d*
e^m*x^5*x^m/(m + 5) + 3*A*b*c^2*d*e^m*x^5*x^m/(m + 5) + 3*A*a*c*d^2*e^m*x^5
*x^m/(m + 5) + B*a*c^3*e^m*x^3*x^m/(m + 3) + A*b*c^3*e^m*x^3*x^m/(m + 3) +
3*A*a*c^2*d*e^m*x^3*x^m/(m + 3) + (e*x)^(m + 1)*A*a*c^3/(e*(m + 1))
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 1708 vs. 2(189) = 378.

Time = 0.35 (sec) , antiderivative size = 1708, normalized size of antiderivative = 9.04

$$\int (ex)^m \left(a+bx^2\right)\left(A+Bx^2\right)\left(c+dx^2\right)^3\,dx = \text{Too large to display}$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*b*d^3*m^5*x^11 + 25*(e*x)^m*B*b*d^3*m^4*x^11 + 3*(e*x)^m*B*b*c*d
^2*m^5*x^9 + (e*x)^m*B*a*d^3*m^5*x^9 + (e*x)^m*A*b*d^3*m^5*x^9 + 230*(e*x)^
```

```
m*B*b*d^3*m^3*x^11 + 81*(e*x)^m*B*b*c*d^2*m^4*x^9 + 27*(e*x)^m*B*a*d^3*m^4*
x^9 + 27*(e*x)^m*A*b*d^3*m^4*x^9 + 950*(e*x)^m*B*b*d^3*m^2*x^11 + 3*(e*x)^m
*B*b*c^2*d*m^5*x^7 + 3*(e*x)^m*B*a*c*d^2*m^5*x^7 + 3*(e*x)^m*A*b*c*d^2*m^5*
x^7 + (e*x)^m*A*a*d^3*m^5*x^7 + 786*(e*x)^m*B*b*c*d^2*m^3*x^9 + 262*(e*x)^m
*B*a*d^3*m^3*x^9 + 262*(e*x)^m*A*b*d^3*m^3*x^9 + 1689*(e*x)^m*B*b*d^3*m*x^1
1 + 87*(e*x)^m*B*b*c^2*d*m^4*x^7 + 87*(e*x)^m*B*a*c*d^2*m^4*x^7 + 87*(e*x)^
m*A*b*c*d^2*m^4*x^7 + 29*(e*x)^m*A*a*d^3*m^4*x^7 + 3366*(e*x)^m*B*b*c*d^2*m
^2*x^9 + 1122*(e*x)^m*B*a*d^3*m^2*x^9 + 1122*(e*x)^m*A*b*d^3*m^2*x^9 + 945*
(e*x)^m*B*b*d^3*x^11 + (e*x)^m*B*b*c^3*m^5*x^5 + 3*(e*x)^m*B*a*c^2*d*m^5*x^
5 + 3*(e*x)^m*A*b*c^2*d*m^5*x^5 + 3*(e*x)^m*A*a*c*d^2*m^5*x^5 + 906*(e*x)^m
*B*b*c^2*d*m^3*x^7 + 906*(e*x)^m*B*a*c*d^2*m^3*x^7 + 906*(e*x)^m*A*b*c*d^2*
m^3*x^7 + 302*(e*x)^m*A*a*d^3*m^3*x^7 + 6123*(e*x)^m*B*b*c*d^2*m*x^9 + 2041
*(e*x)^m*B*a*d^3*m*x^9 + 2041*(e*x)^m*A*b*d^3*m*x^9 + 31*(e*x)^m*B*b*c^3*m^
4*x^5 + 93*(e*x)^m*B*a*c^2*d*m^4*x^5 + 93*(e*x)^m*A*b*c^2*d*m^4*x^5 + 93*(e
*x)^m*A*a*c*d^2*m^4*x^5 + 4098*(e*x)^m*B*b*c^2*d*m^2*x^7 + 4098*(e*x)^m*B*a
*c*d^2*m^2*x^7 + 4098*(e*x)^m*A*b*c*d^2*m^2*x^7 + 1366*(e*x)^m*A*a*d^3*m^2*
x^7 + 3465*(e*x)^m*B*b*c*d^2*x^9 + 1155*(e*x)^m*B*a*d^3*x^9 + 1155*(e*x)^m*
A*b*d^3*x^9 + (e*x)^m*B*a*c^3*m^5*x^3 + (e*x)^m*A*b*c^3*m^5*x^3 + 3*(e*x)^m
*A*a*c^2*d*m^5*x^3 + 350*(e*x)^m*B*b*c^3*m^3*x^5 + 1050*(e*x)^m*B*a*c^2*d*m
^3*x^5 + 1050*(e*x)^m*A*b*c^2*d*m^3*x^5 + 1050*(e*x)^m*A*a*c*d^2*m^3*x^5 +
7731*(e*x)^m*B*b*c^2*d*m*x^7 + 7731*(e*x)^m*B*a*c*d^2*m*x^7 + 7731*(e*x)^m*
A*b*c*d^2*m*x^7 + 2577*(e*x)^m*A*a*d^3*m*x^7 + 33*(e*x)^m*B*a*c^3*m^4*x^3 +
 33*(e*x)^m*A*b*c^3*m^4*x^3 + 99*(e*x)^m*A*a*c^2*d*m^4*x^3 + 1730*(e*x)^m*B
*b*c^3*m^2*x^5 + 5190*(e*x)^m*B*a*c^2*d*m^2*x^5 + 5190*(e*x)^m*A*b*c^2*d*m^
2*x^5 + 5190*(e*x)^m*A*a*c*d^2*m^2*x^5 + 4455*(e*x)^m*B*b*c^2*d*x^7 + 4455*
(e*x)^m*B*a*c*d^2*x^7 + 4455*(e*x)^m*A*b*c*d^2*x^7 + 1485*(e*x)^m*A*a*d^3*x
^7 + (e*x)^m*A*a*c^3*m^5*x + 406*(e*x)^m*B*a*c^3*m^3*x^3 + 406*(e*x)^m*A*b*
c^3*m^3*x^3 + 1218*(e*x)^m*A*a*c^2*d*m^3*x^3 + 3489*(e*x)^m*B*b*c^3*m*x^5 +
 10467*(e*x)^m*B*a*c^2*d*m*x^5 + 10467*(e*x)^m*A*b*c^2*d*m*x^5 + 10467*(e*x
)^m*A*a*c*d^2*m*x^5 + 35*(e*x)^m*A*a*c^3*m^4*x + 2262*(e*x)^m*B*a*c^3*m^2*x
^3 + 2262*(e*x)^m*A*b*c^3*m^2*x^3 + 6786*(e*x)^m*A*a*c^2*d*m^2*x^3 + 2079*(
e*x)^m*B*b*c^3*x^5 + 6237*(e*x)^m*B*a*c^2*d*x^5 + 6237*(e*x)^m*A*b*c^2*d*x^
5 + 6237*(e*x)^m*A*a*c*d^2*x^5 + 470*(e*x)^m*A*a*c^3*m^3*x + 5353*(e*x)^m*B
*a*c^3*m*x^3 + 5353*(e*x)^m*A*b*c^3*m*x^3 + 16059*(e*x)^m*A*a*c^2*d*m*x^3 +
 3010*(e*x)^m*A*a*c^3*m^2*x + 3465*(e*x)^m*B*a*c^3*x^3 + 3465*(e*x)^m*A*b*c
^3*x^3 + 10395*(e*x)^m*A*a*c^2*d*x^3 + 9129*(e*x)^m*A*a*c^3*m*x + 10395*(e*
x)^m*A*a*c^3*x)/(m^6 + 36*m^5 + 505*m^4 + 3480*m^3 + 12139*m^2 + 19524*m +
10395)
```

Mupad [B] (verification not implemented)

Time = 5.91 (sec) , antiderivative size = 469, normalized size of antiderivative = 2.48

$$\int (ex)^m\left(a+bx^2\right)\left(A+Bx^2\right)\left(c+dx^2\right)^3\,dx$$
$$=\frac{c^2\,x^3\,{\left(e\,x\right)}^m\,\left(3\,A\,a\,d+A\,b\,c+B\,a\,c\right)\,\left(m^5+33\,m^4+406\,m^3+2262\,m^2+5353\,m+3465\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+\frac{d^2\,x^9\,{\left(e\,x\right)}^m\,\left(A\,b\,d+B\,a\,d+3\,B\,b\,c\right)\,\left(m^5+27\,m^4+262\,m^3+1122\,m^2+2041\,m+1155\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+\frac{c\,x^5\,{\left(e\,x\right)}^m\,\left(3\,A\,a\,d^2+B\,b\,c^2+3\,A\,b\,c\,d+3\,B\,a\,c\,d\right)\,\left(m^5+31\,m^4+350\,m^3+1730\,m^2+3489\,m+2079\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+\frac{d\,x^7\,{\left(e\,x\right)}^m\,\left(A\,a\,d^2+3\,B\,b\,c^2+3\,A\,b\,c\,d+3\,B\,a\,c\,d\right)\,\left(m^5+29\,m^4+302\,m^3+1366\,m^2+2577\,m+1485\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+\frac{B\,b\,d^3\,x^{11}\,{\left(e\,x\right)}^m\,\left(m^5+25\,m^4+230\,m^3+950\,m^2+1689\,m+945\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$
$$+\frac{A\,a\,c^3\,x\,{\left(e\,x\right)}^m\,\left(m^5+35\,m^4+470\,m^3+3010\,m^2+9129\,m+10395\right)}{m^6+36\,m^5+505\,m^4+3480\,m^3+12139\,m^2+19524\,m+10395}$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)*(c + d*x^2)^3,x)
```

```
[Out] (c^2*x^3*(e*x)^m*(3*A*a*d + A*b*c + B*a*c)*(5353*m + 2262*m^2 + 406*m^3 + 3
3*m^4 + m^5 + 3465))/(19524*m + 12139*m^2 + 3480*m^3 + 505*m^4 + 36*m^5 + m
^6 + 10395) + (d^2*x^9*(e*x)^m*(A*b*d + B*a*d + 3*B*b*c)*(2041*m + 1122*m^2
 + 262*m^3 + 27*m^4 + m^5 + 1155))/(19524*m + 12139*m^2 + 3480*m^3 + 505*m^
4 + 36*m^5 + m^6 + 10395) + (c*x^5*(e*x)^m*(3*A*a*d^2 + B*b*c^2 + 3*A*b*c*d
 + 3*B*a*c*d)*(3489*m + 1730*m^2 + 350*m^3 + 31*m^4 + m^5 + 2079))/(19524*m
 + 12139*m^2 + 3480*m^3 + 505*m^4 + 36*m^5 + m^6 + 10395) + (d*x^7*(e*x)^m*
(A*a*d^2 + 3*B*b*c^2 + 3*A*b*c*d + 3*B*a*c*d)*(2577*m + 1366*m^2 + 302*m^3
+ 29*m^4 + m^5 + 1485))/(19524*m + 12139*m^2 + 3480*m^3 + 505*m^4 + 36*m^5
+ m^6 + 10395) + (B*b*d^3*x^11*(e*x)^m*(1689*m + 950*m^2 + 230*m^3 + 25*m^4
 + m^5 + 945))/(19524*m + 12139*m^2 + 3480*m^3 + 505*m^4 + 36*m^5 + m^6 + 1
0395) + (A*a*c^3*x*(e*x)^m*(9129*m + 3010*m^2 + 470*m^3 + 35*m^4 + m^5 + 10
395))/(19524*m + 12139*m^2 + 3480*m^3 + 505*m^4 + 36*m^5 + m^6 + 10395)
```

3.18 $\int (ex)^m (A+Bx^2) (c+dx^2)^3 \, dx$

Optimal result

Integrand size = 22, antiderivative size = 121

$$\int (ex)^m (A+Bx^2) (c+dx^2)^3 \, dx = \frac{Ac^3(ex)^{1+m}}{e(1+m)} + \frac{c^2(Bc+3Ad)(ex)^{3+m}}{e^3(3+m)} + \frac{3cd(Bc+Ad)(ex)^{5+m}}{e^5(5+m)} + \frac{d^2(3Bc+Ad)(ex)^{7+m}}{e^7(7+m)} + \frac{Bd^3(ex)^{9+m}}{e^9(9+m)}$$

```
[Out] A*c^3*(e*x)^(1+m)/e/(1+m)+c^2*(3*A*d+B*c)*(e*x)^(3+m)/e^3/(3+m)+3*c*d*(A*d+
B*c)*(e*x)^(5+m)/e^5/(5+m)+d^2*(A*d+3*B*c)*(e*x)^(7+m)/e^7/(7+m)+B*d^3*(e*x
)^(9+m)/e^9/(9+m)
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 121, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 1, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.045, Rules used = {459}

$$\int (ex)^m (A+Bx^2) (c+dx^2)^3 \, dx = \frac{c^2(ex)^{m+3}(3Ad+Bc)}{e^3(m+3)} + \frac{d^2(ex)^{m+7}(Ad+3Bc)}{e^7(m+7)} + \frac{3cd(ex)^{m+5}(Ad+Bc)}{e^5(m+5)} + \frac{Ac^3(ex)^{m+1}}{e(m+1)} + \frac{Bd^3(ex)^{m+9}}{e^9(m+9)}$$

```
[In] Int[(e*x)^m*(A + B*x^2)*(c + d*x^2)^3,x]
```

```
[Out] (A*c^3*(e*x)^(1 + m))/(e*(1 + m)) + (c^2*(B*c + 3*A*d)*(e*x)^(3 + m))/(e^3*
(3 + m)) + (3*c*d*(B*c + A*d)*(e*x)^(5 + m))/(e^5*(5 + m)) + (d^2*(3*B*c +
A*d)*(e*x)^(7 + m))/(e^7*(7 + m)) + (B*d^3*(e*x)^(9 + m))/(e^9*(9 + m))
```

Rule 459

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.), x_Symbol] :> Int[ExpandIntegrand[(e*x)^m*(a + b*x^n)^p*(c + d*x^
n)^q, x], x] /; FreeQ[{a, b, c, d, e, m, n}, x] && NeQ[b*c - a*d, 0] && IGt
Q[p, 0] && IGtQ[q, 0]
```

Rubi steps

$$\text{integral} = \int \left(Ac^3(ex)^m + \frac{c^2(Bc+3Ad)(ex)^{2+m}}{e^2} + \frac{3cd(Bc+Ad)(ex)^{4+m}}{e^4} + \frac{d^2(3Bc+Ad)(ex)^{6+m}}{e^6} + \frac{Bd^3(ex)^{8+m}}{e^8}\right) dx$$

$$= \frac{Ac^3(ex)^{1+m}}{e(1+m)} + \frac{c^2(Bc+3Ad)(ex)^{3+m}}{e^3(3+m)} + \frac{3cd(Bc+Ad)(ex)^{5+m}}{e^5(5+m)} + \frac{d^2(3Bc+Ad)(ex)^{7+m}}{e^7(7+m)} + \frac{Bd^3(ex)^{9+m}}{e^9(9+m)}$$

Mathematica [A] (verified)

Time = 0.10 (sec) , antiderivative size = 90, normalized size of antiderivative = 0.74

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right)^3 dx = x(ex)^m \left(\frac{Ac^3}{1+m} + \frac{c^2(Bc+3Ad)x^2}{3+m} + \frac{3cd(Bc+Ad)x^4}{5+m} + \frac{d^2(3Bc+Ad)x^6}{7+m} + \frac{Bd^3x^8}{9+m}\right)$$

```
[In] Integrate[(e*x)^m*(A + B*x^2)*(c + d*x^2)^3,x]
```

```
[Out] x*(e*x)^m*((A*c^3)/(1 + m) + (c^2*(B*c + 3*A*d)*x^2)/(3 + m) + (3*c*d*(B*c
+ A*d)*x^4)/(5 + m) + (d^2*(3*B*c + A*d)*x^6)/(7 + m) + (B*d^3*x^8)/(9 + m)
)
```

Maple [B] (verified)

Leaf count of result is larger than twice the leaf count of optimal. 474 vs. 2(121) = 242.

Time = 3.41 (sec) , antiderivative size = 475, normalized size of antiderivative = 3.93

method	result
gosper	$\frac{x(B\,d^3m^4x^8+16B\,d^3m^3x^8+A\,d^3m^4x^6+3Bc\,d^2m^4x^6+86B\,d^3m^2x^8+18A\,d^3m^3x^6+54Bc\,d^2m^3x^6+176m\,x^8B\,d^3+3Ac\,d^2m^4x^4}{}$
risch	$\frac{x(B\,d^3m^4x^8+16B\,d^3m^3x^8+A\,d^3m^4x^6+3Bc\,d^2m^4x^6+86B\,d^3m^2x^8+18A\,d^3m^3x^6+54Bc\,d^2m^3x^6+176m\,x^8B\,d^3+3Ac\,d^2m^4x^4}{}$
parallelrisch	$\frac{900B\,x^5(ex)^m c^2dm+492A\,x^3(ex)^m c^2d\,m^2+1374A\,x^3(ex)^m c^2dm+315B\,x^3(ex)^m c^3+945Ax(ex)^m c^3+666B\,x^7(ex)^m c\,d^2m+60}{}$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^3,x,method=_RETURNVERBOSE)
```

```
[Out] x*(B*d^3*m^4*x^8+16*B*d^3*m^3*x^8+A*d^3*m^4*x^6+3*B*c*d^2*m^4*x^6+86*B*d^3*
m^2*x^8+18*A*d^3*m^3*x^6+54*B*c*d^2*m^3*x^6+176*B*d^3*m*x^8+3*A*c*d^2*m^4*x
^4+104*A*d^3*m^2*x^6+3*B*c^2*d*m^4*x^4+312*B*c*d^2*m^2*x^6+105*B*d^3*x^8+60
*A*c*d^2*m^3*x^4+222*A*d^3*m*x^6+60*B*c^2*d*m^3*x^4+666*B*c*d^2*m*x^6+3*A*c
^2*d*m^4*x^2+390*A*c*d^2*m^2*x^4+135*A*d^3*x^6+B*c^3*m^4*x^2+390*B*c^2*d*m^
2*x^4+405*B*c*d^2*x^6+66*A*c^2*d*m^3*x^2+900*A*c*d^2*m*x^4+22*B*c^3*m^3*x^2
+900*B*c^2*d*m*x^4+A*c^3*m^4+492*A*c^2*d*m^2*x^2+567*A*c*d^2*x^4+164*B*c^3*
m^2*x^2+567*B*c^2*d*x^4+24*A*c^3*m^3+1374*A*c^2*d*m*x^2+458*B*c^3*m*x^2+206
*A*c^3*m^2+945*A*c^2*d*x^2+315*B*c^3*x^2+744*A*c^3*m+945*A*c^3)*(e*x)^m/(9+
m)/(7+m)/(5+m)/(3+m)/(1+m)
```

Fricas [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 381 vs. $2(121) = 242$.

Time = 0.27 (sec) , antiderivative size = 381, normalized size of antiderivative = 3.15

$$\int (ex)^m \left(A+Bx^2\right)\left(c+dx^2\right)^3\,dx = \frac{((Bd^3m^4+16\,Bd^3m^3+86\,Bd^3m^2+176\,Bd^3m+105\,Bd^3)x^9+((3\,Bcd^2+Ad^3)m^4+405\,Bcd^2+135\,Ad^3}{}$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="fricas")
```

```
[Out] ((B*d^3*m^4 + 16*B*d^3*m^3 + 86*B*d^3*m^2 + 176*B*d^3*m + 105*B*d^3)*x^9 +
((3*B*c*d^2 + A*d^3)*m^4 + 405*B*c*d^2 + 135*A*d^3 + 18*(3*B*c*d^2 + A*d^3)
*m^3 + 104*(3*B*c*d^2 + A*d^3)*m^2 + 222*(3*B*c*d^2 + A*d^3)*m)*x^7 + 3*((B
*c^2*d + A*c*d^2)*m^4 + 189*B*c^2*d + 189*A*c*d^2 + 20*(B*c^2*d + A*c*d^2)*
m^3 + 130*(B*c^2*d + A*c*d^2)*m^2 + 300*(B*c^2*d + A*c*d^2)*m)*x^5 + ((B*c^
3 + 3*A*c^2*d)*m^4 + 315*B*c^3 + 945*A*c^2*d + 22*(B*c^3 + 3*A*c^2*d)*m^3 +
 164*(B*c^3 + 3*A*c^2*d)*m^2 + 458*(B*c^3 + 3*A*c^2*d)*m)*x^3 + (A*c^3*m^4
+ 24*A*c^3*m^3 + 206*A*c^3*m^2 + 744*A*c^3*m + 945*A*c^3)*x)*(e*x)^m/(m^5 +
 25*m^4 + 230*m^3 + 950*m^2 + 1689*m + 945)
```

Sympy [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 2152 vs. 2(110) = 220.

Time = 0.63 (sec) , antiderivative size = 2152, normalized size of antiderivative = 17.79

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)**3,x)
```

```
[Out] Piecewise(((-A*c**3/(8*x**8) - A*c**2*d/(2*x**6) - 3*A*c*d**2/(4*x**4) - A*
d**3/(2*x**2) - B*c**3/(6*x**6) - 3*B*c**2*d/(4*x**4) - 3*B*c*d**2/(2*x**2)
 + B*d**3*log(x))/e**9, Eq(m, -9)), ((-A*c**3/(6*x**6) - 3*A*c**2*d/(4*x**4
) - 3*A*c*d**2/(2*x**2) + A*d**3*log(x) - B*c**3/(4*x**4) - 3*B*c**2*d/(2*x
**2) + 3*B*c*d**2*log(x) + B*d**3*x**2/2)/e**7, Eq(m, -7)), ((-A*c**3/(4*x*
*4) - 3*A*c**2*d/(2*x**2) + 3*A*c*d**2*log(x) + A*d**3*x**2/2 - B*c**3/(2*x
**2) + 3*B*c**2*d*log(x) + 3*B*c*d**2*x**2/2 + B*d**3*x**4/4)/e**5, Eq(m, -
5)), ((-A*c**3/(2*x**2) + 3*A*c**2*d*log(x) + 3*A*c*d**2*x**2/2 + A*d**3*x*
*4/4 + B*c**3*log(x) + 3*B*c**2*d*x**2/2 + 3*B*c*d**2*x**4/4 + B*d**3*x**6/
6)/e**3, Eq(m, -3)), ((A*c**3*log(x) + 3*A*c**2*d*x**2/2 + 3*A*c*d**2*x**4/
4 + A*d**3*x**6/6 + B*c**3*x**2/2 + 3*B*c**2*d*x**4/4 + B*c*d**2*x**6/2 + B
*d**3*x**8/8)/e, Eq(m, -1)), (A*c**3*m**4*x*(e*x)**m/(m**5 + 25*m**4 + 230*
m**3 + 950*m**2 + 1689*m + 945) + 24*A*c**3*m**3*x*(e*x)**m/(m**5 + 25*m**4
 + 230*m**3 + 950*m**2 + 1689*m + 945) + 206*A*c**3*m**2*x*(e*x)**m/(m**5 +
 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 744*A*c**3*m*x*(e*x)**m/(m
**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 945*A*c**3*x*(e*x)**m
/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 3*A*c**2*d*m**4*x*
*3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 66*A*c*
*2*d*m**3*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 94
5) + 492*A*c**2*d*m**2*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2
+ 1689*m + 945) + 1374*A*c**2*d*m*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3
+ 950*m**2 + 1689*m + 945) + 945*A*c**2*d*x**3*(e*x)**m/(m**5 + 25*m**4 + 2
30*m**3 + 950*m**2 + 1689*m + 945) + 3*A*c*d**2*m**4*x**5*(e*x)**m/(m**5 +
25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 60*A*c*d**2*m**3*x**5*(e*x)
**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 390*A*c*d**2*m*
*2*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 90
0*A*c*d**2*m*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m +
 945) + 567*A*c*d**2*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 +
1689*m + 945) + A*d**3*m**4*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*
m**2 + 1689*m + 945) + 18*A*d**3*m**3*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m
**3 + 950*m**2 + 1689*m + 945) + 104*A*d**3*m**2*x**7*(e*x)**m/(m**5 + 25*m
**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 222*A*d**3*m*x**7*(e*x)**m/(m**
5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 135*A*d**3*x**7*(e*x)**
m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + B*c**3*m**4*x**3*
(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 22*B*c**3*
```

```
m**3*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) +
164*B*c**3*m**2*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*
m + 945) + 458*B*c**3*m*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2
 + 1689*m + 945) + 315*B*c**3*x**3*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 95
0*m**2 + 1689*m + 945) + 3*B*c**2*d*m**4*x**5*(e*x)**m/(m**5 + 25*m**4 + 23
0*m**3 + 950*m**2 + 1689*m + 945) + 60*B*c**2*d*m**3*x**5*(e*x)**m/(m**5 +
25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 390*B*c**2*d*m**2*x**5*(e*x
)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 900*B*c**2*d*m
*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 567*
B*c**2*d*x**5*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945
) + 3*B*c*d**2*m**4*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1
689*m + 945) + 54*B*c*d**2*m**3*x**7*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 +
950*m**2 + 1689*m + 945) + 312*B*c*d**2*m**2*x**7*(e*x)**m/(m**5 + 25*m**4
+ 230*m**3 + 950*m**2 + 1689*m + 945) + 666*B*c*d**2*m*x**7*(e*x)**m/(m**5
+ 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 405*B*c*d**2*x**7*(e*x)**
m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + B*d**3*m**4*x**9*
(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) + 16*B*d**3*
m**3*x**9*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m + 945) +
86*B*d**3*m**2*x**9*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2 + 1689*m
 + 945) + 176*B*d**3*m*x**9*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950*m**2
+ 1689*m + 945) + 105*B*d**3*x**9*(e*x)**m/(m**5 + 25*m**4 + 230*m**3 + 950
*m**2 + 1689*m + 945), True))
```

Maxima [A] (verification not implemented)

none

Time = 0.22 (sec) , antiderivative size = 162, normalized size of antiderivative = 1.34

$$\int (ex)^m \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \frac{Bd^3e^mx^9x^m}{m+9} + \frac{3\,Bcd^2e^mx^7x^m}{m+7} + \frac{Ad^3e^mx^7x^m}{m+7} + \frac{3\,Bc^2de^mx^5x^m}{m+5} + \frac{3\,Acd^2e^mx^5x^m}{m+5} + \frac{Bc^3e^mx^3x^m}{m+3} + \frac{3\,Ac^2de^mx^3x^m}{m+3} + \frac{(ex)^{m+1}\,Ac^3}{e(m+1)}$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="maxima")
```

```
[Out] B*d^3*e^m*x^9*x^m/(m + 9) + 3*B*c*d^2*e^m*x^7*x^m/(m + 7) + A*d^3*e^m*x^7*x
^m/(m + 7) + 3*B*c^2*d*e^m*x^5*x^m/(m + 5) + 3*A*c*d^2*e^m*x^5*x^m/(m + 5)
+ B*c^3*e^m*x^3*x^m/(m + 3) + 3*A*c^2*d*e^m*x^3*x^m/(m + 3) + (e*x)^(m + 1)
*A*c^3/(e*(m + 1))
```

Giac [B] (verification not implemented)

Leaf count of result is larger than twice the leaf count of optimal. 673 vs. $2(121) = 242$.

Time = 0.32 (sec) , antiderivative size = 673, normalized size of antiderivative = 5.56

$$\int (ex)^m (A + Bx^2) (c + dx^2)^3 \, dx = \frac{(ex)^m Bd^3m^4x^9 + 16 (ex)^m Bd^3m^3x^9 + 3 (ex)^m Bcd^2m^4x^7 + (ex)^m Ad^3m^4x^7 + 86 (ex)^m Bd^3m^2x^9 + 54 (e}{}$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="giac")
```

```
[Out] ((e*x)^m*B*d^3*m^4*x^9 + 16*(e*x)^m*B*d^3*m^3*x^9 + 3*(e*x)^m*B*c*d^2*m^4*x
^7 + (e*x)^m*A*d^3*m^4*x^7 + 86*(e*x)^m*B*d^3*m^2*x^9 + 54*(e*x)^m*B*c*d^2*
m^3*x^7 + 18*(e*x)^m*A*d^3*m^3*x^7 + 176*(e*x)^m*B*d^3*m*x^9 + 3*(e*x)^m*B*
c^2*d*m^4*x^5 + 3*(e*x)^m*A*c*d^2*m^4*x^5 + 312*(e*x)^m*B*c*d^2*m^2*x^7 + 1
04*(e*x)^m*A*d^3*m^2*x^7 + 105*(e*x)^m*B*d^3*x^9 + 60*(e*x)^m*B*c^2*d*m^3*x
^5 + 60*(e*x)^m*A*c*d^2*m^3*x^5 + 666*(e*x)^m*B*c*d^2*m*x^7 + 222*(e*x)^m*A
*d^3*m*x^7 + (e*x)^m*B*c^3*m^4*x^3 + 3*(e*x)^m*A*c^2*d*m^4*x^3 + 390*(e*x)^
m*B*c^2*d*m^2*x^5 + 390*(e*x)^m*A*c*d^2*m^2*x^5 + 405*(e*x)^m*B*c*d^2*x^7 +
 135*(e*x)^m*A*d^3*x^7 + 22*(e*x)^m*B*c^3*m^3*x^3 + 66*(e*x)^m*A*c^2*d*m^3*
x^3 + 900*(e*x)^m*B*c^2*d*m*x^5 + 900*(e*x)^m*A*c*d^2*m*x^5 + (e*x)^m*A*c^3
*m^4*x + 164*(e*x)^m*B*c^3*m^2*x^3 + 492*(e*x)^m*A*c^2*d*m^2*x^3 + 567*(e*x
)^m*B*c^2*d*x^5 + 567*(e*x)^m*A*c*d^2*x^5 + 24*(e*x)^m*A*c^3*m^3*x + 458*(e
*x)^m*B*c^3*m*x^3 + 1374*(e*x)^m*A*c^2*d*m*x^3 + 206*(e*x)^m*A*c^3*m^2*x +
315*(e*x)^m*B*c^3*x^3 + 945*(e*x)^m*A*c^2*d*x^3 + 744*(e*x)^m*A*c^3*m*x + 9
45*(e*x)^m*A*c^3*x)/(m^5 + 25*m^4 + 230*m^3 + 950*m^2 + 1689*m + 945)
```

Mupad [B] (verification not implemented)

Time = 5.60 (sec) , antiderivative size = 280, normalized size of antiderivative = 2.31

$$\begin{aligned}\int (ex)^m (A + Bx^2) (c + dx^2)^3 \, dx &= (e\,x)^m \left(\frac{A\,c^3\,x\,(m^4 + 24\,m^3 + 206\,m^2 + 744\,m + 945)}{m^5 + 25\,m^4 + 230\,m^3 + 950\,m^2 + 1689\,m + 945} \right. \\ &+ \frac{B\,d^3\,x^9\,(m^4 + 16\,m^3 + 86\,m^2 + 176\,m + 105)}{m^5 + 25\,m^4 + 230\,m^3 + 950\,m^2 + 1689\,m + 945} \\ &+ \frac{c^2\,x^3\,(3\,A\,d + B\,c)\,(m^4 + 22\,m^3 + 164\,m^2 + 458\,m + 315)}{m^5 + 25\,m^4 + 230\,m^3 + 950\,m^2 + 1689\,m + 945} \\ &+ \frac{d^2\,x^7\,(A\,d + 3\,B\,c)\,(m^4 + 18\,m^3 + 104\,m^2 + 222\,m + 135)}{m^5 + 25\,m^4 + 230\,m^3 + 950\,m^2 + 1689\,m + 945} \\ &\left. + \frac{3\,c\,d\,x^5\,(A\,d + B\,c)\,(m^4 + 20\,m^3 + 130\,m^2 + 300\,m + 189)}{m^5 + 25\,m^4 + 230\,m^3 + 950\,m^2 + 1689\,m + 945}\right)\end{aligned}$$

```
[In] int((A + B*x^2)*(e*x)^m*(c + d*x^2)^3,x)
```

```
[Out] (e*x)^m*((A*c^3*x*(744*m + 206*m^2 + 24*m^3 + m^4 + 945))/(1689*m + 950*m^2
 + 230*m^3 + 25*m^4 + m^5 + 945) + (B*d^3*x^9*(176*m + 86*m^2 + 16*m^3 + m^
4 + 105))/(1689*m + 950*m^2 + 230*m^3 + 25*m^4 + m^5 + 945) + (c^2*x^3*(3*A
*d + B*c)*(458*m + 164*m^2 + 22*m^3 + m^4 + 315))/(1689*m + 950*m^2 + 230*m
^3 + 25*m^4 + m^5 + 945) + (d^2*x^7*(A*d + 3*B*c)*(222*m + 104*m^2 + 18*m^3
 + m^4 + 135))/(1689*m + 950*m^2 + 230*m^3 + 25*m^4 + m^5 + 945) + (3*c*d*x
^5*(A*d + B*c)*(300*m + 130*m^2 + 20*m^3 + m^4 + 189))/(1689*m + 950*m^2 +
230*m^3 + 25*m^4 + m^5 + 945))
```

3.19 $\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^3}{a+bx^2} dx$

Optimal result

Integrand size = 31, antiderivative size = 258

$$\begin{aligned}
&\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^3}{a+bx^2} dx \\
&= -\frac{(a^3Bd^3+3ab^2cd(Bc+Ad)-a^2bd^2(3Bc+Ad)-b^3c^2(Bc+3Ad))(ex)^{1+m}}{b^4e(1+m)} \\
&\quad+\frac{d(a^2Bd^2+3b^2c(Bc+Ad)-abd(3Bc+Ad))(ex)^{3+m}}{b^3e^3(3+m)} \\
&\quad+\frac{d^2(3bBc+Abd-aBd)(ex)^{5+m}}{b^2e^5(5+m)}+\frac{Bd^3(ex)^{7+m}}{be^7(7+m)} \\
&\quad+\frac{(Ab-aB)(bc-ad)^3(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{ab^4e(1+m)}
\end{aligned}$$

```
[Out] -(a^3*B*d^3+3*a*b^2*c*d*(A*d+B*c)-a^2*b*d^2*(A*d+3*B*c)-b^3*c^2*(3*A*d+B*c)
)*(e*x)^(1+m)/b^4/e/(1+m)+d*(a^2*B*d^2+3*b^2*c*(A*d+B*c)-a*b*d*(A*d+3*B*c))
*(e*x)^(3+m)/b^3/e^3/(3+m)+d^2*(A*b*d-B*a*d+3*B*b*c)*(e*x)^(5+m)/b^2/e^5/(5
+m)+B*d^3*(e*x)^(7+m)/b/e^7/(7+m)+(A*b-B*a)*(-a*d+b*c)^3*(e*x)^(1+m)*hyperg
eom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/a/b^4/e/(1+m)
```

Rubi [A] (verified)

Time = 0.19 (sec) , antiderivative size = 258, 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 = {584, 371}

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^3}{a+bx^2} dx = \frac{d(ex)^{m+3} (a^2Bd^2-abd(Ad+3Bc)+3b^2c(Ad+Bc))}{b^3e^3(m+3)} - \frac{(ex)^{m+1} (a^3Bd^3-a^2bd^2(Ad+3Bc)+3ab^2cd(Ad+Bc)+b^3(-c^2)(3Ad+Bc))}{b^4e(m+1)} + \frac{(ex)^{m+1}(Ab-aB)(bc-ad)^3 \text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)}{ab^4e(m+1)} + \frac{d^2(ex)^{m+5}(-aBd+Abd+3bBc)}{b^2e^5(m+5)} + \frac{Bd^3(ex)^{m+7}}{be^7(m+7)}$$

```
[In] Int[((e*x)^m*(A + B*x^2)*(c + d*x^2)^3)/(a + b*x^2),x]
```

```
[Out] -(((a^3*B*d^3 + 3*a*b^2*c*d*(B*c + A*d) - a^2*b*d^2*(3*B*c + A*d) - b^3*c^2
*(B*c + 3*A*d))*(e*x)^(1 + m))/(b^4*e*(1 + m))) + (d*(a^2*B*d^2 + 3*b^2*c*(
B*c + A*d) - a*b*d*(3*B*c + A*d))*(e*x)^(3 + m))/(b^3*e^3*(3 + m)) + (d^2*(
3*b*B*c + A*b*d - a*B*d)*(e*x)^(5 + m))/(b^2*e^5*(5 + m)) + (B*d^3*(e*x)^(7
 + m))/(b*e^7*(7 + m)) + ((A*b - a*B)*(b*c - a*d)^3*(e*x)^(1 + m)*Hypergeom
etric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(a*b^4*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\text{integral} = \int \left(-\frac{\left(a^3Bd^3+3ab^2cd(Bc+Ad)-a^2bd^2(3Bc+Ad)-b^3c^2(Bc+3Ad)\right)(ex)^m}{b^4} + \frac{d\left(a^2Bd^2+3b^2c(Bc+Ad)-abd(3Bc+Ad)\right)(ex)^{2+m}}{b^3e^2} + \frac{d^2(3bBc+Abd-aBd)(ex)^{4+m}}{b^2e^4} + \frac{Bd^3(ex)^{6+m}}{be^6} + \frac{\left(Ab^4c^3-ab^3Bc^3-3aAb^3c^2d+3a^2b^2Bc^2d+3a^2Ab^2cd^2-3a^3bBcd^2-a^3Abd^3+a^4Bd^3\right)(ex)^m}{b^4\left(a+bx^2\right)}\right)dx$$

$$= -\frac{\left(a^3Bd^3+3ab^2cd(Bc+Ad)-a^2bd^2(3Bc+Ad)-b^3c^2(Bc+3Ad)\right)(ex)^{1+m}}{b^4e(1+m)} + \frac{d\left(a^2Bd^2+3b^2c(Bc+Ad)-abd(3Bc+Ad)\right)(ex)^{3+m}}{b^3e^3(3+m)} + \frac{d^2(3bBc+Abd-aBd)(ex)^{5+m}}{b^2e^5(5+m)} + \frac{Bd^3(ex)^{7+m}}{be^7(7+m)} + \frac{\left((Ab-aB)(bc-ad)^3\right)\int\frac{(ex)^m}{a+bx^2}\,dx}{b^4}$$

$$= -\frac{\left(a^3Bd^3+3ab^2cd(Bc+Ad)-a^2bd^2(3Bc+Ad)-b^3c^2(Bc+3Ad)\right)(ex)^{1+m}}{b^4e(1+m)} + \frac{d\left(a^2Bd^2+3b^2c(Bc+Ad)-abd(3Bc+Ad)\right)(ex)^{3+m}}{b^3e^3(3+m)} + \frac{d^2(3bBc+Abd-aBd)(ex)^{5+m}}{b^2e^5(5+m)} + \frac{Bd^3(ex)^{7+m}}{be^7(7+m)} + \frac{(Ab-aB)(bc-ad)^3(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{bx^2}{a}\right)}{ab^4e(1+m)}$$

Mathematica [A] (verified)

Time = 0.59 (sec) , antiderivative size = 217, normalized size of antiderivative = 0.84

$$\int\frac{(ex)^m\left(A+Bx^2\right)\left(c+dx^2\right)^3}{a+bx^2}\,dx = \frac{x(ex)^m\left(\frac{-a^3Bd^3-3ab^2cd(Bc+Ad)+a^2bd^2(3Bc+Ad)+b^3c^2(Bc+3Ad)}{1+m}+\frac{bd\left(a^2Bd^2+3b^2c(Bc+Ad)-abd(3Bc+Ad)\right)x^2}{3+m}+\frac{b^2d^2(3bBc+Ab\cdots}{5+m\cdots}\right.}{b^4}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2)*(c + d*x^2)^3)/(a + b*x^2),x]
```

```
[Out] (x*(e*x)^m*((-(a^3*B*d^3) - 3*a*b^2*c*d*(B*c + A*d) + a^2*b*d^2*(3*B*c + A*
d) + b^3*c^2*(B*c + 3*A*d))/(1 + m) + (b*d*(a^2*B*d^2 + 3*b^2*c*(B*c + A*d)
```

```
- a*b*d*(3*B*c + A*d))*x^2)/(3 + m) + (b^2*d^2*(3*b*B*c + A*b*d - a*B*d)*x
^4)/(5 + m) + (b^3*B*d^3*x^6)/(7 + m) + ((-(A*b) + a*B)*(-(b*c) + a*d)^3*Hy
pergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(a*(1 + m))))/b^4
```

Maple [F]

$$\int \frac{(ex)^m (x^2 B + A) (d\,x^2 + c)^3}{b\,x^2 + a} dx$$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a),x)
```

```
[Out] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a),x)
```

Fricas [F]

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)^3}{a + bx^2} dx = \int \frac{(Bx^2 + A)(dx^2 + c)^3 (ex)^m}{bx^2 + a} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a),x, algorithm="fricas")
```

```
[Out] integral((B*d^3*x^8 + (3*B*c*d^2 + A*d^3)*x^6 + 3*(B*c^2*d + A*c*d^2)*x^4 +
 A*c^3 + (B*c^3 + 3*A*c^2*d)*x^2)*(e*x)^m/(b*x^2 + a), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 9.38 (sec) , antiderivative size = 887, normalized size of antiderivative = 3.44

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)^3}{a + bx^2} dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)**3/(b*x**2+a),x)
```

```
[Out] A*c**3*e**m*m*x**(m + 1)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*g
amma(m/2 + 1/2)/(4*a*gamma(m/2 + 3/2)) + A*c**3*e**m*x**(m + 1)*lerchphi(b*
x**2*exp_polar(I*pi)/a, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(4*a*gamma(m/2 + 3/2
)) + 3*A*c**2*d*e**m*m*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2
 + 3/2)*gamma(m/2 + 3/2)/(4*a*gamma(m/2 + 5/2)) + 9*A*c**2*d*e**m*x**(m + 3
)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*a*ga
mma(m/2 + 5/2)) + 3*A*c*d**2*e**m*m*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*
pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(4*a*gamma(m/2 + 7/2)) + 15*A*c*d**2*
e**m*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2
+ 5/2)/(4*a*gamma(m/2 + 7/2)) + A*d**3*e**m*m*x**(m + 7)*lerchphi(b*x**2*ex
p_polar(I*pi)/a, 1, m/2 + 7/2)*gamma(m/2 + 7/2)/(4*a*gamma(m/2 + 9/2)) + 7*
```

```
A*d**3*e**m*x**(m + 7)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 7/2)*gam
ma(m/2 + 7/2)/(4*a*gamma(m/2 + 9/2)) + B*c**3*e**m*m*x**(m + 3)*lerchphi(b*
x**2*exp_polar(I*pi)/a, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*a*gamma(m/2 + 5/2
)) + 3*B*c**3*e**m*x**(m + 3)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 3
/2)*gamma(m/2 + 3/2)/(4*a*gamma(m/2 + 5/2)) + 3*B*c**2*d*e**m*m*x**(m + 5)*
lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(4*a*gamm
a(m/2 + 7/2)) + 15*B*c**2*d*e**m*x**(m + 5)*lerchphi(b*x**2*exp_polar(I*pi)
/a, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(4*a*gamma(m/2 + 7/2)) + 3*B*c*d**2*e**m
*m*x**(m + 7)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 7/2)*gamma(m/2 +
7/2)/(4*a*gamma(m/2 + 9/2)) + 21*B*c*d**2*e**m*x**(m + 7)*lerchphi(b*x**2*e
xp_polar(I*pi)/a, 1, m/2 + 7/2)*gamma(m/2 + 7/2)/(4*a*gamma(m/2 + 9/2)) + B
*d**3*e**m*m*x**(m + 9)*lerchphi(b*x**2*exp_polar(I*pi)/a, 1, m/2 + 9/2)*ga
mma(m/2 + 9/2)/(4*a*gamma(m/2 + 11/2)) + 9*B*d**3*e**m*x**(m + 9)*lerchphi(
b*x**2*exp_polar(I*pi)/a, 1, m/2 + 9/2)*gamma(m/2 + 9/2)/(4*a*gamma(m/2 + 1
1/2))
```

Maxima [F]

$$\int \frac{(ex)^m\,(A+Bx^2)\,(c+dx^2)^3}{a+bx^2}\,dx=\int \frac{(Bx^2+A)(dx^2+c)^3(ex)^m}{bx^2+a}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a),x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^3*(e*x)^m/(b*x^2 + a), x)
```

Giac [F]

$$\int \frac{(ex)^m\,(A+Bx^2)\,(c+dx^2)^3}{a+bx^2}\,dx=\int \frac{(Bx^2+A)(dx^2+c)^3(ex)^m}{bx^2+a}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a),x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^3*(e*x)^m/(b*x^2 + a), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^3}{a+bx^2} \, dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(d\,x^2+c)^3}{b\,x^2+a} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^3)/(a + b*x^2),x)
[Out] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^3)/(a + b*x^2), x)
```

3.20 $\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^3}{(a+bx^2)^2} \, dx$

Optimal result

Integrand size = 31, antiderivative size = 347

$$\begin{aligned}
\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^3}{(a+bx^2)^2} \, dx =
&-\frac{d(Ab(3b^2c^2(1+m)-3abcd(3+m)+a^2d^2(5+m))-aB(3b^2c^2(3+m)-3abcd(5+m)+a^2d^2(7+m}{2ab^4e(1+m)} \\
&-\frac{d^2(Ab(3bc(3+m)-ad(5+m))-aB(3bc(5+m)-ad(7+m)))(ex)^{3+m}}{2ab^3e^3(3+m)} \\
&-\frac{d^3(Ab(5+m)-aB(7+m))(ex)^{5+m}}{2ab^2e^5(5+m)}+\frac{(Ab-aB)(ex)^{1+m}(c+dx^2)^3}{2abe(a+bx^2)} \\
&+\frac{(bc-ad)^2(aB(bc(1+m)-ad(7+m))+Ab(ad(5+m)+b(c-cm)))(ex)^{1+m}\text{Hypergeometric2F1}\left(1\right.}{2a^2b^4e(1+m)}
\end{aligned}$$

```
[Out] -1/2*d*(A*b*(3*b^2*c^2*(1+m)-3*a*b*c*d*(3+m)+a^2*d^2*(5+m))-a*B*(3*b^2*c^2*
(3+m)-3*a*b*c*d*(5+m)+a^2*d^2*(7+m)))*(e*x)^(1+m)/a/b^4/e/(1+m)-1/2*d^2*(A*
b*(3*b*c*(3+m)-a*d*(5+m))-a*B*(3*b*c*(5+m)-a*d*(7+m)))*(e*x)^(3+m)/a/b^3/e^
3/(3+m)-1/2*d^3*(A*b*(5+m)-a*B*(7+m))*(e*x)^(5+m)/a/b^2/e^5/(5+m)+1/2*(A*b-
B*a)*(e*x)^(1+m)*(d*x^2+c)^3/a/b/e/(b*x^2+a)+1/2*(-a*d+b*c)^2*(a*B*(b*c*(1+
m)-a*d*(7+m))+A*b*(a*d*(5+m)+b*(-c*m+c)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2
*m],[3/2+1/2*m],-b*x^2/a)/a^2/b^4/e/(1+m)
```

Rubi [A] (verified)

Time = 0.40 (sec) , antiderivative size = 347, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {591, 584, 371}

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)^3}{(a+bx^2)^2}\,dx$$
$$= \frac{(ex)^{m+1}(bc-ad)^2 \text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)(Ab(ad(m+5)+b(c-cm))+aB(bc(m+1)}{2a^2b^4e(m+1)}$$
$$-\frac{d(ex)^{m+1}(Ab(a^2d^2(m+5)-3abcd(m+3)+3b^2c^2(m+1))-aB(a^2d^2(m+7)-3abcd(m+5)+3b^2c^2}{2ab^4e(m+1)}$$
$$-\frac{d^2(ex)^{m+3}(Ab(3bc(m+3)-ad(m+5))-aB(3bc(m+5)-ad(m+7)))}{2ab^3e^3(m+3)}$$
$$-\frac{d^3(ex)^{m+5}(Ab(m+5)-aB(m+7))}{2ab^2e^5(m+5)}+\frac{(c+dx^2)^3(ex)^{m+1}(Ab-aB)}{2abe(a+bx^2)}$$

```
[In] Int[((e*x)^m*(A + B*x^2)*(c + d*x^2)^3)/(a + b*x^2)^2,x]
```

```
[Out] -1/2*(d*(A*b*(3*b^2*c^2*(1 + m) - 3*a*b*c*d*(3 + m) + a^2*d^2*(5 + m)) - a*
B*(3*b^2*c^2*(3 + m) - 3*a*b*c*d*(5 + m) + a^2*d^2*(7 + m)))*(e*x)^(1 + m))
/(a*b^4*e*(1 + m)) - (d^2*(A*b*(3*b*c*(3 + m) - a*d*(5 + m)) - a*B*(3*b*c*(
5 + m) - a*d*(7 + m)))*(e*x)^(3 + m))/(2*a*b^3*e^3*(3 + m)) - (d^3*(A*b*(5
+ m) - a*B*(7 + m))*(e*x)^(5 + m))/(2*a*b^2*e^5*(5 + m)) + ((A*b - a*B)*(e*
x)^(1 + m)*(c + d*x^2)^3)/(2*a*b*e*(a + b*x^2)) + ((b*c - a*d)^2*(a*B*(b*c*
(1 + m) - a*d*(7 + m)) + A*b*(a*d*(5 + m) + b*(c - c*m)))*(e*x)^(1 + m)*Hyp
ergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(2*a^2*b^4*e*(1 + m)
)
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rule 591

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
 a*f])
```

Rubi steps

$$\text{integral} = \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^3}{2abe\left(a+bx^2\right)} - \frac{\int \frac{(ex)^m\left(c+dx^2\right)^2\left(-c(Ab(1-m)+aB(1+m))+d(Ab(5+m)-aB(7+m))x^2\right)}{a+bx^2}\,dx}{2ab}$$

$$= \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^3}{2abe\left(a+bx^2\right)} - \frac{\int \left(\frac{d\left(Ab\left(3b^2c^2(1+m)-3abcd(3+m)+a^2d^2(5+m)\right)-aB\left(3b^2c^2(3+m)-3abcd(5+m)+a^2d^2(7+m)\right)\right)(ex)^m}{b^3} + \frac{d^2(Ab(3bc(3+m)-\cdots\right.}{\cdots}$$

$$= -\frac{d\left(Ab\left(3b^2c^2(1+m)-3abcd(3+m)+a^2d^2(5+m)\right)-aB\left(3b^2c^2(3+m)-3abcd(5+m)+a^2d\cdots\right.\right.}{2ab^4e(1+m)} - \frac{d^2(Ab(3bc(3+m)-ad(5+m))-aB(3bc(5+m)-ad(7+m)))(ex)^{3+m}}{2ab^3e^3(3+m)} - \frac{d^3(Ab(5+m)-aB(7+m))(ex)^{5+m}}{2ab^2e^5(5+m)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^3}{2abe\left(a+bx^2\right)} - \frac{\left(-Ab^4c^3-ab^3Bc^3-3aAb^3c^2d+9a^2b^2Bc^2d+9a^2Ab^2cd^2-15a^3bBcd^2-5a^3Abd^3+7a^4Bd^3+\cdots\right.}{\cdots}$$

$$= -\frac{d\left(Ab\left(3b^2c^2(1+m)-3abcd(3+m)+a^2d^2(5+m)\right)-aB\left(3b^2c^2(3+m)-3abcd(5+m)+a^2d\cdots\right.\right.}{2ab^4e(1+m)} - \frac{d^2(Ab(3bc(3+m)-ad(5+m))-aB(3bc(5+m)-ad(7+m)))(ex)^{3+m}}{2ab^3e^3(3+m)} - \frac{d^3(Ab(5+m)-aB(7+m))(ex)^{5+m}}{2ab^2e^5(5+m)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^3}{2abe\left(a+bx^2\right)} + \frac{(bc-ad)^2(Ab(bc(1-m)+ad(5+m))+aB(bc(1+m)-ad(7+m)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+\cdots}{2}\cdots\right.}{2a^2b^4e(1+m)}$$

Mathematica [A] (verified)

Time = 0.78 (sec) , antiderivative size = 209, normalized size of antiderivative = 0.60

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^3}{(a+bx^2)^2} \, dx = \frac{x(ex)^m \left(\frac{d(3a^2Bd^2+3b^2c(Bc+Ad)-2abd(3Bc+Ad))}{1+m} + \frac{bd^2(3bBc+Abd-2aBd)x^2}{3+m} + \frac{b^2Bd^3x^4}{5+m} + \frac{(bc-ad)^2(bBc+3Abd-4aBd)\,\text{Hypergeom}}{a(1+m)}\right.}{b^4}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2)*(c + d*x^2)^3)/(a + b*x^2)^2,x]
```

```
[Out] (x*(e*x)^m*((d*(3*a^2*B*d^2 + 3*b^2*c*(B*c + A*d) - 2*a*b*d*(3*B*c + A*d)))
/(1 + m) + (b*d^2*(3*b*B*c + A*b*d - 2*a*B*d)*x^2)/(3 + m) + (b^2*B*d^3*x^4
)/(5 + m) + ((b*c - a*d)^2*(b*B*c + 3*A*b*d - 4*a*B*d)*Hypergeometric2F1[1,
 (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(a*(1 + m)) + ((-(A*b) + a*B)*(-(b*c)
 + a*d)^3*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(a^2*(1
 + m))))/b^4
```

Maple [F]

$$\int \frac{(ex)^m (x^2B+A) (d\,x^2+c)^3}{(b\,x^2+a)^2} dx$$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a)^2,x)
```

```
[Out] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a)^2,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A+Bx^2) (c+dx^2)^3}{(a+bx^2)^2} \, dx = \int \frac{(Bx^2+A)(dx^2+c)^3(ex)^m}{(bx^2+a)^2} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a)^2,x, algorithm="fricas")
```

```
[Out] integral((B*d^3*x^8 + (3*B*c*d^2 + A*d^3)*x^6 + 3*(B*c^2*d + A*c*d^2)*x^4 +
 A*c^3 + (B*c^3 + 3*A*c^2*d)*x^2)*(e*x)^m/(b^2*x^4 + 2*a*b*x^2 + a^2), x)
```

Sympy [F]

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)^3}{(a+bx^2)^2}\,dx = \int \frac{(ex)^m (A+Bx^2)(c+dx^2)^3}{(a+bx^2)^2}\,dx$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)**3/(b*x**2+a)**2,x)
[Out] Integral((e*x)**m*(A + B*x**2)*(c + d*x**2)**3/(a + b*x**2)**2, x)
```

Maxima [F]

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)^3}{(a+bx^2)^2}\,dx = \int \frac{(Bx^2+A)(dx^2+c)^3(ex)^m}{(bx^2+a)^2}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a)^2,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^3*(e*x)^m/(b*x^2 + a)^2, x)
```

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)^3}{(a+bx^2)^2}\,dx = \int \frac{(Bx^2+A)(dx^2+c)^3(ex)^m}{(bx^2+a)^2}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^3*(e*x)^m/(b*x^2 + a)^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)^3}{(a+bx^2)^2}\,dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(d\,x^2+c)^3}{(b\,x^2+a)^2}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^3)/(a + b*x^2)^2,x)
[Out] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^3)/(a + b*x^2)^2, x)
```

3.21 $\int \frac{(ex)^m(A+Bx^2)(c+dx^2)^3}{(a+bx^2)^3}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 480

$$\int \frac{(ex)^m(A+Bx^2)(c+dx^2)^3}{(a+bx^2)^3}\,dx =$$

$$-\frac{d(Ab(2b^2c^2(3+2m-m^2)+3abcd(3+4m+m^2)-a^2d^2(15+8m+m^2))+aB(2b^2c^2(1+m)^2-3abcd}{8a^2b^4e(1+m)}$$

$$-\frac{d^2(Ab(3+m)(bc(3-m)+ad(5+m))+aB(bc(3+4m+m^2)-ad(35+12m+m^2)))(ex)^{3+m}}{8a^2b^3e^3(3+m)}$$

$$+\frac{(Ab(bc(3-m)+ad(3+m))+aB(bc(1+m)-ad(7+m)))(ex)^{1+m}(c+dx^2)^2}{8a^2b^2e(a+bx^2)}$$

$$+\frac{(Ab-aB)(ex)^{1+m}(c+dx^2)^3}{4abe(a+bx^2)^2}$$

$$+\frac{(bc-ad)(Ab(2abcd(3-2m-m^2)+b^2c^2(3-4m+m^2)+a^2d^2(15+8m+m^2))+aB(b^2c^2(1-m^2)+}{8a^3b^4e(1+}$$

```
[Out] -1/8*d*(A*b*(2*b^2*c^2*(-m^2+2*m+3)+3*a*b*c*d*(m^2+4*m+3)-a^2*d^2*(m^2+8*m+
15))+a*B*(2*b^2*c^2*(1+m)^2-3*a*b*c*d*(m^2+8*m+15)+a^2*d^2*(m^2+12*m+35)))*
(e*x)^(1+m)/a^2/b^4/e/(1+m)-1/8*d^2*(A*b*(3+m)*(b*c*(3-m)+a*d*(5+m))+a*B*(b
*c*(m^2+4*m+3)-a*d*(m^2+12*m+35)))*(e*x)^(3+m)/a^2/b^3/e^3/(3+m)+1/8*(A*b*(
b*c*(3-m)+a*d*(3+m))+a*B*(b*c*(1+m)-a*d*(7+m)))*(e*x)^(1+m)*(d*x^2+c)^2/a^2
/b^2/e/(b*x^2+a)+1/4*(A*b-B*a)*(e*x)^(1+m)*(d*x^2+c)^3/a/b/e/(b*x^2+a)^2+1/
8*(-a*d+b*c)*(A*b*(2*a*b*c*d*(-m^2-2*m+3)+b^2*c^2*(m^2-4*m+3)+a^2*d^2*(m^2+
8*m+15))+a*B*(b^2*c^2*(-m^2+1)+2*a*b*c*d*(m^2+6*m+5)-a^2*d^2*(m^2+12*m+35))
)*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/a^3/b^4/e/(1+m
)
```

Rubi [A] (verified)

Time = 0.67 (sec) , antiderivative size = 480, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {591, 584, 371}

$$\int \frac{(ex)^m (A+Bx^2)(c+dx^2)^3}{(a+bx^2)^3}\,dx =$$

$$-\frac{d^2(ex)^{m+3}(Ab(m+3)(ad(m+5)+bc(3-m))+aB(bc(m^2+4m+3)-ad(m^2+12m+35)))}{8a^2b^3e^3(m+3)}$$

$$+\frac{(c+dx^2)^2(ex)^{m+1}(Ab(ad(m+3)+bc(3-m))+aB(bc(m+1)-ad(m+7)))}{8a^2b^2e(a+bx^2)}$$

$$-\frac{d(ex)^{m+1}(Ab(-a^2d^2(m^2+8m+15)+3abcd(m^2+4m+3)+2b^2c^2(-m^2+2m+3))+aB(a^2d^2(m^2}{8a^2b^4e(m+1)}$$

$$+\frac{(ex)^{m+1}(bc-ad)\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)(Ab(a^2d^2(m^2+8m+15)+2abcd(-m^2-2}{8a^3b^4e(}$$

$$+\frac{(c+dx^2)^3(ex)^{m+1}(Ab-aB)}{4abe(a+bx^2)^2}$$

```
[In] Int[((e*x)^m*(A + B*x^2)*(c + d*x^2)^3)/(a + b*x^2)^3,x]
```

```
[Out] -1/8*(d*(A*b*(2*b^2*c^2*(3 + 2*m - m^2) + 3*a*b*c*d*(3 + 4*m + m^2) - a^2*d
^2*(15 + 8*m + m^2)) + a*B*(2*b^2*c^2*(1 + m)^2 - 3*a*b*c*d*(15 + 8*m + m^2
) + a^2*d^2*(35 + 12*m + m^2)))*(e*x)^(1 + m))/(a^2*b^4*e*(1 + m)) - (d^2*(
A*b*(3 + m)*(b*c*(3 - m) + a*d*(5 + m)) + a*B*(b*c*(3 + 4*m + m^2) - a*d*(3
5 + 12*m + m^2)))*(e*x)^(3 + m))/(8*a^2*b^3*e^3*(3 + m)) + ((A*b*(b*c*(3 -
m) + a*d*(3 + m)) + a*B*(b*c*(1 + m) - a*d*(7 + m)))*(e*x)^(1 + m)*(c + d*x
^2)^2)/(8*a^2*b^2*e*(a + b*x^2)) + ((A*b - a*B)*(e*x)^(1 + m)*(c + d*x^2)^3
)/(4*a*b*e*(a + b*x^2)^2) + ((b*c - a*d)*(A*b*(2*a*b*c*d*(3 - 2*m - m^2) +
b^2*c^2*(3 - 4*m + m^2) + a^2*d^2*(15 + 8*m + m^2)) + a*B*(b^2*c^2*(1 - m^2
) + 2*a*b*c*d*(5 + 6*m + m^2) - a^2*d^2*(35 + 12*m + m^2)))*(e*x)^(1 + m)*H
ypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(8*a^3*b^4*e*(1 +
m))
```

<u>Rule 371</u>

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

<u>Rule 584</u>

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
```

```
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rule 591

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
 a*f])
```

Rubi steps

$$\text{integral} = \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^3}{4abe\left(a+bx^2\right)^2} - \frac{\int \frac{(ex)^m\left(c+dx^2\right)^2\left(-c(Ab(3-m)+aB(1+m))+d(Ab(3+m)-aB(7+m))x^2\right)}{\left(a+bx^2\right)^2}\,dx}{4ab}$$

$$= \frac{(Ab(bc(3-m)+ad(3+m))+aB(bc(1+m)-ad(7+m)))(ex)^{1+m}\left(c+dx^2\right)^2}{8a^2b^2e\left(a+bx^2\right)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^3}{4abe\left(a+bx^2\right)^2} + \frac{\int \frac{(ex)^m\left(c+dx^2\right)\left(c\left(aB(1+m)(ad(7+m)+b(c-cm))+Ab\left(bc\left(3-4m+m^2\right)-ad\left(3+4m+m^2\right)\right)\right)-d\left(Ab(3+m)(bc(3-m)+ad(5+m))+a\cdots\right.\right.}{a+bx^2}}{8a^2b^2}$$

$$= \frac{(Ab(bc(3-m)+ad(3+m))+aB(bc(1+m)-ad(7+m)))(ex)^{1+m}\left(c+dx^2\right)^2}{8a^2b^2e\left(a+bx^2\right)} + \frac{(Ab-aB)(ex)^{1+m}\left(c+dx^2\right)^3}{4abe\left(a+bx^2\right)^2} + \frac{\int \left(-\frac{d\left(Ab\left(2b^2c^2\left(3+2m-m^2\right)+3abcd\left(3+4m+m^2\right)-a^2d^2\left(15+8m+m^2\right)\right)+aB\left(2b^2c^2(1+m)^2-3abcd\left(15+8m+m^2\right)+a^2d^2\left(35+12\cdots\right.\right.\right.}{b^2}\right.}{\cdots}$$

$$= -\frac{d(Ab(2b^2c^2(3+2m-m^2)+3abcd(3+4m+m^2)-a^2d^2(15+8m+m^2))+aB(2b^2c^2(1+m)^2}{8a^2b^4e(1+m)}$$
$$-\frac{d^2(Ab(3+m)(bc(3-m)+ad(5+m))+aB(bc(3+4m+m^2)-ad(35+12m+m^2)))(ex)^{3+}}{8a^2b^3e^3(3+m)}$$
$$+\frac{(Ab(bc(3-m)+ad(3+m))+aB(bc(1+m)-ad(7+m)))(ex)^{1+m}(c+dx^2)^2}{8a^2b^2e(a+bx^2)}$$
$$+\frac{(Ab-aB)(ex)^{1+m}(c+dx^2)^3}{4abe(a+bx^2)^2}$$
$$+\frac{((bc-ad)(Ab(2abcd(3-2m-m^2)+b^2c^2(3-4m+m^2)+a^2d^2(15+8m+m^2))+aB(b^2c^2(1}{8a^2b^4}$$
$$= -\frac{d(Ab(2b^2c^2(3+2m-m^2)+3abcd(3+4m+m^2)-a^2d^2(15+8m+m^2))+aB(2b^2c^2(1+m)^2}{8a^2b^4e(1+m)}$$
$$-\frac{d^2(Ab(3+m)(bc(3-m)+ad(5+m))+aB(bc(3+4m+m^2)-ad(35+12m+m^2)))(ex)^{3+}}{8a^2b^3e^3(3+m)}$$
$$+\frac{(Ab(bc(3-m)+ad(3+m))+aB(bc(1+m)-ad(7+m)))(ex)^{1+m}(c+dx^2)^2}{8a^2b^2e(a+bx^2)}$$
$$+\frac{(Ab-aB)(ex)^{1+m}(c+dx^2)^3}{4abe(a+bx^2)^2}$$
$$+\frac{(bc-ad)(Ab(2abcd(3-2m-m^2)+b^2c^2(3-4m+m^2)+a^2d^2(15+8m+m^2))+aB(b^2c^2(1}{8a^3b^4e(1-}$$

Mathematica [A] (verified)

Time = 0.79 (sec) , antiderivative size = 218, normalized size of antiderivative = 0.45

$$\int \frac{(ex)^m(A+Bx^2)(c+dx^2)^3}{(a+bx^2)^3}\,dx$$
$$= \frac{x(ex)^m\left(\frac{d^2(3bBc+Abd-3aBd)}{1+m}+\frac{bBd^3x^2}{3+m}+\frac{3d(bc-ad)(bBc+Abd-2aBd)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{a(1+m)}+\frac{(bc-ad)^2(bBc+}{}\right.}{b^4}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2)*(c + d*x^2)^3)/(a + b*x^2)^3,x]
```

```
[Out] (x*(e*x)^m*((d^2*(3*b*B*c + A*b*d - 3*a*B*d))/(1 + m) + (b*B*d^3*x^2)/(3 +
m) + (3*d*(b*c - a*d)*(b*B*c + A*b*d - 2*a*B*d)*Hypergeometric2F1[1, (1 + m
)/2, (3 + m)/2, -((b*x^2)/a)])/(a*(1 + m)) + ((b*c - a*d)^2*(b*B*c + 3*A*b*
d - 4*a*B*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(a^2
*(1 + m)) + ((-(A*b) + a*B)*(-(b*c) + a*d)^3*Hypergeometric2F1[3, (1 + m)/2
, (3 + m)/2, -((b*x^2)/a)])/(a^3*(1 + m))))/b^4
```

Maple [F]

$$\int \frac{(ex)^m (x^2B + A)(d\,x^2 + c)^3}{(b\,x^2 + a)^3}dx$$

```
[In] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a)^3,x)
```

```
[Out] int((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a)^3,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)^3}{(a + bx^2)^3}\,dx = \int \frac{(Bx^2 + A)(dx^2 + c)^3(ex)^m}{(bx^2 + a)^3}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a)^3,x, algorithm="fricas")
```

```
[Out] integral((B*d^3*x^8 + (3*B*c*d^2 + A*d^3)*x^6 + 3*(B*c^2*d + A*c*d^2)*x^4 +
 A*c^3 + (B*c^3 + 3*A*c^2*d)*x^2)*(e*x)^m/(b^3*x^6 + 3*a*b^2*x^4 + 3*a^2*b*
x^2 + a^3), x)
```

Sympy [F]

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)^3}{(a + bx^2)^3}\,dx = \int \frac{(ex)^m (A + Bx^2)(c + dx^2)^3}{(a + bx^2)^3}\,dx$$

```
[In] integrate((e*x)**m*(B*x**2+A)*(d*x**2+c)**3/(b*x**2+a)**3,x)
```

```
[Out] Integral((e*x)**m*(A + B*x**2)*(c + d*x**2)**3/(a + b*x**2)**3, x)
```

Maxima [F]

$$\int \frac{(ex)^m (A + Bx^2)(c + dx^2)^3}{(a + bx^2)^3}\,dx = \int \frac{(Bx^2 + A)(dx^2 + c)^3(ex)^m}{(bx^2 + a)^3}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a)^3,x, algorithm="maxima")
```

```
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^3*(e*x)^m/(b*x^2 + a)^3, x)
```

Giac [F]

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)^3}{(a + bx^2)^3} \, dx = \int \frac{(Bx^2 + A)(dx^2 + c)^3 (ex)^m}{(bx^2 + a)^3} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)*(d*x^2+c)^3/(b*x^2+a)^3,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^3*(e*x)^m/(b*x^2 + a)^3, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A + Bx^2) (c + dx^2)^3}{(a + bx^2)^3} \, dx = \int \frac{(B\,x^2 + A)\,(e\,x)^m\,(d\,x^2 + c)^3}{(b\,x^2 + a)^3} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^3)/(a + b*x^2)^3,x)
[Out] int(((A + B*x^2)*(e*x)^m*(c + d*x^2)^3)/(a + b*x^2)^3, x)
```

3.22 $\int \frac{(ex)^m (a+bx^2)^4 (A+Bx^2)}{c+dx^2} \, dx$

Optimal result

Integrand size = 31, antiderivative size = 363

$$\begin{aligned}
&\int \frac{(ex)^m (a+bx^2)^4 (A+Bx^2)}{c+dx^2} \, dx \\
&= \frac{(a^4Bd^4 + b^4c^3(Bc-Ad) - 4ab^3c^2d(Bc-Ad) + 6a^2b^2cd^2(Bc-Ad) - 4a^3bd^3(Bc-Ad))(ex)^{1+m}}{d^5e(1+m)} \\
&\quad + \frac{b(4a^3Bd^3 - b^3c^2(Bc-Ad) + 4ab^2cd(Bc-Ad) - 6a^2bd^2(Bc-Ad))(ex)^{3+m}}{d^4e^3(3+m)} \\
&\quad + \frac{b^2(6a^2Bd^2 + b^2c(Bc-Ad) - 4abd(Bc-Ad))(ex)^{5+m}}{d^3e^5(5+m)} \\
&\quad - \frac{b^3(bBc - Abd - 4aBd)(ex)^{7+m}}{d^2e^7(7+m)} + \frac{b^4B(ex)^{9+m}}{de^9(9+m)} \\
&\quad - \frac{(bc-ad)^4(Bc-Ad)(ex)^{1+m} \text{Hypergeometric2F1}\left(1, \frac{1+m}{2}, \frac{3+m}{2}, -\frac{dx^2}{c}\right)}{cd^5e(1+m)}
\end{aligned}$$

```
[Out] (a^4*B*d^4+b^4*c^3*(-A*d+B*c)-4*a*b^3*c^2*d*(-A*d+B*c)+6*a^2*b^2*c*d^2*(-A*
d+B*c)-4*a^3*b*d^3*(-A*d+B*c))*(e*x)^(1+m)/d^5/e/(1+m)+b*(4*a^3*B*d^3-b^3*c
^2*(-A*d+B*c)+4*a*b^2*c*d*(-A*d+B*c)-6*a^2*b*d^2*(-A*d+B*c))*(e*x)^(3+m)/d^
4/e^3/(3+m)+b^2*(6*a^2*B*d^2+b^2*c*(-A*d+B*c)-4*a*b*d*(-A*d+B*c))*(e*x)^(5+
m)/d^3/e^5/(5+m)-b^3*(-A*b*d-4*B*a*d+B*b*c)*(e*x)^(7+m)/d^2/e^7/(7+m)+b^4*B
*(e*x)^(9+m)/d/e^9/(9+m)-(-a*d+b*c)^4*(-A*d+B*c)*(e*x)^(1+m)*hypergeom([1,
1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/c/d^5/e/(1+m)
```

Rubi [A] (verified)

Time = 0.25 (sec) , antiderivative size = 363, 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 = {584, 371}

$$\int \frac{(ex)^m (a+bx^2)^4 (A+Bx^2)}{c+dx^2} dx = \frac{b^2(ex)^{m+5} (6a^2Bd^2-4abd(Bc-Ad)+b^2c(Bc-Ad))}{d^3e^5(m+5)} + \frac{b(ex)^{m+3} (4a^3Bd^3-6a^2bd^2(Bc-Ad)+4ab^2cd(Bc-Ad)+b^3(-c^2)(Bc-Ad))}{d^4e^3(m+3)} + \frac{(ex)^{m+1} (a^4Bd^4-4a^3bd^3(Bc-Ad)+6a^2b^2cd^2(Bc-Ad)-4ab^3c^2d(Bc-Ad)+b^4c^3(Bc-Ad))}{d^5e(m+1)} - \frac{b^3(ex)^{m+7}(-4aBd-Abd+bBc)}{d^2e^7(m+7)} - \frac{(ex)^{m+1}(bc-ad)^4(Bc-Ad)\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)}{cd^5e(m+1)} + \frac{b^4B(ex)^{m+9}}{de^9(m+9)}$$

```
[In] Int[((e*x)^m*(a + b*x^2)^4*(A + B*x^2))/(c + d*x^2),x]
```

```
[Out] ((a^4*B*d^4 + b^4*c^3*(B*c - A*d) - 4*a*b^3*c^2*d*(B*c - A*d) + 6*a^2*b^2*c
*d^2*(B*c - A*d) - 4*a^3*b*d^3*(B*c - A*d))*(e*x)^(1 + m))/(d^5*e*(1 + m))
+ (b*(4*a^3*B*d^3 - b^3*c^2*(B*c - A*d) + 4*a*b^2*c*d*(B*c - A*d) - 6*a^2*b
*d^2*(B*c - A*d))*(e*x)^(3 + m))/(d^4*e^3*(3 + m)) + (b^2*(6*a^2*B*d^2 + b^
2*c*(B*c - A*d) - 4*a*b*d*(B*c - A*d))*(e*x)^(5 + m))/(d^3*e^5*(5 + m)) - (
b^3*(b*B*c - A*b*d - 4*a*B*d)*(e*x)^(7 + m))/(d^2*e^7*(7 + m)) + (b^4*B*(e*
x)^(9 + m))/(d*e^9*(9 + m)) - ((b*c - a*d)^4*(B*c - A*d)*(e*x)^(1 + m)*Hype
rgeometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c*d^5*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

integral

$$= \int \left(\frac{\left(a^4Bd^4+b^4c^3(Bc-Ad)-4ab^3c^2d(Bc-Ad)+6a^2b^2cd^2(Bc-Ad)-4a^3bd^3(Bc-Ad)\right)(ex)^m}{d^5} + \frac{b\left(4a^3Bd^3-b^3c^2(Bc-Ad)+4ab^2cd(Bc-Ad)-6a^2bd^2(Bc-Ad)\right)(ex)^{2+m}}{d^4e^2} + \frac{b^2\left(6a^2Bd^2+b^2c(Bc-Ad)-4abd(Bc-Ad)\right)(ex)^{4+m}}{d^3e^4} - \frac{b^3(bBc-Abd-4aBd)(ex)^{6+m}}{d^2e^6} + \frac{b^4B(ex)^{8+m}}{de^8} + \frac{(-b^4Bc^5+Ab^4c^4d+4ab^3Bc^4d-4aAb^3c^3d^2-6a^2b^2Bc^3d^2+6a^2Ab^2c^2d^3+4a^3bBc^2d^3-4a^3Abcd^4-a^4A}{d^5\left(c+dx^2\right)}$$

$$= \frac{\left(a^4Bd^4+b^4c^3(Bc-Ad)-4ab^3c^2d(Bc-Ad)+6a^2b^2cd^2(Bc-Ad)-4a^3bd^3(Bc-Ad)\right)(ex)^{1+m}}{d^5e(1+m)} + \frac{b\left(4a^3Bd^3-b^3c^2(Bc-Ad)+4ab^2cd(Bc-Ad)-6a^2bd^2(Bc-Ad)\right)(ex)^{3+m}}{d^4e^3(3+m)} + \frac{b^2\left(6a^2Bd^2+b^2c(Bc-Ad)-4abd(Bc-Ad)\right)(ex)^{5+m}}{d^3e^5(5+m)} - \frac{b^3(bBc-Abd-4aBd)(ex)^{7+m}}{d^2e^7(7+m)} + \frac{b^4B(ex)^{9+m}}{de^9(9+m)} - \frac{\left((bc-ad)^4(Bc-Ad)\right)\int \frac{(ex)^m}{c+dx^2}\,dx}{d^5}$$

$$= \frac{\left(a^4Bd^4+b^4c^3(Bc-Ad)-4ab^3c^2d(Bc-Ad)+6a^2b^2cd^2(Bc-Ad)-4a^3bd^3(Bc-Ad)\right)(ex)^{1+m}}{d^5e(1+m)} + \frac{b\left(4a^3Bd^3-b^3c^2(Bc-Ad)+4ab^2cd(Bc-Ad)-6a^2bd^2(Bc-Ad)\right)(ex)^{3+m}}{d^4e^3(3+m)} + \frac{b^2\left(6a^2Bd^2+b^2c(Bc-Ad)-4abd(Bc-Ad)\right)(ex)^{5+m}}{d^3e^5(5+m)} - \frac{b^3(bBc-Abd-4aBd)(ex)^{7+m}}{d^2e^7(7+m)} + \frac{b^4B(ex)^{9+m}}{de^9(9+m)} - \frac{(bc-ad)^4(Bc-Ad)(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{cd^5e(1+m)}$$

Mathematica [A] (verified)

Time = 0.69 (sec) , antiderivative size = 315, normalized size of antiderivative = 0.87

$$\int \frac{(ex)^m (a+bx^2)^4 (A+Bx^2)}{c+dx^2} dx$$
$$= \frac{x(ex)^m \left(\frac{a^4Bd^4+b^4c^3(Bc-Ad)+6a^2b^2cd^2(Bc-Ad)+4ab^3c^2d(-Bc+Ad)+4a^3bd^3(-Bc+Ad)}{1+m} + \frac{bd(4a^3Bd^3+4ab^2cd(Bc-Ad)+b^3c^2(-Bc+}{3+m}\right.}{}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)^4*(A + B*x^2))/(c + d*x^2),x]
```

```
[Out] (x*(e*x)^m*((a^4*B*d^4 + b^4*c^3*(B*c - A*d) + 6*a^2*b^2*c*d^2*(B*c - A*d)
+ 4*a*b^3*c^2*d*(-(B*c) + A*d) + 4*a^3*b*d^3*(-(B*c) + A*d))/(1 + m) + (b*d
*(4*a^3*B*d^3 + 4*a*b^2*c*d*(B*c - A*d) + b^3*c^2*(-(B*c) + A*d) + 6*a^2*b*
d^2*(-(B*c) + A*d))*x^2)/(3 + m) + (b^2*d^2*(6*a^2*B*d^2 + b^2*c*(B*c - A*d
) + 4*a*b*d*(-(B*c) + A*d))*x^4)/(5 + m) + (b^3*d^3*(-(b*B*c) + A*b*d + 4*a
*B*d)*x^6)/(7 + m) + (b^4*B*d^4*x^8)/(9 + m) - ((b*c - a*d)^4*(B*c - A*d)*H
ypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c*(1 + m))))/d^5
```

Maple [F]

$$\int \frac{(ex)^m (b\,x^2+a)^4 (x^2B+A)}{d\,x^2+c}dx$$

```
[In] int((e*x)^m*(b*x^2+a)^4*(B*x^2+A)/(d*x^2+c),x)
```

```
[Out] int((e*x)^m*(b*x^2+a)^4*(B*x^2+A)/(d*x^2+c),x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)^4 (A+Bx^2)}{c+dx^2} dx = \int \frac{(Bx^2+A)(bx^2+a)^4(ex)^m}{dx^2+c} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^4*(B*x^2+A)/(d*x^2+c),x, algorithm="fricas")
```

```
[Out] integral((B*b^4*x^10 + (4*B*a*b^3 + A*b^4)*x^8 + 2*(3*B*a^2*b^2 + 2*A*a*b^3
)*x^6 + A*a^4 + 2*(2*B*a^3*b + 3*A*a^2*b^2)*x^4 + (B*a^4 + 4*A*a^3*b)*x^2)*
(e*x)^m/(d*x^2 + c), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 13.39 (sec) , antiderivative size = 1102, normalized size of antiderivative = 3.04

$$\int \frac{(ex)^m (a+bx^2)^4 (A+Bx^2)}{c+dx^2} \, dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**4*(B*x**2+A)/(d*x**2+c),x)
```

```
[Out] A*a**4*e**m*m*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*g
amma(m/2 + 1/2)/(4*c*gamma(m/2 + 3/2)) + A*a**4*e**m*x**(m + 1)*lerchphi(d*
x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(4*c*gamma(m/2 + 3/2
)) + A*a**3*b*e**m*m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 +
 3/2)*gamma(m/2 + 3/2)/(c*gamma(m/2 + 5/2)) + 3*A*a**3*b*e**m*x**(m + 3)*le
rchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(c*gamma(m/
2 + 5/2)) + 3*A*a**2*b**2*e**m*m*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)
/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(2*c*gamma(m/2 + 7/2)) + 15*A*a**2*b**2*
e**m*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2
+ 5/2)/(2*c*gamma(m/2 + 7/2)) + A*a*b**3*e**m*m*x**(m + 7)*lerchphi(d*x**2*
exp_polar(I*pi)/c, 1, m/2 + 7/2)*gamma(m/2 + 7/2)/(c*gamma(m/2 + 9/2)) + 7*
A*a*b**3*e**m*x**(m + 7)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 7/2)*g
amma(m/2 + 7/2)/(c*gamma(m/2 + 9/2)) + A*b**4*e**m*m*x**(m + 9)*lerchphi(d*
x**2*exp_polar(I*pi)/c, 1, m/2 + 9/2)*gamma(m/2 + 9/2)/(4*c*gamma(m/2 + 11/
2)) + 9*A*b**4*e**m*x**(m + 9)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 +
9/2)*gamma(m/2 + 9/2)/(4*c*gamma(m/2 + 11/2)) + B*a**4*e**m*m*x**(m + 3)*le
rchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*c*gamma(
m/2 + 5/2)) + 3*B*a**4*e**m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1
, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*c*gamma(m/2 + 5/2)) + B*a**3*b*e**m*m*x**(
m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(c
*gamma(m/2 + 7/2)) + 5*B*a**3*b*e**m*x**(m + 5)*lerchphi(d*x**2*exp_polar(I
*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(c*gamma(m/2 + 7/2)) + 3*B*a**2*b**2
*e**m*m*x**(m + 7)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 7/2)*gamma(m
/2 + 7/2)/(2*c*gamma(m/2 + 9/2)) + 21*B*a**2*b**2*e**m*x**(m + 7)*lerchphi(
d*x**2*exp_polar(I*pi)/c, 1, m/2 + 7/2)*gamma(m/2 + 7/2)/(2*c*gamma(m/2 + 9
/2)) + B*a*b**3*e**m*m*x**(m + 9)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2
 + 9/2)*gamma(m/2 + 9/2)/(c*gamma(m/2 + 11/2)) + 9*B*a*b**3*e**m*x**(m + 9)
*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 9/2)*gamma(m/2 + 9/2)/(c*gamma
(m/2 + 11/2)) + B*b**4*e**m*m*x**(m + 11)*lerchphi(d*x**2*exp_polar(I*pi)/c
, 1, m/2 + 11/2)*gamma(m/2 + 11/2)/(4*c*gamma(m/2 + 13/2)) + 11*B*b**4*e**m
*x**(m + 11)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 11/2)*gamma(m/2 +
11/2)/(4*c*gamma(m/2 + 13/2))
```

Maxima [F]

$$\int \frac{(ex)^m (a + bx^2)^4 (A + Bx^2)}{c + dx^2} dx = \int \frac{(Bx^2 + A)(bx^2 + a)^4 (ex)^m}{dx^2 + c} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^4*(B*x^2+A)/(d*x^2+c),x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^4*(e*x)^m/(d*x^2 + c), x)
```

Giac [F]

$$\int \frac{(ex)^m (a + bx^2)^4 (A + Bx^2)}{c + dx^2} dx = \int \frac{(Bx^2 + A)(bx^2 + a)^4 (ex)^m}{dx^2 + c} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^4*(B*x^2+A)/(d*x^2+c),x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^4*(e*x)^m/(d*x^2 + c), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a + bx^2)^4 (A + Bx^2)}{c + dx^2} dx = \int \frac{(B\,x^2 + A)\,(e\,x)^m\,(b\,x^2 + a)^4}{d\,x^2 + c} dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^4)/(c + d*x^2),x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^4)/(c + d*x^2), x)
```

3.23 $\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{c+dx^2} \, dx$

Optimal result

Integrand size = 31, antiderivative size = 260

$$\begin{aligned}
&\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{c+dx^2} \, dx \\
&= \frac{(a^3Bd^3 - b^3c^2(Bc-Ad) + 3ab^2cd(Bc-Ad) - 3a^2bd^2(Bc-Ad))(ex)^{1+m}}{d^4e(1+m)} \\
&\quad + \frac{b(3a^2Bd^2 + b^2c(Bc-Ad) - 3abd(Bc-Ad))(ex)^{3+m}}{d^3e^3(3+m)} \\
&\quad - \frac{b^2(bBc - Abd - 3aBd)(ex)^{5+m}}{d^2e^5(5+m)} + \frac{b^3B(ex)^{7+m}}{de^7(7+m)} \\
&\quad + \frac{(bc-ad)^3(Bc-Ad)(ex)^{1+m} \text{Hypergeometric2F1}\left(1, \frac{1+m}{2}, \frac{3+m}{2}, -\frac{dx^2}{c}\right)}{cd^4e(1+m)}
\end{aligned}$$

```
[Out] (a^3*B*d^3-b^3*c^2*(-A*d+B*c)+3*a*b^2*c*d*(-A*d+B*c)-3*a^2*b*d^2*(-A*d+B*c)
)*(e*x)^(1+m)/d^4/e/(1+m)+b*(3*a^2*B*d^2+b^2*c*(-A*d+B*c)-3*a*b*d*(-A*d+B*c
))*(e*x)^(3+m)/d^3/e^3/(3+m)-b^2*(-A*b*d-3*B*a*d+B*b*c)*(e*x)^(5+m)/d^2/e^5
/(5+m)+b^3*B*(e*x)^(7+m)/d/e^7/(7+m)+(-a*d+b*c)^3*(-A*d+B*c)*(e*x)^(1+m)*hy
pergeom([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/c/d^4/e/(1+m)
```

Rubi [A] (verified)

Time = 0.17 (sec) , antiderivative size = 260, 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 = {584, 371}

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{c+dx^2} dx$$
$$= \frac{b(ex)^{m+3} (3a^2Bd^2 - 3abd(Bc-Ad) + b^2c(Bc-Ad))}{d^3e^3(m+3)}$$
$$+ \frac{(ex)^{m+1} (a^3Bd^3 - 3a^2bd^2(Bc-Ad) + 3ab^2cd(Bc-Ad) + b^3(-c^2)(Bc-Ad))}{d^4e(m+1)}$$
$$- \frac{b^2(ex)^{m+5}(-3aBd - Abd + bBc)}{d^2e^5(m+5)}$$
$$+ \frac{(ex)^{m+1}(bc-ad)^3(Bc-Ad)\,\text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{dx^2}{c}\right)}{cd^4e(m+1)} + \frac{b^3B(ex)^{m+7}}{de^7(m+7)}$$

```
[In] Int[((e*x)^m*(a + b*x^2)^3*(A + B*x^2))/(c + d*x^2),x]
```

```
[Out] ((a^3*B*d^3 - b^3*c^2*(B*c - A*d) + 3*a*b^2*c*d*(B*c - A*d) - 3*a^2*b*d^2*(
B*c - A*d))*(e*x)^(1 + m))/(d^4*e*(1 + m)) + (b*(3*a^2*B*d^2 + b^2*c*(B*c -
 A*d) - 3*a*b*d*(B*c - A*d))*(e*x)^(3 + m))/(d^3*e^3*(3 + m)) - (b^2*(b*B*c
 - A*b*d - 3*a*B*d)*(e*x)^(5 + m))/(d^2*e^5*(5 + m)) + (b^3*B*(e*x)^(7 + m)
)/(d*e^7*(7 + m)) + ((b*c - a*d)^3*(B*c - A*d)*(e*x)^(1 + m)*Hypergeometric
2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c*d^4*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\text{integral} = \int \left(\frac{(a^3Bd^3 - b^3c^2(Bc-Ad) + 3ab^2cd(Bc-Ad) - 3a^2bd^2(Bc-Ad))\,(ex)^m}{d^4} + \frac{b(3a^2Bd^2 + b^2c(Bc-Ad) - 3abd(Bc-Ad))\,(ex)^{2+m}}{d^3e^2} - \frac{b^2(bBc-Abd-3aBd)(ex)^{4+m}}{d^2e^4} + \frac{b^3B(ex)^{6+m}}{de^6} + \frac{(b^3Bc^4 - Ab^3c^3d - 3ab^2Bc^3d + 3aAb^2c^2d^2 + 3a^2bBc^2d^2 - 3a^2Abcd^3 - a^3Bcd^3 + a^3Ad^4)\,(ex)^m}{d^4\,(c+dx^2)} \right) dx$$

$$= \frac{(a^3Bd^3 - b^3c^2(Bc-Ad) + 3ab^2cd(Bc-Ad) - 3a^2bd^2(Bc-Ad))\,(ex)^{1+m}}{d^4e(1+m)} + \frac{b(3a^2Bd^2 + b^2c(Bc-Ad) - 3abd(Bc-Ad))\,(ex)^{3+m}}{d^3e^3(3+m)} - \frac{b^2(bBc-Abd-3aBd)(ex)^{5+m}}{d^2e^5(5+m)} + \frac{b^3B(ex)^{7+m}}{de^7(7+m)} + \frac{((bc-ad)^3(Bc-Ad))\int \frac{(ex)^m}{c+dx^2}\,dx}{d^4}$$

$$= \frac{(a^3Bd^3 - b^3c^2(Bc-Ad) + 3ab^2cd(Bc-Ad) - 3a^2bd^2(Bc-Ad))\,(ex)^{1+m}}{d^4e(1+m)} + \frac{b(3a^2Bd^2 + b^2c(Bc-Ad) - 3abd(Bc-Ad))\,(ex)^{3+m}}{d^3e^3(3+m)} - \frac{b^2(bBc-Abd-3aBd)(ex)^{5+m}}{d^2e^5(5+m)} + \frac{b^3B(ex)^{7+m}}{de^7(7+m)} + \frac{(bc-ad)^3(Bc-Ad)(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{cd^4e(1+m)}$$

Mathematica [A] (verified)

Time = 0.56 (sec) , antiderivative size = 219, normalized size of antiderivative = 0.84

$$\int \frac{(ex)^m\,(a+bx^2)^3\,(A+Bx^2)}{c+dx^2}\,dx = \frac{x(ex)^m\left(\frac{a^3Bd^3+3ab^2cd(Bc-Ad)+b^3c^2(-Bc+Ad)+3a^2bd^2(-Bc+Ad)}{1+m} + \frac{bd(3a^2Bd^2+b^2c(Bc-Ad)+3abd(-Bc+Ad))x^2}{3+m} + \frac{b^2d^2(-bBc+A}{5+}\right.}{d^4}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)^3*(A + B*x^2))/(c + d*x^2),x]
```

```
[Out] (x*(e*x)^m*((a^3*B*d^3 + 3*a*b^2*c*d*(B*c - A*d) + b^3*c^2*(-(B*c) + A*d) +
 3*a^2*b*d^2*(-(B*c) + A*d))/(1 + m) + (b*d*(3*a^2*B*d^2 + b^2*c*(B*c - A*d
```

```
) + 3*a*b*d*(-(B*c) + A*d))*x^2)/(3 + m) + (b^2*d^2*(-(b*B*c) + A*b*d + 3*a
*B*d)*x^4)/(5 + m) + (b^3*B*d^3*x^6)/(7 + m) + ((b*c - a*d)^3*(B*c - A*d)*H
ypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c*(1 + m))))/d^4
```

Maple [F]

$$\int \frac{(ex)^m (b\,x^2+a)^3 (x^2B+A)}{d\,x^2+c}dx$$

```
[In] int((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c),x)
```

```
[Out] int((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c),x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{c+dx^2}\,dx = \int \frac{(Bx^2+A)(bx^2+a)^3(ex)^m}{dx^2+c}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c),x, algorithm="fricas")
```

```
[Out] integral((B*b^3*x^8 + (3*B*a*b^2 + A*b^3)*x^6 + 3*(B*a^2*b + A*a*b^2)*x^4 +
 A*a^3 + (B*a^3 + 3*A*a^2*b)*x^2)*(e*x)^m/(d*x^2 + c), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 9.12 (sec) , antiderivative size = 887, normalized size of antiderivative = 3.41

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{c+dx^2}\,dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**3*(B*x**2+A)/(d*x**2+c),x)
```

```
[Out] A*a**3*e**m*m*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*g
amma(m/2 + 1/2)/(4*c*gamma(m/2 + 3/2)) + A*a**3*e**m*x**(m + 1)*lerchphi(d*
x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(4*c*gamma(m/2 + 3/2
)) + 3*A*a**2*b*e**m*m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2
 + 3/2)*gamma(m/2 + 3/2)/(4*c*gamma(m/2 + 5/2)) + 9*A*a**2*b*e**m*x**(m + 3
)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*c*ga
mma(m/2 + 5/2)) + 3*A*a*b**2*e**m*m*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*
pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(4*c*gamma(m/2 + 7/2)) + 15*A*a*b**2*
e**m*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2
+ 5/2)/(4*c*gamma(m/2 + 7/2)) + A*b**3*e**m*m*x**(m + 7)*lerchphi(d*x**2*ex
p_polar(I*pi)/c, 1, m/2 + 7/2)*gamma(m/2 + 7/2)/(4*c*gamma(m/2 + 9/2)) + 7*
```

```
A*b**3*e**m*x**(m + 7)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 7/2)*gam
ma(m/2 + 7/2)/(4*c*gamma(m/2 + 9/2)) + B*a**3*e**m*m*x**(m + 3)*lerchphi(d*
x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*c*gamma(m/2 + 5/2
)) + 3*B*a**3*e**m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3
/2)*gamma(m/2 + 3/2)/(4*c*gamma(m/2 + 5/2)) + 3*B*a**2*b*e**m*m*x**(m + 5)*
lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(4*c*gamm
a(m/2 + 7/2)) + 15*B*a**2*b*e**m*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)
/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(4*c*gamma(m/2 + 7/2)) + 3*B*a*b**2*e**m
*m*x**(m + 7)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 7/2)*gamma(m/2 +
7/2)/(4*c*gamma(m/2 + 9/2)) + 21*B*a*b**2*e**m*x**(m + 7)*lerchphi(d*x**2*e
xp_polar(I*pi)/c, 1, m/2 + 7/2)*gamma(m/2 + 7/2)/(4*c*gamma(m/2 + 9/2)) + B
*b**3*e**m*m*x**(m + 9)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 9/2)*ga
mma(m/2 + 9/2)/(4*c*gamma(m/2 + 11/2)) + 9*B*b**3*e**m*x**(m + 9)*lerchphi(
d*x**2*exp_polar(I*pi)/c, 1, m/2 + 9/2)*gamma(m/2 + 9/2)/(4*c*gamma(m/2 + 1
1/2))
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{c+dx^2}\,dx = \int \frac{(Bx^2+A)(bx^2+a)^3(ex)^m}{dx^2+c}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c),x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^3*(e*x)^m/(d*x^2 + c), x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{c+dx^2}\,dx = \int \frac{(Bx^2+A)(bx^2+a)^3(ex)^m}{dx^2+c}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c),x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^3*(e*x)^m/(d*x^2 + c), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{c+dx^2}\,dx = \int \frac{(B\,x^2+A)\,\left(e\,x\right)^m\,{\left(b\,x^2+a\right)}^3}{d\,x^2+c}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^3)/(c + d*x^2),x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^3)/(c + d*x^2), x)
```

3.24 $\int \frac{(ex)^m(a+bx^2)^2(A+Bx^2)}{c+dx^2}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 180

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{c+dx^2}\,dx = \frac{(a^2Bd^2+b^2c(Bc-Ad)-2abd(Bc-Ad))\,(ex)^{1+m}}{d^3e(1+m)} - \frac{b(bBc-Abd-2aBd)(ex)^{3+m}}{d^2e^3(3+m)} + \frac{b^2B(ex)^{5+m}}{de^5(5+m)} - \frac{(bc-ad)^2(Bc-Ad)(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{cd^3e(1+m)}$$

```
[Out] (a^2*B*d^2+b^2*c*(-A*d+B*c)-2*a*b*d*(-A*d+B*c))*(e*x)^(1+m)/d^3/e/(1+m)-b*(
-A*b*d-2*B*a*d+B*b*c)*(e*x)^(3+m)/d^2/e^3/(3+m)+b^2*B*(e*x)^(5+m)/d/e^5/(5+
m)-(-a*d+b*c)^2*(-A*d+B*c)*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m]
,-d*x^2/c)/c/d^3/e/(1+m)
```

Rubi [A] (verified)

Time = 0.12 (sec) , antiderivative size = 180, 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 = {584, 371}

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{c+dx^2} \, dx$$
$$= \frac{(ex)^{m+1}(a^2Bd^2 - 2abd(Bc-Ad) + b^2c(Bc-Ad))}{d^3e(m+1)}$$
$$- \frac{(ex)^{m+1}(bc-ad)^2(Bc-Ad)\,\text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{dx^2}{c}\right)}{cd^3e(m+1)}$$
$$- \frac{b(ex)^{m+3}(-2aBd - Abd + bBc)}{d^2e^3(m+3)} + \frac{b^2B(ex)^{m+5}}{de^5(m+5)}$$

```
[In] Int[((e*x)^m*(a + b*x^2)^2*(A + B*x^2))/(c + d*x^2),x]
```

```
[Out] ((a^2*B*d^2 + b^2*c*(B*c - A*d) - 2*a*b*d*(B*c - A*d))*(e*x)^(1 + m))/(d^3*
e*(1 + m)) - (b*(b*B*c - A*b*d - 2*a*B*d)*(e*x)^(3 + m))/(d^2*e^3*(3 + m))
+ (b^2*B*(e*x)^(5 + m))/(d*e^5*(5 + m)) - ((b*c - a*d)^2*(B*c - A*d)*(e*x)^
(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c*d^3*e*
(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$\text{integral} = \int \left(\frac{(a^2Bd^2 + b^2c(Bc-Ad) - 2abd(Bc-Ad))(ex)^m}{d^3} - \frac{b(bBc - Abd - 2aBd)(ex)^{2+m}}{d^2e^2} + \frac{b^2B(ex)^{4+m}}{de^4} + \frac{(-b^2Bc^3 + Ab^2c^2d + 2abBc^2d - 2aAbcd^2 - a^2Bcd^2 + a^2Ad^3)(ex)^m}{d^3(c+dx^2)}\right) dx$$

$$= \frac{(a^2Bd^2 + b^2c(Bc - Ad) - 2abd(Bc - Ad))\,(ex)^{1+m}}{d^3e(1+m)} - \frac{b(bBc - Abd - 2aBd)(ex)^{3+m}}{d^2e^3(3+m)} + \frac{b^2B(ex)^{5+m}}{de^5(5+m)} - \frac{((bc-ad)^2(Bc-Ad))\int \frac{(ex)^m}{c+dx^2}\,dx}{d^3}$$

$$= \frac{(a^2Bd^2 + b^2c(Bc - Ad) - 2abd(Bc - Ad))\,(ex)^{1+m}}{d^3e(1+m)} - \frac{b(bBc - Abd - 2aBd)(ex)^{3+m}}{d^2e^3(3+m)} + \frac{b^2B(ex)^{5+m}}{de^5(5+m)} - \frac{(bc-ad)^2(Bc-Ad)(ex)^{1+m}\,{}_2F_1\left(1, \frac{1+m}{2}; \frac{3+m}{2}; -\frac{dx^2}{c}\right)}{cd^3e(1+m)}$$

Mathematica [A] (verified)

Time = 0.25 (sec) , antiderivative size = 147, normalized size of antiderivative = 0.82

$$\int \frac{(ex)^m\,(a+bx^2)^2\,(A+Bx^2)}{c+dx^2}\,dx$$

$$= \frac{x(ex)^m\left(\frac{a^2Bd^2+b^2c(Bc-Ad)+2abd(-Bc+Ad)}{1+m} + \frac{bd(-bBc+Abd+2aBd)x^2}{3+m} + \frac{b^2Bd^2x^4}{5+m} - \frac{(bc-ad)^2(Bc-Ad)\,\text{Hypergeometric2F1}\left(1,\frac{1+}{2}\right.}{c(1+m)}\right.}{d^3}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)^2*(A + B*x^2))/(c + d*x^2),x]
```

```
[Out] (x*(e*x)^m*((a^2*B*d^2 + b^2*c*(B*c - A*d) + 2*a*b*d*(-(B*c) + A*d))/(1 + m
) + (b*d*(-(b*B*c) + A*b*d + 2*a*B*d)*x^2)/(3 + m) + (b^2*B*d^2*x^4)/(5 + m
) - ((b*c - a*d)^2*(B*c - A*d)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -
((d*x^2)/c)])/(c*(1 + m))))/d^3
```

Maple [F]

$$\int \frac{(ex)^m\,(b\,x^2+a)^2\,(x^2B+A)}{d\,x^2+c}dx$$

```
[In] int((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c),x)
```

```
[Out] int((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c),x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{c+dx^2}\,dx = \int \frac{(Bx^2+A)(bx^2+a)^2(ex)^m}{dx^2+c}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c),x, algorithm="fricas")
```

```
[Out] integral((B*b^2*x^6 + (2*B*a*b + A*b^2)*x^4 + A*a^2 + (B*a^2 + 2*A*a*b)*x^2
)*(e*x)^m/(d*x^2 + c), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 5.84 (sec) , antiderivative size = 649, normalized size of antiderivative = 3.61

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{c+dx^2}\,dx = \frac{Aa^2e^m m x^{m+1}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{1}{2}\right)\Gamma\left(\frac{m}{2}+\frac{1}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)} + \frac{Aa^2e^m x^{m+1}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{1}{2}\right)\Gamma\left(\frac{m}{2}+\frac{1}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)} + \frac{Aabe^m m x^{m+3}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{3}{2}\right)\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)}{2c\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)} + \frac{3Aabe^m x^{m+3}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{3}{2}\right)\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)}{2c\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)} + \frac{Ab^2e^m m x^{m+5}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{5}{2}\right)\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{7}{2}\right)} + \frac{5Ab^2e^m x^{m+5}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{5}{2}\right)\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{7}{2}\right)} + \frac{Ba^2e^m m x^{m+3}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{3}{2}\right)\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)} + \frac{3Ba^2e^m x^{m+3}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{3}{2}\right)\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)} + \frac{Babe^m m x^{m+5}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{5}{2}\right)\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)}{2c\Gamma\left(\frac{m}{2}+\frac{7}{2}\right)} + \frac{5Babe^m x^{m+5}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{5}{2}\right)\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)}{2c\Gamma\left(\frac{m}{2}+\frac{7}{2}\right)} + \frac{Bb^2e^m m x^{m+7}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{7}{2}\right)\Gamma\left(\frac{m}{2}+\frac{7}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{9}{2}\right)} + \frac{7Bb^2e^m x^{m+7}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{7}{2}\right)\Gamma\left(\frac{m}{2}+\frac{7}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{9}{2}\right)}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**2*(B*x**2+A)/(d*x**2+c),x)
```

```
[Out] A*a**2*e**m*m*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*g
amma(m/2 + 1/2)/(4*c*gamma(m/2 + 3/2)) + A*a**2*e**m*x**(m + 1)*lerchphi(d*
x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(4*c*gamma(m/2 + 3/2
)) + A*a*b*e**m*m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/
2)*gamma(m/2 + 3/2)/(2*c*gamma(m/2 + 5/2)) + 3*A*a*b*e**m*x**(m + 3)*lerchp
```

```
hi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(2*c*gamma(m/2
+ 5/2)) + A*b**2*e**m*m*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/
2 + 5/2)*gamma(m/2 + 5/2)/(4*c*gamma(m/2 + 7/2)) + 5*A*b**2*e**m*x**(m + 5)
*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(4*c*gam
ma(m/2 + 7/2)) + B*a**2*e**m*m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c
, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*c*gamma(m/2 + 5/2)) + 3*B*a**2*e**m*x**
(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(
4*c*gamma(m/2 + 5/2)) + B*a*b*e**m*m*x**(m + 5)*lerchphi(d*x**2*exp_polar(I
*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(2*c*gamma(m/2 + 7/2)) + 5*B*a*b*e**
m*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5
/2)/(2*c*gamma(m/2 + 7/2)) + B*b**2*e**m*m*x**(m + 7)*lerchphi(d*x**2*exp_p
olar(I*pi)/c, 1, m/2 + 7/2)*gamma(m/2 + 7/2)/(4*c*gamma(m/2 + 9/2)) + 7*B*b
**2*e**m*x**(m + 7)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 7/2)*gamma(
m/2 + 7/2)/(4*c*gamma(m/2 + 9/2))
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{c+dx^2} \, dx = \int \frac{(Bx^2+A)(bx^2+a)^2(ex)^m}{dx^2+c} \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c),x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^2*(e*x)^m/(d*x^2 + c), x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{c+dx^2} \, dx = \int \frac{(Bx^2+A)(bx^2+a)^2(ex)^m}{dx^2+c} \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c),x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^2*(e*x)^m/(d*x^2 + c), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{c+dx^2} \, dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(b\,x^2+a)^2}{d\,x^2+c} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^2)/(c + d*x^2),x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^2)/(c + d*x^2), x)
```

3.25 $\int \frac{(ex)^m(a+bx^2)(A+Bx^2)}{c+dx^2}\,dx$

Optimal result

Integrand size = 29, antiderivative size = 120

$$\begin{aligned}\int \frac{(ex)^m\,(a+bx^2)\,(A+Bx^2)}{c+dx^2}\,dx &= -\frac{(bBc-Abd-aBd)(ex)^{1+m}}{d^2e(1+m)}+\frac{bB(ex)^{3+m}}{de^3(3+m)}\\&\quad+\frac{(bc-ad)(Bc-Ad)(ex)^{1+m}\operatorname{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{cd^2e(1+m)}\end{aligned}$$

```
[Out] -(-A*b*d-B*a*d+B*b*c)*(e*x)^(1+m)/d^2/e/(1+m)+b*B*(e*x)^(3+m)/d/e^3/(3+m)+(
-a*d+b*c)*(-A*d+B*c)*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^
2/c)/c/d^2/e/(1+m)
```

Rubi [A] (verified)

Time = 0.08 (sec) , antiderivative size = 120, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.069, Rules used = {584, 371}

$$\begin{aligned}\int \frac{(ex)^m\,(a+bx^2)\,(A+Bx^2)}{c+dx^2}\,dx &= \frac{(ex)^{m+1}(bc-ad)(Bc-Ad)\operatorname{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)}{cd^2e(m+1)}\\&\quad-\frac{(ex)^{m+1}(-aBd-Abd+bBc)}{d^2e(m+1)}+\frac{bB(ex)^{m+3}}{de^3(m+3)}\end{aligned}$$

```
[In] Int[((e*x)^m*(a + b*x^2)*(A + B*x^2))/(c + d*x^2),x]
```

```
[Out] -(((b*B*c - A*b*d - a*B*d)*(e*x)^(1 + m))/(d^2*e*(1 + m))) + (b*B*(e*x)^(3
+ m))/(d*e^3*(3 + m)) + ((b*c - a*d)*(B*c - A*d)*(e*x)^(1 + m)*Hypergeometr
ic2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c*d^2*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \int \left(-\frac{(bBc-Abd-aBd)(ex)^m}{d^2}+\frac{bB(ex)^{2+m}}{de^2}+\frac{(bBc^2-Abcd-aBcd+aAd^2)\,(ex)^m}{d^2\,(c+dx^2)}\right) dx \\
&= -\frac{(bBc-Abd-aBd)(ex)^{1+m}}{d^2e(1+m)}+\frac{bB(ex)^{3+m}}{de^3(3+m)}+\frac{((bc-ad)(Bc-Ad))\int \frac{(ex)^m}{c+dx^2}\,dx}{d^2} \\
&= -\frac{(bBc-Abd-aBd)(ex)^{1+m}}{d^2e(1+m)}+\frac{bB(ex)^{3+m}}{de^3(3+m)} \\
&\quad +\frac{(bc-ad)(Bc-Ad)(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{cd^2e(1+m)}
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.12 (sec) , antiderivative size = 93, normalized size of antiderivative = 0.78

$$
\int \frac{(ex)^m\,(a+bx^2)\,(A+Bx^2)}{c+dx^2}\,dx = \frac{x(ex)^m\left(\frac{-bBc+Abd+aBd}{1+m}+\frac{bBdx^2}{3+m}+\frac{(bc-ad)(Bc-Ad)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{c(1+m)}\right)}{d^2}
$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)*(A + B*x^2))/(c + d*x^2),x]
```

```
[Out] (x*(e*x)^m*((-(b*B*c) + A*b*d + a*B*d)/(1 + m) + (b*B*d*x^2)/(3 + m) + ((b*
c - a*d)*(B*c - A*d)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c
)])/(c*(1 + m))))/d^2
```

Maple [F]

$$\int \frac{(ex)^m (b\,x^2+a)\,(x^2 B+A)}{d\,x^2+c}dx$$

```
[In] int((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c),x)
[Out] int((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c),x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)\,(A+Bx^2)}{c+dx^2}\,dx = \int \frac{(Bx^2+A)(bx^2+a)(ex)^m}{dx^2+c}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c),x, algorithm="fricas")
[Out] integral((B*b*x^4 + (B*a + A*b)*x^2 + A*a)*(e*x)^m/(d*x^2 + c), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 3.50 (sec) , antiderivative size = 418, normalized size of antiderivative = 3.48

$$\begin{aligned}\int \frac{(ex)^m (a+bx^2)\,(A+Bx^2)}{c+dx^2}\,dx &= \frac{Aae^m m x^{m+1}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{1}{2}\right)\Gamma\left(\frac{m}{2}+\frac{1}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)} \\ &+ \frac{Aae^m x^{m+1}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{1}{2}\right)\Gamma\left(\frac{m}{2}+\frac{1}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)} \\ &+ \frac{Abe^m m x^{m+3}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{3}{2}\right)\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)} \\ &+ \frac{3Abe^m x^{m+3}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{3}{2}\right)\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)} \\ &+ \frac{Bae^m m x^{m+3}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{3}{2}\right)\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)} \\ &+ \frac{3Bae^m x^{m+3}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{3}{2}\right)\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)} \\ &+ \frac{Bbe^m m x^{m+5}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{5}{2}\right)\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{7}{2}\right)} \\ &+ \frac{5Bbe^m x^{m+5}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{5}{2}\right)\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{7}{2}\right)}\end{aligned}$$

```
[In] integrate((e*x)**m*(b*x**2+a)*(B*x**2+A)/(d*x**2+c),x)
```

```
[Out] A*a*e**m*m*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamm
a(m/2 + 1/2)/(4*c*gamma(m/2 + 3/2)) + A*a*e**m*x**(m + 1)*lerchphi(d*x**2*e
xp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(4*c*gamma(m/2 + 3/2)) + A
*b*e**m*m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma
(m/2 + 3/2)/(4*c*gamma(m/2 + 5/2)) + 3*A*b*e**m*x**(m + 3)*lerchphi(d*x**2*
exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*c*gamma(m/2 + 5/2)) +
B*a*e**m*m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamm
a(m/2 + 3/2)/(4*c*gamma(m/2 + 5/2)) + 3*B*a*e**m*x**(m + 3)*lerchphi(d*x**2
*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*c*gamma(m/2 + 5/2)) +
 B*b*e**m*m*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gam
ma(m/2 + 5/2)/(4*c*gamma(m/2 + 7/2)) + 5*B*b*e**m*x**(m + 5)*lerchphi(d*x**
2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(4*c*gamma(m/2 + 7/2))
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{c+dx^2}\,dx=\int \frac{(Bx^2+A)(bx^2+a)(ex)^m}{dx^2+c}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c),x, algorithm="maxima")
```

```
[Out] integrate((B*x^2 + A)*(b*x^2 + a)*(e*x)^m/(d*x^2 + c), x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{c+dx^2}\,dx=\int \frac{(Bx^2+A)(bx^2+a)(ex)^m}{dx^2+c}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c),x, algorithm="giac")
```

```
[Out] integrate((B*x^2 + A)*(b*x^2 + a)*(e*x)^m/(d*x^2 + c), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{c+dx^2}\,dx=\int \frac{(B\,x^2+A)\,(e\,x)^m\,(b\,x^2+a)}{d\,x^2+c}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2))/(c + d*x^2),x)
```

```
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2))/(c + d*x^2), x)
```

3.26 $\int \frac{(ex)^m(A+Bx^2)}{c+dx^2} dx$

Optimal result

Integrand size = 22, antiderivative size = 77

$$\int \frac{(ex)^m (A+Bx^2)}{c+dx^2} dx = \frac{B(ex)^{1+m}}{de(1+m)} - \frac{(Bc-Ad)(ex)^{1+m} \text{Hypergeometric2F1}\left(1, \frac{1+m}{2}, \frac{3+m}{2}, -\frac{dx^2}{c}\right)}{cde(1+m)}$$

```
[Out] B*(e*x)^(1+m)/d/e/(1+m)-(-A*d+B*c)*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/
2+1/2*m],-d*x^2/c)/c/d/e/(1+m)
```

Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 77, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.091, Rules used = {470, 371}

$$\int \frac{(ex)^m (A+Bx^2)}{c+dx^2} dx = \frac{B(ex)^{m+1}}{de(m+1)} - \frac{(ex)^{m+1}(Bc-Ad) \text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{dx^2}{c}\right)}{cde(m+1)}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/(c + d*x^2),x]
```

```
[Out] (B*(e*x)^(1 + m))/(d*e*(1 + m)) - ((B*c - A*d)*(e*x)^(1 + m)*Hypergeometric
2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c*d*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 470

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[d*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(b*e*(m + n*(p
+ 1) + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(b*(m + n*(p
 + 1) + 1)), Int[(e*x)^m*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, m,
n, p}, x] && NeQ[b*c - a*d, 0] && NeQ[m + n*(p + 1) + 1, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{B(ex)^{1+m}}{de(1+m)} - \frac{(Bc(1+m)-Ad(1+m))\int \frac{(ex)^m}{c+dx^2}\,dx}{d(1+m)} \\
&= \frac{B(ex)^{1+m}}{de(1+m)} - \frac{(Bc-Ad)(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{cde(1+m)}
\end{aligned}
$$

Mathematica [A] (verified)

Time = 0.06 (sec) , antiderivative size = 56, normalized size of antiderivative = 0.73

$$
\int \frac{(ex)^m\,(A+Bx^2)}{c+dx^2}\,dx = \frac{x(ex)^m\left(Bc+(-Bc+Ad)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)\right)}{cd(1+m)}
$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/(c + d*x^2),x]
[Out] (x*(e*x)^m*(B*c + (-(B*c) + A*d)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2,
 -((d*x^2)/c)]))/(c*d*(1 + m))
```

Maple [F]

$$
\int \frac{(ex)^m\,(x^2B+A)}{d\,x^2+c}dx
$$

```
[In] int((e*x)^m*(B*x^2+A)/(d*x^2+c),x)
[Out] int((e*x)^m*(B*x^2+A)/(d*x^2+c),x)
```

Fricas [F]

$$\int \frac{(ex)^m (A+Bx^2)}{c+dx^2}\,dx = \int \frac{(Bx^2+A)(ex)^m}{dx^2+c}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(d*x^2+c),x, algorithm="fricas")
[Out] integral((B*x^2 + A)*(e*x)^m/(d*x^2 + c), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 1.79 (sec) , antiderivative size = 201, normalized size of antiderivative = 2.61

$$\int \frac{(ex)^m (A+Bx^2)}{c+dx^2}\,dx = \frac{Ae^m m x^{m+1}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{1}{2}\right)\Gamma\left(\frac{m}{2}+\frac{1}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)} + \frac{Ae^m x^{m+1}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{1}{2}\right)\Gamma\left(\frac{m}{2}+\frac{1}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)} + \frac{Be^m m x^{m+3}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{3}{2}\right)\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)} + \frac{3Be^m x^{m+3}\Phi\left(\frac{dx^2e^{i\pi}}{c},1,\frac{m}{2}+\frac{3}{2}\right)\Gamma\left(\frac{m}{2}+\frac{3}{2}\right)}{4c\Gamma\left(\frac{m}{2}+\frac{5}{2}\right)}$$

```
[In] integrate((e*x)**m*(B*x**2+A)/(d*x**2+c),x)
[Out] A*e**m*m*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(
m/2 + 1/2)/(4*c*gamma(m/2 + 3/2)) + A*e**m*x**(m + 1)*lerchphi(d*x**2*exp_p
olar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(4*c*gamma(m/2 + 3/2)) + B*e**
m*m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 +
 3/2)/(4*c*gamma(m/2 + 5/2)) + 3*B*e**m*x**(m + 3)*lerchphi(d*x**2*exp_pola
r(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(4*c*gamma(m/2 + 5/2))
```

Maxima [F]

$$\int \frac{(ex)^m (A + Bx^2)}{c + dx^2}\, dx = \int \frac{(Bx^2 + A)(ex)^m}{dx^2 + c}\, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(d*x^2+c),x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(e*x)^m/(d*x^2 + c), x)
```

Giac [F]

$$\int \frac{(ex)^m (A + Bx^2)}{c + dx^2}\, dx = \int \frac{(Bx^2 + A)(ex)^m}{dx^2 + c}\, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(d*x^2+c),x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(e*x)^m/(d*x^2 + c), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A + Bx^2)}{c + dx^2}\, dx = \int \frac{(B\,x^2 + A)\,(e\,x)^m}{d\,x^2 + c}\, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/(c + d*x^2),x)
[Out] int(((A + B*x^2)*(e*x)^m)/(c + d*x^2), x)
```

3.27 $\int \frac{(ex)^m(A+Bx^2)}{(a+bx^2)(c+dx^2)}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 125

$$\int \frac{(ex)^m(A+Bx^2)}{(a+bx^2)(c+dx^2)}\,dx = \frac{(Ab-aB)(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{a(bc-ad)e(1+m)} + \frac{(Bc-Ad)(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{c(bc-ad)e(1+m)}$$

```
[Out] (A*b-B*a)*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/a/(-a*
d+b*c)/e/(1+m)+(-A*d+B*c)*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],
-d*x^2/c)/c/(-a*d+b*c)/e/(1+m)
```

Rubi [A] (verified)

Time = 0.09 (sec) , antiderivative size = 125, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.065, Rules used = {598, 371}

$$\int \frac{(ex)^m(A+Bx^2)}{(a+bx^2)(c+dx^2)}\,dx = \frac{(ex)^{m+1}(Ab-aB)\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)}{ae(m+1)(bc-ad)} + \frac{(ex)^{m+1}(Bc-Ad)\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)}{ce(m+1)(bc-ad)}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/((a + b*x^2)*(c + d*x^2)),x]
```

```
[Out] ((A*b - a*B)*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*
x^2)/a)])/(a*(b*c - a*d)*e*(1 + m)) + ((B*c - A*d)*(e*x)^(1 + m)*Hypergeome
tric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c*(b*c - a*d)*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

$$\begin{aligned}\text{integral} &= \int \left(\frac{(Ab-aB)(ex)^m}{(bc-ad)\,(a+bx^2)}+\frac{(Bc-Ad)(ex)^m}{(bc-ad)\,(c+dx^2)}\right)\,dx\\ &= \frac{(Ab-aB)\int \frac{(ex)^m}{a+bx^2}\,dx}{bc-ad}+\frac{(Bc-Ad)\int \frac{(ex)^m}{c+dx^2}\,dx}{bc-ad}\\ &= \frac{(Ab-aB)(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{bx^2}{a}\right)}{a(bc-ad)e(1+m)}+\frac{(Bc-Ad)(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{c(bc-ad)e(1+m)}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.16 (sec) , antiderivative size = 100, normalized size of antiderivative = 0.80

$$\int \frac{(ex)^m\,(A+Bx^2)}{(a+bx^2)\,(c+dx^2)}\,dx$$
$$=\frac{x(ex)^m\left((-Abc+aBc)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)+a(-Bc+Ad)\,\text{Hypergeometric2F1}\left(1\right.\right.}{ac(-bc+ad)(1+m)}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/((a + b*x^2)*(c + d*x^2)),x]
```

```
[Out] (x*(e*x)^m*((-(A*b*c) + a*B*c)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -
((b*x^2)/a)] + a*(-(B*c) + A*d)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2,
-((d*x^2)/c)]))/(a*c*(-(b*c) + a*d)*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (x^2B + A)}{(b\,x^2 + a)\,(d\,x^2 + c)}dx$$

[In] int((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c),x)

[Out] int((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c),x)

Fricas [F]

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)\,(c + dx^2)}\,dx = \int \frac{(Bx^2 + A)(ex)^m}{(bx^2 + a)(dx^2 + c)}\,dx$$

[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c),x, algorithm="fricas")

[Out] integral((B*x^2 + A)*(e*x)^m/(b*d*x^4 + (b*c + a*d)*x^2 + a*c), x)

Sympy [F]

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)\,(c + dx^2)}\,dx = \int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)\,(c + dx^2)}\,dx$$

[In] integrate((e*x)**m*(B*x**2+A)/(b*x**2+a)/(d*x**2+c),x)

[Out] Integral((e*x)**m*(A + B*x**2)/((a + b*x**2)*(c + d*x**2)), x)

Maxima [F]

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)\,(c + dx^2)}\,dx = \int \frac{(Bx^2 + A)(ex)^m}{(bx^2 + a)(dx^2 + c)}\,dx$$

[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c),x, algorithm="maxima")

[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)*(d*x^2 + c)), x)

Giac [F]

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)(c + dx^2)} \, dx = \int \frac{(Bx^2 + A)(ex)^m}{(bx^2 + a)(dx^2 + c)} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c),x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)*(d*x^2 + c)), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)(c + dx^2)} \, dx = \int \frac{(B\,x^2 + A)\,(e\,x)^m}{(b\,x^2 + a)\,(d\,x^2 + c)} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)*(c + d*x^2)),x)
[Out] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)*(c + d*x^2)), x)
```

3.28 $\int \frac{(ex)^m(A+Bx^2)}{(a+bx^2)^2(c+dx^2)} \, dx$

Optimal result

Integrand size = 31, antiderivative size = 206

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)} \, dx = \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e(a+bx^2)} + \frac{(Ab(bc(1-m)-ad(3-m))+aB(ad(1-m)+bc(1+m)))(ex)^{1+m} \text{Hypergeometric2F1}\left(1, \frac{1+m}{2}, \frac{3+m}{2}, \right.}{2a^2(bc-ad)^2 e(1+m)} - \frac{d(Bc-Ad)(ex)^{1+m} \text{Hypergeometric2F1}\left(1, \frac{1+m}{2}, \frac{3+m}{2}, -\frac{dx^2}{c}\right)}{c(bc-ad)^2 e(1+m)}$$

```
[Out] 1/2*(A*b-B*a)*(e*x)^(1+m)/a/(-a*d+b*c)/e/(b*x^2+a)+1/2*(A*b*(b*c*(1-m)-a*d*
(3-m))+a*B*(a*d*(1-m)+b*c*(1+m)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2
+1/2*m],-b*x^2/a)/a^2/(-a*d+b*c)^2/e/(1+m)-d*(-A*d+B*c)*(e*x)^(1+m)*hyperge
om([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/c/(-a*d+b*c)^2/e/(1+m)
```

Rubi [A] (verified)

Time = 0.24 (sec) , antiderivative size = 206, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {593, 598, 371}

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)} \, dx = \frac{(ex)^{m+1} \text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{bx^2}{a}\right) (Ab(bc(1-m)-ad(3-m))+aB(ad(1-m)+bc(m+}{2a^2 e(m+1)(bc-ad)^2} - \frac{d(ex)^{m+1}(Bc-Ad) \text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{dx^2}{c}\right)}{ce(m+1)(bc-ad)^2} + \frac{(ex)^{m+1}(Ab-aB)}{2ae(a+bx^2)(bc-ad)}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/((a + b*x^2)^2*(c + d*x^2)),x]
```

```
[Out] ((A*b - a*B)*(e*x)^(1 + m))/(2*a*(b*c - a*d)*e*(a + b*x^2)) + ((A*b*(b*c*(1
 - m) - a*d*(3 - m)) + a*B*(a*d*(1 - m) + b*c*(1 + m)))*(e*x)^(1 + m)*Hyper
geometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(2*a^2*(b*c - a*d)^2*e
*(1 + m)) - (d*(B*c - A*d)*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3
 + m)/2, -((d*x^2)/c)])/(c*(b*c - a*d)^2*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 593

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(m
 + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^(q + 1)/(a*g*n*(b*c - a*d)*(p + 1)))
, x] + Dist[1/(a*n*(b*c - a*d)*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c
 + d*x^n)^q*Simp[c*(b*e - a*f)*(m + 1) + e*n*(b*c - a*d)*(p + 1) + d*(b*e -
 a*f)*(m + n*(p + q + 2) + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g
, m, q}, x] && IGtQ[n, 0] && LtQ[p, -1]
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)} - \frac{\int \frac{(ex)^m\left(2aAd-Abc(1-m)-aBc(1+m)-(Ab-aB)d(1-m)x^2\right)}{(a+bx^2)(c+dx^2)}\,dx}{2a(bc-ad)} \\
&= \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)} \\
&\quad - \frac{\int \left(\frac{(-Ab(bc(1-m)-ad(3-m))-aB(ad(1-m)+bc(1+m)))(ex)^m}{(bc-ad)(a+bx^2)} + \frac{2ad(-Bc+Ad)(ex)^m}{(-bc+ad)(c+dx^2)}\right)dx}{2a(bc-ad)} \\
&= \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)} - \frac{(d(Bc-Ad))\int \frac{(ex)^m}{c+dx^2}\,dx}{(bc-ad)^2} \\
&\quad + \frac{(Ab(bc(1-m)-ad(3-m))+aB(ad(1-m)+bc(1+m)))\int \frac{(ex)^m}{a+bx^2}\,dx}{2a(bc-ad)^2}
\end{aligned}
$$

$$= \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)} + \frac{(Ab(bc(1-m)-ad(3-m))+aB(ad(1-m)+bc(1+m)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{bx^2}{a}\right)}{2a^2(bc-ad)^2e(1+m)} - \frac{d(Bc-Ad)(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{c(bc-ad)^2e(1+m)}$$

Mathematica [A] (verified)

Time = 0.36 (sec) , antiderivative size = 149, normalized size of antiderivative = 0.72

$$\int \frac{(ex)^m\,(A+Bx^2)}{(a+bx^2)^2\,(c+dx^2)}\,dx = -\frac{x(ex)^m\left(abc(-Bc+Ad)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)+a^2d(Bc-Ad)\,\text{Hypergeometric2F1}\right.}{a^2c(bc-ad)^2(1+}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/((a + b*x^2)^2*(c + d*x^2)),x]
```

```
[Out] -((x*(e*x)^m*(a*b*c*(-(B*c) + A*d)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/
2, -((b*x^2)/a)] + a^2*d*(B*c - A*d)*Hypergeometric2F1[1, (1 + m)/2, (3 + m
)/2, -((d*x^2)/c)] - (A*b - a*B)*c*(b*c - a*d)*Hypergeometric2F1[2, (1 + m)
/2, (3 + m)/2, -((b*x^2)/a)]))/(a^2*c*(b*c - a*d)^2*(1 + m)))
```

Maple [F]

$$\int \frac{(ex)^m\,(x^2B+A)}{(b\,x^2+a)^2\,(d\,x^2+c)}dx$$

```
[In] int((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c),x)
```

```
[Out] int((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c),x)
```

Fricas [F]

$$\int \frac{(ex)^m\,(A+Bx^2)}{(a+bx^2)^2\,(c+dx^2)}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^2(dx^2+c)}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c),x, algorithm="fricas")
```

```
[Out] integral((B*x^2 + A)*(e*x)^m/(b^2*d*x^6 + (b^2*c + 2*a*b*d)*x^4 + a^2*c + (
2*a*b*c + a^2*d)*x^2), x)
```

Sympy [F(-1)]

Timed out.

$$\int \frac{(ex)^m\,(A+Bx^2)}{(a+bx^2)^2\,(c+dx^2)}\,dx = \text{Timed out}$$

```
[In] integrate((e*x)**m*(B*x**2+A)/(b*x**2+a)**2/(d*x**2+c),x)
[Out] Timed out
```

Maxima [F]

$$\int \frac{(ex)^m\,(A+Bx^2)}{(a+bx^2)^2\,(c+dx^2)}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^2(dx^2+c)}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c),x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^2*(d*x^2 + c)), x)
```

Giac [F]

$$\int \frac{(ex)^m\,(A+Bx^2)}{(a+bx^2)^2\,(c+dx^2)}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^2(dx^2+c)}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c),x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^2*(d*x^2 + c)), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m\,(A+Bx^2)}{(a+bx^2)^2\,(c+dx^2)}\,dx = \int \frac{\left(B\,x^2+A\right)\,{\left(e\,x\right)}^m}{{\left(b\,x^2+a\right)}^2\,\left(d\,x^2+c\right)}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^2*(c + d*x^2)),x)
[Out] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^2*(c + d*x^2)), x)
```

3.29 $\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)} dx$

Optimal result

Integrand size = 31, antiderivative size = 342

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)} dx = \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e (a+bx^2)^2}$$
$$+ \frac{(Ab(bc(3-m)-ad(7-m))+aB(ad(3-m)+bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2 e (a+bx^2)}$$
$$+ \frac{(Ab(a^2d^2(15-8m+m^2)-2abcd(5-6m+m^2)+b^2c^2(3-4m+m^2))+aB(b^2c^2(1-m^2)-2abcd(3+}{8a^3(bc-ad)^3 e(1+m}$$
$$+ \frac{d^2(Bc-Ad)(ex)^{1+m} \text{Hypergeometric2F1}\left(1, \frac{1+m}{2}, \frac{3+m}{2}, -\frac{dx^2}{c}\right)}{c(bc-ad)^3 e(1+m)}$$

```
[Out] 1/4*(A*b-B*a)*(e*x)^(1+m)/a/(-a*d+b*c)/e/(b*x^2+a)^2+1/8*(A*b*(b*c*(3-m)-a*
d*(7-m))+a*B*(a*d*(3-m)+b*c*(1+m)))*(e*x)^(1+m)/a^2/(-a*d+b*c)^2/e/(b*x^2+a
)+1/8*(A*b*(a^2*d^2*(m^2-8*m+15)-2*a*b*c*d*(m^2-6*m+5)+b^2*c^2*(m^2-4*m+3))
+a*B*(b^2*c^2*(-m^2+1)-2*a*b*c*d*(-m^2+2*m+3)-a^2*d^2*(m^2-4*m+3)))*(e*x)^(
1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/a^3/(-a*d+b*c)^3/e/(1+m
)+d^2*(-A*d+B*c)*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)
/c/(-a*d+b*c)^3/e/(1+m)
```

Rubi [A] (verified)

Time = 0.50 (sec) , antiderivative size = 342, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {593, 598, 371}

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)}\,dx$$
$$= \frac{(ex)^{m+1}(Ab(bc(3-m)-ad(7-m))+aB(ad(3-m)+bc(m+1)))}{8a^2e\,(a+bx^2)\,(bc-ad)^2}$$
$$+\frac{(ex)^{m+1}\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)(Ab(a^2d^2(m^2-8m+15)-2abcd(m^2-6m+5)+b}{8a^3e(m+1)(bc-}$$
$$+\frac{d^2(ex)^{m+1}(Bc-Ad)\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)}{ce(m+1)(bc-ad)^3}$$
$$+\frac{(ex)^{m+1}(Ab-aB)}{4ae\,(a+bx^2)^2\,(bc-ad)}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/((a + b*x^2)^3*(c + d*x^2)),x]
```

```
[Out] ((A*b - a*B)*(e*x)^(1 + m))/(4*a*(b*c - a*d)*e*(a + b*x^2)^2) + ((A*b*(b*c*
(3 - m) - a*d*(7 - m)) + a*B*(a*d*(3 - m) + b*c*(1 + m)))*(e*x)^(1 + m))/(8
*a^2*(b*c - a*d)^2*e*(a + b*x^2)) + ((A*b*(a^2*d^2*(15 - 8*m + m^2) - 2*a*b
*c*d*(5 - 6*m + m^2) + b^2*c^2*(3 - 4*m + m^2)) + a*B*(b^2*c^2*(1 - m^2) -
2*a*b*c*d*(3 + 2*m - m^2) - a^2*d^2*(3 - 4*m + m^2)))*(e*x)^(1 + m)*Hyperge
ometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(8*a^3*(b*c - a*d)^3*e*(
1 + m)) + (d^2*(B*c - A*d)*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3
 + m)/2, -((d*x^2)/c)])/(c*(b*c - a*d)^3*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 593

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(m
 + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^(q + 1)/(a*g*n*(b*c - a*d)*(p + 1)))
, x] + Dist[1/(a*n*(b*c - a*d)*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c
 + d*x^n)^q*Simp[c*(b*e - a*f)*(m + 1) + e*n*(b*c - a*d)*(p + 1) + d*(b*e -
 a*f)*(m + n*(p + q + 2) + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g
, m, q}, x] && IGtQ[n, 0] && LtQ[p, -1]
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

$$\text{integral} = \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\left(a+bx^2\right)^2} - \frac{\int \frac{(ex)^m(4aAd-Abc(3-m)-aBc(1+m)-(Ab-aB)d(3-m)x^2)}{(a+bx^2)^2(c+dx^2)}\,dx}{4a(bc-ad)}$$

$$= \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\left(a+bx^2\right)^2} + \frac{(Ab(bc(3-m)-ad(7-m))+aB(ad(3-m)+bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\left(a+bx^2\right)} + \frac{\int \frac{(ex)^m(-aBc(1+m)(ad(5-m)-b(c-cm))+A(8a^2d^2-abcd(7-8m+m^2)+b^2c^2(3-4m+m^2))+d(1-m)(Ab(bc(3-m)-ad(7-m))+}{(a+bx^2)(c+dx^2)}}{8a^2(bc-ad)^2}$$

$$= \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\left(a+bx^2\right)^2} + \frac{(Ab(bc(3-m)-ad(7-m))+aB(ad(3-m)+bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\left(a+bx^2\right)} + \frac{\int \left(\frac{(Ab(a^2d^2(15-8m+m^2)-2abcd(5-6m+m^2)+b^2c^2(3-4m+m^2))+aB(b^2c^2(1-m^2)-2abcd(3+2m-m^2)-a^2d^2(3-4m+m^2)))}{(bc-ad)(a+bx^2)}\right.}{8a^2(bc-ad)^2}$$

$$= \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\left(a+bx^2\right)^2} + \frac{(Ab(bc(3-m)-ad(7-m))+aB(ad(3-m)+bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\left(a+bx^2\right)} + \frac{(d^2(Bc-Ad))\int \frac{(ex)^m}{c+dx^2}\,dx}{(bc-ad)^3} + \frac{(Ab(a^2d^2(15-8m+m^2)-2abcd(5-6m+m^2)+b^2c^2(3-4m+m^2))+aB(b^2c^2(1-m^2)-2a}{8a^2(bc-ad)^3}$$

$$= \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2} + \frac{(Ab(bc(3-m)-ad(7-m))+aB(ad(3-m)+bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)} + \frac{(Ab(a^2d^2(15-8m+m^2)-2abcd(5-6m+m^2)+b^2c^2(3-4m+m^2))+aB(b^2c^2(1-m^2)-}{8a^3(bc-ad)^3e(1+} + \frac{d^2(Bc-Ad)(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{c(bc-ad)^3e(1+m)}$$

Mathematica [A] (verified)

Time = 0.89 (sec) , antiderivative size = 195, normalized size of antiderivative = 0.57

$$\int \frac{(ex)^m\,(A+Bx^2)}{(a+bx^2)^3\,(c+dx^2)}\,dx = \frac{x(ex)^m\left(\frac{bd(-Bc+Ad)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{a} + \frac{d^2(Bc-Ad)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{c} + \frac{b(bc-ad)(B}{}\right.}{(bc-ad)^3(1+m)}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/((a + b*x^2)^3*(c + d*x^2)),x]
```

```
[Out] (x*(e*x)^m*((b*d*(-(B*c) + A*d)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2,
-((b*x^2)/a)])/a + (d^2*(B*c - A*d)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)
/2, -((d*x^2)/c)])/c + (b*(b*c - a*d)*(B*c - A*d)*Hypergeometric2F1[2, (1 +
 m)/2, (3 + m)/2, -((b*x^2)/a)])/a^2 + ((A*b - a*B)*(b*c - a*d)^2*Hypergeom
etric2F1[3, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/a^3))/((b*c - a*d)^3*(1 +
m))
```

Maple [F]

$$\int \frac{(ex)^m\,(x^2B+A)}{(b\,x^2+a)^3\,(d\,x^2+c)}dx$$

```
[In] int((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c),x)
```

```
[Out] int((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c),x)
```

Fricas [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)} \, dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^3(dx^2+c)} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c),x, algorithm="fricas")
[Out] integral((B*x^2 + A)*(e*x)^m/(b^3*d*x^8 + (b^3*c + 3*a*b^2*d)*x^6 + 3*(a*b^
2*c + a^2*b*d)*x^4 + a^3*c + (3*a^2*b*c + a^3*d)*x^2), x)
```

Sympy [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)} \, dx = \text{Timed out}$$

```
[In] integrate((e*x)**m*(B*x**2+A)/(b*x**2+a)**3/(d*x**2+c),x)
[Out] Timed out
```

Maxima [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)} \, dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^3(dx^2+c)} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c),x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^3*(d*x^2 + c)), x)
```

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)} \, dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^3(dx^2+c)} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c),x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^3*(d*x^2 + c)), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)} \, dx = \int \frac{(B\,x^2+A)\,(e\,x)^m}{(b\,x^2+a)^3\,(d\,x^2+c)} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^3*(c + d*x^2)),x)
[Out] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^3*(c + d*x^2)), x)
```

3.30 $\int \frac{(ex)^m(a+bx^2)^3(A+Bx^2)}{(c+dx^2)^2}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 340

$$\int \frac{(ex)^m\,(a+bx^2)^3\,(A+Bx^2)}{(c+dx^2)^2}\,dx = -\frac{b(3a^2d^2(Ad(1+m)-Bc(3+m))-3abcd(Ad(3+m)-Bc(5+m))+b^2c^2(Ad(5+m)-Bc(7+m)))}{2cd^4e(1+m)} - \frac{b^2(3ad(Ad(3+m)-Bc(5+m))-bc(Ad(5+m)-Bc(7+m)))(ex)^{3+m}}{2cd^3e^3(3+m)} - \frac{b^3(Ad(5+m)-Bc(7+m))(ex)^{5+m}}{2cd^2e^5(5+m)} - \frac{(Bc-Ad)(ex)^{1+m}\,(a+bx^2)^3}{2cde\,(c+dx^2)} + \frac{(bc-ad)^2(ad(Ad(1-m)+Bc(1+m))+bc(Ad(5+m)-Bc(7+m)))(ex)^{1+m}\,\mathrm{Hypergeometric2F1}\left(1\right.}{2c^2d^4e(1+m)}$$

```
[Out] -1/2*b*(3*a^2*d^2*(A*d*(1+m)-B*c*(3+m))-3*a*b*c*d*(A*d*(3+m)-B*c*(5+m))+b^2
*c^2*(A*d*(5+m)-B*c*(7+m)))*(e*x)^(1+m)/c/d^4/e/(1+m)-1/2*b^2*(3*a*d*(A*d*(
3+m)-B*c*(5+m))-b*c*(A*d*(5+m)-B*c*(7+m)))*(e*x)^(3+m)/c/d^3/e^3/(3+m)-1/2*
b^3*(A*d*(5+m)-B*c*(7+m))*(e*x)^(5+m)/c/d^2/e^5/(5+m)-1/2*(-A*d+B*c)*(e*x)^
(1+m)*(b*x^2+a)^3/c/d/e/(d*x^2+c)+1/2*(-a*d+b*c)^2*(a*d*(A*d*(1-m)+B*c*(1+m
))+b*c*(A*d*(5+m)-B*c*(7+m)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2
*m],-d*x^2/c)/c^2/d^4/e/(1+m)
```

Rubi [A] (verified)

Time = 0.47 (sec) , antiderivative size = 340, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {591, 584, 371}

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^2} dx =$$
$$-\frac{b(ex)^{m+1} (3a^2d^2(Ad(m+1)-Bc(m+3))-3abcd(Ad(m+3)-Bc(m+5))+b^2c^2(Ad(m+5)-Bc}{2cd^4e(m+1)}$$
$$-\frac{b^2(ex)^{m+3}(3ad(Ad(m+3)-Bc(m+5))-bc(Ad(m+5)-Bc(m+7)))}{2cd^3e^3(m+3)}$$
$$+\frac{(ex)^{m+1}(bc-ad)^2 \text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)(ad(Ad(1-m)+Bc(m+1))+bc(Ad(m}{2c^2d^4e(m+1)}$$
$$-\frac{(a+bx^2)^3 (ex)^{m+1}(Bc-Ad)}{2cde(c+dx^2)}-\frac{b^3(ex)^{m+5}(Ad(m+5)-Bc(m+7))}{2cd^2e^5(m+5)}$$

```
[In] Int[((e*x)^m*(a + b*x^2)^3*(A + B*x^2))/(c + d*x^2)^2,x]
```

```
[Out] -1/2*(b*(3*a^2*d^2*(A*d*(1 + m) - B*c*(3 + m)) - 3*a*b*c*d*(A*d*(3 + m) - B
*c*(5 + m)) + b^2*c^2*(A*d*(5 + m) - B*c*(7 + m)))*(e*x)^(1 + m))/(c*d^4*e*
(1 + m)) - (b^2*(3*a*d*(A*d*(3 + m) - B*c*(5 + m)) - b*c*(A*d*(5 + m) - B*c
*(7 + m)))*(e*x)^(3 + m))/(2*c*d^3*e^3*(3 + m)) - (b^3*(A*d*(5 + m) - B*c*(
7 + m))*(e*x)^(5 + m))/(2*c*d^2*e^5*(5 + m)) - ((B*c - A*d)*(e*x)^(1 + m)*(
a + b*x^2)^3)/(2*c*d*e*(c + d*x^2)) + ((b*c - a*d)^2*(a*d*(A*d*(1 - m) + B*
c*(1 + m)) + b*c*(A*d*(5 + m) - B*c*(7 + m)))*(e*x)^(1 + m)*Hypergeometric2
F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(2*c^2*d^4*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rule 591

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
```

```
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
 a*f])
```

Rubi steps

$$\text{integral} = -\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^3}{2cde\left(c+dx^2\right)} - \frac{\int \frac{(ex)^m\left(a+bx^2\right)^2\left(-a(Ad(1-m)+Bc(1+m))+b(Ad(5+m)-Bc(7+m))x^2\right)}{c+dx^2}\,dx}{2cd}$$

$$= -\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^3}{2cde\left(c+dx^2\right)} - \frac{\int \left(\frac{b\left(3a^2d^2(Ad(1+m)-Bc(3+m))-3abcd(Ad(3+m)-Bc(5+m))+b^2c^2(Ad(5+m)-Bc(7+m))\right)(ex)^m}{d^3} + \frac{b^2(3ad(Ad(3+m)-Bc(5\cdots}{}\right.}{}$$

$$= -\frac{b\left(3a^2d^2(Ad(1+m)-Bc(3+m))-3abcd(Ad(3+m)-Bc(5+m))+b^2c^2(Ad(5+m)-Bc(7\cdots\right.}{2cd^4e(1+m)} - \frac{b^2(3ad(Ad(3+m)-Bc(5+m))-bc(Ad(5+m)-Bc(7+m)))(ex)^{3+m}}{2cd^3e^3(3+m)} - \frac{b^3(Ad(5+m)-Bc(7+m))(ex)^{5+m}}{2cd^2e^5(5+m)} - \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^3}{2cde\left(c+dx^2\right)} + \frac{\left((bc-ad)^2(ad(Ad(1-m)+Bc(1+m))+bc(Ad(5+m)-Bc(7+m)))\right)\int \frac{(ex)^m}{c+dx^2}\,dx}{2cd^4}$$

$$= -\frac{b\left(3a^2d^2(Ad(1+m)-Bc(3+m))-3abcd(Ad(3+m)-Bc(5+m))+b^2c^2(Ad(5+m)-Bc(7\cdots\right.}{2cd^4e(1+m)} - \frac{b^2(3ad(Ad(3+m)-Bc(5+m))-bc(Ad(5+m)-Bc(7+m)))(ex)^{3+m}}{2cd^3e^3(3+m)} - \frac{b^3(Ad(5+m)-Bc(7+m))(ex)^{5+m}}{2cd^2e^5(5+m)} - \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^3}{2cde\left(c+dx^2\right)} + \frac{(bc-ad)^2(ad(Ad(1-m)+Bc(1+m))+bc(Ad(5+m)-Bc(7+m)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+\cdots}{2}\right.}{2c^2d^4e(1+m)}$$

Mathematica [A] (verified)

Time = 0.80 (sec) , antiderivative size = 212, normalized size of antiderivative = 0.62

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^2} dx = \frac{x(ex)^m \left(\frac{b(3a^2Bd^2+b^2c(3Bc-2Ad)+3abd(-2Bc+Ad))}{1+m} + \frac{b^2d(-2bBc+Abd+3aBd)x^2}{3+m} + \frac{b^3Bd^2x^4}{5+m} - \frac{(bc-ad)^2(4bBc-3Abd-aBd)\,\mathrm{Hyp}}{c(}\right.}{d^4}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)^3*(A + B*x^2))/(c + d*x^2)^2,x]
```

```
[Out] (x*(e*x)^m*((b*(3*a^2*B*d^2 + b^2*c*(3*B*c - 2*A*d) + 3*a*b*d*(-2*B*c + A*d
)))/(1 + m) + (b^2*d*(-2*b*B*c + A*b*d + 3*a*B*d)*x^2)/(3 + m) + (b^3*B*d^2
*x^4)/(5 + m) - ((b*c - a*d)^2*(4*b*B*c - 3*A*b*d - a*B*d)*Hypergeometric2F
1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c*(1 + m)) + ((b*c - a*d)^3*(B*c
 - A*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c^2*(1 +
 m))))/d^4
```

Maple [F]

$$\int \frac{(ex)^m (b\,x^2+a)^3 (x^2B+A)}{(d\,x^2+c)^2}dx$$

```
[In] int((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c)^2,x)
```

```
[Out] int((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c)^2,x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^2} dx = \int \frac{(Bx^2+A)(bx^2+a)^3(ex)^m}{(dx^2+c)^2} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="fricas")
```

```
[Out] integral((B*b^3*x^8 + (3*B*a*b^2 + A*b^3)*x^6 + 3*(B*a^2*b + A*a*b^2)*x^4 +
 A*a^3 + (B*a^3 + 3*A*a^2*b)*x^2)*(e*x)^m/(d^2*x^4 + 2*c*d*x^2 + c^2), x)
```

Sympy [F]

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^2}\,dx = \int \frac{(ex)^m (A+Bx^2)(a+bx^2)^3}{(c+dx^2)^2}\,dx$$

```
[In] integrate((e*x)**m*(b*x**2+a)**3*(B*x**2+A)/(d*x**2+c)**2,x)
[Out] Integral((e*x)**m*(A + B*x**2)*(a + b*x**2)**3/(c + d*x**2)**2, x)
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(bx^2+a)^3(ex)^m}{(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^3*(e*x)^m/(d*x^2 + c)^2, x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(bx^2+a)^3(ex)^m}{(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^3*(e*x)^m/(d*x^2 + c)^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^2}\,dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(b\,x^2+a)^3}{(d\,x^2+c)^2}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^3)/(c + d*x^2)^2,x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^3)/(c + d*x^2)^2, x)
```

3.31 $\int \frac{(ex)^m(a+bx^2)^2(A+Bx^2)}{(c+dx^2)^2}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 246

$$\int \frac{(ex)^m\,(a+bx^2)^2\,(A+Bx^2)}{(c+dx^2)^2}\,dx$$
$$= -\frac{b(2ad(Ad(1+m)-Bc(3+m))-bc(Ad(3+m)-Bc(5+m)))(ex)^{1+m}}{2cd^3e(1+m)}$$
$$-\frac{b^2(Ad(3+m)-Bc(5+m))(ex)^{3+m}}{2cd^2e^3(3+m)}-\frac{(Bc-Ad)(ex)^{1+m}\,(a+bx^2)^2}{2cde\,(c+dx^2)}$$
$$-\frac{(bc-ad)(ad(Ad(1-m)+Bc(1+m))+bc(Ad(3+m)-Bc(5+m)))(ex)^{1+m}\,\text{Hypergeometric2F1}\left(\right.}{2c^2d^3e(1+m)}$$

```
[Out] -1/2*b*(2*a*d*(A*d*(1+m)-B*c*(3+m))-b*c*(A*d*(3+m)-B*c*(5+m)))*(e*x)^(1+m)/
c/d^3/e/(1+m)-1/2*b^2*(A*d*(3+m)-B*c*(5+m))*(e*x)^(3+m)/c/d^2/e^3/(3+m)-1/2
*(-A*d+B*c)*(e*x)^(1+m)*(b*x^2+a)^2/c/d/e/(d*x^2+c)-1/2*(-a*d+b*c)*(a*d*(A*
d*(1-m)+B*c*(1+m))+b*c*(A*d*(3+m)-B*c*(5+m)))*(e*x)^(1+m)*hypergeom([1, 1/2
+1/2*m],[3/2+1/2*m],-d*x^2/c)/c^2/d^3/e/(1+m)
```

Rubi [A] (verified)

Time = 0.28 (sec) , antiderivative size = 246, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used

$= \{591, 584, 371\}$

$$\int \frac{(ex)^m \left(a+bx^2\right)^2 \left(A+Bx^2\right)}{\left(c+dx^2\right)^2}\,dx =$$

$$-\frac{(ex)^{m+1}(bc-ad)\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)(ad(Ad(1-m)+Bc(m+1))+bc(Ad(m+}{2c^2d^3e(m+1)}$$

$$-\frac{b(ex)^{m+1}(2ad(Ad(m+1)-Bc(m+3))-bc(Ad(m+3)-Bc(m+5)))}{2cd^3e(m+1)}$$

$$-\frac{\left(a+bx^2\right)^2(ex)^{m+1}(Bc-Ad)}{2cde\left(c+dx^2\right)}-\frac{b^2(ex)^{m+3}(Ad(m+3)-Bc(m+5))}{2cd^2e^3(m+3)}$$

```
[In] Int[((e*x)^m*(a + b*x^2)^2*(A + B*x^2))/(c + d*x^2)^2,x]
```

```
[Out] -1/2*(b*(2*a*d*(A*d*(1 + m) - B*c*(3 + m)) - b*c*(A*d*(3 + m) - B*c*(5 + m)
))*(e*x)^(1 + m))/(c*d^3*e*(1 + m)) - (b^2*(A*d*(3 + m) - B*c*(5 + m))*(e*x
)^(3 + m))/(2*c*d^2*e^3*(3 + m)) - ((B*c - A*d)*(e*x)^(1 + m)*(a + b*x^2)^2
)/(2*c*d*e*(c + d*x^2)) - ((b*c - a*d)*(a*d*(A*d*(1 - m) + B*c*(1 + m)) + b
*c*(A*d*(3 + m) - B*c*(5 + m)))*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/
2, (3 + m)/2, -((d*x^2)/c)])/(2*c^2*d^3*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rule 591

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
 a*f])
```

Rubi steps

$$\text{integral} = -\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^2}{2cde\left(c+dx^2\right)} - \frac{\int \frac{(ex)^m\left(a+bx^2\right)\left(-a(Ad(1-m)+Bc(1+m))+b(Ad(3+m)-Bc(5+m))x^2\right)}{c+dx^2}\,dx}{2cd}$$

$$= -\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^2}{2cde\left(c+dx^2\right)} - \frac{\int \left(\frac{b(2ad(Ad(1+m)-Bc(3+m))-bc(Ad(3+m)-Bc(5+m)))(ex)^m}{d^2} + \frac{b^2(Ad(3+m)-Bc(5+m))(ex)^{2+m}}{de^2} + \frac{(-5b^2Bc^3+3Ab^2c^2 \cdots}{\cdots}\right.}{2cd}$$

$$= -\frac{b(2ad(Ad(1+m)-Bc(3+m))-bc(Ad(3+m)-Bc(5+m)))(ex)^{1+m}}{2cd^3e(1+m)} - \frac{b^2(Ad(3+m)-Bc(5+m))(ex)^{3+m}}{2cd^2e^3(3+m)} - \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^2}{2cde\left(c+dx^2\right)} - \frac{((bc-ad)(ad(Ad(1-m)+Bc(1+m))+bc(Ad(3+m)-Bc(5+m))))\int \frac{(ex)^m}{c+dx^2}\,dx}{2cd^3}$$

$$= -\frac{b(2ad(Ad(1+m)-Bc(3+m))-bc(Ad(3+m)-Bc(5+m)))(ex)^{1+m}}{2cd^3e(1+m)} - \frac{b^2(Ad(3+m)-Bc(5+m))(ex)^{3+m}}{2cd^2e^3(3+m)} - \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^2}{2cde\left(c+dx^2\right)} - \frac{(bc-ad)(ad(Ad(1-m)+Bc(1+m))+bc(Ad(3+m)-Bc(5+m)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+\cdots}{2}\cdots\right.}{2c^2d^3e(1+m)}$$

Mathematica [A] (verified)

Time = 0.65 (sec) , antiderivative size = 158, normalized size of antiderivative = 0.64

$$\int \frac{(ex)^m\left(a+bx^2\right)^2\left(A+Bx^2\right)}{\left(c+dx^2\right)^2}\,dx = \frac{x(ex)^m\left(\frac{b(-2bBc+Abd+2aBd)}{1+m} + \frac{b^2Bdx^2}{3+m} + \frac{(bc-ad)(3bBc-2Abd-aBd)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{c(1+m)} - \frac{(bc-ad)^2(Bc-A\cdots}{\cdots}\right.}{d^3}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)^2*(A + B*x^2))/(c + d*x^2)^2,x]
```

```
[Out] (x*(e*x)^m*((b*(-2*b*B*c + A*b*d + 2*a*B*d))/(1 + m) + (b^2*B*d*x^2)/(3 + m
) + ((b*c - a*d)*(3*b*B*c - 2*A*b*d - a*B*d)*Hypergeometric2F1[1, (1 + m)/2
, (3 + m)/2, -((d*x^2)/c)])/(c*(1 + m)) - ((b*c - a*d)^2*(B*c - A*d)*Hyperg
eometric2F1[2, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c^2*(1 + m))))/d^3
```

Maple [F]

$$\int \frac{(ex)^m (b\,x^2+a)^2 (x^2B+A)}{(d\,x^2+c)^2}dx$$

```
[In] int((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c)^2,x)
```

```
[Out] int((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c)^2,x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(bx^2+a)^2(ex)^m}{(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="fricas")
```

```
[Out] integral((B*b^2*x^6 + (2*B*a*b + A*b^2)*x^4 + A*a^2 + (B*a^2 + 2*A*a*b)*x^2
)*(e*x)^m/(d^2*x^4 + 2*c*d*x^2 + c^2), x)
```

Sympy [F]

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^2}\,dx = \int \frac{(ex)^m (A+Bx^2)(a+bx^2)^2}{(c+dx^2)^2}\,dx$$

```
[In] integrate((e*x)**m*(b*x**2+a)**2*(B*x**2+A)/(d*x**2+c)**2,x)
```

```
[Out] Integral((e*x)**m*(A + B*x**2)*(a + b*x**2)**2/(c + d*x**2)**2, x)
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(bx^2+a)^2(ex)^m}{(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="maxima")
```

```
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^2*(e*x)^m/(d*x^2 + c)^2, x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^2} \, dx = \int \frac{(Bx^2+A)(bx^2+a)^2(ex)^m}{(dx^2+c)^2} \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^2*(e*x)^m/(d*x^2 + c)^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^2} \, dx = \int \frac{(B\,x^2+A)\,\left(e\,x\right)^m\,\left(b\,x^2+a\right)^2}{\left(d\,x^2+c\right)^2} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^2)/(c + d*x^2)^2,x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^2)/(c + d*x^2)^2, x)
```

3.32 $\int \frac{(ex)^m(a+bx^2)(A+Bx^2)}{(c+dx^2)^2}\,dx$

Optimal result

Integrand size = 29, antiderivative size = 171

$$\int \frac{(ex)^m(a+bx^2)(A+Bx^2)}{(c+dx^2)^2}\,dx = -\frac{B(ad(1+m)-bc(3+m))(ex)^{1+m}}{2cd^2e(1+m)} - \frac{(bc-ad)(ex)^{1+m}(A+Bx^2)}{2cde(c+dx^2)} + \frac{(ad(Ad(1-m)+Bc(1+m))+bc(Ad(1+m)-Bc(3+m)))(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2}\right.}{2c^2d^2e(1+m)}$$

```
[Out] -1/2*B*(a*d*(1+m)-b*c*(3+m))*(e*x)^(1+m)/c/d^2/e/(1+m)-1/2*(-a*d+b*c)*(e*x)
^(1+m)*(B*x^2+A)/c/d/e/(d*x^2+c)+1/2*(a*d*(A*d*(1-m)+B*c*(1+m))+b*c*(A*d*(1
+m)-B*c*(3+m)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/
c^2/d^2/e/(1+m)
```

Rubi [A] (verified)

Time = 0.14 (sec) , antiderivative size = 171, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.103, Rules used = {591, 470, 371}

$$\int \frac{(ex)^m(a+bx^2)(A+Bx^2)}{(c+dx^2)^2}\,dx = \frac{(ex)^{m+1}\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)(ad(Ad(1-m)+Bc(m+1))+bc(Ad(m+1)-Bc(m}{2c^2d^2e(m+1)} - \frac{(A+Bx^2)(ex)^{m+1}(bc-ad)}{2cde(c+dx^2)} - \frac{B(ex)^{m+1}(ad(m+1)-bc(m+3))}{2cd^2e(m+1)}$$

```
[In] Int[((e*x)^m*(a + b*x^2)*(A + B*x^2))/(c + d*x^2)^2,x]
```

```
[Out] -1/2*(B*(a*d*(1 + m) - b*c*(3 + m))*(e*x)^(1 + m))/(c*d^2*e*(1 + m)) - ((b*
c - a*d)*(e*x)^(1 + m)*(A + B*x^2))/(2*c*d*e*(c + d*x^2)) + ((a*d*(A*d*(1 -
 m) + B*c*(1 + m)) + b*c*(A*d*(1 + m) - B*c*(3 + m)))*(e*x)^(1 + m)*Hyperge
ometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(2*c^2*d^2*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 470

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[d*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(b*e*(m + n*(p
+ 1) + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(b*(m + n*(p
 + 1) + 1)), Int[(e*x)^m*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, m,
n, p}, x] && NeQ[b*c - a*d, 0] && NeQ[m + n*(p + 1) + 1, 0]
```

Rule 591

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
 a*f])
```

Rubi steps

integral

$$= -\frac{(bc-ad)(ex)^{1+m}\left(A+Bx^2\right)}{2cde\left(c+dx^2\right)}-\frac{\int \frac{(ex)^m\left(-A(ad(1-m)+bc(1+m))+B(ad(1+m)-bc(3+m))x^2\right)}{c+dx^2}\,dx}{2cd}$$

$$= -\frac{B(ad(1+m)-bc(3+m))(ex)^{1+m}}{2cd^2e(1+m)}-\frac{(bc-ad)(ex)^{1+m}\left(A+Bx^2\right)}{2cde\left(c+dx^2\right)} + \frac{(ad(Ad(1-m)+Bc(1+m))+bc(Ad(1+m)-Bc(3+m)))\int \frac{(ex)^m}{c+dx^2}\,dx}{2cd^2}$$

$$= -\frac{B(ad(1+m)-bc(3+m))(ex)^{1+m}}{2cd^2e(1+m)}-\frac{(bc-ad)(ex)^{1+m}\left(A+Bx^2\right)}{2cde\left(c+dx^2\right)} + \frac{(ad(Ad(1-m)+Bc(1+m))+bc(Ad(1+m)-Bc(3+m)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{2c^2d^2e(1+m)}$$

Mathematica [A] (verified)

Time = 0.21 (sec) , antiderivative size = 108, normalized size of antiderivative = 0.63

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{(c+dx^2)^2} dx$$
$$= \frac{x(ex)^m \left(bBc^2 + c(-2bBc + Abd + aBd) \text{Hypergeometric2F1}\left(1, \frac{1+m}{2}, \frac{3+m}{2}, -\frac{dx^2}{c}\right) + (bc-ad)(Bc-Ad)\right.}{c^2d^2(1+m)}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)*(A + B*x^2))/(c + d*x^2)^2,x]
```

```
[Out] (x*(e*x)^m*(b*B*c^2 + c*(-2*b*B*c + A*b*d + a*B*d)*Hypergeometric2F1[1, (1
+ m)/2, (3 + m)/2, -((d*x^2)/c)] + (b*c - a*d)*(B*c - A*d)*Hypergeometric2F
1[2, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)]))/(c^2*d^2*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (b\,x^2+a)(x^2B+A)}{(d\,x^2+c)^2}dx$$

```
[In] int((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c)^2,x)
```

```
[Out] int((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c)^2,x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{(c+dx^2)^2} dx = \int \frac{(Bx^2+A)(bx^2+a)(ex)^m}{(dx^2+c)^2} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="fricas")
```

```
[Out] integral((B*b*x^4 + (B*a + A*b)*x^2 + A*a)*(e*x)^m/(d^2*x^4 + 2*c*d*x^2 + c
^2), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 29.82 (sec) , antiderivative size = 2069, normalized size of antiderivative = 12.10

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{(c+dx^2)^2} dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)*(B*x**2+A)/(d*x**2+c)**2,x)
```

```
[Out] A*a*(-c*e**m*m**2*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/
2)*gamma(m/2 + 1/2)/(8*c**3*gamma(m/2 + 3/2) + 8*c**2*d*x**2*gamma(m/2 + 3/
2)) + 2*c*e**m*m*x**(m + 1)*gamma(m/2 + 1/2)/(8*c**3*gamma(m/2 + 3/2) + 8*c
**2*d*x**2*gamma(m/2 + 3/2)) + c*e**m*x**(m + 1)*lerchphi(d*x**2*exp_polar(
I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(8*c**3*gamma(m/2 + 3/2) + 8*c**2*d
*x**2*gamma(m/2 + 3/2)) + 2*c*e**m*x**(m + 1)*gamma(m/2 + 1/2)/(8*c**3*gamm
a(m/2 + 3/2) + 8*c**2*d*x**2*gamma(m/2 + 3/2)) - d*e**m*m**2*x**2*x**(m + 1
)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(8*c**3
*gamma(m/2 + 3/2) + 8*c**2*d*x**2*gamma(m/2 + 3/2)) + d*e**m*x**2*x**(m + 1
)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(8*c**3
*gamma(m/2 + 3/2) + 8*c**2*d*x**2*gamma(m/2 + 3/2))) + A*b*(-c*e**m*m**2*x*
*(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/
(8*c**3*gamma(m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2 + 5/2)) - 4*c*e**m*m*x**
(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(
8*c**3*gamma(m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2 + 5/2)) + 2*c*e**m*m*x**(
m + 3)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2
+ 5/2)) - 3*c*e**m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3
/2)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2 + 5
/2)) + 6*c*e**m*x**(m + 3)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c*
*2*d*x**2*gamma(m/2 + 5/2)) - d*e**m*m**2*x**2*x**(m + 3)*lerchphi(d*x**2*e
xp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) +
 8*c**2*d*x**2*gamma(m/2 + 5/2)) - 4*d*e**m*m*x**2*x**(m + 3)*lerchphi(d*x*
*2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/
2) + 8*c**2*d*x**2*gamma(m/2 + 5/2)) - 3*d*e**m*x**2*x**(m + 3)*lerchphi(d*
x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 +
5/2) + 8*c**2*d*x**2*gamma(m/2 + 5/2))) + B*a*(-c*e**m*m**2*x**(m + 3)*lerc
hphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c**3*gamma
(m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2 + 5/2)) - 4*c*e**m*m*x**(m + 3)*lerch
phi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c**3*gamma(
m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2 + 5/2)) + 2*c*e**m*m*x**(m + 3)*gamma(
m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2 + 5/2)) - 3*c
*e**m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2
 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2 + 5/2)) + 6*c*e*
*m*x**(m + 3)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c**2*d*x**2*gam
ma(m/2 + 5/2)) - d*e**m*m**2*x**2*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi
)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c**2*d*x**
2*gamma(m/2 + 5/2)) - 4*d*e**m*m*x**2*x**(m + 3)*lerchphi(d*x**2*exp_polar(
I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c**2*d
*x**2*gamma(m/2 + 5/2)) - 3*d*e**m*x**2*x**(m + 3)*lerchphi(d*x**2*exp_pola
r(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c**2
*d*x**2*gamma(m/2 + 5/2))) + B*b*(-c*e**m*m**2*x**(m + 5)*lerchphi(d*x**2*e
xp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(8*c**3*gamma(m/2 + 7/2) +
 8*c**2*d*x**2*gamma(m/2 + 7/2)) - 8*c*e**m*m*x**(m + 5)*lerchphi(d*x**2*ex
p_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(8*c**3*gamma(m/2 + 7/2) +
8*c**2*d*x**2*gamma(m/2 + 7/2)) + 2*c*e**m*m*x**(m + 5)*gamma(m/2 + 5/2)/(8
```

```
*c**3*gamma(m/2 + 7/2) + 8*c**2*d*x**2*gamma(m/2 + 7/2)) - 15*c*e**m*x**(m
+ 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(8*c
**3*gamma(m/2 + 7/2) + 8*c**2*d*x**2*gamma(m/2 + 7/2)) + 10*c*e**m*x**(m +
5)*gamma(m/2 + 5/2)/(8*c**3*gamma(m/2 + 7/2) + 8*c**2*d*x**2*gamma(m/2 + 7/
2)) - d*e**m*m**2*x**2*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2
 + 5/2)*gamma(m/2 + 5/2)/(8*c**3*gamma(m/2 + 7/2) + 8*c**2*d*x**2*gamma(m/2
 + 7/2)) - 8*d*e**m*m*x**2*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1,
 m/2 + 5/2)*gamma(m/2 + 5/2)/(8*c**3*gamma(m/2 + 7/2) + 8*c**2*d*x**2*gamma
(m/2 + 7/2)) - 15*d*e**m*x**2*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c,
 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(8*c**3*gamma(m/2 + 7/2) + 8*c**2*d*x**2*ga
mma(m/2 + 7/2)))
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2) (A+Bx^2)}{(c+dx^2)^2} \, dx = \int \frac{(Bx^2+A)(bx^2+a)(ex)^m}{(dx^2+c)^2} \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)*(e*x)^m/(d*x^2 + c)^2, x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2) (A+Bx^2)}{(c+dx^2)^2} \, dx = \int \frac{(Bx^2+A)(bx^2+a)(ex)^m}{(dx^2+c)^2} \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)*(e*x)^m/(d*x^2 + c)^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2) (A+Bx^2)}{(c+dx^2)^2} \, dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(b\,x^2+a)}{(d\,x^2+c)^2} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2))/(c + d*x^2)^2,x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2))/(c + d*x^2)^2, x)
```

3.33 $\int \frac{(ex)^m(A+Bx^2)}{(c+dx^2)^2}\,dx$

Optimal result

Integrand size = 22, antiderivative size = 103

$$\int \frac{(ex)^m\left(A+Bx^2\right)}{\left(c+dx^2\right)^2}\,dx = -\frac{(Bc-Ad)(ex)^{1+m}}{2cde\left(c+dx^2\right)} + \frac{(Ad(1-m)+Bc(1+m))(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{2c^2de(1+m)}$$

```
[Out] -1/2*(-A*d+B*c)*(e*x)^(1+m)/c/d/e/(d*x^2+c)+1/2*(A*d*(1-m)+B*c*(1+m))*(e*x)
^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/c^2/d/e/(1+m)
```

Rubi [A] (verified)

Time = 0.03 (sec) , antiderivative size = 103, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.091, Rules used = {468, 371}

$$\int \frac{(ex)^m\left(A+Bx^2\right)}{\left(c+dx^2\right)^2}\,dx = \frac{(ex)^{m+1}(Ad(1-m)+Bc(m+1))\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)}{2c^2de(m+1)} - \frac{(ex)^{m+1}(Bc-Ad)}{2cde\left(c+dx^2\right)}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/(c + d*x^2)^2,x]
```

```
[Out] -1/2*((B*c - A*d)*(e*x)^(1 + m))/(c*d*e*(c + d*x^2)) + ((A*d*(1 - m) + B*c*
(1 + m))*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)
/c)])/(2*c^2*d*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 468

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(-(b*c - a*d))*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(a
*b*e*n*(p + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(a*b*n*
(p + 1)), Int[(e*x)^m*(a + b*x^n)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e,
m, n}, x] && NeQ[b*c - a*d, 0] && LtQ[p, -1] && (( !IntegerQ[p + 1/2] && Ne
Q[p, -5/4]) ||  !RationalQ[m] || (IGtQ[n, 0] && ILtQ[p + 1/2, 0] && LeQ[-1,
 m, (-n)*(p + 1)]))
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{(Bc-Ad)(ex)^{1+m}}{2cde\,(c+dx^2)}+\frac{(-Ad(-1+m)+Bc(1+m))\int\frac{(ex)^m}{c+dx^2}\,dx}{2cd}\\ &= -\frac{(Bc-Ad)(ex)^{1+m}}{2cde\,(c+dx^2)}+\frac{(Ad(1-m)+Bc(1+m))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{2c^2de(1+m)}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.08 (sec) , antiderivative size = 81, normalized size of antiderivative = 0.79

$$\int\frac{(ex)^m\,(A+Bx^2)}{(c+dx^2)^2}\,dx = \frac{x(ex)^m\left(Bc\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)+(-Bc+Ad)\,\text{Hypergeometric2F1}\left(2,\frac{1+m}{2},\frac{3+m}{2},-\right.\right.}{c^2d(1+m)}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/(c + d*x^2)^2,x]
```

```
[Out] (x*(e*x)^m*(B*c*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)] +
(-(B*c) + A*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)]))/(
c^2*d*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m\,(x^2B+A)}{(d\,x^2+c)^2}dx$$

```
[In] int((e*x)^m*(B*x^2+A)/(d*x^2+c)^2,x)
[Out] int((e*x)^m*(B*x^2+A)/(d*x^2+c)^2,x)
```

Fricas [F]

$$\int \frac{(ex)^m\,(A+Bx^2)}{(c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="fricas")
[Out] integral((B*x^2 + A)*(e*x)^m/(d^2*x^4 + 2*c*d*x^2 + c^2), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 15.02 (sec) , antiderivative size = 954, normalized size of antiderivative = 9.26

$$\int \frac{(ex)^m\,(A+Bx^2)}{(c+dx^2)^2}\,dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(B*x**2+A)/(d*x**2+c)**2,x)
[Out] A*(-c*e**m*m**2*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)
*gamma(m/2 + 1/2)/(8*c**3*gamma(m/2 + 3/2) + 8*c**2*d*x**2*gamma(m/2 + 3/2)
) + 2*c*e**m*m*x**(m + 1)*gamma(m/2 + 1/2)/(8*c**3*gamma(m/2 + 3/2) + 8*c**
2*d*x**2*gamma(m/2 + 3/2)) + c*e**m*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*
pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(8*c**3*gamma(m/2 + 3/2) + 8*c**2*d*x
**2*gamma(m/2 + 3/2)) + 2*c*e**m*x**(m + 1)*gamma(m/2 + 1/2)/(8*c**3*gamma(
m/2 + 3/2) + 8*c**2*d*x**2*gamma(m/2 + 3/2)) - d*e**m*m**2*x**2*x**(m + 1)*
lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(8*c**3*g
amma(m/2 + 3/2) + 8*c**2*d*x**2*gamma(m/2 + 3/2)) + d*e**m*x**2*x**(m + 1)*
lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(8*c**3*g
amma(m/2 + 3/2) + 8*c**2*d*x**2*gamma(m/2 + 3/2))) + B*(-c*e**m*m**2*x**(m
+ 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c
**3*gamma(m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2 + 5/2)) - 4*c*e**m*m*x**(m +
 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c*
*3*gamma(m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2 + 5/2)) + 2*c*e**m*m*x**(m +
3)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2 + 5/
```

```
2)) - 3*c*e**m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*
gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c**2*d*x**2*gamma(m/2 + 5/2))
 + 6*c*e**m*x**(m + 3)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c**2*d
*x**2*gamma(m/2 + 5/2)) - d*e**m*m**2*x**2*x**(m + 3)*lerchphi(d*x**2*exp_p
olar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) + 8*c
**2*d*x**2*gamma(m/2 + 5/2)) - 4*d*e**m*m*x**2*x**(m + 3)*lerchphi(d*x**2*e
xp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2) +
 8*c**2*d*x**2*gamma(m/2 + 5/2)) - 3*d*e**m*x**2*x**(m + 3)*lerchphi(d*x**2
*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(8*c**3*gamma(m/2 + 5/2)
 + 8*c**2*d*x**2*gamma(m/2 + 5/2)))
```

Maxima [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(c+dx^2)^2} dx = \int \frac{(Bx^2+A)(ex)^m}{(dx^2+c)^2} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(e*x)^m/(d*x^2 + c)^2, x)
```

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(c+dx^2)^2} dx = \int \frac{(Bx^2+A)(ex)^m}{(dx^2+c)^2} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(e*x)^m/(d*x^2 + c)^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)}{(c+dx^2)^2} dx = \int \frac{(B\,x^2+A)\,(e\,x)^m}{(d\,x^2+c)^2} dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/(c + d*x^2)^2,x)
[Out] int(((A + B*x^2)*(e*x)^m)/(c + d*x^2)^2, x)
```

3.34 $\int \frac{(ex)^m(A+Bx^2)}{(a+bx^2)(c+dx^2)^2}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 205

$$\int \frac{(ex)^m(A+Bx^2)}{(a+bx^2)(c+dx^2)^2}\,dx = \frac{(Bc-Ad)(ex)^{1+m}}{2c(bc-ad)e(c+dx^2)} + \frac{b(Ab-aB)(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{a(bc-ad)^2e(1+m)} + \frac{(bc(Bc(1-m)-Ad(3-m))+ad(Ad(1-m)+Bc(1+m)))(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+}{2}\right.}{2c^2(bc-ad)^2e(1+m)}$$

```
[Out] 1/2*(-A*d+B*c)*(e*x)^(1+m)/c/(-a*d+b*c)/e/(d*x^2+c)+b*(A*b-B*a)*(e*x)^(1+m)
*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/a/(-a*d+b*c)^2/e/(1+m)+1/2*
(b*c*(B*c*(1-m)-A*d*(3-m))+a*d*(A*d*(1-m)+B*c*(1+m)))*(e*x)^(1+m)*hypergeom
([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/c^2/(-a*d+b*c)^2/e/(1+m)
```

Rubi [A] (verified)

Time = 0.25 (sec) , antiderivative size = 205, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {593, 598, 371}

$$\int \frac{(ex)^m(A+Bx^2)}{(a+bx^2)(c+dx^2)^2}\,dx = \frac{(ex)^{m+1}\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)(ad(Ad(1-m)+Bc(m+1))+bc(Bc(1-m)-Ad(3}{2c^2e(m+1)(bc-ad)^2} + \frac{b(ex)^{m+1}(Ab-aB)\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)}{ae(m+1)(bc-ad)^2} + \frac{(ex)^{m+1}(Bc-Ad)}{2ce(c+dx^2)(bc-ad)}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/((a + b*x^2)*(c + d*x^2)^2),x]
```

```
[Out] ((B*c - A*d)*(e*x)^(1 + m))/(2*c*(b*c - a*d)*e*(c + d*x^2)) + (b*(A*b - a*B
)*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(
a*(b*c - a*d)^2*e*(1 + m)) + ((b*c*(B*c*(1 - m) - A*d*(3 - m)) + a*d*(A*d*(
1 - m) + B*c*(1 + m)))*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m
)/2, -((d*x^2)/c)])/(2*c^2*(b*c - a*d)^2*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 593

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(m
 + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^(q + 1)/(a*g*n*(b*c - a*d)*(p + 1)))
, x] + Dist[1/(a*n*(b*c - a*d)*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c
 + d*x^n)^q*Simp[c*(b*e - a*f)*(m + 1) + e*n*(b*c - a*d)*(p + 1) + d*(b*e -
 a*f)*(m + n*(p + q + 2) + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g
, m, q}, x] && IGtQ[n, 0] && LtQ[p, -1]
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

$$
\begin{aligned}
\text{integral} &= \frac{(Bc-Ad)(ex)^{1+m}}{2c(bc-ad)e\left(c+dx^2\right)}+\frac{\int \frac{(ex)^m\left(2Abc-aAd(1-m)-aBc(1+m)+b(Bc-Ad)(1-m)x^2\right)}{(a+bx^2)(c+dx^2)}\,dx}{2c(bc-ad)}\\
&= \frac{(Bc-Ad)(ex)^{1+m}}{2c(bc-ad)e\left(c+dx^2\right)}\\
&\quad+\frac{\int \left(\frac{2b(Ab-aB)c(ex)^m}{(bc-ad)(a+bx^2)}+\frac{(ad(Ad(1-m)+Bc(1+m))-bc(Ad(3-m)-B(c-cm)))(ex)^m}{(bc-ad)(c+dx^2)}\right)dx}{2c(bc-ad)}\\
&= \frac{(Bc-Ad)(ex)^{1+m}}{2c(bc-ad)e\left(c+dx^2\right)}+\frac{(b(Ab-aB))\int \frac{(ex)^m}{a+bx^2}\,dx}{(bc-ad)^2}\\
&\quad+\frac{(ad(Ad(1-m)+Bc(1+m))-bc(Ad(3-m)-B(c-cm)))\int \frac{(ex)^m}{c+dx^2}\,dx}{2c(bc-ad)^2}
\end{aligned}
$$

$$= \frac{(Bc-Ad)(ex)^{1+m}}{2c(bc-ad)e\,(c+dx^2)} + \frac{b(Ab-aB)(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{bx^2}{a}\right)}{a(bc-ad)^2e(1+m)} + \frac{(bc(Bc(1-m)-Ad(3-m))+ad(Ad(1-m)+Bc(1+m)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{2c^2(bc-ad)^2e(1+m)}$$

Mathematica [A] (verified)

Time = 0.34 (sec) , antiderivative size = 147, normalized size of antiderivative = 0.72

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^2}\,dx = \frac{x(ex)^m \left(b(Ab-aB)c^2\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)+a(-Ab+aB)cd\,\text{Hypergeometric2F1}\left(\right.\right.}{ac^2(bc-ad)^2(1+m}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/((a + b*x^2)*(c + d*x^2)^2),x]
```

```
[Out] (x*(e*x)^m*(b*(A*b - a*B)*c^2*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -(
(b*x^2)/a)] + a*(-(A*b) + a*B)*c*d*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/
2, -((d*x^2)/c)] + a*(b*c - a*d)*(B*c - A*d)*Hypergeometric2F1[2, (1 + m)/2
, (3 + m)/2, -((d*x^2)/c)]))/(a*c^2*(b*c - a*d)^2*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (x^2B+A)}{(b\,x^2+a)(d\,x^2+c)^2}dx$$

```
[In] int((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c)^2,x)
```

```
[Out] int((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c)^2,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c)^2,x, algorithm="fricas")
```

```
[Out] integral((B*x^2 + A)*(e*x)^m/(b*d^2*x^6 + (2*b*c*d + a*d^2)*x^4 + a*c^2 + (
b*c^2 + 2*a*c*d)*x^2), x)
```

Sympy [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^2}\,dx = \int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^2}\,dx$$

```
[In] integrate((e*x)**m*(B*x**2+A)/(b*x**2+a)/(d*x**2+c)**2,x)
[Out] Integral((e*x)**m*(A + B*x**2)/((a + b*x**2)*(c + d*x**2)**2), x)
```

Maxima [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c)^2,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)*(d*x^2 + c)^2), x)
```

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)*(d*x^2 + c)^2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^2}\,dx = \int \frac{(B\,x^2+A)\,(e\,x)^m}{(b\,x^2+a)\,(d\,x^2+c)^2}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)*(c + d*x^2)^2),x)
[Out] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)*(c + d*x^2)^2), x)
```

3.35 $\int \frac{(ex)^m(A+Bx^2)}{(a+bx^2)^2(c+dx^2)^2}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 304

$$\int \frac{(ex)^m(A+Bx^2)}{(a+bx^2)^2(c+dx^2)^2}\,dx = \frac{d(Abc-2aBc+aAd)(ex)^{1+m}}{2ac(bc-ad)^2e(c+dx^2)}+\frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e(a+bx^2)(c+dx^2)}$$
$$+\frac{b(Ab(bc(1-m)-ad(5-m))+aB(ad(3-m)+bc(1+m)))(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+}{2}\right.}{2a^2(bc-ad)^3e(1+m)}$$
$$-\frac{d(bc(Bc(3-m)-Ad(5-m))+ad(Ad(1-m)+Bc(1+m)))(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3}{}\right.}{2c^2(bc-ad)^3e(1+m)}$$

```
[Out] 1/2*d*(A*a*d+A*b*c-2*B*a*c)*(e*x)^(1+m)/a/c/(-a*d+b*c)^2/e/(d*x^2+c)+1/2*(A
*b-B*a)*(e*x)^(1+m)/a/(-a*d+b*c)/e/(b*x^2+a)/(d*x^2+c)+1/2*b*(A*b*(b*c*(1-m
)-a*d*(5-m))+a*B*(a*d*(3-m)+b*c*(1+m)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m
],[3/2+1/2*m],-b*x^2/a)/a^2/(-a*d+b*c)^3/e/(1+m)-1/2*d*(b*c*(B*c*(3-m)-A*d*
(5-m))+a*d*(A*d*(1-m)+B*c*(1+m)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2
+1/2*m],-d*x^2/c)/c^2/(-a*d+b*c)^3/e/(1+m)
```

Rubi [A] (verified)

Time = 0.51 (sec) , antiderivative size = 304, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {593, 598, 371}

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^2} \, dx$$
$$= \frac{b(ex)^{m+1} \text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{bx^2}{a}\right) (Ab(bc(1-m) - ad(5-m)) + aB(ad(3-m) + bc(m \cdots}{2a^2 e(m+1)(bc-ad)^3}$$
$$- \frac{d(ex)^{m+1} \text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{dx^2}{c}\right) (ad(Ad(1-m) + Bc(m+1)) + bc(Bc(3-m) - Ad \cdots}{2c^2 e(m+1)(bc-ad)^3}$$
$$+ \frac{d(ex)^{m+1}(aAd - 2aBc + Abc)}{2ace\,(c+dx^2)\,(bc-ad)^2} + \frac{(ex)^{m+1}(Ab - aB)}{2ae\,(a+bx^2)\,(c+dx^2)\,(bc-ad)}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/((a + b*x^2)^2*(c + d*x^2)^2),x]
```

```
[Out] (d*(A*b*c - 2*a*B*c + a*A*d)*(e*x)^(1 + m))/(2*a*c*(b*c - a*d)^2*e*(c + d*x
^2)) + ((A*b - a*B)*(e*x)^(1 + m))/(2*a*(b*c - a*d)*e*(a + b*x^2)*(c + d*x^
2)) + (b*(A*b*(b*c*(1 - m) - a*d*(5 - m)) + a*B*(a*d*(3 - m) + b*c*(1 + m))
)*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(
2*a^2*(b*c - a*d)^3*e*(1 + m)) - (d*(b*c*(B*c*(3 - m) - A*d*(5 - m)) + a*d*
(A*d*(1 - m) + B*c*(1 + m)))*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2,
(3 + m)/2, -((d*x^2)/c)])/(2*c^2*(b*c - a*d)^3*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 593

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(m
 + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^(q + 1)/(a*g*n*(b*c - a*d)*(p + 1)))
, x] + Dist[1/(a*n*(b*c - a*d)*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c
 + d*x^n)^q*Simp[c*(b*e - a*f)*(m + 1) + e*n*(b*c - a*d)*(p + 1) + d*(b*e -
 a*f)*(m + n*(p + q + 2) + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g
, m, q}, x] && IGtQ[n, 0] && LtQ[p, -1]
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
```

```
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

integral

$$= \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)\,(c+dx^2)} - \frac{\int \frac{(ex)^m(2aAd-Abc(1-m)-aBc(1+m)-(Ab-aB)d(3-m)x^2)}{(a+bx^2)(c+dx^2)^2}\,dx}{2a(bc-ad)}$$

$$= \frac{d(Abc-2aBc+aAd)(ex)^{1+m}}{2ac(bc-ad)^2e\,(c+dx^2)} + \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)\,(c+dx^2)} - \frac{\int \frac{(ex)^m(2(A(4abcd-b^2c^2(1-m)-a^2d^2(1-m))-aBc(bc+ad)(1+m))-2bd(Abc-2aBc+aAd)(1-m)x^2)}{(a+bx^2)(c+dx^2)}\,dx}{4ac(bc-ad)^2}$$

$$= \frac{d(Abc-2aBc+aAd)(ex)^{1+m}}{2ac(bc-ad)^2e\,(c+dx^2)} + \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)\,(c+dx^2)} - \frac{\int \left(\frac{2bc(-Ab(bc(1-m)-ad(5-m))-aB(ad(3-m)+bc(1+m)))(ex)^m}{(bc-ad)(a+bx^2)} + \frac{2ad(bc(Bc(3-m)-Ad(5-m))+ad(Ad(1-m)+Bc(1+m)))(ex)^m}{(bc-ad)(c+dx^2)}\right)}{4ac(bc-ad)^2}$$

$$= \frac{d(Abc-2aBc+aAd)(ex)^{1+m}}{2ac(bc-ad)^2e\,(c+dx^2)} + \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)\,(c+dx^2)} + \frac{(b(Ab(bc(1-m)-ad(5-m))+aB(ad(3-m)+bc(1+m))))\int \frac{(ex)^m}{a+bx^2}\,dx}{2a(bc-ad)^3} - \frac{(d(bc(Bc(3-m)-Ad(5-m))+ad(Ad(1-m)+Bc(1+m))))\int \frac{(ex)^m}{c+dx^2}\,dx}{2c(bc-ad)^3}$$

$$= \frac{d(Abc-2aBc+aAd)(ex)^{1+m}}{2ac(bc-ad)^2e\,(c+dx^2)} + \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)\,(c+dx^2)} + \frac{b(Ab(bc(1-m)-ad(5-m))+aB(ad(3-m)+bc(1+m)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{bx^2}{a}\right)}{2a^2(bc-ad)^3e(1+m)} - \frac{d(bc(Bc(3-m)-Ad(5-m))+ad(Ad(1-m)+Bc(1+m)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{2c^2(bc-ad)^3e(1+m)}$$

Mathematica [A] (verified)

Time = 0.94 (sec) , antiderivative size = 207, normalized size of antiderivative = 0.68

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^2} \, dx$$
$$= \frac{x(ex)^m \left(-abc^2(bBc-2Abd+aBd) \text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)+a^2cd(bBc-2Abd+aBd)\right.}{}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/((a + b*x^2)^2*(c + d*x^2)^2),x]
```

```
[Out] (x*(e*x)^m*(-(a*b*c^2*(b*B*c - 2*A*b*d + a*B*d)*Hypergeometric2F1[1, (1 + m
)/2, (3 + m)/2, -((b*x^2)/a)]) + a^2*c*d*(b*B*c - 2*A*b*d + a*B*d)*Hypergeo
metric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)] - (b*c - a*d)*(b*(A*b - a*
B)*c^2*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)] + a^2*d*(-(
B*c) + A*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])))/(a^
2*c^2*(-(b*c) + a*d)^3*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (x^2B+A)}{(b\,x^2+a)^2 (d\,x^2+c)^2} dx$$

```
[In] int((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c)^2,x)
```

```
[Out] int((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c)^2,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^2} \, dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^2(dx^2+c)^2} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c)^2,x, algorithm="fricas")
```

```
[Out] integral((B*x^2 + A)*(e*x)^m/(b^2*d^2*x^8 + 2*(b^2*c*d + a*b*d^2)*x^6 + (b^
2*c^2 + 4*a*b*c*d + a^2*d^2)*x^4 + a^2*c^2 + 2*(a*b*c^2 + a^2*c*d)*x^2), x)
```

Sympy [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^2}\,dx = \text{Timed out}$$

```
[In] integrate((e*x)**m*(B*x**2+A)/(b*x**2+a)**2/(d*x**2+c)**2,x)
[Out] Timed out
```

Maxima [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^2(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c)^2,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^2*(d*x^2 + c)^2), x)
```

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^2(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^2*(d*x^2 + c)^2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^2}\,dx = \int \frac{(B\,x^2+A)\,(e\,x)^m}{(b\,x^2+a)^2\,(d\,x^2+c)^2}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^2*(c + d*x^2)^2),x)
[Out] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^2*(c + d*x^2)^2), x)
```

3.36 $\int \frac{(ex)^m\left(A+Bx^2\right)}{\left(a+bx^2\right)^3\left(c+dx^2\right)^2}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 491

$$\begin{aligned}
&\int \frac{(ex)^m\left(A+Bx^2\right)}{\left(a+bx^2\right)^3\left(c+dx^2\right)^2}\,dx \\
&= -\frac{d(A(4a^2d^2-b^2c^2(3-m)+abcd(11-m))-aBc(ad(11-m)+bc(1+m)))\,(ex)^{1+m}}{8a^2c(bc-ad)^3e\,(c+dx^2)} \\
&\quad+\frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)} \\
&\quad+\frac{(Ab(bc(3-m)-ad(9-m))+aB(ad(5-m)+bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)\,(c+dx^2)} \\
&\quad+\frac{b(aB(b^2c^2(1-m^2)-2abcd(5+4m-m^2)-a^2d^2(15-8m+m^2))+Ab(a^2d^2(35-12m+m^2)-2abcd}{8a^3(bc-ad)^4e(1+} \\
&\quad+\frac{d^2(bc(Bc(5-m)-Ad(7-m))+ad(Ad(1-m)+Bc(1+m)))(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3}{}\right.}{2c^2(bc-ad)^4e(1+m)}
\end{aligned}$$

```
[Out] -1/8*d*(A*(4*a^2*d^2-b^2*c^2*(3-m)+a*b*c*d*(11-m))-a*B*c*(a*d*(11-m)+b*c*(1
+m)))*(e*x)^(1+m)/a^2/c/(-a*d+b*c)^3/e/(d*x^2+c)+1/4*(A*b-B*a)*(e*x)^(1+m)/
a/(-a*d+b*c)/e/(b*x^2+a)^2/(d*x^2+c)+1/8*(A*b*(b*c*(3-m)-a*d*(9-m))+a*B*(a*
d*(5-m)+b*c*(1+m)))*(e*x)^(1+m)/a^2/(-a*d+b*c)^2/e/(b*x^2+a)/(d*x^2+c)+1/8*
b*(a*B*(b^2*c^2*(-m^2+1)-2*a*b*c*d*(-m^2+4*m+5)-a^2*d^2*(m^2-8*m+15))+A*b*(
a^2*d^2*(m^2-12*m+35)-2*a*b*c*d*(m^2-8*m+7)+b^2*c^2*(m^2-4*m+3)))*(e*x)^(1+
m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/a^3/(-a*d+b*c)^4/e/(1+m)+
1/2*d^2*(b*c*(B*c*(5-m)-A*d*(7-m))+a*d*(A*d*(1-m)+B*c*(1+m)))*(e*x)^(1+m)*h
ypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/c^2/(-a*d+b*c)^4/e/(1+m)
```

Rubi [A] (verified)

Time = 0.94 (sec) , antiderivative size = 491, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {593, 598, 371}

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)^2} \, dx$$
$$= -\frac{d(ex)^{m+1} \left(A(4a^2d^2+abcd(11-m)-b^2c^2(3-m))-aBc(ad(11-m)+bc(m+1))\right)}{8a^2ce\,(c+dx^2)\,(bc-ad)^3}$$
$$+\frac{(ex)^{m+1}(Ab(bc(3-m)-ad(9-m))+aB(ad(5-m)+bc(m+1)))}{8a^2e\,(a+bx^2)\,(c+dx^2)\,(bc-ad)^2}$$
$$+\frac{b(ex)^{m+1}\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)(Ab(a^2d^2(m^2-12m+35)-2abcd(m^2-8m+7)+}{8a^3e(m+1)(bc}$$
$$+\frac{d^2(ex)^{m+1}\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)(ad(Ad(1-m)+Bc(m+1))+bc(Bc(5-m)-}{2c^2e(m+1)(bc-ad)^4}$$
$$+\frac{(ex)^{m+1}(Ab-aB)}{4ae\,(a+bx^2)^2\,(c+dx^2)\,(bc-ad)}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/((a + b*x^2)^3*(c + d*x^2)^2),x]
```

```
[Out] -1/8*(d*(A*(4*a^2*d^2 - b^2*c^2*(3 - m) + a*b*c*d*(11 - m)) - a*B*c*(a*d*(1
1 - m) + b*c*(1 + m)))*(e*x)^(1 + m))/(a^2*c*(b*c - a*d)^3*e*(c + d*x^2)) +
 ((A*b - a*B)*(e*x)^(1 + m))/(4*a*(b*c - a*d)*e*(a + b*x^2)^2*(c + d*x^2))
+ ((A*b*(b*c*(3 - m) - a*d*(9 - m)) + a*B*(a*d*(5 - m) + b*c*(1 + m)))*(e*x
)^(1 + m))/(8*a^2*(b*c - a*d)^2*e*(a + b*x^2)*(c + d*x^2)) + (b*(a*B*(b^2*c
^2*(1 - m^2) - 2*a*b*c*d*(5 + 4*m - m^2) - a^2*d^2*(15 - 8*m + m^2)) + A*b*
(a^2*d^2*(35 - 12*m + m^2) - 2*a*b*c*d*(7 - 8*m + m^2) + b^2*c^2*(3 - 4*m +
 m^2)))*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/
a)])/(8*a^3*(b*c - a*d)^4*e*(1 + m)) + (d^2*(b*c*(B*c*(5 - m) - A*d*(7 - m)
) + a*d*(A*d*(1 - m) + B*c*(1 + m)))*(e*x)^(1 + m)*Hypergeometric2F1[1, (1
+ m)/2, (3 + m)/2, -((d*x^2)/c)])/(2*c^2*(b*c - a*d)^4*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 593

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(m
```

```
 + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^(q + 1)/(a*g*n*(b*c - a*d)*(p + 1)))
, x] + Dist[1/(a*n*(b*c - a*d)*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c
 + d*x^n)^q*Simp[c*(b*e - a*f)*(m + 1) + e*n*(b*c - a*d)*(p + 1) + d*(b*e -
 a*f)*(m + n*(p + q + 2) + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g
, m, q}, x] && IGtQ[n, 0] && LtQ[p, -1]
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

$$\text{integral} = \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)} - \frac{\int \frac{(ex)^m(4aAd-Abc(3-m)-aBc(1+m)-(Ab-aB)d(5-m)x^2)}{(a+bx^2)^2(c+dx^2)^2}\,dx}{4a(bc-ad)}$$

$$= \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)} + \frac{(Ab(bc(3-m)-ad(9-m))+aB(ad(5-m)+bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)\,(c+dx^2)} + \frac{\int \frac{(ex)^m(-aBc(1+m)(ad(7-m)-b(c-cm))+A(8a^2d^2-abcd(5-10m+m^2)+b^2c^2(3-4m+m^2))+d(3-m)(Ab(bc(3-m)-ad(9-m))}{(a+bx^2)(c+dx^2)^2}}{8a^2(bc-ad)^2}$$

$$= -\frac{d(A(4a^2d^2-b^2c^2(3-m)+abcd(11-m))-aBc(ad(11-m)+bc(1+m)))\,(ex)^{1+m}}{8a^2c(bc-ad)^3e\,(c+dx^2)} + \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)} + \frac{(Ab(bc(3-m)-ad(9-m))+aB(ad(5-m)+bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)\,(c+dx^2)} + \frac{\int \frac{(ex)^m(-2(aBc(4a^2d^2-b^2c^2(1-m)+abcd(9-m))(1+m)-A(24a^2bcd^2-4a^3d^3(1-m)-ab^2c^2d(11-12m+m^2)+b^3c^3(3-4m+m^2))}{(a+bx^2)(c+dx^2)}}{16a^2c(bc-ad)^3}$$

$$= -\frac{d(A(4a^2d^2 - b^2c^2(3-m) + abcd(11-m)) - aBc(ad(11-m) + bc(1+m)))\,(ex)^{1+m}}{8a^2c(bc-ad)^3e\,(c+dx^2)} + \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)} + \frac{(Ab(bc(3-m) - ad(9-m)) + aB(ad(5-m) + bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)\,(c+dx^2)} + \frac{\int \left(\frac{2bc(aB(b^2c^2(1-m^2) - 2abcd(5+4m-m^2) - a^2d^2(15-8m+m^2)) + Ab(a^2d^2(35-12m+m^2) - 2abcd(7-8m+m^2) + b^2c^2(3-4m}{(bc-ad)(a+bx^2)}\right.}{16a^2c(bc-ad)^3}$$

$$= -\frac{d(A(4a^2d^2 - b^2c^2(3-m) + abcd(11-m)) - aBc(ad(11-m) + bc(1+m)))\,(ex)^{1+m}}{8a^2c(bc-ad)^3e\,(c+dx^2)} + \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)} + \frac{(Ab(bc(3-m) - ad(9-m)) + aB(ad(5-m) + bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)\,(c+dx^2)} + \frac{(d^2(bc(Bc(5-m) - Ad(7-m)) + ad(Ad(1-m) + Bc(1+m))))\int \frac{(ex)^m}{c+dx^2}\,dx}{2c(bc-ad)^4} + \frac{(b(aB(b^2c^2(1-m^2) - 2abcd(5+4m-m^2) - a^2d^2(15-8m+m^2)) + Ab(a^2d^2(35-12m+m^2}{8a^2(bc-ad)^4}$$

$$= -\frac{d(A(4a^2d^2 - b^2c^2(3-m) + abcd(11-m)) - aBc(ad(11-m) + bc(1+m)))\,(ex)^{1+m}}{8a^2c(bc-ad)^3e\,(c+dx^2)} + \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)} + \frac{(Ab(bc(3-m) - ad(9-m)) + aB(ad(5-m) + bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)\,(c+dx^2)} + \frac{b(aB(b^2c^2(1-m^2) - 2abcd(5+4m-m^2) - a^2d^2(15-8m+m^2)) + Ab(a^2d^2(35-12m+m^2}{8a^3(bc-ad)^4e(1+} + \frac{d^2(bc(Bc(5-m) - Ad(7-m)) + ad(Ad(1-m) + Bc(1+m)))(ex)^{1+m}\,{}_2F_1\left(1, \frac{1+m}{2}; \frac{3+m}{2}; -\frac{dx}{c}\right.}{2c^2(bc-ad)^4e(1+m)}$$

Mathematica [A] (verified)

Time = 1.20 (sec) , antiderivative size = 265, normalized size of antiderivative = 0.54

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)^2} \, dx = \frac{x(ex)^m \left(-\frac{bd(2bBc-3Abd+aBd)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{a} + \frac{d^2(2bBc-3Abd+aBd)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{c}\right.}{}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/((a + b*x^2)^3*(c + d*x^2)^2),x]
```

```
[Out] (x*(e*x)^m*(-((b*d*(2*b*B*c - 3*A*b*d + a*B*d)*Hypergeometric2F1[1, (1 + m)
/2, (3 + m)/2, -((b*x^2)/a)])/a) + (d^2*(2*b*B*c - 3*A*b*d + a*B*d)*Hyperge
ometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/c + (b*(b*c - a*d)*(b*B*
c - 2*A*b*d + a*B*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((b*x^2)/a
)])/a^2 + (d^2*(b*c - a*d)*(B*c - A*d)*Hypergeometric2F1[2, (1 + m)/2, (3 +
 m)/2, -((d*x^2)/c)])/c^2 + (b*(A*b - a*B)*(b*c - a*d)^2*Hypergeometric2F1[
3, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/a^3))/((b*c - a*d)^4*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (x^2 B + A)}{(b x^2 + a)^3 (d x^2 + c)^2} dx$$

```
[In] int((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c)^2,x)
```

```
[Out] int((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c)^2,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)^2} \, dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^3(dx^2+c)^2} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c)^2,x, algorithm="fricas")
```

```
[Out] integral((B*x^2 + A)*(e*x)^m/(b^3*d^2*x^10 + (2*b^3*c*d + 3*a*b^2*d^2)*x^8
+ (b^3*c^2 + 6*a*b^2*c*d + 3*a^2*b*d^2)*x^6 + a^3*c^2 + (3*a*b^2*c^2 + 6*a^
2*b*c*d + a^3*d^2)*x^4 + (3*a^2*b*c^2 + 2*a^3*c*d)*x^2), x)
```

Sympy [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)^2}\,dx = \text{Timed out}$$

```
[In] integrate((e*x)**m*(B*x**2+A)/(b*x**2+a)**3/(d*x**2+c)**2,x)
[Out] Timed out
```

Maxima [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^3(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c)^2,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^3*(d*x^2 + c)^2), x)
```

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)^2}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^3(dx^2+c)^2}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^3*(d*x^2 + c)^2), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)^2}\,dx = \int \frac{(B\,x^2+A)\,(e\,x)^m}{(b\,x^2+a)^3\,(d\,x^2+c)^2}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^3*(c + d*x^2)^2),x)
[Out] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^3*(c + d*x^2)^2), x)
```

3.37 $\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^3} \, dx$

Optimal result

Integrand size = 31, antiderivative size = 433

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^3} \, dx = -\frac{b(2a^2d^2(1+m)(Ad(3-m)+Bc(1+m))+3abcd(3+m)(Ad(1+m)-Bc(5+m))-b^2c^2(5+m)(Ad}{8c^2d^4e(1+m)}$$
$$-\frac{b^2(ad(3+m)(Ad(3-m)+Bc(1+m))+bc(5+m)(Ad(3+m)-Bc(7+m)))(ex)^{3+m}}{8c^2d^3e^3(3+m)}$$
$$-\frac{(Bc-Ad)(ex)^{1+m}(a+bx^2)^3}{4cde(c+dx^2)^2}$$
$$+\frac{(ad(Ad(3-m)+Bc(1+m))+bc(Ad(3+m)-Bc(7+m)))(ex)^{1+m}(a+bx^2)^2}{8c^2d^2e(c+dx^2)}$$
$$-\frac{(bc-ad)(a^2d^2(1-m)(Ad(3-m)+Bc(1+m))+b^2c^2(5+m)(Ad(3+m)-Bc(7+m))+2abcd(Ad(}{8c^3d^4e(1+m)}$$

```
[Out] -1/8*b*(2*a^2*d^2*(1+m)*(A*d*(3-m)+B*c*(1+m))+3*a*b*c*d*(3+m)*(A*d*(1+m)-B*
c*(5+m))-b^2*c^2*(5+m)*(A*d*(3+m)-B*c*(7+m)))*(e*x)^(1+m)/c^2/d^4/e/(1+m)-1
/8*b^2*(a*d*(3+m)*(A*d*(3-m)+B*c*(1+m))+b*c*(5+m)*(A*d*(3+m)-B*c*(7+m)))*(e
*x)^(3+m)/c^2/d^3/e^3/(3+m)-1/4*(-A*d+B*c)*(e*x)^(1+m)*(b*x^2+a)^3/c/d/e/(d
*x^2+c)^2+1/8*(a*d*(A*d*(3-m)+B*c*(1+m))+b*c*(A*d*(3+m)-B*c*(7+m)))*(e*x)^(
1+m)*(b*x^2+a)^2/c^2/d^2/e/(d*x^2+c)-1/8*(-a*d+b*c)*(a^2*d^2*(1-m)*(A*d*(3-
m)+B*c*(1+m))+b^2*c^2*(5+m)*(A*d*(3+m)-B*c*(7+m))+2*a*b*c*d*(A*d*(-m^2-2*m+
3)+B*c*(m^2+6*m+5)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^
2/c)/c^3/d^4/e/(1+m)
```

Rubi [A] (verified)

Time = 0.73 (sec) , antiderivative size = 433, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {591, 584, 371}

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^3} \, dx =$$

$$-\frac{b(ex)^{m+1}(2a^2d^2(m+1)(Ad(3-m)+Bc(m+1))+3abcd(m+3)(Ad(m+1)-Bc(m+5))-b^2c^2(n}{8c^2d^4e(m+1)}$$

$$-\frac{(ex)^{m+1}(bc-ad)\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)(a^2d^2(1-m)(Ad(3-m)+Bc(m+1))+2}{8c^3d^4e(m+1}$$

$$-\frac{b^2(ex)^{m+3}(ad(m+3)(Ad(3-m)+Bc(m+1))+bc(m+5)(Ad(m+3)-Bc(m+7)))}{8c^2d^3e^3(m+3)}$$

$$+\frac{(a+bx^2)^2(ex)^{m+1}(ad(Ad(3-m)+Bc(m+1))+bc(Ad(m+3)-Bc(m+7)))}{8c^2d^2e(c+dx^2)}$$

$$-\frac{(a+bx^2)^3(ex)^{m+1}(Bc-Ad)}{4cde(c+dx^2)^2}$$

```
[In] Int[((e*x)^m*(a + b*x^2)^3*(A + B*x^2))/(c + d*x^2)^3,x]
```

```
[Out] -1/8*(b*(2*a^2*d^2*(1 + m)*(A*d*(3 - m) + B*c*(1 + m)) + 3*a*b*c*d*(3 + m)*
(A*d*(1 + m) - B*c*(5 + m)) - b^2*c^2*(5 + m)*(A*d*(3 + m) - B*c*(7 + m)))*
(e*x)^(1 + m))/(c^2*d^4*e*(1 + m)) - (b^2*(a*d*(3 + m)*(A*d*(3 - m) + B*c*(
1 + m)) + b*c*(5 + m)*(A*d*(3 + m) - B*c*(7 + m)))*(e*x)^(3 + m))/(8*c^2*d^
3*e^3*(3 + m)) - ((B*c - A*d)*(e*x)^(1 + m)*(a + b*x^2)^3)/(4*c*d*e*(c + d*
x^2)^2) + ((a*d*(A*d*(3 - m) + B*c*(1 + m)) + b*c*(A*d*(3 + m) - B*c*(7 + m
)))*(e*x)^(1 + m)*(a + b*x^2)^2)/(8*c^2*d^2*e*(c + d*x^2)) - ((b*c - a*d)*(
a^2*d^2*(1 - m)*(A*d*(3 - m) + B*c*(1 + m)) + b^2*c^2*(5 + m)*(A*d*(3 + m)
- B*c*(7 + m)) + 2*a*b*c*d*(A*d*(3 - 2*m - m^2) + B*c*(5 + 6*m + m^2)))*(e*
x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(8*c^3
*d^4*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 584

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Int[ExpandIntegrand[
```

```
(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^q*(e + f*x^n)^r, x], x] /; FreeQ[{a, b, c
, d, e, f, g, m, n}, x] && IGtQ[p, -2] && IGtQ[q, 0] && IGtQ[r, 0]
```

Rule 591

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
 a*f])
```

Rubi steps

$$\text{integral} = -\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^3}{4cde\left(c+dx^2\right)^2} - \frac{\int \frac{(ex)^m\left(a+bx^2\right)^2\left(-a(Ad(3-m)+Bc(1+m))+b(Ad(3+m)-Bc(7+m))x^2\right)}{\left(c+dx^2\right)^2}\,dx}{4cd}$$

$$= -\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^3}{4cde\left(c+dx^2\right)^2} + \frac{(ad(Ad(3-m)+Bc(1+m))+bc(Ad(3+m)-Bc(7+m)))(ex)^{1+m}\left(a+bx^2\right)^2}{8c^2d^2e\left(c+dx^2\right)} + \frac{\int \frac{(ex)^m\left(a+bx^2\right)\left(a(ad(1-m)(Ad(3-m)+Bc(1+m))-bc(1+m)(Ad(3+m)-Bc(7+m)))-b(ad(3+m)(Ad(3-m)+Bc(1+m))+bc(5+\right.}{c+dx^2}}{8c^2d^2}$$

$$= -\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^3}{4cde\left(c+dx^2\right)^2} + \frac{(ad(Ad(3-m)+Bc(1+m))+bc(Ad(3+m)-Bc(7+m)))(ex)^{1+m}\left(a+bx^2\right)^2}{8c^2d^2e\left(c+dx^2\right)} + \frac{\int \left(-\frac{b\left(2a^2d^2(1+m)(Ad(3-m)+Bc(1+m))+3abcd(3+m)(Ad(1+m)-Bc(5+m))-b^2c^2(5+m)(Ad(3+m)-Bc(7+m))\right)(ex)^m}{d^2} - \right.}{}$$

$$= -\frac{b(2a^2d^2(1+m)(Ad(3-m)+Bc(1+m))+3abcd(3+m)(Ad(1+m)-Bc(5+m))-b^2c^2(5}{8c^2d^4e(1+m)}$$
$$-\frac{b^2(ad(3+m)(Ad(3-m)+Bc(1+m))+bc(5+m)(Ad(3+m)-Bc(7+m)))(ex)^{3+m}}{8c^2d^3e^3(3+m)}$$
$$-\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^3}{4cde\left(c+dx^2\right)^2}$$
$$+\frac{(ad(Ad(3-m)+Bc(1+m))+bc(Ad(3+m)-Bc(7+m)))(ex)^{1+m}\left(a+bx^2\right)^2}{8c^2d^2e\left(c+dx^2\right)}$$
$$-\frac{((bc-ad)\left(a^2d^2(1-m)(Ad(3-m)+Bc(1+m))+b^2c^2(5+m)(Ad(3+m)-Bc(7+m))+\right.}{8c^2d^4}$$

$$= -\frac{b(2a^2d^2(1+m)(Ad(3-m)+Bc(1+m))+3abcd(3+m)(Ad(1+m)-Bc(5+m))-b^2c^2(5}{8c^2d^4e(1+m)}$$
$$-\frac{b^2(ad(3+m)(Ad(3-m)+Bc(1+m))+bc(5+m)(Ad(3+m)-Bc(7+m)))(ex)^{3+m}}{8c^2d^3e^3(3+m)}$$
$$-\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^3}{4cde\left(c+dx^2\right)^2}$$
$$+\frac{(ad(Ad(3-m)+Bc(1+m))+bc(Ad(3+m)-Bc(7+m)))(ex)^{1+m}\left(a+bx^2\right)^2}{8c^2d^2e\left(c+dx^2\right)}$$
$$-\frac{(bc-ad)\left(a^2d^2(1-m)(Ad(3-m)+Bc(1+m))+b^2c^2(5+m)(Ad(3+m)-Bc(7+m))+2\right.}{8c^3d^4e(1+m)}$$

Mathematica [A] (verified)

Time = 0.83 (sec) , antiderivative size = 222, normalized size of antiderivative = 0.51

$$\int \frac{(ex)^m\left(a+bx^2\right)^3\left(A+Bx^2\right)}{\left(c+dx^2\right)^3}\,dx$$
$$=\frac{x(ex)^m\left(\frac{b^2(-3bBc+Abd+3aBd)}{1+m}+\frac{b^3Bdx^2}{3+m}+\frac{3b(bc-ad)(2bBc-Abd-aBd)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{c(1+m)}-\frac{(bc-ad)^2(4bB}{}\right.}{d^4}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)^3*(A + B*x^2))/(c + d*x^2)^3,x]
```

```
[Out] (x*(e*x)^m*((b^2*(-3*b*B*c + A*b*d + 3*a*B*d))/(1 + m) + (b^3*B*d*x^2)/(3 +
 m) + (3*b*(b*c - a*d)*(2*b*B*c - A*b*d - a*B*d)*Hypergeometric2F1[1, (1 +
m)/2, (3 + m)/2, -((d*x^2)/c)])/(c*(1 + m)) - ((b*c - a*d)^2*(4*b*B*c - 3*A
*b*d - a*B*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(c^
2*(1 + m)) + ((b*c - a*d)^3*(B*c - A*d)*Hypergeometric2F1[3, (1 + m)/2, (3
+ m)/2, -((d*x^2)/c)])/(c^3*(1 + m))))/d^4
```

Maple [F]

$$\int \frac{(ex)^m (b\,x^2+a)^3 (x^2B+A)}{(d\,x^2+c)^3}dx$$

```
[In] int((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c)^3,x)
[Out] int((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c)^3,x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^3}\,dx = \int \frac{(Bx^2+A)(bx^2+a)^3(ex)^m}{(dx^2+c)^3}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="fricas")
[Out] integral((B*b^3*x^8 + (3*B*a*b^2 + A*b^3)*x^6 + 3*(B*a^2*b + A*a*b^2)*x^4 +
 A*a^3 + (B*a^3 + 3*A*a^2*b)*x^2)*(e*x)^m/(d^3*x^6 + 3*c*d^2*x^4 + 3*c^2*d*
x^2 + c^3), x)
```

Sympy [F]

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^3}\,dx = \int \frac{(ex)^m (A+Bx^2)(a+bx^2)^3}{(c+dx^2)^3}\,dx$$

```
[In] integrate((e*x)**m*(b*x**2+a)**3*(B*x**2+A)/(d*x**2+c)**3,x)
[Out] Integral((e*x)**m*(A + B*x**2)*(a + b*x**2)**3/(c + d*x**2)**3, x)
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^3}\,dx = \int \frac{(Bx^2+A)(bx^2+a)^3(ex)^m}{(dx^2+c)^3}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^3*(e*x)^m/(d*x^2 + c)^3, x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^3} \, dx = \int \frac{(Bx^2+A)(bx^2+a)^3(ex)^m}{(dx^2+c)^3} \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^3*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^3*(e*x)^m/(d*x^2 + c)^3, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^3 (A+Bx^2)}{(c+dx^2)^3} \, dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(b\,x^2+a)^3}{(d\,x^2+c)^3} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^3)/(c + d*x^2)^3,x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^3)/(c + d*x^2)^3, x)
```

3.38 $\int \frac{(ex)^m(a+bx^2)^2(A+Bx^2)}{(c+dx^2)^3}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 292

$$\int \frac{(ex)^m\left(a+bx^2\right)^2\left(A+Bx^2\right)}{\left(c+dx^2\right)^3}\,dx$$
$$= \frac{b(ad(1+m)-bc(3+m))(Ad(1+m)-Bc(5+m))(ex)^{1+m}}{8c^2d^3e(1+m)}$$
$$- \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^2}{4cde\left(c+dx^2\right)^2}$$
$$- \frac{(bc-ad)(ex)^{1+m}\left(a(Ad(3-m)+Bc(1+m))-b(Ad(1+m)-Bc(5+m))x^2\right)}{8c^2d^2e\left(c+dx^2\right)}$$
$$+ \frac{(ad(ad(1-m)+bc(1+m))(Ad(3-m)+Bc(1+m))-bc(ad(1+m)-bc(3+m))(Ad(1+m)-Bc(}{8c^3d^3e(1+m)}$$

```
[Out] 1/8*b*(a*d*(1+m)-b*c*(3+m))*(A*d*(1+m)-B*c*(5+m))*(e*x)^(1+m)/c^2/d^3/e/(1+
m)-1/4*(-A*d+B*c)*(e*x)^(1+m)*(b*x^2+a)^2/c/d/e/(d*x^2+c)^2-1/8*(-a*d+b*c)*
(e*x)^(1+m)*(a*(A*d*(3-m)+B*c*(1+m))-b*(A*d*(1+m)-B*c*(5+m))*x^2)/c^2/d^2/e
/(d*x^2+c)+1/8*(a*d*(a*d*(1-m)+b*c*(1+m))*(A*d*(3-m)+B*c*(1+m))-b*c*(a*d*(1
+m)-b*c*(3+m))*(A*d*(1+m)-B*c*(5+m)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],
[3/2+1/2*m],-d*x^2/c)/c^3/d^3/e/(1+m)
```

Rubi [A] (verified)

Time = 0.28 (sec) , antiderivative size = 292, normalized size of antiderivative = 1.00, number of steps used = 4, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {591, 470, 371}

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^3} dx$$

$$= \frac{(ex)^{m+1} \text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{dx^2}{c}\right) (ad(ad(1-m)+bc(m+1))(Ad(3-m)+Bc(m+1)}{8c^3d^3e(m+1)}$$
$$+ \frac{b(ex)^{m+1}(ad(m+1)-bc(m+3))(Ad(m+1)-Bc(m+5))}{8c^2d^3e(m+1)}$$
$$- \frac{(ex)^{m+1}(bc-ad)\left(a(Ad(3-m)+Bc(m+1))-bx^2(Ad(m+1)-Bc(m+5))\right)}{8c^2d^2e\,(c+dx^2)}$$
$$- \frac{(a+bx^2)^2 (ex)^{m+1}(Bc-Ad)}{4cde\,(c+dx^2)^2}$$

```
[In] Int[((e*x)^m*(a + b*x^2)^2*(A + B*x^2))/(c + d*x^2)^3,x]
```

```
[Out] (b*(a*d*(1 + m) - b*c*(3 + m))*(A*d*(1 + m) - B*c*(5 + m))*(e*x)^(1 + m))/(
8*c^2*d^3*e*(1 + m)) - ((B*c - A*d)*(e*x)^(1 + m)*(a + b*x^2)^2)/(4*c*d*e*(
c + d*x^2)^2) - ((b*c - a*d)*(e*x)^(1 + m)*(a*(A*d*(3 - m) + B*c*(1 + m)) -
 b*(A*d*(1 + m) - B*c*(5 + m))*x^2))/(8*c^2*d^2*e*(c + d*x^2)) + ((a*d*(a*d
*(1 - m) + b*c*(1 + m))*(A*d*(3 - m) + B*c*(1 + m)) - b*c*(a*d*(1 + m) - b*
c*(3 + m))*(A*d*(1 + m) - B*c*(5 + m)))*(e*x)^(1 + m)*Hypergeometric2F1[1,
(1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(8*c^3*d^3*e*(1 + m))
```

<u>Rule 371</u>

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

<u>Rule 470</u>

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[d*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(b*e*(m + n*(p
+ 1) + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(b*(m + n*(p
 + 1) + 1)), Int[(e*x)^m*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, m,
n, p}, x] && NeQ[b*c - a*d, 0] && NeQ[m + n*(p + 1) + 1, 0]
```

<u>Rule 591</u>

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
```

```
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
 a*f])
```

Rubi steps

$$\text{integral} = -\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^2}{4cde\left(c+dx^2\right)^2} - \frac{\int \frac{(ex)^m(a+bx^2)(-a(Ad(3-m)+Bc(1+m))+b(Ad(1+m)-Bc(5+m))x^2)}{(c+dx^2)^2}\,dx}{4cd}$$

$$= -\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^2}{4cde\left(c+dx^2\right)^2} - \frac{(bc-ad)(ex)^{1+m}\left(a(Ad(3-m)+Bc(1+m))-b(Ad(1+m)-Bc(5+m))x^2\right)}{8c^2d^2e\left(c+dx^2\right)} + \frac{\int \frac{(ex)^m\left(a(ad(1-m)+bc(1+m))(Ad(3-m)+Bc(1+m))+b(ad(1+m)-bc(3+m))(Ad(1+m)-Bc(5+m))x^2\right)}{c+dx^2}\,dx}{8c^2d^2}$$

$$= \frac{b(ad(1+m)-bc(3+m))(Ad(1+m)-Bc(5+m))(ex)^{1+m}}{8c^2d^3e(1+m)} - \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^2}{4cde\left(c+dx^2\right)^2} - \frac{(bc-ad)(ex)^{1+m}\left(a(Ad(3-m)+Bc(1+m))-b(Ad(1+m)-Bc(5+m))x^2\right)}{8c^2d^2e\left(c+dx^2\right)} + \frac{\left(a(ad(1-m)+bc(1+m))(Ad(3-m)+Bc(1+m))-\frac{bc(ad(1+m)-bc(3+m))(Ad(1+m)-Bc(5+m))}{d}\right)\int}{8c^2d^2}$$

$$= \frac{b(ad(1+m)-bc(3+m))(Ad(1+m)-Bc(5+m))(ex)^{1+m}}{8c^2d^3e(1+m)} - \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^2}{4cde\left(c+dx^2\right)^2} - \frac{(bc-ad)(ex)^{1+m}\left(a(Ad(3-m)+Bc(1+m))-b(Ad(1+m)-Bc(5+m))x^2\right)}{8c^2d^2e\left(c+dx^2\right)} + \frac{\left(a(ad(1-m)+bc(1+m))(Ad(3-m)+Bc(1+m))-\frac{bc(ad(1+m)-bc(3+m))(Ad(1+m)-Bc(5+m))}{d}\right)(e}{8c^3d^2e(1+m)}$$

Mathematica [A] (verified)

Time = 0.76 (sec) , antiderivative size = 169, normalized size of antiderivative = 0.58

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^3} dx$$
$$= \frac{x(ex)^m \left(b^2B - \frac{b(3bBc-Abd-2aBd) \text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{c} + \frac{(bc-ad)(3bBc-2Abd-aBd) \text{Hypergeometric2F1}\left(2,\frac{1}{}\right.}{c^2}\right.}{d^3(1+m)}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)^2*(A + B*x^2))/(c + d*x^2)^3,x]
```

```
[Out] (x*(e*x)^m*(b^2*B - (b*(3*b*B*c - A*b*d - 2*a*B*d)*Hypergeometric2F1[1, (1
+ m)/2, (3 + m)/2, -((d*x^2)/c)])/c + ((b*c - a*d)*(3*b*B*c - 2*A*b*d - a*B
*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/c^2 - ((b*c -
 a*d)^2*(B*c - A*d)*Hypergeometric2F1[3, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)
])/c^3))/(d^3*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (b\,x^2+a)^2 (x^2B+A)}{(d\,x^2+c)^3}dx$$

```
[In] int((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c)^3,x)
```

```
[Out] int((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c)^3,x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^3} dx = \int \frac{(Bx^2+A)(bx^2+a)^2(ex)^m}{(dx^2+c)^3} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="fricas")
```

```
[Out] integral((B*b^2*x^6 + (2*B*a*b + A*b^2)*x^4 + A*a^2 + (B*a^2 + 2*A*a*b)*x^2
)*(e*x)^m/(d^3*x^6 + 3*c*d^2*x^4 + 3*c^2*d*x^2 + c^3), x)
```

Sympy [F]

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^3} \, dx = \int \frac{(ex)^m (A+Bx^2) (a+bx^2)^2}{(c+dx^2)^3} \, dx$$

```
[In] integrate((e*x)**m*(b*x**2+a)**2*(B*x**2+A)/(d*x**2+c)**3,x)
[Out] Integral((e*x)**m*(A + B*x**2)*(a + b*x**2)**2/(c + d*x**2)**3, x)
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^3} \, dx = \int \frac{(Bx^2+A)(bx^2+a)^2(ex)^m}{(dx^2+c)^3} \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^2*(e*x)^m/(d*x^2 + c)^3, x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^3} \, dx = \int \frac{(Bx^2+A)(bx^2+a)^2(ex)^m}{(dx^2+c)^3} \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^2*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^2*(e*x)^m/(d*x^2 + c)^3, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^2 (A+Bx^2)}{(c+dx^2)^3} \, dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(b\,x^2+a)^2}{(d\,x^2+c)^3} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^2)/(c + d*x^2)^3,x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^2)/(c + d*x^2)^3, x)
```

3.39 $\int \frac{(ex)^m\left(a+bx^2\right)\left(A+Bx^2\right)}{\left(c+dx^2\right)^3}\,dx$

Optimal result

Integrand size = 29, antiderivative size = 208

$$\int \frac{(ex)^m\left(a+bx^2\right)\left(A+Bx^2\right)}{\left(c+dx^2\right)^3}\,dx = -\frac{(bc-ad)(ex)^{1+m}\left(A+Bx^2\right)}{4cde\left(c+dx^2\right)^2} + \frac{(bc(Ad(1+m)-Bc(3+m))+ad(Ad(3-m)-B(c-cm)))(ex)^{1+m}}{8c^2d^2e\left(c+dx^2\right)} + \frac{(ad(1-m)(Ad(3-m)+Bc(1+m))+bc(1+m)(Ad(1-m)+Bc(3+m)))(ex)^{1+m}\,\text{Hypergeometric}}{8c^3d^2e(1+m)}$$

```
[Out] -1/4*(-a*d+b*c)*(e*x)^(1+m)*(B*x^2+A)/c/d/e/(d*x^2+c)^2+1/8*(b*c*(A*d*(1+m)
-B*c*(3+m))+a*d*(A*d*(3-m)-B*(-c*m+c)))*(e*x)^(1+m)/c^2/d^2/e/(d*x^2+c)+1/8
*(a*d*(1-m)*(A*d*(3-m)+B*c*(1+m))+b*c*(1+m)*(A*d*(1-m)+B*c*(3+m)))*(e*x)^(1
+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/c^3/d^2/e/(1+m)
```

Rubi [A] (verified)

Time = 0.20 (sec) , antiderivative size = 208, normalized size of antiderivative = 1.00, number of steps used = 3, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.103, Rules used = {591, 468, 371}

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{(c+dx^2)^3}\,dx$$
$$= \frac{(ex)^{m+1}\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)(ad(1-m)(Ad(3-m)+Bc(m+1))+bc(m+1)(Ad(1}{8c^3d^2e(m+1)}$$
$$+\frac{(ex)^{m+1}(ad(Ad(3-m)-B(c-cm))+bc(Ad(m+1)-Bc(m+3)))}{8c^2d^2e\,(c+dx^2)}$$
$$-\frac{(A+Bx^2)(ex)^{m+1}(bc-ad)}{4cde\,(c+dx^2)^2}$$

```
[In] Int[((e*x)^m*(a + b*x^2)*(A + B*x^2))/(c + d*x^2)^3,x]
```

```
[Out] -1/4*((b*c - a*d)*(e*x)^(1 + m)*(A + B*x^2))/(c*d*e*(c + d*x^2)^2) + ((b*c*
(A*d*(1 + m) - B*c*(3 + m)) + a*d*(A*d*(3 - m) - B*(c - c*m)))*(e*x)^(1 + m
))/(8*c^2*d^2*e*(c + d*x^2)) + ((a*d*(1 - m)*(A*d*(3 - m) + B*c*(1 + m)) +
b*c*(1 + m)*(A*d*(1 - m) + B*c*(3 + m)))*(e*x)^(1 + m)*Hypergeometric2F1[1,
 (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(8*c^3*d^2*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 468

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(-(b*c - a*d))*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(a
*b*e*n*(p + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(a*b*n*
(p + 1)), Int[(e*x)^m*(a + b*x^n)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e,
m, n}, x] && NeQ[b*c - a*d, 0] && LtQ[p, -1] && (( !IntegerQ[p + 1/2] && Ne
Q[p, -5/4]) ||  !RationalQ[m] || (IGtQ[n, 0] && ILtQ[p + 1/2, 0] && LeQ[-1,
 m, (-n)*(p + 1)]))
```

Rule 591

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(
m + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^q/(a*b*g*n*(p + 1))), x] + Dist[1/(
```

```
a*b*n*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c + d*x^n)^(q - 1)*Simp[c*
(b*e*n*(p + 1) + (b*e - a*f)*(m + 1)) + d*(b*e*n*(p + 1) + (b*e - a*f)*(m +
 n*q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g, m}, x] && IGtQ[n,
 0] && LtQ[p, -1] && GtQ[q, 0] &&  !(EqQ[q, 1] && SimplerQ[b*c - a*d, b*e -
 a*f])
```

Rubi steps

integral

$$= -\frac{(bc-ad)(ex)^{1+m}(A+Bx^2)}{4cde(c+dx^2)^2} - \frac{\int \frac{(ex)^m(-A(ad(3-m)+bc(1+m))-B(ad(1-m)+bc(3+m))x^2)}{(c+dx^2)^2}\,dx}{4cd}$$

$$= -\frac{(bc-ad)(ex)^{1+m}(A+Bx^2)}{4cde(c+dx^2)^2} + \frac{(bc(Ad(1+m)-Bc(3+m))+ad(Ad(3-m)-B(c-cm)))(ex)^{1+m}}{8c^2d^2e(c+dx^2)} + \frac{(ad(1-m)(Ad(3-m)+Bc(1+m))+bc(1+m)(Ad(1-m)+Bc(3+m)))\int \frac{(ex)^m}{c+dx^2}\,dx}{8c^2d^2}$$

$$= -\frac{(bc-ad)(ex)^{1+m}(A+Bx^2)}{4cde(c+dx^2)^2} + \frac{(bc(Ad(1+m)-Bc(3+m))+ad(Ad(3-m)-B(c-cm)))(ex)^{1+m}}{8c^2d^2e(c+dx^2)} + \frac{(ad(1-m)(Ad(3-m)+Bc(1+m))+bc(1+m)(Ad(1-m)+Bc(3+m)))(ex)^{1+m}\,{}_2F_1\left(1,\frac{1+m}{2};\frac{3+m}{2}\right.}{8c^3d^2e(1+m)}$$

Mathematica [A] (verified)

Time = 0.43 (sec) , antiderivative size = 133, normalized size of antiderivative = 0.64

$$\int \frac{(ex)^m(a+bx^2)(A+Bx^2)}{(c+dx^2)^3}\,dx = \frac{x(ex)^m\left(bBc^2\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)+c(-2bBc+Abd+aBd)\,\text{Hypergeometric2F1}\left(\right.\right.}{c^3d^2(1+m)}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)*(A + B*x^2))/(c + d*x^2)^3,x]
```

```
[Out] (x*(e*x)^m*(b*B*c^2*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)
] + c*(-2*b*B*c + A*b*d + a*B*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2,
 -((d*x^2)/c)] + (b*c - a*d)*(B*c - A*d)*Hypergeometric2F1[3, (1 + m)/2, (3
 + m)/2, -((d*x^2)/c)]))/(c^3*d^2*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (b\,x^2+a)\,(x^2B+A)}{(d\,x^2+c)^3}dx$$

```
[In] int((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c)^3,x)
```

```
[Out] int((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c)^3,x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{(c+dx^2)^3}\,dx = \int \frac{(Bx^2+A)(bx^2+a)(ex)^m}{(dx^2+c)^3}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="fricas")
```

```
[Out] integral((B*b*x^4 + (B*a + A*b)*x^2 + A*a)*(e*x)^m/(d^3*x^6 + 3*c*d^2*x^4 +
 3*c^2*d*x^2 + c^3), x)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 94.11 (sec) , antiderivative size = 6411, normalized size of antiderivative = 30.82

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{(c+dx^2)^3}\,dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(b*x**2+a)*(B*x**2+A)/(d*x**2+c)**3,x)
```

```
[Out] A*a*(c**2*e**m*m**3*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 +
1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2
+ 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) - 3*c**2*e**m*m**2*x**(m + 1)*
lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*
gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamm
a(m/2 + 3/2)) - 2*c**2*e**m*m**2*x**(m + 1)*gamma(m/2 + 1/2)/(32*c**5*gamma
(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2
 + 3/2)) - c**2*e**m*m*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2
 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m
/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) + 8*c**2*e**m*m*x**(m + 1)*
gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2
) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) + 3*c**2*e**m*x**(m + 1)*lerchphi(d
*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2
+ 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/
2)) + 10*c**2*e**m*x**(m + 1)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) +
```

```
64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) + 2*c
*d*e**m*m**3*x**2*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/
2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 +
3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) - 6*c*d*e**m*m**2*x**2*x**(m + 1
)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**
5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*ga
mma(m/2 + 3/2)) - 2*c*d*e**m*m**2*x**2*x**(m + 1)*gamma(m/2 + 1/2)/(32*c**5
*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gam
ma(m/2 + 3/2)) - 2*c*d*e**m*m*x**2*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*p
i)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*
x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) + 4*c*d*e**m*m*
x**2*x**(m + 1)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2
*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) + 6*c*d*e**m*x**2*x
**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)
/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2
*x**4*gamma(m/2 + 3/2)) + 6*c*d*e**m*x**2*x**(m + 1)*gamma(m/2 + 1/2)/(32*c
**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*
gamma(m/2 + 3/2)) + d**2*e**m*m**3*x**4*x**(m + 1)*lerchphi(d*x**2*exp_pola
r(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c*
*4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) - 3*d**2*e
**m*m**2*x**4*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*g
amma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2)
 + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) - d**2*e**m*m*x**4*x**(m + 1)*lerchp
hi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(
m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2
+ 3/2)) + 3*d**2*e**m*x**4*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1,
 m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gam
ma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2))) + A*b*(c**2*e**m*m**3*
x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2
)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**
2*x**4*gamma(m/2 + 5/2)) + 3*c**2*e**m*m**2*x**(m + 3)*lerchphi(d*x**2*exp_
polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 6
4*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 2*c*
*2*e**m*m**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**
4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - c**2*e**m
*m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 +
3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*
d**2*x**4*gamma(m/2 + 5/2)) - 3*c**2*e**m*x**(m + 3)*lerchphi(d*x**2*exp_po
lar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*
c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) + 18*c**
2*e**m*x**(m + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x*
*2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) + 2*c*d*e**m*m**3
*x**2*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2
 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c*
*3*d**2*x**4*gamma(m/2 + 5/2)) + 6*c*d*e**m*m**2*x**2*x**(m + 3)*lerchphi(d
```

```
*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2
+ 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/
2)) - 2*c*d*e**m*m**2*x**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 +
 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2
)) - 2*c*d*e**m*m*x**2*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2
 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m
/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 4*c*d*e**m*m*x**2*x**(m +
 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 +
 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 6*c*d*e**m*x**2*x**(m + 3)*le
rchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*ga
mma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(
m/2 + 5/2)) + 6*c*d*e**m*x**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/
2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 +
5/2)) + d**2*e**m*m**3*x**4*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1
, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*ga
mma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) + 3*d**2*e**m*m**2*x**
4*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3
/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d
**2*x**4*gamma(m/2 + 5/2)) - d**2*e**m*m*x**4*x**(m + 3)*lerchphi(d*x**2*ex
p_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) +
 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 3*
d**2*e**m*x**4*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*
gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2
) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2))) + B*a*(c**2*e**m*m**3*x**(m + 3)*l
erchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*g
amma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma
(m/2 + 5/2)) + 3*c**2*e**m*m**2*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/
c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**
2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 2*c**2*e**m*m**2
*x**(m + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gam
ma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - c**2*e**m*m*x**(m + 3
)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**
5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*ga
mma(m/2 + 5/2)) - 3*c**2*e**m*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c,
 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*
gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) + 18*c**2*e**m*x**(m
 + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2
 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) + 2*c*d*e**m*m**3*x**2*x**(m
+ 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*
c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4
*gamma(m/2 + 5/2)) + 6*c*d*e**m*m**2*x**2*x**(m + 3)*lerchphi(d*x**2*exp_po
lar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*
c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 2*c*d*
e**m*m**2*x**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c
**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 2*c*d*e
```

```
**m*m*x**2*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamm
a(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) +
32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 4*c*d*e**m*m*x**2*x**(m + 3)*gamma(m/
2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c
**3*d**2*x**4*gamma(m/2 + 5/2)) - 6*c*d*e**m*x**2*x**(m + 3)*lerchphi(d*x**
2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/
2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2))
 + 6*c*d*e**m*x**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 6
4*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) + d**2
*e**m*m**3*x**4*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)
*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/
2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) + 3*d**2*e**m*m**2*x**4*x**(m + 3)
*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5
*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gam
ma(m/2 + 5/2)) - d**2*e**m*m*x**4*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi
)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x
**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 3*d**2*e**m*x*
*4*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 +
3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*
d**2*x**4*gamma(m/2 + 5/2))) + B*b*(c**2*e**m*m**3*x**(m + 5)*lerchphi(d*x*
*2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(32*c**5*gamma(m/2 + 7
/2) + 64*c**4*d*x**2*gamma(m/2 + 7/2) + 32*c**3*d**2*x**4*gamma(m/2 + 7/2))
 + 9*c**2*e**m*m**2*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 +
5/2)*gamma(m/2 + 5/2)/(32*c**5*gamma(m/2 + 7/2) + 64*c**4*d*x**2*gamma(m/2
+ 7/2) + 32*c**3*d**2*x**4*gamma(m/2 + 7/2)) - 2*c**2*e**m*m**2*x**(m + 5)*
gamma(m/2 + 5/2)/(32*c**5*gamma(m/2 + 7/2) + 64*c**4*d*x**2*gamma(m/2 + 7/2
) + 32*c**3*d**2*x**4*gamma(m/2 + 7/2)) + 23*c**2*e**m*m*x**(m + 5)*lerchph
i(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(32*c**5*gamma(m
/2 + 7/2) + 64*c**4*d*x**2*gamma(m/2 + 7/2) + 32*c**3*d**2*x**4*gamma(m/2 +
 7/2)) - 8*c**2*e**m*m*x**(m + 5)*gamma(m/2 + 5/2)/(32*c**5*gamma(m/2 + 7/2
) + 64*c**4*d*x**2*gamma(m/2 + 7/2) + 32*c**3*d**2*x**4*gamma(m/2 + 7/2)) +
 15*c**2*e**m*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*g
amma(m/2 + 5/2)/(32*c**5*gamma(m/2 + 7/2) + 64*c**4*d*x**2*gamma(m/2 + 7/2)
 + 32*c**3*d**2*x**4*gamma(m/2 + 7/2)) + 10*c**2*e**m*x**(m + 5)*gamma(m/2
+ 5/2)/(32*c**5*gamma(m/2 + 7/2) + 64*c**4*d*x**2*gamma(m/2 + 7/2) + 32*c**
3*d**2*x**4*gamma(m/2 + 7/2)) + 2*c*d*e**m*m**3*x**2*x**(m + 5)*lerchphi(d*
x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(32*c**5*gamma(m/2 +
 7/2) + 64*c**4*d*x**2*gamma(m/2 + 7/2) + 32*c**3*d**2*x**4*gamma(m/2 + 7/2
)) + 18*c*d*e**m*m**2*x**2*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1,
 m/2 + 5/2)*gamma(m/2 + 5/2)/(32*c**5*gamma(m/2 + 7/2) + 64*c**4*d*x**2*gam
ma(m/2 + 7/2) + 32*c**3*d**2*x**4*gamma(m/2 + 7/2)) - 2*c*d*e**m*m**2*x**2*
x**(m + 5)*gamma(m/2 + 5/2)/(32*c**5*gamma(m/2 + 7/2) + 64*c**4*d*x**2*gamm
a(m/2 + 7/2) + 32*c**3*d**2*x**4*gamma(m/2 + 7/2)) + 46*c*d*e**m*m*x**2*x**
(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(
32*c**5*gamma(m/2 + 7/2) + 64*c**4*d*x**2*gamma(m/2 + 7/2) + 32*c**3*d**2*x
```

```
**4*gamma(m/2 + 7/2)) - 12*c*d*e**m*m*x**2*x**(m + 5)*gamma(m/2 + 5/2)/(32*
c**5*gamma(m/2 + 7/2) + 64*c**4*d*x**2*gamma(m/2 + 7/2) + 32*c**3*d**2*x**4
*gamma(m/2 + 7/2)) + 30*c*d*e**m*x**2*x**(m + 5)*lerchphi(d*x**2*exp_polar(
I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(32*c**5*gamma(m/2 + 7/2) + 64*c**4
*d*x**2*gamma(m/2 + 7/2) + 32*c**3*d**2*x**4*gamma(m/2 + 7/2)) - 10*c*d*e**
m*x**2*x**(m + 5)*gamma(m/2 + 5/2)/(32*c**5*gamma(m/2 + 7/2) + 64*c**4*d*x*
*2*gamma(m/2 + 7/2) + 32*c**3*d**2*x**4*gamma(m/2 + 7/2)) + d**2*e**m*m**3*
x**4*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2
+ 5/2)/(32*c**5*gamma(m/2 + 7/2) + 64*c**4*d*x**2*gamma(m/2 + 7/2) + 32*c**
3*d**2*x**4*gamma(m/2 + 7/2)) + 9*d**2*e**m*m**2*x**4*x**(m + 5)*lerchphi(d
*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(32*c**5*gamma(m/2
+ 7/2) + 64*c**4*d*x**2*gamma(m/2 + 7/2) + 32*c**3*d**2*x**4*gamma(m/2 + 7/
2)) + 23*d**2*e**m*m*x**4*x**(m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1,
m/2 + 5/2)*gamma(m/2 + 5/2)/(32*c**5*gamma(m/2 + 7/2) + 64*c**4*d*x**2*gamm
a(m/2 + 7/2) + 32*c**3*d**2*x**4*gamma(m/2 + 7/2)) + 15*d**2*e**m*x**4*x**(
m + 5)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 5/2)*gamma(m/2 + 5/2)/(3
2*c**5*gamma(m/2 + 7/2) + 64*c**4*d*x**2*gamma(m/2 + 7/2) + 32*c**3*d**2*x*
*4*gamma(m/2 + 7/2)))
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{(c+dx^2)^3}\,dx = \int \frac{(Bx^2+A)(bx^2+a)(ex)^m}{(dx^2+c)^3}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)*(e*x)^m/(d*x^2 + c)^3, x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{(c+dx^2)^3}\,dx = \int \frac{(Bx^2+A)(bx^2+a)(ex)^m}{(dx^2+c)^3}\,dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)*(e*x)^m/(d*x^2 + c)^3, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)(A+Bx^2)}{(c+dx^2)^3}\,dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(b\,x^2+a)}{(d\,x^2+c)^3}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2))/(c + d*x^2)^3,x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2))/(c + d*x^2)^3, x)
```

3.40 $\int \frac{(ex)^m(A+Bx^2)}{(c+dx^2)^3}\,dx$

Optimal result

Integrand size = 22, antiderivative size = 103

$$\int \frac{(ex)^m\left(A+Bx^2\right)}{\left(c+dx^2\right)^3}\,dx = -\frac{(Bc-Ad)(ex)^{1+m}}{4cde\left(c+dx^2\right)^2} + \frac{(Ad(3-m)+Bc(1+m))(ex)^{1+m}\,\text{Hypergeometric2F1}\left(2,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{4c^3de(1+m)}$$

```
[Out] -1/4*(-A*d+B*c)*(e*x)^(1+m)/c/d/e/(d*x^2+c)^2+1/4*(A*d*(3-m)+B*c*(1+m))*(e*
x)^(1+m)*hypergeom([2, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/c^3/d/e/(1+m)
```

Rubi [A] (verified)

Time = 0.04 (sec) , antiderivative size = 103, normalized size of antiderivative = 1.00, number of steps used = 2, number of rules used = 2, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.091, Rules used = {468, 371}

$$\int \frac{(ex)^m\left(A+Bx^2\right)}{\left(c+dx^2\right)^3}\,dx = \frac{(ex)^{m+1}(Ad(3-m)+Bc(m+1))\,\text{Hypergeometric2F1}\left(2,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)}{4c^3de(m+1)} - \frac{(ex)^{m+1}(Bc-Ad)}{4cde\left(c+dx^2\right)^2}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/(c + d*x^2)^3,x]
```

```
[Out] -1/4*((B*c - A*d)*(e*x)^(1 + m))/(c*d*e*(c + d*x^2)^2) + ((A*d*(3 - m) + B*
c*(1 + m))*(e*x)^(1 + m)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((d*x^
2)/c)])/(4*c^3*d*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 468

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[(-(b*c - a*d))*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(a
*b*e*n*(p + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(a*b*n*
(p + 1)), Int[(e*x)^m*(a + b*x^n)^(p + 1), x], x] /; FreeQ[{a, b, c, d, e,
m, n}, x] && NeQ[b*c - a*d, 0] && LtQ[p, -1] && (( !IntegerQ[p + 1/2] && Ne
Q[p, -5/4]) ||  !RationalQ[m] || (IGtQ[n, 0] && ILtQ[p + 1/2, 0] && LeQ[-1,
 m, (-n)*(p + 1)]))
```

Rubi steps

$$\begin{aligned}\text{integral} &= -\frac{(Bc-Ad)(ex)^{1+m}}{4cde\left(c+dx^2\right)^2}+\frac{(-Ad(-3+m)+Bc(1+m))\int\frac{(ex)^m}{(c+dx^2)^2}\,dx}{4cd}\\ &= -\frac{(Bc-Ad)(ex)^{1+m}}{4cde\left(c+dx^2\right)^2}+\frac{(Ad(3-m)+Bc(1+m))(ex)^{1+m}\,{}_2F_1\left(2,\frac{1+m}{2};\frac{3+m}{2};-\frac{dx^2}{c}\right)}{4c^3de(1+m)}\end{aligned}$$

Mathematica [A] (verified)

Time = 0.09 (sec) , antiderivative size = 81, normalized size of antiderivative = 0.79

$$\int\frac{(ex)^m\left(A+Bx^2\right)}{\left(c+dx^2\right)^3}\,dx$$
$$=\frac{x(ex)^m\left(Bc\,\text{Hypergeometric2F1}\left(2,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)+(-Bc+Ad)\,\text{Hypergeometric2F1}\left(3,\frac{1+m}{2},\frac{3+m}{2},-\right.\right.}{c^3d(1+m)}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/(c + d*x^2)^3,x]
```

```
[Out] (x*(e*x)^m*(B*c*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)] +
(-(B*c) + A*d)*Hypergeometric2F1[3, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)]))/(
c^3*d*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (x^2B + A)}{(d\,x^2 + c)^3}dx$$

```
[In] int((e*x)^m*(B*x^2+A)/(d*x^2+c)^3,x)
[Out] int((e*x)^m*(B*x^2+A)/(d*x^2+c)^3,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A + Bx^2)}{(c + dx^2)^3}\,dx = \int \frac{(Bx^2 + A)(ex)^m}{(dx^2 + c)^3}\,dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="fricas")
[Out] integral((B*x^2 + A)*(e*x)^m/(d^3*x^6 + 3*c*d^2*x^4 + 3*c^2*d*x^2 + c^3), x
)
```

Sympy [C] (verification not implemented)

Result contains complex when optimal does not.

Time = 52.50 (sec) , antiderivative size = 3199, normalized size of antiderivative = 31.06

$$\int \frac{(ex)^m (A + Bx^2)}{(c + dx^2)^3}\,dx = \text{Too large to display}$$

```
[In] integrate((e*x)**m*(B*x**2+A)/(d*x**2+c)**3,x)
[Out] A*(c**2*e**m*m**3*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/
2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 +
3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) - 3*c**2*e**m*m**2*x**(m + 1)*le
rchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*ga
mma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(
m/2 + 3/2)) - 2*c**2*e**m*m**2*x**(m + 1)*gamma(m/2 + 1/2)/(32*c**5*gamma(m
/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 +
 3/2)) - c**2*e**m*m*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 +
 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2
 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) + 8*c**2*e**m*m*x**(m + 1)*ga
mma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2)
+ 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) + 3*c**2*e**m*x**(m + 1)*lerchphi(d*x
**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 +
3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)
) + 10*c**2*e**m*x**(m + 1)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64
```

```
*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) + 2*c*d
*e**m*m**3*x**2*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)
*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/
2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) - 6*c*d*e**m*m**2*x**2*x**(m + 1)*
lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*
gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamm
a(m/2 + 3/2)) - 2*c*d*e**m*m**2*x**2*x**(m + 1)*gamma(m/2 + 1/2)/(32*c**5*g
amma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma
(m/2 + 3/2)) - 2*c*d*e**m*m*x**2*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)
/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x*
*2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) + 4*c*d*e**m*m*x*
*2*x**(m + 1)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*g
amma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) + 6*c*d*e**m*x**2*x**
(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(
32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x
**4*gamma(m/2 + 3/2)) + 6*c*d*e**m*x**2*x**(m + 1)*gamma(m/2 + 1/2)/(32*c**
5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*ga
mma(m/2 + 3/2)) + d**2*e**m*m**3*x**4*x**(m + 1)*lerchphi(d*x**2*exp_polar(
I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4
*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) - 3*d**2*e**
m*m**2*x**4*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gam
ma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) +
 32*c**3*d**2*x**4*gamma(m/2 + 3/2)) - d**2*e**m*m*x**4*x**(m + 1)*lerchphi
(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/
2 + 3/2) + 64*c**4*d*x**2*gamma(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 +
3/2)) + 3*d**2*e**m*x**4*x**(m + 1)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m
/2 + 1/2)*gamma(m/2 + 1/2)/(32*c**5*gamma(m/2 + 3/2) + 64*c**4*d*x**2*gamma
(m/2 + 3/2) + 32*c**3*d**2*x**4*gamma(m/2 + 3/2))) + B*(c**2*e**m*m**3*x**(
m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(3
2*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x*
*4*gamma(m/2 + 5/2)) + 3*c**2*e**m*m**2*x**(m + 3)*lerchphi(d*x**2*exp_pola
r(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c*
*4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 2*c**2*e
**m*m**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*
x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - c**2*e**m*m*x
**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)
/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2
*x**4*gamma(m/2 + 5/2)) - 3*c**2*e**m*x**(m + 3)*lerchphi(d*x**2*exp_polar(
I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4
*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) + 18*c**2*e*
*m*x**(m + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*g
amma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) + 2*c*d*e**m*m**3*x**
2*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3
/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d
**2*x**4*gamma(m/2 + 5/2)) + 6*c*d*e**m*m**2*x**2*x**(m + 3)*lerchphi(d*x**
```

```
2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/
2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2))
- 2*c*d*e**m*m**2*x**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2
) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) -
 2*c*d*e**m*m*x**2*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3
/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 +
 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 4*c*d*e**m*m*x**2*x**(m + 3)*
gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2
) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 6*c*d*e**m*x**2*x**(m + 3)*lerchp
hi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(
m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2
+ 5/2)) + 6*c*d*e**m*x**2*x**(m + 3)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 +
5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)
) + d**2*e**m*m**3*x**4*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/
2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(
m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) + 3*d**2*e**m*m**2*x**4*x*
*(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/
(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*
x**4*gamma(m/2 + 5/2)) - d**2*e**m*m*x**4*x**(m + 3)*lerchphi(d*x**2*exp_po
lar(I*pi)/c, 1, m/2 + 3/2)*gamma(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*
c**4*d*x**2*gamma(m/2 + 5/2) + 32*c**3*d**2*x**4*gamma(m/2 + 5/2)) - 3*d**2
*e**m*x**4*x**(m + 3)*lerchphi(d*x**2*exp_polar(I*pi)/c, 1, m/2 + 3/2)*gamm
a(m/2 + 3/2)/(32*c**5*gamma(m/2 + 5/2) + 64*c**4*d*x**2*gamma(m/2 + 5/2) +
32*c**3*d**2*x**4*gamma(m/2 + 5/2)))
```

Maxima [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(c+dx^2)^3} \, dx = \int \frac{(Bx^2+A)(ex)^m}{(dx^2+c)^3} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(e*x)^m/(d*x^2 + c)^3, x)
```

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(c+dx^2)^3} \, dx = \int \frac{(Bx^2+A)(ex)^m}{(dx^2+c)^3} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(e*x)^m/(d*x^2 + c)^3, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)}{(c+dx^2)^3}\,dx = \int \frac{(B\,x^2+A)\,(e\,x)^m}{(d\,x^2+c)^3}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/(c + d*x^2)^3,x)
[Out] int(((A + B*x^2)*(e*x)^m)/(c + d*x^2)^3, x)
```

3.41 $\int \frac{(ex)^m\left(A+Bx^2\right)}{\left(a+bx^2\right)\left(c+dx^2\right)^3}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 333

$$\int \frac{(ex)^m\left(A+Bx^2\right)}{\left(a+bx^2\right)\left(c+dx^2\right)^3}\,dx = \frac{(Bc-Ad)(ex)^{1+m}}{4c(bc-ad)e\left(c+dx^2\right)^2} + \frac{(bc(Bc(3-m)-Ad(7-m))+ad(Ad(3-m)+Bc(1+m)))(ex)^{1+m}}{8c^2(bc-ad)^2e\left(c+dx^2\right)} + \frac{b^2(Ab-aB)(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{a(bc-ad)^3e(1+m)} + \frac{(b^2c^2(Bc(1-m)-Ad(5-m))(3-m)-a^2d^2(1-m)(Ad(3-m)+Bc(1+m))+2abcd(Bc(3+2m-}{8c^3(bc-ad)^3e(1+m)}$$

```
[Out] 1/4*(-A*d+B*c)*(e*x)^(1+m)/c/(-a*d+b*c)/e/(d*x^2+c)^2+1/8*(b*c*(B*c*(3-m)-A
*d*(7-m))+a*d*(A*d*(3-m)+B*c*(1+m)))*(e*x)^(1+m)/c^2/(-a*d+b*c)^2/e/(d*x^2+
c)+b^2*(A*b-B*a)*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)
/a/(-a*d+b*c)^3/e/(1+m)+1/8*(b^2*c^2*(B*c*(1-m)-A*d*(5-m))*(3-m)-a^2*d^2*(1
-m)*(A*d*(3-m)+B*c*(1+m))+2*a*b*c*d*(B*c*(-m^2+2*m+3)+A*d*(m^2-6*m+5)))*(e*
x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/c^3/(-a*d+b*c)^3/e/
(1+m)
```

Rubi [A] (verified)

Time = 0.47 (sec) , antiderivative size = 333, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {593, 598, 371}

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^3} \, dx$$

$$= \frac{(ex)^{m+1} \text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{dx^2}{c}\right)(-a^2d^2(1-m)(Ad(3-m)+Bc(m+1))+2abcd(Ad(\ldots}{8c^3e(m+1)(bc-ad)^3}$$
$$+ \frac{b^2(ex)^{m+1}(Ab-aB) \text{Hypergeometric2F1}\left(1, \frac{m+1}{2}, \frac{m+3}{2}, -\frac{bx^2}{a}\right)}{ae(m+1)(bc-ad)^3}$$
$$+ \frac{(ex)^{m+1}(ad(Ad(3-m)+Bc(m+1))+bc(Bc(3-m)-Ad(7-m)))}{8c^2e(c+dx^2)(bc-ad)^2}$$
$$+ \frac{(ex)^{m+1}(Bc-Ad)}{4ce(c+dx^2)^2(bc-ad)}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/((a + b*x^2)*(c + d*x^2)^3),x]
```

```
[Out] ((B*c - A*d)*(e*x)^(1 + m))/(4*c*(b*c - a*d)*e*(c + d*x^2)^2) + ((b*c*(B*c*
(3 - m) - A*d*(7 - m)) + a*d*(A*d*(3 - m) + B*c*(1 + m)))*(e*x)^(1 + m))/(8
*c^2*(b*c - a*d)^2*e*(c + d*x^2)) + (b^2*(A*b - a*B)*(e*x)^(1 + m)*Hypergeo
metric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(a*(b*c - a*d)^3*e*(1 + m
)) + ((b^2*c^2*(B*c*(1 - m) - A*d*(5 - m))*(3 - m) - a^2*d^2*(1 - m)*(A*d*(
3 - m) + B*c*(1 + m)) + 2*a*b*c*d*(B*c*(3 + 2*m - m^2) + A*d*(5 - 6*m + m^2
)))*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])
/(8*c^3*(b*c - a*d)^3*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] && !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 593

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(m
 + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^(q + 1)/(a*g*n*(b*c - a*d)*(p + 1)))
, x] + Dist[1/(a*n*(b*c - a*d)*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c
 + d*x^n)^q*Simp[c*(b*e - a*f)*(m + 1) + e*n*(b*c - a*d)*(p + 1) + d*(b*e -
 a*f)*(m + n*(p + q + 2) + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g
, m, q}, x] && IGtQ[n, 0] && LtQ[p, -1]
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

$$\text{integral} = \frac{(Bc-Ad)(ex)^{1+m}}{4c(bc-ad)e\left(c+dx^2\right)^2} + \frac{\int \frac{(ex)^m\left(4Abc-aAd(3-m)-aBc(1+m)+b(Bc-Ad)(3-m)x^2\right)}{(a+bx^2)(c+dx^2)^2}\,dx}{4c(bc-ad)}$$

$$= \frac{(Bc-Ad)(ex)^{1+m}}{4c(bc-ad)e\left(c+dx^2\right)^2} + \frac{(bc(Bc(3-m)-Ad(7-m))+ad(Ad(3-m)+Bc(1+m)))(ex)^{1+m}}{8c^2(bc-ad)^2e\left(c+dx^2\right)} + \frac{\int \frac{(ex)^m\left(aBc(ad(1-m)-bc(5-m))(1+m)+A\left(8b^2c^2-abcd\left(7-8m+m^2\right)+a^2d^2\left(3-4m+m^2\right)\right)+b(1-m)(bc(Bc(3-m)-Ad(7-m))+\cdots\right)}{(a+bx^2)(c+dx^2)}}{8c^2(bc-ad)^2}$$

$$= \frac{(Bc-Ad)(ex)^{1+m}}{4c(bc-ad)e\left(c+dx^2\right)^2} + \frac{(bc(Bc(3-m)-Ad(7-m))+ad(Ad(3-m)+Bc(1+m)))(ex)^{1+m}}{8c^2(bc-ad)^2e\left(c+dx^2\right)} + \frac{\int \left(\frac{8b^2(Ab-aB)c^2(ex)^m}{(bc-ad)(a+bx^2)} + \frac{\left(b^2c^2(Bc(1-m)-Ad(5-m))(3-m)-a^2d^2(1-m)(Ad(3-m)+Bc(1+m))+2abcd\left(Bc\left(3+2m-m^2\right)+A\cdots\right)\right)}{(bc-ad)(c+dx^2)}\right)}{8c^2(bc-ad)^2}$$

$$= \frac{(Bc-Ad)(ex)^{1+m}}{4c(bc-ad)e\left(c+dx^2\right)^2} + \frac{(bc(Bc(3-m)-Ad(7-m))+ad(Ad(3-m)+Bc(1+m)))(ex)^{1+m}}{8c^2(bc-ad)^2e\left(c+dx^2\right)} + \frac{\left(b^2(Ab-aB)\right)\int \frac{(ex)^m}{a+bx^2}\,dx}{(bc-ad)^3} + \frac{\left(b^2c^2(Bc(1-m)-Ad(5-m))(3-m)-a^2d^2(1-m)(Ad(3-m)+Bc(1+m))+2abcd(Bc(3\cdots)\right)}{8c^2(bc-ad)^3}$$

$$= \frac{(Bc - Ad)(ex)^{1+m}}{4c(bc - ad)e\,(c + dx^2)^2}$$
$$+ \frac{(bc(Bc(3-m) - Ad(7-m)) + ad(Ad(3-m) + Bc(1+m)))(ex)^{1+m}}{8c^2(bc-ad)^2e\,(c+dx^2)}$$
$$+ \frac{b^2(Ab - aB)(ex)^{1+m}\,{}_2F_1\left(1, \frac{1+m}{2}; \frac{3+m}{2}; -\frac{bx^2}{a}\right)}{a(bc-ad)^3e(1+m)}$$
$$+ \frac{(b^2c^2(Bc(1-m) - Ad(5-m))(3-m) - a^2d^2(1-m)(Ad(3-m) + Bc(1+m)) + 2abcd(Bc(}{8c^3(bc-ad)^3e(1+m)}$$

Mathematica [A] (verified)

Time = 0.87 (sec) , antiderivative size = 197, normalized size of antiderivative = 0.59

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)(c + dx^2)^3}\,dx$$
$$= \frac{x(ex)^m \left(\frac{b^2(Ab-aB)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{a} - \frac{b(Ab-aB)d\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{dx^2}{c}\right)}{c} - \frac{(Ab-aB)d(bc}{}\right.}{(bc-ad)^3(1+m)}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/((a + b*x^2)*(c + d*x^2)^3),x]
```

```
[Out] (x*(e*x)^m*((b^2*(A*b - a*B)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((
b*x^2)/a)])/a - (b*(A*b - a*B)*d*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2,
 -((d*x^2)/c)])/c - ((A*b - a*B)*d*(b*c - a*d)*Hypergeometric2F1[2, (1 + m)
/2, (3 + m)/2, -((d*x^2)/c)])/c^2 + ((b*c - a*d)^2*(B*c - A*d)*Hypergeometr
ic2F1[3, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/c^3))/((b*c - a*d)^3*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (x^2B + A)}{(b\,x^2 + a)(d\,x^2 + c)^3}dx$$

```
[In] int((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c)^3,x)
```

```
[Out] int((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c)^3,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^3}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)(dx^2+c)^3}\,dx$$

[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c)^3,x, algorithm="fricas")

[Out] integral((B*x^2 + A)*(e*x)^m/(b*d^3*x^8 + (3*b*c*d^2 + a*d^3)*x^6 + 3*(b*c^2*d + a*c*d^2)*x^4 + a*c^3 + (b*c^3 + 3*a*c^2*d)*x^2), x)

Sympy [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^3}\,dx = \text{Timed out}$$

[In] integrate((e*x)**m*(B*x**2+A)/(b*x**2+a)/(d*x**2+c)**3,x)

[Out] Timed out

Maxima [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^3}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)(dx^2+c)^3}\,dx$$

[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c)^3,x, algorithm="maxima")

[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)*(d*x^2 + c)^3), x)

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)(c+dx^2)^3}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)(dx^2+c)^3}\,dx$$

[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)/(d*x^2+c)^3,x, algorithm="giac")

[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)*(d*x^2 + c)^3), x)

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2) (c + dx^2)^3} \, dx = \int \frac{(B\,x^2 + A)\,\left(e\,x\right)^m}{(b\,x^2 + a)\,\left(d\,x^2 + c\right)^3} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)*(c + d*x^2)^3),x)
[Out] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)*(c + d*x^2)^3), x)
```

3.42 $\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^3} dx$

Optimal result

Integrand size = 31, antiderivative size = 452

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^3} dx = \frac{d(2Abc-3aBc+aAd)(ex)^{1+m}}{4ac(bc-ad)^2 e (c+dx^2)^2} + \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e(a+bx^2)(c+dx^2)^2} + \frac{d(A(4b^2c^2-a^2d^2(3-m)+abcd(11-m))-aBc(bc(11-m)+ad(1+m)))(ex)^{1+m}}{8ac^2(bc-ad)^3 e(c+dx^2)} + \frac{b^2(Ab(bc(1-m)-ad(7-m))+aB(ad(5-m)+bc(1+m)))(ex)^{1+m}\,\text{Hypergeometric2F1}\left(1, \frac{1+m}{2}, \frac{3+m}{2}\right.}{2a^2(bc-ad)^4 e(1+m)} - \frac{d(b^2c^2(Bc(3-m)-Ad(7-m))(5-m)-a^2d^2(1-m)(Ad(3-m)+Bc(1+m))+2abcd(Bc(5+4m}{8c^3(bc-ad)^4 e(1+m)}$$

```
[Out] 1/4*d*(A*a*d+2*A*b*c-3*B*a*c)*(e*x)^(1+m)/a/c/(-a*d+b*c)^2/e/(d*x^2+c)^2+1/
2*(A*b-B*a)*(e*x)^(1+m)/a/(-a*d+b*c)/e/(b*x^2+a)/(d*x^2+c)^2+1/8*d*(A*(4*b^
2*c^2-a^2*d^2*(3-m)+a*b*c*d*(11-m))-a*B*c*(b*c*(11-m)+a*d*(1+m)))*(e*x)^(1+
m)/a/c^2/(-a*d+b*c)^3/e/(d*x^2+c)+1/2*b^2*(A*b*(b*c*(1-m)-a*d*(7-m))+a*B*(a
*d*(5-m)+b*c*(1+m)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^
2/a)/a^2/(-a*d+b*c)^4/e/(1+m)-1/8*d*(b^2*c^2*(B*c*(3-m)-A*d*(7-m))*(5-m)-a^
2*d^2*(1-m)*(A*d*(3-m)+B*c*(1+m))+2*a*b*c*d*(B*c*(-m^2+4*m+5)+A*d*(m^2-8*m+
7)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/c^3/(-a*d+b
*c)^4/e/(1+m)
```

Rubi [A] (verified)

Time = 0.86 (sec) , antiderivative size = 452, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.097, Rules used = {593, 598, 371}

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^3} dx$$
$$= \frac{d(ex)^{m+1} (A(-a^2d^2(3-m)+abcd(11-m)+4b^2c^2)-aBc(ad(m+1)+bc(11-m)))}{8ac^2e(c+dx^2)(bc-ad)^3}$$
$$- \frac{d(ex)^{m+1} \text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)(-a^2d^2(1-m)(Ad(3-m)+Bc(m+1))+2abcd(}{8c^3e(m+1)(bc-ad}$$
$$+ \frac{b^2(ex)^{m+1} \text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)(Ab(bc(1-m)-ad(7-m))+aB(ad(5-m)+bc}{2a^2e(m+1)(bc-ad)^4}$$
$$+ \frac{d(ex)^{m+1}(aAd-3aBc+2Abc)}{4ace(c+dx^2)^2(bc-ad)^2} + \frac{(ex)^{m+1}(Ab-aB)}{2ae(a+bx^2)(c+dx^2)^2(bc-ad)}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/((a + b*x^2)^2*(c + d*x^2)^3),x]
```

```
[Out] (d*(2*A*b*c - 3*a*B*c + a*A*d)*(e*x)^(1 + m))/(4*a*c*(b*c - a*d)^2*e*(c + d
*x^2)^2) + ((A*b - a*B)*(e*x)^(1 + m))/(2*a*(b*c - a*d)*e*(a + b*x^2)*(c +
d*x^2)^2) + (d*(A*(4*b^2*c^2 - a^2*d^2*(3 - m) + a*b*c*d*(11 - m)) - a*B*c*
(b*c*(11 - m) + a*d*(1 + m)))*(e*x)^(1 + m))/(8*a*c^2*(b*c - a*d)^3*e*(c +
d*x^2)) + (b^2*(A*b*(b*c*(1 - m) - a*d*(7 - m)) + a*B*(a*d*(5 - m) + b*c*(1
 + m)))*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/
a)])/(2*a^2*(b*c - a*d)^4*e*(1 + m)) - (d*(b^2*c^2*(B*c*(3 - m) - A*d*(7 -
m))*(5 - m) - a^2*d^2*(1 - m)*(A*d*(3 - m) + B*c*(1 + m)) + 2*a*b*c*d*(B*c*
(5 + 4*m - m^2) + A*d*(7 - 8*m + m^2)))*(e*x)^(1 + m)*Hypergeometric2F1[1,
(1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/(8*c^3*(b*c - a*d)^4*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 593

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(m
 + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^(q + 1)/(a*g*n*(b*c - a*d)*(p + 1)))
, x] + Dist[1/(a*n*(b*c - a*d)*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c
 + d*x^n)^q*Simp[c*(b*e - a*f)*(m + 1) + e*n*(b*c - a*d)*(p + 1) + d*(b*e -
```

```
a*f)*(m + n*(p + q + 2) + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g
, m, q}, x] && IGtQ[n, 0] && LtQ[p, -1]
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

$$\text{integral} = \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)\,(c+dx^2)^2} - \frac{\int \frac{(ex)^m\left(2aAd-Abc(1-m)-aBc(1+m)-(Ab-aB)d(5-m)x^2\right)}{(a+bx^2)(c+dx^2)^3}\,dx}{2a(bc-ad)}$$

$$= \frac{d(2Abc-3aBc+aAd)(ex)^{1+m}}{4ac(bc-ad)^2e\,(c+dx^2)^2} + \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)\,(c+dx^2)^2} - \frac{\int \frac{(ex)^m\left(2\left(A\left(8abcd-2b^2c^2(1-m)-a^2d^2(3-m)\right)-aBc(2bc+ad)(1+m)\right)-2bd(2Abc-3aBc+aAd)(3-m)x^2\right)}{(a+bx^2)(c+dx^2)^2}\,dx}{8ac(bc-ad)^2}$$

$$= \frac{d(2Abc-3aBc+aAd)(ex)^{1+m}}{4ac(bc-ad)^2e\,(c+dx^2)^2} + \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)\,(c+dx^2)^2} + \frac{d\left(A\left(4b^2c^2-a^2d^2(3-m)+abcd(11-m)\right)-aBc\left(bc(11-m)+ad(1+m)\right)\right)(ex)^{1+m}}{8ac^2(bc-ad)^3e\,(c+dx^2)} - \frac{\int \frac{(ex)^m\left(-2\left(aBc\left(4b^2c^2-a^2d^2(1-m)+abcd(9-m)\right)\right)(1+m)-A\left(24ab^2c^2d-4b^3c^3(1-m)-a^2bcd^2\left(11-12m+m^2\right)+a^3d^3\left(3-4m+m^2\right)\right.\right.}{(a+bx^2)(c+dx^2)}}{16ac^2(bc-ad)^3}$$

$$= \frac{d(2Abc-3aBc+aAd)(ex)^{1+m}}{4ac(bc-ad)^2e\,(c+dx^2)^2} + \frac{(Ab-aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)\,(c+dx^2)^2} + \frac{d\left(A\left(4b^2c^2-a^2d^2(3-m)+abcd(11-m)\right)-aBc\left(bc(11-m)+ad(1+m)\right)\right)(ex)^{1+m}}{8ac^2(bc-ad)^3e\,(c+dx^2)} - \frac{\int \left(\frac{8b^2c^2\left(-Ab\left(bc(1-m)-ad(7-m)\right)-aB\left(ad(5-m)+bc(1+m)\right)\right)(ex)^m}{(bc-ad)(a+bx^2)} + \frac{2ad\left(b^2c^2\left(Bc(3-m)-Ad(7-m)\right)(5-m)-a^2d^2(1-m)(A\right.}{}\right.}{16ac^2(bc-ad)^3}$$

$$= \frac{d(2Abc - 3aBc + aAd)(ex)^{1+m}}{4ac(bc-ad)^2 e\,(c+dx^2)^2} + \frac{(Ab - aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)\,(c+dx^2)^2}$$
$$+ \frac{d(A(4b^2c^2 - a^2d^2(3-m) + abcd(11-m)) - aBc(bc(11-m) + ad(1+m)))\,(ex)^{1+m}}{8ac^2(bc-ad)^3 e\,(c+dx^2)}$$
$$+ \frac{(b^2(Ab(bc(1-m) - ad(7-m)) + aB(ad(5-m) + bc(1+m))))\int \frac{(ex)^m}{a+bx^2}\,dx}{2a(bc-ad)^4}$$
$$- \frac{(d(b^2c^2(Bc(3-m) - Ad(7-m))(5-m) - a^2d^2(1-m)(Ad(3-m) + Bc(1+m)) + 2abcd(B}{8c^2(bc-ad)^4}$$

$$= \frac{d(2Abc - 3aBc + aAd)(ex)^{1+m}}{4ac(bc-ad)^2 e\,(c+dx^2)^2} + \frac{(Ab - aB)(ex)^{1+m}}{2a(bc-ad)e\,(a+bx^2)\,(c+dx^2)^2}$$
$$+ \frac{d(A(4b^2c^2 - a^2d^2(3-m) + abcd(11-m)) - aBc(bc(11-m) + ad(1+m)))\,(ex)^{1+m}}{8ac^2(bc-ad)^3 e\,(c+dx^2)}$$
$$+ \frac{b^2(Ab(bc(1-m) - ad(7-m)) + aB(ad(5-m) + bc(1+m)))(ex)^{1+m}\,{}_2F_1\left(1, \frac{1+m}{2}; \frac{3+m}{2}; -\frac{bx^2}{a}\right)}{2a^2(bc-ad)^4 e(1+m)}$$
$$- \frac{d(b^2c^2(Bc(3-m) - Ad(7-m))(5-m) - a^2d^2(1-m)(Ad(3-m) + Bc(1+m)) + 2abcd(Bc}{8c^3(bc-ad)^4 e(1+m)}$$

Mathematica [A] (verified)

Time = 1.24 (sec) , antiderivative size = 266, normalized size of antiderivative = 0.59

$$\int \frac{(ex)^m\,(A+Bx^2)}{(a+bx^2)^2\,(c+dx^2)^3}\,dx$$
$$= \frac{x(ex)^m \left(\frac{b^2(bBc - 3Abd + 2aBd)\,\text{Hypergeometric2F1}\left(1, \frac{1+m}{2}, \frac{3+m}{2}, -\frac{bx^2}{a}\right)}{a} - \frac{bd(bBc - 3Abd + 2aBd)\,\text{Hypergeometric2F1}\left(1, \frac{1+m}{2}, \frac{3+m}{2}, -\frac{dx^2}{c}\right)}{c}\right.}{}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/((a + b*x^2)^2*(c + d*x^2)^3),x]
```

```
[Out] (x*(e*x)^m*((b^2*(b*B*c - 3*A*b*d + 2*a*B*d)*Hypergeometric2F1[1, (1 + m)/2
, (3 + m)/2, -((b*x^2)/a)])/a - (b*d*(b*B*c - 3*A*b*d + 2*a*B*d)*Hypergeome
tric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/c + (b^2*(-(A*b) + a*B)*(-(
b*c) + a*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/a^2 -
 (d*(b*c - a*d)*(b*B*c - 2*A*b*d + a*B*d)*Hypergeometric2F1[2, (1 + m)/2, (
3 + m)/2, -((d*x^2)/c)])/c^2 + (d*(b*c - a*d)^2*(-(B*c) + A*d)*Hypergeometr
ic2F1[3, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/c^3))/((b*c - a*d)^4*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^m (x^2B + A)}{(b\,x^2 + a)^2\,(d\,x^2 + c)^3}dx$$

```
[In] int((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c)^3,x)
```

```
[Out] int((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c)^3,x)
```

Fricas [F]

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)^2 (c + dx^2)^3} dx = \int \frac{(Bx^2 + A)(ex)^m}{(bx^2 + a)^2(dx^2 + c)^3} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c)^3,x, algorithm="fricas")
```

```
[Out] integral((B*x^2 + A)*(e*x)^m/(b^2*d^3*x^10 + (3*b^2*c*d^2 + 2*a*b*d^3)*x^8
+ (3*b^2*c^2*d + 6*a*b*c*d^2 + a^2*d^3)*x^6 + a^2*c^3 + (b^2*c^3 + 6*a*b*c^
2*d + 3*a^2*c*d^2)*x^4 + (2*a*b*c^3 + 3*a^2*c^2*d)*x^2), x)
```

Sympy [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)^2 (c + dx^2)^3} dx = \text{Timed out}$$

```
[In] integrate((e*x)**m*(B*x**2+A)/(b*x**2+a)**2/(d*x**2+c)**3,x)
```

```
[Out] Timed out
```

Maxima [F]

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)^2 (c + dx^2)^3} dx = \int \frac{(Bx^2 + A)(ex)^m}{(bx^2 + a)^2(dx^2 + c)^3} dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c)^3,x, algorithm="maxima")
```

```
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^2*(d*x^2 + c)^3), x)
```

Giac [F]

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^3} \, dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^2(dx^2+c)^3} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^2/(d*x^2+c)^3,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^2*(d*x^2 + c)^3), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^2 (c+dx^2)^3} \, dx = \int \frac{(B\,x^2+A)\,(e\,x)^m}{(b\,x^2+a)^2\,(d\,x^2+c)^3} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^2*(c + d*x^2)^3),x)
[Out] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^2*(c + d*x^2)^3), x)
```

3.43 $\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)^3} \, dx$

Optimal result

Integrand size = 31, antiderivative size = 665

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)^3} \, dx$$
$$= -\frac{d(A(2a^2d^2-b^2c^2(3-m)+abcd(13-m))-aBc(ad(11-m)+bc(1+m)))(ex)^{1+m}}{8a^2c(bc-ad)^3e(c+dx^2)^2}$$
$$+\frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e(a+bx^2)^2(c+dx^2)^2}$$
$$+\frac{(Ab(bc(3-m)-ad(11-m))+aB(ad(7-m)+bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e(a+bx^2)(c+dx^2)^2}$$
$$+\frac{d(A(bc+ad)(b^2c^2(3-m)+a^2d^2(3-m)-2abcd(9-m))+aBc(2abcd(11-m)+b^2c^2(1+m)+a^2d^2}{8a^2c^2(bc-ad)^4e(c+dx^2)}$$
$$+\frac{b^2(aB(b^2c^2(1-m^2)-2abcd(7+6m-m^2)-a^2d^2(35-12m+m^2))+Ab(a^2d^2(63-16m+m^2)-2ab}{8a^3(bc-ad)^5e(1}$$
$$+\frac{d^2(b^2c^2(Bc(5-m)-Ad(9-m))(7-m)-a^2d^2(1-m)(Ad(3-m)+Bc(1+m))+2abcd(Bc(7+6m}{8c^3(bc-ad)^5e(1+m)}$$

```
[Out] -1/8*d*(A*(2*a^2*d^2-b^2*c^2*(3-m)+a*b*c*d*(13-m))-a*B*c*(a*d*(11-m)+b*c*(1
+m)))*(e*x)^(1+m)/a^2/c/(-a*d+b*c)^3/e/(d*x^2+c)^2+1/4*(A*b-B*a)*(e*x)^(1+m
)/a/(-a*d+b*c)/e/(b*x^2+a)^2/(d*x^2+c)^2+1/8*(A*b*(b*c*(3-m)-a*d*(11-m))+a*
B*(a*d*(7-m)+b*c*(1+m)))*(e*x)^(1+m)/a^2/(-a*d+b*c)^2/e/(b*x^2+a)/(d*x^2+c)
^2+1/8*d*(A*(a*d+b*c)*(b^2*c^2*(3-m)+a^2*d^2*(3-m)-2*a*b*c*d*(9-m))+a*B*c*(
2*a*b*c*d*(11-m)+b^2*c^2*(1+m)+a^2*d^2*(1+m)))*(e*x)^(1+m)/a^2/c^2/(-a*d+b*
c)^4/e/(d*x^2+c)+1/8*b^2*(a*B*(b^2*c^2*(-m^2+1)-2*a*b*c*d*(-m^2+6*m+7)-a^2*
d^2*(m^2-12*m+35))+A*b*(a^2*d^2*(m^2-16*m+63)-2*a*b*c*d*(m^2-10*m+9)+b^2*c^
2*(m^2-4*m+3)))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/
```

```
a^3/(-a*d+b*c)^5/e/(1+m)+1/8*d^2*(b^2*c^2*(B*c*(5-m)-A*d*(9-m))*(7-m)-a^2*d
^2*(1-m)*(A*d*(3-m)+B*c*(1+m))+2*a*b*c*d*(B*c*(-m^2+6*m+7)+A*d*(m^2-10*m+9)
))*(e*x)^(1+m)*hypergeom([1, 1/2+1/2*m],[3/2+1/2*m],-d*x^2/c)/c^3/(-a*d+b*c
)^5/e/(1+m)
```

Rubi [A] (verified)

Time = 1.47 (sec) , antiderivative size = 665, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 3, $\frac{\text{number of rules}}{\text{integrand size}} = 0.097$, Rules used = {593, 598, 371}

$$\int \frac{(ex)^m (A+Bx^2)}{(a+bx^2)^3 (c+dx^2)^3} dx$$
$$= \frac{d(ex)^{m+1} \left(A(ad+bc)\left(a^2d^2(3-m)-2abcd(9-m)+b^2c^2(3-m)\right)+aBc(a^2d^2(m+1)+2abcd(11-m$$
$$8a^2c^2e(c+dx^2)(bc-ad)^4$$
$$-\frac{d(ex)^{m+1}\left(A(2a^2d^2+abcd(13-m)-b^2c^2(3-m))-aBc(ad(11-m)+bc(m+1))\right)}{8a^2ce(c+dx^2)^2(bc-ad)^3}$$
$$+\frac{d^2(ex)^{m+1}\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{dx^2}{c}\right)\left(-a^2d^2(1-m)(Ad(3-m)+Bc(m+1))+2abcd\right.}{8c^3e(m+1)(bc-a}$$
$$+\frac{(ex)^{m+1}(Ab(bc(3-m)-ad(11-m))+aB(ad(7-m)+bc(m+1)))}{8a^2e(a+bx^2)(c+dx^2)^2(bc-ad)^2}$$
$$+\frac{b^2(ex)^{m+1}\,\text{Hypergeometric2F1}\left(1,\frac{m+1}{2},\frac{m+3}{2},-\frac{bx^2}{a}\right)\left(Ab(a^2d^2(m^2-16m+63)-2abcd(m^2-10m+9)\right.}{8a^3e(m+1)(b}$$
$$+\frac{(ex)^{m+1}(Ab-aB)}{4ae(a+bx^2)^2(c+dx^2)^2(bc-ad)}$$

```
[In] Int[((e*x)^m*(A + B*x^2))/((a + b*x^2)^3*(c + d*x^2)^3),x]
```

```
[Out] -1/8*(d*(A*(2*a^2*d^2 - b^2*c^2*(3 - m) + a*b*c*d*(13 - m)) - a*B*c*(a*d*(1
1 - m) + b*c*(1 + m)))*(e*x)^(1 + m))/(a^2*c*(b*c - a*d)^3*e*(c + d*x^2)^2)
 + ((A*b - a*B)*(e*x)^(1 + m))/(4*a*(b*c - a*d)*e*(a + b*x^2)^2*(c + d*x^2)
^2) + ((A*b*(b*c*(3 - m) - a*d*(11 - m)) + a*B*(a*d*(7 - m) + b*c*(1 + m)))
*(e*x)^(1 + m))/(8*a^2*(b*c - a*d)^2*e*(a + b*x^2)*(c + d*x^2)^2) + (d*(A*(
b*c + a*d)*(b^2*c^2*(3 - m) + a^2*d^2*(3 - m) - 2*a*b*c*d*(9 - m)) + a*B*c*
(2*a*b*c*d*(11 - m) + b^2*c^2*(1 + m) + a^2*d^2*(1 + m)))*(e*x)^(1 + m))/(8
*a^2*c^2*(b*c - a*d)^4*e*(c + d*x^2)) + (b^2*(a*B*(b^2*c^2*(1 - m^2) - 2*a*
b*c*d*(7 + 6*m - m^2) - a^2*d^2*(35 - 12*m + m^2)) + A*b*(a^2*d^2*(63 - 16*
m + m^2) - 2*a*b*c*d*(9 - 10*m + m^2) + b^2*c^2*(3 - 4*m + m^2)))*(e*x)^(1
+ m)*Hypergeometric2F1[1, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/(8*a^3*(b*c
- a*d)^5*e*(1 + m)) + (d^2*(b^2*c^2*(B*c*(5 - m) - A*d*(9 - m))*(7 - m) - a
^2*d^2*(1 - m)*(A*d*(3 - m) + B*c*(1 + m)) + 2*a*b*c*d*(B*c*(7 + 6*m - m^2)
```

```
 + A*d*(9 - 10*m + m^2)))*(e*x)^(1 + m)*Hypergeometric2F1[1, (1 + m)/2, (3
+ m)/2, -((d*x^2)/c)])/(8*c^3*(b*c - a*d)^5*e*(1 + m))
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 593

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(m
 + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^(q + 1)/(a*g*n*(b*c - a*d)*(p + 1)))
, x] + Dist[1/(a*n*(b*c - a*d)*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c
 + d*x^n)^q*Simp[c*(b*e - a*f)*(m + 1) + e*n*(b*c - a*d)*(p + 1) + d*(b*e -
 a*f)*(m + n*(p + q + 2) + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g
, m, q}, x] && IGtQ[n, 0] && LtQ[p, -1]
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\left(a+bx^2\right)^2\left(c+dx^2\right)^2} - \frac{\int \frac{(ex)^m\left(4aAd-Abc(3-m)-aBc(1+m)-(Ab-aB)d(7-m)x^2\right)}{\left(a+bx^2\right)^2\left(c+dx^2\right)^3}\,dx}{4a(bc-ad)} \\
&= \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\left(a+bx^2\right)^2\left(c+dx^2\right)^2} + \frac{(Ab(bc(3-m)-ad(11-m))+aB(ad(7-m)+bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\left(a+bx^2\right)\left(c+dx^2\right)^2} \\
&\quad + \frac{\int \frac{(ex)^m\left(-aBc(1+m)(ad(9-m)-b(c-cm))+A\left(8a^2d^2-abcd\left(3-12m+m^2\right)+b^2c^2\left(3-4m+m^2\right)\right)+d(5-m)(Ab(bc(3-m)-ad(11-m)\right.}{\left(a+bx^2\right)\left(c+dx^2\right)^3}}{8a^2(bc-ad)^2}
\end{aligned}$$

$$= -\frac{d(A(2a^2d^2 - b^2c^2(3-m) + abcd(13-m)) - aBc(ad(11-m) + bc(1+m)))\,(ex)^{1+m}}{8a^2c(bc-ad)^3e\,(c+dx^2)^2} + \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)^2} + \frac{(Ab(bc(3-m) - ad(11-m)) + aB(ad(7-m) + bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)\,(c+dx^2)^2} + \frac{\int \frac{(ex)^m(-4(aBc(2a^2d^2-b^2c^2(1-m)+abcd(11-m))(1+m)-A(24a^2bcd^2-2a^3d^3(3-m)-ab^2c^2d(9-14m+m^2)+b^3c^3(3-4m+m^2}{(a+bx^2)(c+dx^2)^2}}{32a^2c(bc-ad)^3}$$

$$= -\frac{d(A(2a^2d^2 - b^2c^2(3-m) + abcd(13-m)) - aBc(ad(11-m) + bc(1+m)))\,(ex)^{1+m}}{8a^2c(bc-ad)^3e\,(c+dx^2)^2} + \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)^2} + \frac{(Ab(bc(3-m) - ad(11-m)) + aB(ad(7-m) + bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)\,(c+dx^2)^2} + \frac{d(A(bc+ad)\,(b^2c^2(3-m) + a^2d^2(3-m) - 2abcd(9-m)) + aBc(2abcd(11-m) + b^2c^2(1+}{8a^2c^2(bc-ad)^4e\,(c+dx^2)} + \frac{\int (ex)^m(8(aBc(bc+ad)(b^2c^2(1-m)+a^2d^2(1-m)-2abcd(7-m))(1+m)+A(48a^2b^2c^2d^2-ab^3c^3d(15-16m+m^2)-a^3bcd^3(15-16}{}$$

$$= -\frac{d(A(2a^2d^2 - b^2c^2(3-m) + abcd(13-m)) - aBc(ad(11-m) + bc(1+m)))\,(ex)^{1+m}}{8a^2c(bc-ad)^3e\,(c+dx^2)^2} + \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)^2} + \frac{(Ab(bc(3-m) - ad(11-m)) + aB(ad(7-m) + bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)\,(c+dx^2)^2} + \frac{d(A(bc+ad)\,(b^2c^2(3-m) + a^2d^2(3-m) - 2abcd(9-m)) + aBc(2abcd(11-m) + b^2c^2(1+}{8a^2c^2(bc-ad)^4e\,(c+dx^2)} + \frac{\int \left(\frac{8b^2c^2(aB(b^2c^2(1-m^2)-2abcd(7+6m-m^2)-a^2d^2(35-12m+m^2))+Ab(a^2d^2(63-16m+m^2)-2abcd(9-10m+m^2)+b^2c^2(3-}{(bc-ad)(a+bx^2)}\right.}{}$$

$$= -\frac{d(A(2a^2d^2 - b^2c^2(3-m) + abcd(13-m)) - aBc(ad(11-m) + bc(1+m)))\,(ex)^{1+m}}{8a^2c(bc-ad)^3e\,(c+dx^2)^2}$$
$$+ \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)^2}$$
$$+ \frac{(Ab(bc(3-m) - ad(11-m)) + aB(ad(7-m) + bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)\,(c+dx^2)^2}$$
$$+ \frac{d(A(bc+ad)\,(b^2c^2(3-m) + a^2d^2(3-m) - 2abcd(9-m)) + aBc(2abcd(11-m) + b^2c^2(1+m}{8a^2c^2(bc-ad)^4e\,(c+dx^2)}$$
$$+ \frac{(d^2(b^2c^2(Bc(5-m) - Ad(9-m))(7-m) - a^2d^2(1-m)(Ad(3-m) + Bc(1+m)) + 2abcd(B}{8c^2(bc-ad)^5}$$
$$+ \frac{(b^2(aB(b^2c^2(1-m^2) - 2abcd(7+6m-m^2) - a^2d^2(35-12m+m^2)) + Ab(a^2d^2(63-16m+m}{8a^2(bc-ad)^5}$$

$$= -\frac{d(A(2a^2d^2 - b^2c^2(3-m) + abcd(13-m)) - aBc(ad(11-m) + bc(1+m)))\,(ex)^{1+m}}{8a^2c(bc-ad)^3e\,(c+dx^2)^2}$$
$$+ \frac{(Ab-aB)(ex)^{1+m}}{4a(bc-ad)e\,(a+bx^2)^2\,(c+dx^2)^2}$$
$$+ \frac{(Ab(bc(3-m) - ad(11-m)) + aB(ad(7-m) + bc(1+m)))(ex)^{1+m}}{8a^2(bc-ad)^2e\,(a+bx^2)\,(c+dx^2)^2}$$
$$+ \frac{d(A(bc+ad)\,(b^2c^2(3-m) + a^2d^2(3-m) - 2abcd(9-m)) + aBc(2abcd(11-m) + b^2c^2(1+m}{8a^2c^2(bc-ad)^4e\,(c+dx^2)}$$
$$+ \frac{b^2(aB(b^2c^2(1-m^2) - 2abcd(7+6m-m^2) - a^2d^2(35-12m+m^2)) + Ab(a^2d^2(63-16m+m^2}{8a^3(bc-ad)^5e(1-}$$
$$+ \frac{d^2(b^2c^2(Bc(5-m) - Ad(9-m))(7-m) - a^2d^2(1-m)(Ad(3-m) + Bc(1+m)) + 2abcd(Bc}{8c^3(bc-ad)^5e(1+m)}$$

Mathematica [A] (verified)

Time = 1.51 (sec) , antiderivative size = 329, normalized size of antiderivative = 0.49

$$\int \frac{(ex)^m\,(A+Bx^2)}{(a+bx^2)^3\,(c+dx^2)^3}\,dx$$
$$= \frac{x(ex)^m\left(-\frac{3b^2d(bBc-2Abd+aBd)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\frac{bx^2}{a}\right)}{a} + \frac{3bd^2(bBc-2Abd+aBd)\,\text{Hypergeometric2F1}\left(1,\frac{1+m}{2},\frac{3+m}{2},-\right.}{c}\right.}{}$$

```
[In] Integrate[((e*x)^m*(A + B*x^2))/((a + b*x^2)^3*(c + d*x^2)^3),x]
```

```
[Out] (x*(e*x)^m*((-3*b^2*d*(b*B*c - 2*A*b*d + a*B*d)*Hypergeometric2F1[1, (1 + m
)/2, (3 + m)/2, -((b*x^2)/a)])/a + (3*b*d^2*(b*B*c - 2*A*b*d + a*B*d)*Hyper
```

```
geometric2F1[1, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/c + (b^2*(b*c - a*d)*(
b*B*c - 3*A*b*d + 2*a*B*d)*Hypergeometric2F1[2, (1 + m)/2, (3 + m)/2, -((b*
x^2)/a)])/a^2 + (d^2*(b*c - a*d)*(2*b*B*c - 3*A*b*d + a*B*d)*Hypergeometric
2F1[2, (1 + m)/2, (3 + m)/2, -((d*x^2)/c)])/c^2 + (b^2*(A*b - a*B)*(b*c - a
*d)^2*Hypergeometric2F1[3, (1 + m)/2, (3 + m)/2, -((b*x^2)/a)])/a^3 + (d^2*
(b*c - a*d)^2*(B*c - A*d)*Hypergeometric2F1[3, (1 + m)/2, (3 + m)/2, -((d*x
^2)/c)])/c^3))/((b*c - a*d)^5*(1 + m))
```

Maple [F]

$$\int \frac{(ex)^{m} \left(x^{2} B+A\right)}{\left(b\,x^{2}+a\right)^{3} \left(d\,x^{2}+c\right)^{3}}dx$$

[In] `int((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c)^3,x)`

[Out] `int((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c)^3,x)`

Fricas [F]

$$\int \frac{(ex)^m \left(A+Bx^2\right)}{\left(a+bx^2\right)^3 \left(c+dx^2\right)^3}\,dx = \int \frac{(Bx^2+A)(ex)^m}{(bx^2+a)^3(dx^2+c)^3}\,dx$$

[In] `integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c)^3,x, algorithm="fricas")`

```
[Out] integral((B*x^2 + A)*(e*x)^m/(b^3*d^3*x^12 + 3*(b^3*c*d^2 + a*b^2*d^3)*x^10
 + 3*(b^3*c^2*d + 3*a*b^2*c*d^2 + a^2*b*d^3)*x^8 + (b^3*c^3 + 9*a*b^2*c^2*d
 + 9*a^2*b*c*d^2 + a^3*d^3)*x^6 + a^3*c^3 + 3*(a*b^2*c^3 + 3*a^2*b*c^2*d +
a^3*c*d^2)*x^4 + 3*(a^2*b*c^3 + a^3*c^2*d)*x^2), x)
```

Sympy [F(-1)]

Timed out.

$$\int \frac{(ex)^m \left(A+Bx^2\right)}{\left(a+bx^2\right)^3 \left(c+dx^2\right)^3}\,dx = \text{Timed out}$$

[In] `integrate((e*x)**m*(B*x**2+A)/(b*x**2+a)**3/(d*x**2+c)**3,x)`

[Out] `Timed out`

Maxima [F]

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)^3 (c + dx^2)^3} \, dx = \int \frac{(Bx^2 + A)(ex)^m}{(bx^2 + a)^3 (dx^2 + c)^3} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c)^3,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^3*(d*x^2 + c)^3), x)
```

Giac [F]

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)^3 (c + dx^2)^3} \, dx = \int \frac{(Bx^2 + A)(ex)^m}{(bx^2 + a)^3 (dx^2 + c)^3} \, dx$$

```
[In] integrate((e*x)^m*(B*x^2+A)/(b*x^2+a)^3/(d*x^2+c)^3,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(e*x)^m/((b*x^2 + a)^3*(d*x^2 + c)^3), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (A + Bx^2)}{(a + bx^2)^3 (c + dx^2)^3} \, dx = \int \frac{(B\,x^2 + A)\,(e\,x)^m}{(b\,x^2 + a)^3\,(d\,x^2 + c)^3} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^3*(c + d*x^2)^3),x)
[Out] int(((A + B*x^2)*(e*x)^m)/((a + b*x^2)^3*(c + d*x^2)^3), x)
```

3.44 $\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx$

Optimal result

Integrand size = 31, antiderivative size = 1059

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx =$$

$$-\frac{(a^3Bd^3(105+71m+15m^2+m^3)-a^2bd^2(5+m)\left(Ad(3+m)(9+m+2p)+2Bc(30+13m+m^2+\right.}{}$$

$$+\frac{(a^2Bd^2(35+12m+m^2)+b^2c(24Bc+Ad(99+m^2+40p+4p^2+4m(5+p)))-abd(Ad(5+m)(9+}{b^3e(5+m+2p)(7+m+2p)(9+}$$

$$-\frac{(aBd(7+m)-b(6Bc+Ad(9+m+2p)))(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^2}{b^2e(7+m+2p)(9+m+2p)}$$

$$+\frac{B(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^3}{be(9+m+2p)}$$

$$+\frac{(a(1+m)\left(a^3Bd^3(105+71m+15m^2+m^3)-a^2bd^2(5+m)\left(Ad(3+m)(9+m+2p)+2Bc(30+13\right.\right.}{}$$

```
[Out] -(a^3*B*d^3*(m^3+15*m^2+71*m+105)-a^2*b*d^2*(5+m)*(A*d*(3+m)*(9+m+2*p)+2*B*
c*(m^2+2*m*p+13*m+2*p+30))+a*b^2*c*d*(2*A*d*(216+m^3+84*p+8*p^2+4*m^2*(5+p)
+m*(4*p^2+44*p+123))+B*c*(267+m^3+40*p+4*p^2+m^2*(21+4*p)+m*(4*p^2+44*p+143
)))-b^3*c^2*(48*B*c+A*d*(513+m^3+366*p+92*p^2+8*p^3+m^2*(23+6*p)+m*(12*p^2+
92*p+183))))*(e*x)^(1+m)*(b*x^2+a)^(p+1)/b^4/e/(3+m+2*p)/(5+m+2*p)/(7+m+2*p
)/(9+m+2*p)+(a^2*B*d^2*(m^2+12*m+35)+b^2*c*(24*B*c+A*d*(99+m^2+40*p+4*p^2+4
*m*(5+p)))-a*b*d*(A*d*(5+m)*(9+m+2*p)+B*c*(65+m^2+2*p+2*m*(9+p))))*(e*x)^(1
+m)*(b*x^2+a)^(p+1)*(d*x^2+c)/b^3/e/(5+m+2*p)/(7+m+2*p)/(9+m+2*p)-(a*B*d*(7
+m)-b*(6*B*c+A*d*(9+m+2*p)))*(e*x)^(1+m)*(b*x^2+a)^(p+1)*(d*x^2+c)^2/b^2/e/
(7+m+2*p)/(9+m+2*p)+B*(e*x)^(1+m)*(b*x^2+a)^(p+1)*(d*x^2+c)^3/b/e/(9+m+2*p)
+(a*(1+m)*(a^3*B*d^3*(m^3+15*m^2+71*m+105)-a^2*b*d^2*(5+m)*(A*d*(3+m)*(9+m+
2*p)+2*B*c*(m^2+2*m*p+13*m+2*p+30))+a*b^2*c*d*(2*A*d*(216+m^3+84*p+8*p^2+4*
```

```
m^2*(5+p)+m*(4*p^2+44*p+123))+B*c*(267+m^3+40*p+4*p^2+m^2*(21+4*p)+m*(4*p^2
+44*p+143)))-b^3*c^2*(48*B*c+A*d*(513+m^3+366*p+92*p^2+8*p^3+m^2*(23+6*p)+m
*(12*p^2+92*p+183))))-b*c*(3+m+2*p)*(2*b*c*(2+p)*(2*b*c*(3+p)*(a*B*(1+m)-A*
b*(9+m+2*p))+(-a*d+b*c)*(1+m)*(a*B*(7+m)-A*b*(9+m+2*p)))+(1+m)*(b*c*(2*b*c*
(3+p)*(a*B*(1+m)-A*b*(9+m+2*p))+(-a*d+b*c)*(1+m)*(a*B*(7+m)-A*b*(9+m+2*p)))
-a*(2*b*c*d*(3+p)*(a*B*(1+m)-A*b*(9+m+2*p))+d*(-a*d+b*c)*(1+m)*(a*B*(7+m)-A
*b*(9+m+2*p))+4*(-a*d+b*c)*(a*B*d*(7+m)-b*(6*B*c+A*d*(9+m+2*p)))))))*(e*x)^
(1+m)*(b*x^2+a)^p*hypergeom([-p, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/b^4/e/(1+
m)/(3+m+2*p)/(5+m+2*p)/(7+m+2*p)/(9+m+2*p)/((1+b*x^2/a)^p)
```

Rubi [A] (verified)

Time = 1.54 (sec) , antiderivative size = 1047, normalized size of antiderivative = 0.99, number of steps used = 6, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}} = 0.129$, Rules used = {595, 470, 372, 371}

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx =$$

$$-\frac{(-c^2(48Bc+Ad(m^3+(6p+23)m^2+(12p^2+92p+183)\,m+8p^3+92p^2+366p+513))\,b^3+acd(2Ad}{}$$

$$+\frac{B(bx^2+a)^{p+1}\left(dx^2+c\right)^3(ex)^{m+1}}{be(m+2p+9)}$$

$$+\frac{(6bBc-aBd(m+7)+Abd(m+2p+9))\left(bx^2+a\right)^{p+1}\left(dx^2+c\right)^2(ex)^{m+1}}{b^2e(m+2p+7)(m+2p+9)}$$

$$+\frac{(c(24Bc+Ad(m^2+4(p+5)m+4p^2+40p+99))\,b^2-ad(Ad(m+5)(m+2p+9)+Bc(m^2+2(p+9}{b^3e(m+2p+5)(m+2p+7)(m+2}$$

$$-\frac{\Big(c\Big(2b^2(p+3)(aB(m+1)-Ab(m+2p+9))c^2-2abd(p+3)(aB(m+1)-Ab(m+2p+9))c+b(bc-}{}$$

```
[In] Int[(e*x)^m*(a + b*x^2)^p*(A + B*x^2)*(c + d*x^2)^3,x]
```

```
[Out] -(((a^3*B*d^3*(105 + 71*m + 15*m^2 + m^3) - a^2*b*d^2*(5 + m)*(A*d*(3 + m)*
(9 + m + 2*p) + 2*B*c*(30 + 13*m + m^2 + 2*p + 2*m*p)) + a*b^2*c*d*(2*A*d*(
216 + m^3 + 84*p + 8*p^2 + 4*m^2*(5 + p) + m*(123 + 44*p + 4*p^2)) + B*c*(2
67 + m^3 + 40*p + 4*p^2 + m^2*(21 + 4*p) + m*(143 + 44*p + 4*p^2))) - b^3*c
^2*(48*B*c + A*d*(513 + m^3 + 366*p + 92*p^2 + 8*p^3 + m^2*(23 + 6*p) + m*(
183 + 92*p + 12*p^2))))*(e*x)^(1 + m)*(a + b*x^2)^(1 + p))/(b^4*e*(3 + m +
2*p)*(5 + m + 2*p)*(7 + m + 2*p)*(9 + m + 2*p))) + ((a^2*B*d^2*(35 + 12*m +
 m^2) + b^2*c*(24*B*c + A*d*(99 + m^2 + 40*p + 4*p^2 + 4*m*(5 + p))) - a*b*
d*(A*d*(5 + m)*(9 + m + 2*p) + B*c*(65 + m^2 + 2*p + 2*m*(9 + p))))*(e*x)^(
1 + m)*(a + b*x^2)^(1 + p)*(c + d*x^2))/(b^3*e*(5 + m + 2*p)*(7 + m + 2*p)*
(9 + m + 2*p)) + ((6*b*B*c - a*B*d*(7 + m) + A*b*d*(9 + m + 2*p))*(e*x)^(1
+ m)*(a + b*x^2)^(1 + p)*(c + d*x^2)^2)/(b^2*e*(7 + m + 2*p)*(9 + m + 2*p))
```

```
 + (B*(e*x)^(1 + m)*(a + b*x^2)^(1 + p)*(c + d*x^2)^3)/(b*e*(9 + m + 2*p))
- ((c*(2*b^2*c^2*(3 + p)*(a*B*(1 + m) - A*b*(9 + m + 2*p)) - 2*a*b*c*d*(3 +
 p)*(a*B*(1 + m) - A*b*(9 + m + 2*p)) + b*c*(b*c - a*d)*(1 + m)*(a*B*(7 + m
) - A*b*(9 + m + 2*p)) - a*d*(b*c - a*d)*(1 + m)*(a*B*(7 + m) - A*b*(9 + m
+ 2*p)) + 4*a*(b*c - a*d)*(6*b*B*c - a*B*d*(7 + m) + A*b*d*(9 + m + 2*p)) +
 (2*b*c*(2 + p)*(2*b*c*(3 + p)*(a*B*(1 + m) - A*b*(9 + m + 2*p)) + (b*c - a
*d)*(1 + m)*(a*B*(7 + m) - A*b*(9 + m + 2*p))))/(1 + m)) - (a*(a^3*B*d^3*(1
05 + 71*m + 15*m^2 + m^3) - a^2*b*d^2*(5 + m)*(A*d*(3 + m)*(9 + m + 2*p) +
2*B*c*(30 + 13*m + m^2 + 2*p + 2*m*p)) + a*b^2*c*d*(2*A*d*(216 + m^3 + 84*p
 + 8*p^2 + 4*m^2*(5 + p) + m*(123 + 44*p + 4*p^2)) + B*c*(267 + m^3 + 40*p
+ 4*p^2 + m^2*(21 + 4*p) + m*(143 + 44*p + 4*p^2))) - b^3*c^2*(48*B*c + A*d
*(513 + m^3 + 366*p + 92*p^2 + 8*p^3 + m^2*(23 + 6*p) + m*(183 + 92*p + 12*
p^2)))))/(b*(3 + m + 2*p)))*(e*x)^(1 + m)*(a + b*x^2)^p*Hypergeometric2F1[(
1 + m)/2, -p, (3 + m)/2, -((b*x^2)/a)])/(b^3*e*(5 + m + 2*p)*(7 + m + 2*p)*
(9 + m + 2*p)*(1 + (b*x^2)/a)^p)
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 372

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[a^I
ntPart[p]*((a + b*x^n)^FracPart[p]/(1 + b*(x^n/a))^FracPart[p]), Int[(c*x)^
m*(1 + b*(x^n/a))^p, x], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0]
 &&  !(ILtQ[p, 0] || GtQ[a, 0])
```

Rule 470

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[d*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(b*e*(m + n*(p
+ 1) + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(b*(m + n*(p
 + 1) + 1)), Int[(e*x)^m*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, m,
n, p}, x] && NeQ[b*c - a*d, 0] && NeQ[m + n*(p + 1) + 1, 0]
```

Rule 595

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[f*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*((c + d*x^n)^q/(b*g*(m + n*(p + q + 1) + 1))), x] + Dist[1/(
b*(m + n*(p + q + 1) + 1)), Int[(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^(q - 1)*S
imp[c*((b*e - a*f)*(m + 1) + b*e*n*(p + q + 1)) + (d*(b*e - a*f)*(m + 1) +
f*n*q*(b*c - a*d) + b*e*d*n*(p + q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c,
 d, e, f, g, m, p}, x] && IGtQ[n, 0] && GtQ[q, 0] &&  !(EqQ[q, 1] && Simple
```

```
rQ[e + f*x^n, c + d*x^n])
```

Rubi steps

$$\text{integral} = \frac{B(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^3}{be(9+m+2p)} + \frac{\int (ex)^m\left(a+bx^2\right)^p\left(c+dx^2\right)^2\left(-c(aB(1+m)-Ab(9+m+2p))+(6bBc-aBd(7+m)+Abd(9+m\right.}{b(9+m+2p)}$$

$$= \frac{(6bBc-aBd(7+m)+Abd(9+m+2p))(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^2}{b^2e(7+m+2p)(9+m+2p)} + \frac{B(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^3}{be(9+m+2p)} + \frac{\int (ex)^m\left(a+bx^2\right)^p\left(c+dx^2\right)\left(-c(2bc(3+p)(aB(1+m)-Ab(9+m+2p))+(bc-ad)(1+m)(\right.}{}$$

$$= \frac{(a^2Bd^2(35+12m+m^2)+b^2c(24Bc+Ad(99+m^2+40p+4p^2+4m(5+p)))-abd(Ad(5+m)(}{b^3e(5+m+2p)(7+m+2p)(9} + \frac{(6bBc-aBd(7+m)+Abd(9+m+2p))(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^2}{b^2e(7+m+2p)(9+m+2p)} + \frac{B(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^3}{be(9+m+2p)} + \frac{\int (ex)^m\left(a+bx^2\right)^p\left(-c(2bc(2+p)(2bc(3+p)(aB(1+m)-Ab(9+m+2p))+(bc-ad)(1+m\right.}{}$$

$$= -\frac{(a^3Bd^3(105+71m+15m^2+m^3)-a^2bd^2(5+m)\left(Ad(3+m)(9+m+2p)+2Bc(30+13m+\right.}{} + \frac{(a^2Bd^2(35+12m+m^2)+b^2c(24Bc+Ad(99+m^2+40p+4p^2+4m(5+p)))-abd(Ad(5+m}{b^3e(5+m+2p)(7+m+2p} + \frac{(6bBc-aBd(7+m)+Abd(9+m+2p))(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^2}{b^2e(7+m+2p)(9+m+2p)} + \frac{B(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^3}{be(9+m+2p)} - \frac{\left(c(2bc(2+p)(2bc(3+p)(aB(1+m)-Ab(9+m+2p))+(bc-ad)(1+m)(aB(7+m)-Ab(9\right.}{}$$

$$= -\frac{(a^3Bd^3(105+71m+15m^2+m^3) - a^2bd^2(5+m)\left(Ad(3+m)(9+m+2p)+2Bc(30+13m\right.}{}$$

$$+\frac{(a^2Bd^2(35+12m+m^2)+b^2c(24Bc+Ad(99+m^2+40p+4p^2+4m(5+p)))-abd(Ad(5+}{b^3e(5+m+2p)(7+m+2}$$

$$+\frac{(6bBc-aBd(7+m)+Abd(9+m+2p))(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^2}{b^2e(7+m+2p)(9+m+2p)}$$

$$+\frac{B(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^3}{be(9+m+2p)}$$

$$-\frac{\left(\left(c(2bc(2+p)(2bc(3+p)(aB(1+m)-Ab(9+m+2p))+(bc-ad)(1+m)(aB(7+m)-A\right.\right.}{}$$

$$= -\frac{(a^3Bd^3(105+71m+15m^2+m^3) - a^2bd^2(5+m)\left(Ad(3+m)(9+m+2p)+2Bc(30+13m\right.}{}$$

$$+\frac{(a^2Bd^2(35+12m+m^2)+b^2c(24Bc+Ad(99+m^2+40p+4p^2+4m(5+p)))-abd(Ad(5+}{b^3e(5+m+2p)(7+m+2}$$

$$+\frac{(6bBc-aBd(7+m)+Abd(9+m+2p))(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^2}{b^2e(7+m+2p)(9+m+2p)}$$

$$+\frac{B(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^3}{be(9+m+2p)}$$

$$-\frac{\left(c(2bc(2+p)(2bc(3+p)(aB(1+m)-Ab(9+m+2p))+(bc-ad)(1+m)(aB(7+m)-Ab\right.}{}$$

Mathematica [A] (verified)

Time = 0.33 (sec) , antiderivative size = 248, normalized size of antiderivative = 0.23

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right)\left(c+dx^2\right)^3 \, dx$$

$$= x(ex)^m\left(a+bx^2\right)^p\left(1+\frac{bx^2}{a}\right)^{-p}\left(\frac{Ac^3 \operatorname{Hypergeometric2F1}\left(\frac{1+m}{2},-p,\frac{3+m}{2},-\frac{bx^2}{a}\right)}{1+m}\right.$$

$$+\frac{c^2(Bc+3Ad)x^2 \operatorname{Hypergeometric2F1}\left(\frac{3+m}{2},-p,\frac{5+m}{2},-\frac{bx^2}{a}\right)}{3+m}$$

$$+dx^4\left(\frac{3c(Bc+Ad) \operatorname{Hypergeometric2F1}\left(\frac{5+m}{2},-p,\frac{7+m}{2},-\frac{bx^2}{a}\right)}{5+m}\right.$$

$$+dx^2\left(\frac{(3Bc+Ad) \operatorname{Hypergeometric2F1}\left(\frac{7+m}{2},-p,\frac{9+m}{2},-\frac{bx^2}{a}\right)}{7+m}+\frac{Bdx^2 \operatorname{Hypergeometric2F1}\left(\frac{9+m}{2},-p,\frac{11}{}\right.}{9+m}\right.$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)^p*(A + B*x^2)*(c + d*x^2)^3,x]
```

```
[Out] (x*(e*x)^m*(a + b*x^2)^p*((A*c^3*Hypergeometric2F1[(1 + m)/2, -p, (3 + m)/2
, -((b*x^2)/a)])/(1 + m) + (c^2*(B*c + 3*A*d)*x^2*Hypergeometric2F1[(3 + m)
/2, -p, (5 + m)/2, -((b*x^2)/a)])/(3 + m) + d*x^4*((3*c*(B*c + A*d)*Hyperge
ometric2F1[(5 + m)/2, -p, (7 + m)/2, -((b*x^2)/a)])/(5 + m) + d*x^2*(((3*B*
c + A*d)*Hypergeometric2F1[(7 + m)/2, -p, (9 + m)/2, -((b*x^2)/a)])/(7 + m)
 + (B*d*x^2*Hypergeometric2F1[(9 + m)/2, -p, (11 + m)/2, -((b*x^2)/a)])/(9
+ m)))))/(1 + (b*x^2)/a)^p
```

Maple [F]

$$\int (ex)^m \left(b\,x^2+a\right)^p \left(x^2 B+A\right) \left(d\,x^2+c\right)^3 dx$$

```
[In] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c)^3,x)
```

```
[Out] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c)^3,x)
```

Fricas [F]

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \int \left(Bx^2+A\right) \left(dx^2+c\right)^3 \left(bx^2+a\right)^p (ex)^m \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="fricas")
```

```
[Out] integral((B*d^3*x^8 + (3*B*c*d^2 + A*d^3)*x^6 + 3*(B*c^2*d + A*c*d^2)*x^4 +
 A*c^3 + (B*c^3 + 3*A*c^2*d)*x^2)*(b*x^2 + a)^p*(e*x)^m, x)
```

Sympy [F(-1)]

Timed out.

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \text{Timed out}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**p*(B*x**2+A)*(d*x**2+c)**3,x)
```

```
[Out] Timed out
```

Maxima [F]

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \int \left(Bx^2+A\right) \left(dx^2+c\right)^3 \left(bx^2+a\right)^p (ex)^m \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^3*(b*x^2 + a)^p*(e*x)^m, x)
```

Giac [F]

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \int \left(Bx^2+A\right) \left(dx^2+c\right)^3 \left(bx^2+a\right)^p (ex)^m \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c)^3,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^3*(b*x^2 + a)^p*(e*x)^m, x)
```

Mupad [F(-1)]

Timed out.

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^3 \, dx = \int \left(B\,x^2+A\right)\,{\left(e\,x\right)}^m\,{\left(b\,x^2+a\right)}^p\,{\left(d\,x^2+c\right)}^3 \,dx$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^p*(c + d*x^2)^3,x)
[Out] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^p*(c + d*x^2)^3, x)
```

3.45 $\int (ex)^m (a+bx^2)^p (A+Bx^2) (c+dx^2)^2 \, dx$

Optimal result

Integrand size = 31, antiderivative size = 495

$$\int (ex)^m (a+bx^2)^p (A+Bx^2) (c+dx^2)^2 \, dx$$
$$= \frac{(a^2Bd^2(15+8m+m^2)+b^2c(8Bc+Ad(7+m+2p)^2)-abd(Ad(3+m)(7+m+2p)+Bc(27+m^2+2p}{b^3e(3+m+2p)(5+m+2p)(7+m+2p)}$$
$$- \frac{(aBd(5+m)-b(4Bc+Ad(7+m+2p)))(ex)^{1+m}(a+bx^2)^{1+p}(c+dx^2)}{b^2e(5+m+2p)(7+m+2p)}$$
$$+ \frac{B(ex)^{1+m}(a+bx^2)^{1+p}(c+dx^2)^2}{be(7+m+2p)}$$
$$- \frac{(bc(3+m+2p)(2bc(2+p)(aB(1+m)-Ab(7+m+2p))+(bc-ad)(1+m)(aB(5+m)-Ab(7+m}{}$$

```
[Out] (a^2*B*d^2*(m^2+8*m+15)+b^2*c*(8*B*c+A*d*(7+m+2*p)^2)-a*b*d*(A*d*(3+m)*(7+m
+2*p)+B*c*(27+m^2+2*p+2*m*(6+p))))*(e*x)^(1+m)*(b*x^2+a)^(p+1)/b^3/e/(3+m+2
*p)/(5+m+2*p)/(7+m+2*p)-(a*B*d*(5+m)-b*(4*B*c+A*d*(7+m+2*p)))*(e*x)^(1+m)*(
b*x^2+a)^(p+1)*(d*x^2+c)/b^2/e/(5+m+2*p)/(7+m+2*p)+B*(e*x)^(1+m)*(b*x^2+a)^
(p+1)*(d*x^2+c)^2/b/e/(7+m+2*p)-(b*c*(3+m+2*p)*(2*b*c*(2+p)*(a*B*(1+m)-A*b*
(7+m+2*p))+(-a*d+b*c)*(1+m)*(a*B*(5+m)-A*b*(7+m+2*p)))-a*(1+m)*(2*b*c*d*(2+
p)*(a*B*(1+m)-A*b*(7+m+2*p))+d*(-a*d+b*c)*(1+m)*(a*B*(5+m)-A*b*(7+m+2*p))+2
*(-a*d+b*c)*(a*B*d*(5+m)-b*(4*B*c+A*d*(7+m+2*p)))))*(e*x)^(1+m)*(b*x^2+a)^p
*hypergeom([-p, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/b^3/e/(1+m)/(3+m+2*p)/(5+m
+2*p)/(7+m+2*p)/((1+b*x^2/a)^p)
```

Rubi [A] (verified)

Time = 0.49 (sec) , antiderivative size = 464, normalized size of antiderivative = 0.94, number of steps used = 5, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}} = 0.129$, Rules used = {595, 470, 372, 371}

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx =$$

$$-\frac{(ex)^{m+1}\left(a+bx^2\right)^p\left(\frac{bx^2}{a}+1\right)^{-p}\text{Hypergeometric2F1}\left(\frac{m+1}{2},-p,\frac{m+3}{2},-\frac{bx^2}{a}\right)\left(\frac{a(a^2Bd^2(m^2+8m+15)-abd(Ad(m\right.}{}$$

$$+\frac{(ex)^{m+1}\left(a+bx^2\right)^{p+1}\left(a^2Bd^2(m^2+8m+15)-abd(Ad(m+3)(m+2p+7)+Bc(m^2+2m(p+6)+\right.}{b^3e(m+2p+3)(m+2p+5)(m+2p+7)}$$

$$+\frac{\left(c+dx^2\right)(ex)^{m+1}\left(a+bx^2\right)^{p+1}(-aBd(m+5)+Abd(m+2p+7)+4bBc)}{b^2e(m+2p+5)(m+2p+7)}$$

$$+\frac{B\left(c+dx^2\right)^2(ex)^{m+1}\left(a+bx^2\right)^{p+1}}{be(m+2p+7)}$$

```
[In] Int[(e*x)^m*(a + b*x^2)^p*(A + B*x^2)*(c + d*x^2)^2,x]
```

```
[Out] ((a^2*B*d^2*(15 + 8*m + m^2) + b^2*c*(8*B*c + A*d*(7 + m + 2*p)^2) - a*b*d*
(A*d*(3 + m)*(7 + m + 2*p) + B*c*(27 + m^2 + 2*p + 2*m*(6 + p))))*(e*x)^(1
+ m)*(a + b*x^2)^(1 + p))/(b^3*e*(3 + m + 2*p)*(5 + m + 2*p)*(7 + m + 2*p))
 + ((4*b*B*c - a*B*d*(5 + m) + A*b*d*(7 + m + 2*p))*(e*x)^(1 + m)*(a + b*x^
2)^(1 + p)*(c + d*x^2))/(b^2*e*(5 + m + 2*p)*(7 + m + 2*p)) + (B*(e*x)^(1 +
 m)*(a + b*x^2)^(1 + p)*(c + d*x^2)^2)/(b*e*(7 + m + 2*p)) - ((c*((2*b*c*(2
 + p)*(a*B*(1 + m) - A*b*(7 + m + 2*p)))/(1 + m) + (b*c - a*d)*(a*B*(5 + m)
 - A*b*(7 + m + 2*p))) + (a*(a^2*B*d^2*(15 + 8*m + m^2) + b^2*c*(8*B*c + A*
d*(7 + m + 2*p)^2) - a*b*d*(A*d*(3 + m)*(7 + m + 2*p) + B*c*(27 + m^2 + 2*p
 + 2*m*(6 + p)))))/(b*(3 + m + 2*p)))*(e*x)^(1 + m)*(a + b*x^2)^p*Hypergeom
etric2F1[(1 + m)/2, -p, (3 + m)/2, -((b*x^2)/a)])/(b^2*e*(5 + m + 2*p)*(7 +
 m + 2*p)*(1 + (b*x^2)/a)^p)
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 372

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[a^I
ntPart[p]*((a + b*x^n)^FracPart[p]/(1 + b*(x^n/a))^FracPart[p]), Int[(c*x)^
m*(1 + b*(x^n/a))^p, x], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0]
```

```
&&  !(ILtQ[p, 0] || GtQ[a, 0])
```

Rule 470

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[d*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(b*e*(m + n*(p
+ 1) + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(b*(m + n*(p
 + 1) + 1)), Int[(e*x)^m*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, m,
n, p}, x] && NeQ[b*c - a*d, 0] && NeQ[m + n*(p + 1) + 1, 0]
```

Rule 595

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[f*(g*x)^(m + 1)*(a +
b*x^n)^(p + 1)*((c + d*x^n)^q/(b*g*(m + n*(p + q + 1) + 1))), x] + Dist[1/(
b*(m + n*(p + q + 1) + 1)), Int[(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^(q - 1)*S
imp[c*((b*e - a*f)*(m + 1) + b*e*n*(p + q + 1)) + (d*(b*e - a*f)*(m + 1) +
f*n*q*(b*c - a*d) + b*e*d*n*(p + q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c,
 d, e, f, g, m, p}, x] && IGtQ[n, 0] && GtQ[q, 0] &&  !(EqQ[q, 1] && Simple
rQ[e + f*x^n, c + d*x^n])
```

Rubi steps

$$\text{integral} = \frac{B(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^2}{be(7+m+2p)} + \frac{\int (ex)^m\left(a+bx^2\right)^p\left(c+dx^2\right)\left(-c(aB(1+m)-Ab(7+m+2p))+(4bBc-aBd(5+m)+Abd(7+m+\right.}{b(7+m+2p)}$$

$$= \frac{(4bBc-aBd(5+m)+Abd(7+m+2p))(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)}{b^2e(5+m+2p)(7+m+2p)} + \frac{B(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^2}{be(7+m+2p)} + \frac{\int (ex)^m\left(a+bx^2\right)^p\left(-c(2bc(2+p)(aB(1+m)-Ab(7+m+2p))+(bc-ad)(1+m)(aB(5+m\right.}{}$$

$$= \frac{(a^2Bd^2(15+8m+m^2)+b^2c(8Bc+Ad(7+m+2p)^2)-abd(Ad(3+m)(7+m+2p)+Bc(27+}{b^3e(3+m+2p)(5+m+2p)(7+m+2p)} + \frac{(4bBc-aBd(5+m)+Abd(7+m+2p))(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)}{b^2e(5+m+2p)(7+m+2p)} + \frac{B(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(c+dx^2\right)^2}{be(7+m+2p)} - \frac{\left(c(2bc(2+p)(aB(1+m)-Ab(7+m+2p))+(bc-ad)(1+m)(aB(5+m)-Ab(7+m+2p\right.}{b^2(5}$$

$$= \frac{(a^2Bd^2(15+8m+m^2)+b^2c(8Bc+Ad(7+m+2p)^2)-abd(Ad(3+m)(7+m+2p)+Bc(27}{b^3e(3+m+2p)(5+m+2p)(7+m+2p)}$$
$$+ \frac{(4bBc-aBd(5+m)+Abd(7+m+2p))(ex)^{1+m}(a+bx^2)^{1+p}(c+dx^2)}{b^2e(5+m+2p)(7+m+2p)}$$
$$+ \frac{B(ex)^{1+m}(a+bx^2)^{1+p}(c+dx^2)^2}{be(7+m+2p)}$$
$$- \frac{\Big(\Big(c(2bc(2+p)(aB(1+m)-Ab(7+m+2p))+(bc-ad)(1+m)(aB(5+m)-Ab(7+m+}{}$$

$$= \frac{(a^2Bd^2(15+8m+m^2)+b^2c(8Bc+Ad(7+m+2p)^2)-abd(Ad(3+m)(7+m+2p)+Bc(27}{b^3e(3+m+2p)(5+m+2p)(7+m+2p)}$$
$$+ \frac{(4bBc-aBd(5+m)+Abd(7+m+2p))(ex)^{1+m}(a+bx^2)^{1+p}(c+dx^2)}{b^2e(5+m+2p)(7+m+2p)}$$
$$+ \frac{B(ex)^{1+m}(a+bx^2)^{1+p}(c+dx^2)^2}{be(7+m+2p)}$$

$$- \frac{\Big(c(2bc(2+p)(aB(1+m)-Ab(7+m+2p))+(bc-ad)(1+m)(aB(5+m)-Ab(7+m+2}{}$$

Mathematica [A] (verified)

Time = 0.21 (sec) , antiderivative size = 198, normalized size of antiderivative = 0.40

$$\int (ex)^m (a+bx^2)^p (A+Bx^2)(c+dx^2)^2 \, dx$$
$$= x(ex)^m (a+bx^2)^p \left(1+\frac{bx^2}{a}\right)^{-p} \left(\frac{Ac^2 \,\text{Hypergeometric2F1}\left(\frac{1+m}{2},-p,\frac{3+m}{2},-\frac{bx^2}{a}\right)}{1+m} + \frac{c(Bc+2Ad)x^2 \,\text{Hypergeometric2F1}\left(\frac{3+m}{2},-p,\frac{5+m}{2},-\frac{bx^2}{a}\right)}{3+m} + dx^4\left(\frac{(2Bc+Ad)\,\text{Hypergeometric2F1}\left(\frac{5+m}{2},-p,\frac{7+m}{2},-\frac{bx^2}{a}\right)}{5+m} + \frac{Bdx^2 \,\text{Hypergeometric2F1}\left(\frac{7+m}{2},-p,\frac{9+m}{2},-\frac{bx^2}{a}\right)}{7+m}\right)\right)$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)^p*(A + B*x^2)*(c + d*x^2)^2,x]
```

```
[Out] (x*(e*x)^m*(a + b*x^2)^p*((A*c^2*Hypergeometric2F1[(1 + m)/2, -p, (3 + m)/2
, -((b*x^2)/a)])/(1 + m) + (c*(B*c + 2*A*d)*x^2*Hypergeometric2F1[(3 + m)/2
, -p, (5 + m)/2, -((b*x^2)/a)])/(3 + m) + d*x^4*(((2*B*c + A*d)*Hypergeomet
ric2F1[(5 + m)/2, -p, (7 + m)/2, -((b*x^2)/a)])/(5 + m) + (B*d*x^2*Hypergeo
metric2F1[(7 + m)/2, -p, (9 + m)/2, -((b*x^2)/a)])/(7 + m))))/(1 + (b*x^2)/
a)^p
```

Maple [F]

$$\int \left(e x \right)^{m} \left(b \,x^{2}+a \right)^{p} \left(x^{2} B +A \right) \left(d \,x^{2}+c \right)^{2}d x$$

```
[In] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c)^2,x)
```

```
[Out] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c)^2,x)
```

Fricas [F]

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx=\int { {\left(B x^{2} + A\right)} {\left(d x^{2} + c\right)}^{2} {\left(b x^{2} + a\right)}^{p} \left(e x\right)^{m} \,d x }$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="fricas")
```

```
[Out] integral((B*d^2*x^6 + (2*B*c*d + A*d^2)*x^4 + A*c^2 + (B*c^2 + 2*A*c*d)*x^2
)*(b*x^2 + a)^p*(e*x)^m, x)
```

Sympy [F(-1)]

Timed out.

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx=\text{Timed out}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**p*(B*x**2+A)*(d*x**2+c)**2,x)
```

```
[Out] Timed out
```

Maxima [F]

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \int \left(Bx^2+A\right)\left(dx^2+c\right)^2 \left(bx^2+a\right)^p (ex)^m \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^2*(b*x^2 + a)^p*(e*x)^m, x)
```

Giac [F]

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \int \left(Bx^2+A\right)\left(dx^2+c\right)^2 \left(bx^2+a\right)^p (ex)^m \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)^2*(b*x^2 + a)^p*(e*x)^m, x)
```

Mupad [F(-1)]

Timed out.

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right)^2 \, dx = \int \left(B\,x^2+A\right)\,{\left(e\,x\right)}^m\,{\left(b\,x^2+a\right)}^p\,{\left(d\,x^2+c\right)}^2 \,dx$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^p*(c + d*x^2)^2,x)
[Out] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^p*(c + d*x^2)^2, x)
```

3.46 $\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right) \, dx$

Optimal result

Integrand size = 29, antiderivative size = 253

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right) \, dx$$
$$= -\frac{(aBd(3+m)-b(2Ad+Bc(5+m+2p)))(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{b^2e(3+m+2p)(5+m+2p)}$$
$$+ \frac{d(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(A+Bx^2\right)}{be(5+m+2p)}$$
$$- \frac{(Ab(3+m+2p)(ad(1+m)-bc(5+m+2p))-a(1+m)(aBd(3+m)-b(2Ad+Bc(5+m+2p))))(}{b^2e(1+m)(3+m+2p)(5+m+}$$

```
[Out] -(a*B*d*(3+m)-b*(2*A*d+B*c*(5+m+2*p)))*(e*x)^(1+m)*(b*x^2+a)^(p+1)/b^2/e/(3
+m+2*p)/(5+m+2*p)+d*(e*x)^(1+m)*(b*x^2+a)^(p+1)*(B*x^2+A)/b/e/(5+m+2*p)-(A*
b*(3+m+2*p)*(a*d*(1+m)-b*c*(5+m+2*p))-a*(1+m)*(a*B*d*(3+m)-b*(2*A*d+B*c*(5+
m+2*p))))*(e*x)^(1+m)*(b*x^2+a)^p*hypergeom([-p, 1/2+1/2*m],[3/2+1/2*m],-b*
x^2/a)/b^2/e/(1+m)/(3+m+2*p)/(5+m+2*p)/((1+b*x^2/a)^p)
```

Rubi [A] (verified)

Time = 0.16 (sec) , antiderivative size = 238, normalized size of antiderivative = 0.94, number of steps used = 4, number of rules used = 4, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.138, Rules used

$= \{595, 470, 372, 371\}$

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right)\left(c+dx^2\right)\,dx$$
$$= \frac{(ex)^{m+1}\left(a+bx^2\right)^{p+1}\left(-aBd(m+3)+2Abd+bBc(m+2p+5)\right)}{b^2e(m+2p+3)(m+2p+5)}$$
$$- \frac{(ex)^{m+1}\left(a+bx^2\right)^p\left(\frac{bx^2}{a}+1\right)^{-p}\text{Hypergeometric2F1}\left(\frac{m+1}{2},-p,\frac{m+3}{2},-\frac{bx^2}{a}\right)\left(\frac{a(-aBd(m+3)+2Abd+bBc(m+2p}{b(m+2p+3)}\right.}{be(m+2p+5)}$$
$$+ \frac{d(A+Bx^2)(ex)^{m+1}\left(a+bx^2\right)^{p+1}}{be(m+2p+5)}$$

```
[In] Int[(e*x)^m*(a + b*x^2)^p*(A + B*x^2)*(c + d*x^2),x]
```

```
[Out] ((2*A*b*d - a*B*d*(3 + m) + b*B*c*(5 + m + 2*p))*(e*x)^(1 + m)*(a + b*x^2)^
(1 + p))/(b^2*e*(3 + m + 2*p)*(5 + m + 2*p)) + (d*(e*x)^(1 + m)*(a + b*x^2)
^(1 + p)*(A + B*x^2))/(b*e*(5 + m + 2*p)) - ((a*A*d - (A*b*c*(5 + m + 2*p))
/(1 + m) + (a*(2*A*b*d - a*B*d*(3 + m) + b*B*c*(5 + m + 2*p)))/(b*(3 + m +
2*p)))*(e*x)^(1 + m)*(a + b*x^2)^p*Hypergeometric2F1[(1 + m)/2, -p, (3 + m)
/2, -((b*x^2)/a)])/(b*e*(5 + m + 2*p)*(1 + (b*x^2)/a)^p)
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 372

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[a^I
ntPart[p]*((a + b*x^n)^FracPart[p]/(1 + b*(x^n/a))^FracPart[p]), Int[(c*x)^
m*(1 + b*(x^n/a))^p, x], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0]
 &&  !(ILtQ[p, 0] || GtQ[a, 0])
```

Rule 470

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_)), x_Symbol] :> Simp[d*(e*x)^(m + 1)*((a + b*x^n)^(p + 1)/(b*e*(m + n*(p
+ 1) + 1))), x] - Dist[(a*d*(m + 1) - b*c*(m + n*(p + 1) + 1))/(b*(m + n*(p
 + 1) + 1)), Int[(e*x)^m*(a + b*x^n)^p, x], x] /; FreeQ[{a, b, c, d, e, m,
n, p}, x] && NeQ[b*c - a*d, 0] && NeQ[m + n*(p + 1) + 1, 0]
```

Rule 595

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n
_))^(q_.)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[f*(g*x)^(m + 1)*(a +
```

```
b*x^n)^(p + 1)*((c + d*x^n)^q/(b*g*(m + n*(p + q + 1) + 1))), x] + Dist[1/(
b*(m + n*(p + q + 1) + 1)), Int[(g*x)^m*(a + b*x^n)^p*(c + d*x^n)^(q - 1)*S
imp[c*((b*e - a*f)*(m + 1) + b*e*n*(p + q + 1)) + (d*(b*e - a*f)*(m + 1) +
f*n*q*(b*c - a*d) + b*e*d*n*(p + q + 1))*x^n, x], x], x] /; FreeQ[{a, b, c,
 d, e, f, g, m, p}, x] && IGtQ[n, 0] && GtQ[q, 0] &&  !(EqQ[q, 1] && Simple
rQ[e + f*x^n, c + d*x^n])
```

Rubi steps

$$\text{integral} = \frac{d(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(A+Bx^2\right)}{be(5+m+2p)} + \frac{\int (ex)^m\left(a+bx^2\right)^p\left(-A(ad(1+m)-bc(5+m+2p))+(2Abd-aBd(3+m)+bBc(5+m+2p))x^2\right)\,d}{b(5+m+2p)}$$

$$= \frac{(2Abd-aBd(3+m)+bBc(5+m+2p))(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{b^2e(3+m+2p)(5+m+2p)} + \frac{d(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(A+Bx^2\right)}{be(5+m+2p)} - \frac{\left(A(ad(1+m)-bc(5+m+2p))+\frac{a(1+m)(2Abd-aBd(3+m)+bBc(5+m+2p))}{b(3+m+2p)}\right)\int (ex)^m\left(a+bx^2\right)^p\,dx}{b(5+m+2p)}$$

$$= \frac{(2Abd-aBd(3+m)+bBc(5+m+2p))(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{b^2e(3+m+2p)(5+m+2p)} + \frac{d(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(A+Bx^2\right)}{be(5+m+2p)} - \frac{\left(\left(A(ad(1+m)-bc(5+m+2p))+\frac{a(1+m)(2Abd-aBd(3+m)+bBc(5+m+2p))}{b(3+m+2p)}\right)\left(a+bx^2\right)^p\left(1+\frac{bx^2}{a}\right)^{-p}\right.}{b(5+m+2p)}$$

$$= \frac{(2Abd-aBd(3+m)+bBc(5+m+2p))(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{b^2e(3+m+2p)(5+m+2p)} + \frac{d(ex)^{1+m}\left(a+bx^2\right)^{1+p}\left(A+Bx^2\right)}{be(5+m+2p)} - \frac{\left(A(ad(1+m)-bc(5+m+2p))+\frac{a(1+m)(2Abd-aBd(3+m)+bBc(5+m+2p))}{b(3+m+2p)}\right)(ex)^{1+m}\left(a+bx^2\right)^p\left(1+\right.}{be(1+m)(5+m+2p)}$$

Mathematica [A] (verified)

Time = 0.12 (sec) , antiderivative size = 147, normalized size of antiderivative = 0.58

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = x(ex)^m \left(a+bx^2\right)^p \left(1+\frac{bx^2}{a}\right)^{-p} \left(\frac{Ac \, \text{Hypergeometric2F1}\left(\frac{1+m}{2},-p,\frac{3+m}{2},-\frac{bx^2}{a}\right)}{1+m} + \frac{(Bc+Ad)x^2 \, \text{Hypergeometric2F1}\left(\frac{3+m}{2},-p,\frac{5+m}{2},-\frac{bx^2}{a}\right)}{3+m} + \frac{Bdx^4 \, \text{Hypergeometric2F1}\left(\frac{5+m}{2},-p,\frac{7+m}{2},-\frac{bx^2}{a}\right)}{5+m}\right)$$

```
[In] Integrate[(e*x)^m*(a + b*x^2)^p*(A + B*x^2)*(c + d*x^2),x]
[Out] (x*(e*x)^m*(a + b*x^2)^p*((A*c*Hypergeometric2F1[(1 + m)/2, -p, (3 + m)/2,
-((b*x^2)/a)])/(1 + m) + ((B*c + A*d)*x^2*Hypergeometric2F1[(3 + m)/2, -p,
(5 + m)/2, -((b*x^2)/a)])/(3 + m) + (B*d*x^4*Hypergeometric2F1[(5 + m)/2, -
p, (7 + m)/2, -((b*x^2)/a)])/(5 + m)))/(1 + (b*x^2)/a)^p
```

Maple [F]

$$\int (ex)^m \left(b\,x^2+a\right)^p \left(x^2 B+A\right) \left(d\,x^2+c\right) dx$$

```
[In] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c),x)
[Out] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c),x)
```

Fricas [F]

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \int \left(Bx^2+A\right)\left(dx^2+c\right)\left(bx^2+a\right)^p (ex)^m \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c),x, algorithm="fricas")
[Out] integral((B*d*x^4 + (B*c + A*d)*x^2 + A*c)*(b*x^2 + a)^p*(e*x)^m, x)
```

Sympy [F(-1)]

Timed out.

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \text{Timed out}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**p*(B*x**2+A)*(d*x**2+c),x)
[Out] Timed out
```

Maxima [F]

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \int \left(Bx^2+A\right)\left(dx^2+c\right)\left(bx^2+a\right)^p (ex)^m \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c),x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)*(b*x^2 + a)^p*(e*x)^m, x)
```

Giac [F]

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \int \left(Bx^2+A\right)\left(dx^2+c\right)\left(bx^2+a\right)^p (ex)^m \, dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)*(d*x^2+c),x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(d*x^2 + c)*(b*x^2 + a)^p*(e*x)^m, x)
```

Mupad [F(-1)]

Timed out.

$$\int (ex)^m \left(a+bx^2\right)^p \left(A+Bx^2\right) \left(c+dx^2\right) \, dx = \int \left(B\,x^2+A\right)\,{\left(e\,x\right)}^m\,{\left(b\,x^2+a\right)}^p\,\left(d\,x^2+c\right) \,d x$$

```
[In] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^p*(c + d*x^2),x)
[Out] int((A + B*x^2)*(e*x)^m*(a + b*x^2)^p*(c + d*x^2), x)
```

3.47 $\int \frac{(ex)^m(a+bx^2)^p(A+Bx^2)}{c+dx^2}\,dx$

Optimal result

Integrand size = 31, antiderivative size = 162

$$\int \frac{(ex)^m\left(a+bx^2\right)^p\left(A+Bx^2\right)}{c+dx^2}\,dx = -\frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^p\left(1+\frac{bx^2}{a}\right)^{-p}\text{AppellF1}\left(\frac{1+m}{2},-p,1,\frac{3+m}{2},-\frac{bx^2}{a},-\frac{dx^2}{c}\right)}{cde(1+m)} + \frac{B(ex)^{1+m}\left(a+bx^2\right)^p\left(1+\frac{bx^2}{a}\right)^{-p}\text{Hypergeometric2F1}\left(\frac{1+m}{2},-p,\frac{3+m}{2},-\frac{bx^2}{a}\right)}{de(1+m)}$$

```
[Out] -(-A*d+B*c)*(e*x)^(1+m)*(b*x^2+a)^p*AppellF1(1/2+1/2*m,-p,1,3/2+1/2*m,-b*x^
2/a,-d*x^2/c)/c/d/e/(1+m)/((1+b*x^2/a)^p)+B*(e*x)^(1+m)*(b*x^2+a)^p*hyperge
om([-p, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/d/e/(1+m)/((1+b*x^2/a)^p)
```

Rubi [A] (verified)

Time = 0.11 (sec) , antiderivative size = 162, normalized size of antiderivative = 1.00, number of steps used = 6, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.161, Rules used = {598, 372, 371, 525, 524}

$$\int \frac{(ex)^m\left(a+bx^2\right)^p\left(A+Bx^2\right)}{c+dx^2}\,dx = \frac{B(ex)^{m+1}\left(a+bx^2\right)^p\left(\frac{bx^2}{a}+1\right)^{-p}\text{Hypergeometric2F1}\left(\frac{m+1}{2},-p,\frac{m+3}{2},-\frac{bx^2}{a}\right)}{de(m+1)} - \frac{(ex)^{m+1}\left(a+bx^2\right)^p\left(\frac{bx^2}{a}+1\right)^{-p}(Bc-Ad)\,\text{AppellF1}\left(\frac{m+1}{2},-p,1,\frac{m+3}{2},-\frac{bx^2}{a},-\frac{dx^2}{c}\right)}{cde(m+1)}$$

```
[In] Int[((e*x)^m*(a + b*x^2)^p*(A + B*x^2))/(c + d*x^2),x]
```

```
[Out] -(((B*c - A*d)*(e*x)^(1 + m)*(a + b*x^2)^p*AppellF1[(1 + m)/2, -p, 1, (3 +
m)/2, -((b*x^2)/a), -((d*x^2)/c)])/(c*d*e*(1 + m)*(1 + (b*x^2)/a)^p)) + (B*
(e*x)^(1 + m)*(a + b*x^2)^p*Hypergeometric2F1[(1 + m)/2, -p, (3 + m)/2, -((
b*x^2)/a)])/(d*e*(1 + m)*(1 + (b*x^2)/a)^p)
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 372

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[a^I
ntPart[p]*((a + b*x^n)^FracPart[p]/(1 + b*(x^n/a))^FracPart[p]), Int[(c*x)^
m*(1 + b*(x^n/a))^p, x], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0]
 &&  !(ILtQ[p, 0] || GtQ[a, 0])
```

Rule 524

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_), x_Symbol] :> Simp[a^p*c^q*((e*x)^(m + 1)/(e*(m + 1)))*AppellF1[(m
+ 1)/n, -p, -q, 1 + (m + 1)/n, (-b)*(x^n/a), (-d)*(x^n/c)], x] /; FreeQ[{a,
 b, c, d, e, m, n, p, q}, x] && NeQ[b*c - a*d, 0] && NeQ[m, -1] && NeQ[m, n
 - 1] && (IntegerQ[p] || GtQ[a, 0]) && (IntegerQ[q] || GtQ[c, 0])
```

Rule 525

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_), x_Symbol] :> Dist[a^IntPart[p]*((a + b*x^n)^FracPart[p]/(1 + b*(x^
n/a))^FracPart[p]), Int[(e*x)^m*(1 + b*(x^n/a))^p*(c + d*x^n)^q, x], x] /;
FreeQ[{a, b, c, d, e, m, n, p, q}, x] && NeQ[b*c - a*d, 0] && NeQ[m, -1] &&
 NeQ[m, n - 1] &&  !(IntegerQ[p] || GtQ[a, 0])
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

$$\text{integral} = \int \left(\frac{B(ex)^m (a+bx^2)^p}{d} + \frac{(-Bc+Ad)(ex)^m (a+bx^2)^p}{d(c+dx^2)} \right) dx$$

$$= \frac{B\int (ex)^m (a+bx^2)^p\,dx}{d} + \frac{(-Bc+Ad)\int \frac{(ex)^m(a+bx^2)^p}{c+dx^2}\,dx}{d}$$

$$= \frac{\left(B(a+bx^2)^p\left(1+\frac{bx^2}{a}\right)^{-p}\right)\int (ex)^m\left(1+\frac{bx^2}{a}\right)^p dx}{d} + \frac{\left((-Bc+Ad)(a+bx^2)^p\left(1+\frac{bx^2}{a}\right)^{-p}\right)\int \frac{(ex)^m\left(1+\frac{bx^2}{a}\right)^p}{c+dx^2}\,dx}{d}$$

$$= -\frac{(Bc-Ad)(ex)^{1+m}(a+bx^2)^p\left(1+\frac{bx^2}{a}\right)^{-p}F_1\left(\frac{1+m}{2};-p,1;\frac{3+m}{2};-\frac{bx^2}{a},-\frac{dx^2}{c}\right)}{cde(1+m)} + \frac{B(ex)^{1+m}(a+bx^2)^p\left(1+\frac{bx^2}{a}\right)^{-p}{}_2F_1\left(\frac{1+m}{2},-p;\frac{3+m}{2};-\frac{bx^2}{a}\right)}{de(1+m)}$$

Mathematica [A] (verified)

Time = 0.35 (sec) , antiderivative size = 118, normalized size of antiderivative = 0.73

$$\int \frac{(ex)^m(a+bx^2)^p(A+Bx^2)}{c+dx^2}\,dx$$
$$= \frac{x(ex)^m(a+bx^2)^p\left(1+\frac{bx^2}{a}\right)^{-p}\left((-Bc+Ad)\,\text{AppellF1}\left(\frac{1+m}{2},-p,1,\frac{3+m}{2},-\frac{bx^2}{a},-\frac{dx^2}{c}\right)+Bc\,\text{Hypergeome}\right.}{cd(1+m)}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)^p*(A + B*x^2))/(c + d*x^2),x]
```

```
[Out] (x*(e*x)^m*(a + b*x^2)^p*((-(B*c) + A*d)*AppellF1[(1 + m)/2, -p, 1, (3 + m)
/2, -((b*x^2)/a), -((d*x^2)/c)] + B*c*Hypergeometric2F1[(1 + m)/2, -p, (3 +
 m)/2, -((b*x^2)/a)]))/(c*d*(1 + m)*(1 + (b*x^2)/a)^p)
```

Maple [F]

$$\int \frac{(ex)^m(b\,x^2+a)^p(x^2B+A)}{d\,x^2+c}dx$$

```
[In] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c),x)
```

```
[Out] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c),x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{c+dx^2} dx = \int \frac{(Bx^2+A)(bx^2+a)^p (ex)^m}{dx^2+c} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c),x, algorithm="fricas")
[Out] integral((B*x^2 + A)*(b*x^2 + a)^p*(e*x)^m/(d*x^2 + c), x)
```

Sympy [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{c+dx^2} dx = \text{Timed out}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**p*(B*x**2+A)/(d*x**2+c),x)
[Out] Timed out
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{c+dx^2} dx = \int \frac{(Bx^2+A)(bx^2+a)^p (ex)^m}{dx^2+c} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c),x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^p*(e*x)^m/(d*x^2 + c), x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{c+dx^2} dx = \int \frac{(Bx^2+A)(bx^2+a)^p (ex)^m}{dx^2+c} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c),x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^p*(e*x)^m/(d*x^2 + c), x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{c+dx^2}\,dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(b\,x^2+a)^p}{d\,x^2+c}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^p)/(c + d*x^2),x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^p)/(c + d*x^2), x)
```

3.48 $\int \frac{(ex)^m(a+bx^2)^p(A+Bx^2)}{(c+dx^2)^2} dx$

Optimal result

Integrand size = 31, antiderivative size = 295

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^2} dx = \frac{(Bc-Ad)(ex)^{1+m} (a+bx^2)^{1+p}}{2c(bc-ad)e(c+dx^2)}$$
$$-\frac{(ad(Ad(1-m)+Bc(1+m))-bc(Ad(1-m-2p)+Bc(1+m+2p)))(ex)^{1+m} (a+bx^2)^p \left(1+\frac{bx^2}{a}\right)^{-p}}{2c^2d(bc-ad)e(1+m)}$$
$$-\frac{b(Bc-Ad)(1+m+2p)(ex)^{1+m} (a+bx^2)^p \left(1+\frac{bx^2}{a}\right)^{-p} \text{Hypergeometric2F1}\left(\frac{1+m}{2},-p,\frac{3+m}{2},-\frac{bx^2}{a}\right)}{2cd(bc-ad)e(1+m)}$$

```
[Out] 1/2*(-A*d+B*c)*(e*x)^(1+m)*(b*x^2+a)^(p+1)/c/(-a*d+b*c)/e/(d*x^2+c)-1/2*(a*
d*(A*d*(1-m)+B*c*(1+m))-b*c*(A*d*(1-m-2*p)+B*c*(1+m+2*p)))*(e*x)^(1+m)*(b*x
^2+a)^p*AppellF1(1/2+1/2*m,-p,1,3/2+1/2*m,-b*x^2/a,-d*x^2/c)/c^2/d/(-a*d+b*
c)/e/(1+m)/((1+b*x^2/a)^p)-1/2*b*(-A*d+B*c)*(1+m+2*p)*(e*x)^(1+m)*(b*x^2+a)
^p*hypergeom([-p, 1/2+1/2*m],[3/2+1/2*m],-b*x^2/a)/c/d/(-a*d+b*c)/e/(1+m)/(
(1+b*x^2/a)^p)
```

Rubi [A] (verified)

Time = 0.28 (sec) , antiderivative size = 295, normalized size of antiderivative = 1.00, number of steps used = 7, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.194, Rules used

$= \{593, 598, 372, 371, 525, 524\}$

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^2} \, dx =$$

$$-\frac{(ex)^{m+1} (a+bx^2)^p \left(\frac{bx^2}{a}+1\right)^{-p} (ad(Ad(1-m)+Bc(m+1)) - bc(Ad(-m-2p+1)+Bc(m+2p+}{2c^2de(m+1)(bc-ad)}$$

$$-\frac{b(m+2p+1)(ex)^{m+1} (a+bx^2)^p \left(\frac{bx^2}{a}+1\right)^{-p} (Bc-Ad) \, \text{Hypergeometric2F1}\left(\frac{m+1}{2}, -p, \frac{m+3}{2}, -\frac{bx^2}{a}\right)}{2cde(m+1)(bc-ad)}$$

$$+\frac{(ex)^{m+1} (a+bx^2)^{p+1} (Bc-Ad)}{2ce(c+dx^2)(bc-ad)}$$

```
[In] Int[((e*x)^m*(a + b*x^2)^p*(A + B*x^2))/(c + d*x^2)^2,x]
```

```
[Out] ((B*c - A*d)*(e*x)^(1 + m)*(a + b*x^2)^(1 + p))/(2*c*(b*c - a*d)*e*(c + d*x
^2)) - ((a*d*(A*d*(1 - m) + B*c*(1 + m)) - b*c*(A*d*(1 - m - 2*p) + B*c*(1
+ m + 2*p)))*(e*x)^(1 + m)*(a + b*x^2)^p*AppellF1[(1 + m)/2, -p, 1, (3 + m)
/2, -((b*x^2)/a), -((d*x^2)/c)])/(2*c^2*d*(b*c - a*d)*e*(1 + m)*(1 + (b*x^2
)/a)^p) - (b*(B*c - A*d)*(1 + m + 2*p)*(e*x)^(1 + m)*(a + b*x^2)^p*Hypergeo
metric2F1[(1 + m)/2, -p, (3 + m)/2, -((b*x^2)/a)])/(2*c*d*(b*c - a*d)*e*(1
+ m)*(1 + (b*x^2)/a)^p)
```

<u>Rule 371</u>

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

<u>Rule 372</u>

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[a^I
ntPart[p]*((a + b*x^n)^FracPart[p]/(1 + b*(x^n/a))^FracPart[p]), Int[(c*x)^
m*(1 + b*(x^n/a))^p, x], x] /; FreeQ[{a, b, c, m, n, p}, x] &&  !IGtQ[p, 0]
 &&  !(ILtQ[p, 0] || GtQ[a, 0])
```

<u>Rule 524</u>

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_), x_Symbol] :> Simp[a^p*c^q*((e*x)^(m + 1)/(e*(m + 1)))*AppellF1[(m
+ 1)/n, -p, -q, 1 + (m + 1)/n, (-b)*(x^n/a), (-d)*(x^n/c)], x] /; FreeQ[{a,
 b, c, d, e, m, n, p, q}, x] && NeQ[b*c - a*d, 0] && NeQ[m, -1] && NeQ[m, n
 - 1] && (IntegerQ[p] || GtQ[a, 0]) && (IntegerQ[q] || GtQ[c, 0])
```

<u>Rule 525</u>

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_), x_Symbol] :> Dist[a^IntPart[p]*((a + b*x^n)^FracPart[p]/(1 + b*(x^
n/a))^FracPart[p]), Int[(e*x)^m*(1 + b*(x^n/a))^p*(c + d*x^n)^q, x], x] /;
FreeQ[{a, b, c, d, e, m, n, p, q}, x] && NeQ[b*c - a*d, 0] && NeQ[m, -1] &&
 NeQ[m, n - 1] &&  !(IntegerQ[p] || GtQ[a, 0])
```

Rule 593

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(m
 + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^(q + 1)/(a*g*n*(b*c - a*d)*(p + 1)))
, x] + Dist[1/(a*n*(b*c - a*d)*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c
 + d*x^n)^q*Simp[c*(b*e - a*f)*(m + 1) + e*n*(b*c - a*d)*(p + 1) + d*(b*e -
 a*f)*(m + n*(p + q + 2) + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g
, m, q}, x] && IGtQ[n, 0] && LtQ[p, -1]
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

$$\begin{aligned}
\text{integral} &= \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{2c(bc-ad)e\left(c+dx^2\right)} \\
&\quad+\frac{\int \frac{(ex)^m\left(a+bx^2\right)^p\left(2Abc-aAd(1-m)-aBc(1+m)-b(Bc-Ad)(1+m+2p)x^2\right)}{c+dx^2}\,dx}{2c(bc-ad)} \\
&= \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{2c(bc-ad)e\left(c+dx^2\right)} \\
&\quad+\frac{\int \left(-\frac{b(Bc-Ad)(1+m+2p)(ex)^m\left(a+bx^2\right)^p}{d}+\frac{(d(2Abc-aAd(1-m)-aBc(1+m))+bc(Bc-Ad)(1+m+2p))(ex)^m\left(a+bx^2\right)^p}{d\left(c+dx^2\right)}\right)dx}{2c(bc-ad)} \\
&= \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{2c(bc-ad)e\left(c+dx^2\right)}-\frac{(b(Bc-Ad)(1+m+2p))\int (ex)^m\left(a+bx^2\right)^p\,dx}{2cd(bc-ad)} \\
&\quad-\frac{(ad(Ad(1-m)+Bc(1+m))-bc(Ad(1-m-2p)+Bc(1+m+2p)))\int \frac{(ex)^m\left(a+bx^2\right)^p}{c+dx^2}\,dx}{2cd(bc-ad)}
\end{aligned}$$

$$= \frac{(Bc - Ad)(ex)^{1+m} (a + bx^2)^{1+p}}{2c(bc - ad)e (c + dx^2)}$$

$$- \frac{\left(b(Bc - Ad)(1 + m + 2p) (a + bx^2)^p \left(1 + \frac{bx^2}{a}\right)^{-p}\right) \int (ex)^m \left(1 + \frac{bx^2}{a}\right)^p dx}{2cd(bc - ad)}$$

$$- \frac{\left((ad(Ad(1 - m) + Bc(1 + m)) - bc(Ad(1 - m - 2p) + Bc(1 + m + 2p))) (a + bx^2)^p \left(1 + \frac{bx^2}{a}\right.\right.}{2cd(bc - ad)}$$

$$= \frac{(Bc - Ad)(ex)^{1+m} (a + bx^2)^{1+p}}{2c(bc - ad)e (c + dx^2)}$$

$$- \frac{(ad(Ad(1 - m) + Bc(1 + m)) - bc(Ad(1 - m - 2p) + Bc(1 + m + 2p)))(ex)^{1+m} (a + bx^2)^p \left(1\right.}{2c^2d(bc - ad)e(1 + m)}$$

$$- \frac{b(Bc - Ad)(1 + m + 2p)(ex)^{1+m} (a + bx^2)^p \left(1 + \frac{bx^2}{a}\right)^{-p} {}_2F_1\left(\frac{1+m}{2}, -p; \frac{3+m}{2}; -\frac{bx^2}{a}\right)}{2cd(bc - ad)e(1 + m)}$$

Mathematica [A] (verified)

Time = 0.38 (sec) , antiderivative size = 128, normalized size of antiderivative = 0.43

$$\int \frac{(ex)^m (a + bx^2)^p (A + Bx^2)}{(c + dx^2)^2} dx$$

$$= \frac{x(ex)^m (a + bx^2)^p \left(1 + \frac{bx^2}{a}\right)^{-p} \left(Bc \operatorname{AppellF1}\left(\frac{1+m}{2}, -p, 1, \frac{3+m}{2}, -\frac{bx^2}{a}, -\frac{dx^2}{c}\right) + (-Bc + Ad) \operatorname{AppellF1}\left(\frac{1\cdots}{}\right.\right.}{c^2d(1 + m)}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)^p*(A + B*x^2))/(c + d*x^2)^2,x]
[Out] (x*(e*x)^m*(a + b*x^2)^p*(B*c*AppellF1[(1 + m)/2, -p, 1, (3 + m)/2, -((b*x^
2)/a), -((d*x^2)/c)] + (-(B*c) + A*d)*AppellF1[(1 + m)/2, -p, 2, (3 + m)/2,
 -((b*x^2)/a), -((d*x^2)/c)]))/(c^2*d*(1 + m)*(1 + (b*x^2)/a)^p)
```

Maple [F]

$$\int \frac{(ex)^m (b\,x^2 + a)^p (x^2 B + A)}{(d\,x^2 + c)^2} dx$$

```
[In] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c)^2,x)
[Out] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c)^2,x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^2} dx = \int \frac{(Bx^2+A)(bx^2+a)^p(ex)^m}{(dx^2+c)^2} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="fricas")
[Out] integral((B*x^2 + A)*(b*x^2 + a)^p*(e*x)^m/(d^2*x^4 + 2*c*d*x^2 + c^2), x)
```

Sympy [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^2} dx = \text{Timed out}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**p*(B*x**2+A)/(d*x**2+c)**2,x)
[Out] Timed out
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^2} dx = \int \frac{(Bx^2+A)(bx^2+a)^p(ex)^m}{(dx^2+c)^2} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^p*(e*x)^m/(d*x^2 + c)^2, x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^2} dx = \int \frac{(Bx^2+A)(bx^2+a)^p(ex)^m}{(dx^2+c)^2} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c)^2,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^p*(e*x)^m/(d*x^2 + c)^2, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^2}\,dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(b\,x^2+a)^p}{(d\,x^2+c)^2}\,dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^p)/(c + d*x^2)^2,x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^p)/(c + d*x^2)^2, x)
```

3.49 $\int \frac{(ex)^m(a+bx^2)^p(A+Bx^2)}{(c+dx^2)^3} dx$

Optimal result

Integrand size = 31, antiderivative size = 483

$$\int \frac{(ex)^m\left(a+bx^2\right)^p\left(A+Bx^2\right)}{\left(c+dx^2\right)^3} dx = \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{4c(bc-ad)e\left(c+dx^2\right)^2}$$

$$+\frac{(ad(Ad(3-m)+Bc(1+m))+bc(Bc(1-m-2p)-Ad(5-m-2p)))(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{8c^2(bc-ad)^2e\left(c+dx^2\right)}$$

$$+\frac{\left(a^2d^2(1-m)(Ad(3-m)+Bc(1+m))-2abcd(Bc(1+m)(1-m-2p)+Ad(1-m)(3-m-2p))+\right.}{}$$

$$-\frac{b(ad(Ad(3-m)+Bc(1+m))+bc(Bc(1-m-2p)-Ad(5-m-2p)))(1+m+2p)(ex)^{1+m}\left(a+bx^2\right.}{8c^2d(bc-ad)^2e(1+m)}$$

```
[Out] 1/4*(-A*d+B*c)*(e*x)^(1+m)*(b*x^2+a)^(p+1)/c/(-a*d+b*c)/e/(d*x^2+c)^2+1/8*(
a*d*(A*d*(3-m)+B*c*(1+m))+b*c*(B*c*(1-m-2*p)-A*d*(5-m-2*p)))*(e*x)^(1+m)*(b
*x^2+a)^(p+1)/c^2/(-a*d+b*c)^2/e/(d*x^2+c)+1/8*(a^2*d^2*(1-m)*(A*d*(3-m)+B*
c*(1+m))-2*a*b*c*d*(B*c*(1+m)*(1-m-2*p)+A*d*(1-m)*(3-m-2*p))+b^2*c^2*(1-m-2
*p)*(A*d*(3-m-2*p)+B*c*(1+m+2*p)))*(e*x)^(1+m)*(b*x^2+a)^p*AppellF1(1/2+1/2
*m,-p,1,3/2+1/2*m,-b*x^2/a,-d*x^2/c)/c^3/d/(-a*d+b*c)^2/e/(1+m)/((1+b*x^2/a
)^p)-1/8*b*(a*d*(A*d*(3-m)+B*c*(1+m))+b*c*(B*c*(1-m-2*p)-A*d*(5-m-2*p)))*(1
+m+2*p)*(e*x)^(1+m)*(b*x^2+a)^p*hypergeom([-p, 1/2+1/2*m],[3/2+1/2*m],-b*x^
2/a)/c^2/d/(-a*d+b*c)^2/e/(1+m)/((1+b*x^2/a)^p)
```

Rubi [A] (verified)

Time = 0.70 (sec) , antiderivative size = 483, normalized size of antiderivative = 1.00, number of steps used = 8, number of rules used = 6, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.194, Rules used = {593, 598, 372, 371, 525, 524}

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^3} dx$$

$$= \frac{(ex)^{m+1} (a+bx^2)^p \left(\frac{bx^2}{a}+1\right)^{-p} (a^2d^2(1-m)(Ad(3-m)+Bc(m+1))-2abcd(Ad(1-m)(-m-2p+$$

$$-\frac{b(m+2p+1)(ex)^{m+1} (a+bx^2)^p \left(\frac{bx^2}{a}+1\right)^{-p} \text{Hypergeometric2F1}\left(\frac{m+1}{2},-p,\frac{m+3}{2},-\frac{bx^2}{a}\right) (ad(Ad(3-}{8c^2de(m+1)(bc-ad)^2}$$

$$+\frac{(ex)^{m+1} (a+bx^2)^{p+1} (ad(Ad(3-m)+Bc(m+1))+bc(Bc(-m-2p+1)-Ad(-m-2p+5)))}{8c^2e(c+dx^2)(bc-ad)^2}$$

$$+\frac{(ex)^{m+1} (a+bx^2)^{p+1} (Bc-Ad)}{4ce(c+dx^2)^2(bc-ad)}$$

```
[In] Int[((e*x)^m*(a + b*x^2)^p*(A + B*x^2))/(c + d*x^2)^3,x]
```

```
[Out] ((B*c - A*d)*(e*x)^(1 + m)*(a + b*x^2)^(1 + p))/(4*c*(b*c - a*d)*e*(c + d*x
^2)^2) + ((a*d*(A*d*(3 - m) + B*c*(1 + m)) + b*c*(B*c*(1 - m - 2*p) - A*d*(
5 - m - 2*p)))*(e*x)^(1 + m)*(a + b*x^2)^(1 + p))/(8*c^2*(b*c - a*d)^2*e*(c
 + d*x^2)) + ((a^2*d^2*(1 - m)*(A*d*(3 - m) + B*c*(1 + m)) - 2*a*b*c*d*(B*c
*(1 + m)*(1 - m - 2*p) + A*d*(1 - m)*(3 - m - 2*p)) + b^2*c^2*(1 - m - 2*p)
*(A*d*(3 - m - 2*p) + B*c*(1 + m + 2*p)))*(e*x)^(1 + m)*(a + b*x^2)^p*Appel
lF1[(1 + m)/2, -p, 1, (3 + m)/2, -((b*x^2)/a), -((d*x^2)/c)])/(8*c^3*d*(b*c
 - a*d)^2*e*(1 + m)*(1 + (b*x^2)/a)^p) - (b*(a*d*(A*d*(3 - m) + B*c*(1 + m)
) + b*c*(B*c*(1 - m - 2*p) - A*d*(5 - m - 2*p)))*(1 + m + 2*p)*(e*x)^(1 + m
)*(a + b*x^2)^p*Hypergeometric2F1[(1 + m)/2, -p, (3 + m)/2, -((b*x^2)/a)])/
(8*c^2*d*(b*c - a*d)^2*e*(1 + m)*(1 + (b*x^2)/a)^p)
```

Rule 371

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Simp[a^p
*((c*x)^(m + 1)/(c*(m + 1)))*Hypergeometric2F1[-p, (m + 1)/n, (m + 1)/n + 1
, (-b)*(x^n/a)], x] /; FreeQ[{a, b, c, m, n, p}, x] && !IGtQ[p, 0] && (ILt
Q[p, 0] || GtQ[a, 0])
```

Rule 372

```
Int[((c_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_), x_Symbol] :> Dist[a^I
ntPart[p]*((a + b*x^n)^FracPart[p]/(1 + b*(x^n/a))^FracPart[p]), Int[(c*x)^
m*(1 + b*(x^n/a))^p, x], x] /; FreeQ[{a, b, c, m, n, p}, x] && !IGtQ[p, 0]
```

```
 &&  !(ILtQ[p, 0] || GtQ[a, 0])
```

Rule 524

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_), x_Symbol] :> Simp[a^p*c^q*((e*x)^(m + 1)/(e*(m + 1)))*AppellF1[(m
+ 1)/n, -p, -q, 1 + (m + 1)/n, (-b)*(x^n/a), (-d)*(x^n/c)], x] /; FreeQ[{a,
 b, c, d, e, m, n, p, q}, x] && NeQ[b*c - a*d, 0] && NeQ[m, -1] && NeQ[m, n
 - 1] && (IntegerQ[p] || GtQ[a, 0]) && (IntegerQ[q] || GtQ[c, 0])
```

Rule 525

```
Int[((e_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_), x_Symbol] :> Dist[a^IntPart[p]*((a + b*x^n)^FracPart[p]/(1 + b*(x^
n/a))^FracPart[p]), Int[(e*x)^m*(1 + b*(x^n/a))^p*(c + d*x^n)^q, x], x] /;
FreeQ[{a, b, c, d, e, m, n, p, q}, x] && NeQ[b*c - a*d, 0] && NeQ[m, -1] &&
 NeQ[m, n - 1] &&  !(IntegerQ[p] || GtQ[a, 0])
```

Rule 593

```
Int[((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((c_) + (d_.)*(x_)^(n_
))^(q_)*((e_) + (f_.)*(x_)^(n_)), x_Symbol] :> Simp[(-(b*e - a*f))*(g*x)^(m
 + 1)*(a + b*x^n)^(p + 1)*((c + d*x^n)^(q + 1)/(a*g*n*(b*c - a*d)*(p + 1)))
, x] + Dist[1/(a*n*(b*c - a*d)*(p + 1)), Int[(g*x)^m*(a + b*x^n)^(p + 1)*(c
 + d*x^n)^q*Simp[c*(b*e - a*f)*(m + 1) + e*n*(b*c - a*d)*(p + 1) + d*(b*e -
 a*f)*(m + n*(p + q + 2) + 1)*x^n, x], x], x] /; FreeQ[{a, b, c, d, e, f, g
, m, q}, x] && IGtQ[n, 0] && LtQ[p, -1]
```

Rule 598

```
Int[(((g_.)*(x_))^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_)*((e_) + (f_.)*(x_)^(n
_)))/((c_) + (d_.)*(x_)^(n_)), x_Symbol] :> Int[ExpandIntegrand[(g*x)^m*(a
+ b*x^n)^p*((e + f*x^n)/(c + d*x^n)), x], x] /; FreeQ[{a, b, c, d, e, f, g,
 m, p}, x] && IGtQ[n, 0]
```

Rubi steps

$$\text{integral} = \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{4c(bc-ad)e\left(c+dx^2\right)^2} + \frac{\int \frac{(ex)^m\left(a+bx^2\right)^p\left(4Abc-aAd(3-m)-aBc(1+m)+b(Bc-Ad)(1-m-2p)x^2\right)}{\left(c+dx^2\right)^2}\,dx}{4c(bc-ad)}$$

$$= \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{4c(bc-ad)e\left(c+dx^2\right)^2}$$

$$+ \frac{(ad(Ad(3-m)+Bc(1+m))+bc(Bc(1-m-2p)-Ad(5-m-2p)))(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{8c^2(bc-ad)^2e\left(c+dx^2\right)}$$

$$+ \frac{\int \frac{(ex)^m\left(a+bx^2\right)^p\left(aBc(1+m)(ad(1-m)-bc(3-m-2p))+A\left(8b^2c^2+a^2d^2\left(3-4m+m^2\right)-abcd\left(9+m^2-2m(3-p)+2p\right)\right)+b(d(4Abc- \cdots\right.}{c+dx^2}}{8c^2(bc-ad)^2}$$

$$= \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{4c(bc-ad)e\left(c+dx^2\right)^2}$$

$$+ \frac{(ad(Ad(3-m)+Bc(1+m))+bc(Bc(1-m-2p)-Ad(5-m-2p)))(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{8c^2(bc-ad)^2e\left(c+dx^2\right)}$$

$$+ \frac{\int \left(\frac{b(d(4Abc-aAd(3-m)-aBc(1+m))-bc(Bc-Ad)(1-m-2p))(1+m+2p)(ex)^m\left(a+bx^2\right)^p}{d} + \frac{(-bc(d(4Abc-aAd(3-m)-aBc(\cdots}{\cdots}\right.}{\cdots}$$

$$= \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{4c(bc-ad)e\left(c+dx^2\right)^2}$$

$$+ \frac{(ad(Ad(3-m)+Bc(1+m))+bc(Bc(1-m-2p)-Ad(5-m-2p)))(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{8c^2(bc-ad)^2e\left(c+dx^2\right)}$$

$$- \frac{(b(ad(Ad(3-m)+Bc(1+m))+bc(Bc(1-m-2p)-Ad(5-m-2p)))(1+m+2p)) \int (ex \cdots}{8c^2d(bc-ad)^2}$$

$$+ \frac{(a^2d^2(1-m)(Ad(3-m)+Bc(1+m))-2abcd(Bc(1+m)(1-m-2p)+Ad(1-m)(3-m \cdots}{8c^2d(bc-ad \cdots}$$

$$= \frac{(Bc-Ad)(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{4c(bc-ad)e\left(c+dx^2\right)^2}$$

$$+ \frac{(ad(Ad(3-m)+Bc(1+m))+bc(Bc(1-m-2p)-Ad(5-m-2p)))(ex)^{1+m}\left(a+bx^2\right)^{1+p}}{8c^2(bc-ad)^2e\left(c+dx^2\right)}$$

$$- \frac{\left(b(ad(Ad(3-m)+Bc(1+m))+bc(Bc(1-m-2p)-Ad(5-m-2p)))(1+m+2p)\left(a+ \cdots\right.\right.}{8c^2d(bc-ad)^2}$$

$$+ \frac{\left((a^2d^2(1-m)(Ad(3-m)+Bc(1+m))-2abcd(Bc(1+m)(1-m-2p)+Ad(1-m)(3- \cdots\right.}{\cdots}$$

$$= \frac{(Bc - Ad)(ex)^{1+m} \left(a + bx^2\right)^{1+p}}{4c(bc - ad)e \left(c + dx^2\right)^2}$$

$$+ \frac{(ad(Ad(3 - m) + Bc(1 + m)) + bc(Bc(1 - m - 2p) - Ad(5 - m - 2p)))(ex)^{1+m} \left(a + bx^2\right)^{1+p}}{8c^2(bc - ad)^2 e \left(c + dx^2\right)}$$

$$+ \frac{(a^2d^2(1 - m)(Ad(3 - m) + Bc(1 + m)) - 2abcd(Bc(1 + m)(1 - m - 2p) + Ad(1 - m)(3 - m -}{}$$

$$- \frac{b(ad(Ad(3 - m) + Bc(1 + m)) + bc(Bc(1 - m - 2p) - Ad(5 - m - 2p)))(1 + m + 2p)(ex)^{1+m}}{8c^2d(bc - ad)^2e(1 + m)}$$

Mathematica [A] (verified)

Time = 0.55 (sec) , antiderivative size = 128, normalized size of antiderivative = 0.27

$$\int \frac{(ex)^m \left(a + bx^2\right)^p \left(A + Bx^2\right)}{\left(c + dx^2\right)^3} \, dx$$

$$= \frac{x(ex)^m \left(a + bx^2\right)^p \left(1 + \frac{bx^2}{a}\right)^{-p} \left(Bc \operatorname{AppellF1}\left(\frac{1+m}{2}, -p, 2, \frac{3+m}{2}, -\frac{bx^2}{a}, -\frac{dx^2}{c}\right) + (-Bc + Ad) \operatorname{AppellF1}\left(\frac{1+m}{2}\right.\right.}{c^3d(1 + m)}$$

```
[In] Integrate[((e*x)^m*(a + b*x^2)^p*(A + B*x^2))/(c + d*x^2)^3,x]
```

```
[Out] (x*(e*x)^m*(a + b*x^2)^p*(B*c*AppellF1[(1 + m)/2, -p, 2, (3 + m)/2, -((b*x^
2)/a), -((d*x^2)/c)] + (-(B*c) + A*d)*AppellF1[(1 + m)/2, -p, 3, (3 + m)/2,
 -((b*x^2)/a), -((d*x^2)/c)]))/(c^3*d*(1 + m)*(1 + (b*x^2)/a)^p)
```

Maple [F]

$$\int \frac{(ex)^m \left(b\,x^2 + a\right)^p \left(x^2B + A\right)}{\left(d\,x^2 + c\right)^3} dx$$

```
[In] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c)^3,x)
```

```
[Out] int((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c)^3,x)
```

Fricas [F]

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^3} dx = \int \frac{(Bx^2+A)(bx^2+a)^p(ex)^m}{(dx^2+c)^3} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="fricas")
[Out] integral((B*x^2 + A)*(b*x^2 + a)^p*(e*x)^m/(d^3*x^6 + 3*c*d^2*x^4 + 3*c^2*d
*x^2 + c^3), x)
```

Sympy [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^3} dx = \text{Timed out}$$

```
[In] integrate((e*x)**m*(b*x**2+a)**p*(B*x**2+A)/(d*x**2+c)**3,x)
[Out] Timed out
```

Maxima [F]

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^3} dx = \int \frac{(Bx^2+A)(bx^2+a)^p(ex)^m}{(dx^2+c)^3} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="maxima")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^p*(e*x)^m/(d*x^2 + c)^3, x)
```

Giac [F]

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^3} dx = \int \frac{(Bx^2+A)(bx^2+a)^p(ex)^m}{(dx^2+c)^3} dx$$

```
[In] integrate((e*x)^m*(b*x^2+a)^p*(B*x^2+A)/(d*x^2+c)^3,x, algorithm="giac")
[Out] integrate((B*x^2 + A)*(b*x^2 + a)^p*(e*x)^m/(d*x^2 + c)^3, x)
```

Mupad [F(-1)]

Timed out.

$$\int \frac{(ex)^m (a+bx^2)^p (A+Bx^2)}{(c+dx^2)^3} \, dx = \int \frac{(B\,x^2+A)\,(e\,x)^m\,(b\,x^2+a)^p}{(d\,x^2+c)^3} \, dx$$

```
[In] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^p)/(c + d*x^2)^3,x)
[Out] int(((A + B*x^2)*(e*x)^m*(a + b*x^2)^p)/(c + d*x^2)^3, x)
```

3.50 $\int \frac{\sqrt{a+bx^2}(A+Bx^2)(c+dx^2)}{x}\,dx$

Optimal result

Integrand size = 29, antiderivative size = 84

$$\int \frac{\sqrt{a+bx^2}(A+Bx^2)(c+dx^2)}{x}\,dx = Ac\sqrt{a+bx^2} - \frac{(a+bx^2)^{3/2}(2aBd-5b(Bc+Ad)-3bBdx^2)}{15b^2} - \sqrt{a}Ac\,\text{arctanh}\left(\frac{\sqrt{a+bx^2}}{\sqrt{a}}\right)$$

```
[Out] -1/15*(b*x^2+a)^(3/2)*(2*B*a*d-5*b*(A*d+B*c)-3*b*B*d*x^2)/b^2-A*c*arctanh((
b*x^2+a)^(1/2)/a^(1/2))*a^(1/2)+A*c*(b*x^2+a)^(1/2)
```

Rubi [A] (verified)

Time = 0.05 (sec) , antiderivative size = 84, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}}$ = 0.172, Rules used = {587, 152, 52, 65, 214}

$$\int \frac{\sqrt{a+bx^2}(A+Bx^2)(c+dx^2)}{x}\,dx = -\sqrt{a}Ac\,\text{arctanh}\left(\frac{\sqrt{a+bx^2}}{\sqrt{a}}\right) - \frac{(a+bx^2)^{3/2}(2aBd-5b(Ad+Bc)-3bBdx^2)}{15b^2} + Ac\sqrt{a+bx^2}$$

```
[In] Int[(Sqrt[a + b*x^2]*(A + B*x^2)*(c + d*x^2))/x,x]
```

```
[Out] A*c*Sqrt[a + b*x^2] - ((a + b*x^2)^(3/2)*(2*a*B*d - 5*b*(B*c + A*d) - 3*b*B
*d*x^2))/(15*b^2) - Sqrt[a]*A*c*ArcTanh[Sqrt[a + b*x^2]/Sqrt[a]]
```

Rule 52

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> Simp[
(a + b*x)^(m + 1)*((c + d*x)^n/(b*(m + n + 1))), x] + Dist[n*((b*c - a*d)/(
b*(m + n + 1))), Int[(a + b*x)^m*(c + d*x)^(n - 1), x], x] /; FreeQ[{a, b,
c, d}, x] && NeQ[b*c - a*d, 0] && GtQ[n, 0] && NeQ[m + n + 1, 0] &&  !(IGtQ
[m, 0] && ( !IntegerQ[n] || (GtQ[m, 0] && LtQ[m - n, 0]))) &&  !ILtQ[m + n
+ 2, 0] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 65

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - a*(d/b) +
d*(x^p/b))^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 152

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.)*((e_) + (f_.)*(x_
))*((g_.) + (h_.)*(x_)), x_Symbol] :> Simp[(-(a*d*f*h*(n + 2) + b*c*f*h*(m
+ 2) - b*d*(f*g + e*h)*(m + n + 3) - b*d*f*h*(m + n + 2)*x))*(a + b*x)^(m +
 1)*((c + d*x)^(n + 1)/(b^2*d^2*(m + n + 2)*(m + n + 3))), x] + Dist[(a^2*d
^2*f*h*(n + 1)*(n + 2) + a*b*d*(n + 1)*(2*c*f*h*(m + 1) - d*(f*g + e*h)*(m
+ n + 3)) + b^2*(c^2*f*h*(m + 1)*(m + 2) - c*d*(f*g + e*h)*(m + 1)*(m + n +
 3) + d^2*e*g*(m + n + 2)*(m + n + 3)))/(b^2*d^2*(m + n + 2)*(m + n + 3)),
Int[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, e, f, g, h, m, n}
, x] && NeQ[m + n + 2, 0] && NeQ[m + n + 3, 0]
```

Rule 214

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

Rule 587

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.
)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simpl
ify[(m + 1)/n] - 1)*(a + b*x)^p*(c + d*x)^q*(e + f*x)^r, x], x, x^n], x] /;
 FreeQ[{a, b, c, d, e, f, m, n, p, q, r}, x] && IntegerQ[Simplify[(m + 1)/n
]]
```

Rubi steps

$$\text{integral} = \frac{1}{2}\text{Subst}\left(\int \frac{\sqrt{a+bx}(A+Bx)(c+dx)}{x}\,dx, x, x^2\right)$$

$$
= -\frac{(a+bx^2)^{3/2}(2aBd-5b(Bc+Ad)-3bBdx^2)}{15b^2} + \frac{1}{2}(Ac)\text{Subst}\left(\int \frac{\sqrt{a+bx}}{x}\,dx, x, x^2\right)
$$

$$
= Ac\sqrt{a+bx^2} - \frac{(a+bx^2)^{3/2}(2aBd-5b(Bc+Ad)-3bBdx^2)}{15b^2} + \frac{1}{2}(aAc)\text{Subst}\left(\int \frac{1}{x\sqrt{a+bx}}\,dx, x, x^2\right)
$$

$$
= Ac\sqrt{a+bx^2} - \frac{(a+bx^2)^{3/2}(2aBd-5b(Bc+Ad)-3bBdx^2)}{15b^2} + \frac{(aAc)\text{Subst}\left(\int \frac{1}{-\frac{a}{b}+\frac{x^2}{b}}\,dx, x, \sqrt{a+bx^2}\right)}{b}
$$

$$
= Ac\sqrt{a+bx^2} - \frac{(a+bx^2)^{3/2}(2aBd-5b(Bc+Ad)-3bBdx^2)}{15b^2} - \sqrt{a}Ac\tanh^{-1}\left(\frac{\sqrt{a+bx^2}}{\sqrt{a}}\right)
$$

Mathematica [A] (verified)

Time = 0.12 (sec) , antiderivative size = 91, normalized size of antiderivative = 1.08

$$
\int \frac{\sqrt{a+bx^2}(A+Bx^2)(c+dx^2)}{x}\,dx = \frac{\sqrt{a+bx^2}(-B(a+bx^2)(-5bc+2ad-3bdx^2)+5Ab(3bc+ad+bdx^2))}{15b^2} - \sqrt{a}Ac\,\text{arctanh}\left(\frac{\sqrt{a+bx^2}}{\sqrt{a}}\right)
$$

```
[In] Integrate[(Sqrt[a + b*x^2]*(A + B*x^2)*(c + d*x^2))/x,x]
[Out] (Sqrt[a + b*x^2]*(-(B*(a + b*x^2)*(-5*b*c + 2*a*d - 3*b*d*x^2)) + 5*A*b*(3*
b*c + a*d + b*d*x^2)))/(15*b^2) - Sqrt[a]*A*c*ArcTanh[Sqrt[a + b*x^2]/Sqrt[
a]]
```

Maple [A] (verified)

Time = 3.40 (sec) , antiderivative size = 95, normalized size of antiderivative = 1.13

method	result
pseudoelliptic	$\frac{-3A\sqrt{a}\,b^2c\,\text{arctanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)+\left(\left(x^2\left(\frac{3d\,x^2}{5}+c\right)B+3\left(\frac{d\,x^2}{3}+c\right)A\right)b^2+\left(\left(\frac{d\,x^2}{5}+c\right)B+Ad\right)ab-\frac{2B\,a^2d}{5}\right)\sqrt{b\,x^2+a}}{3b^2}$
default	$Bd\left(\frac{x^2(b\,x^2+a)^{\frac{3}{2}}}{5b}-\frac{2a(b\,x^2+a)^{\frac{3}{2}}}{15b^2}\right)+\frac{Ad(b\,x^2+a)^{\frac{3}{2}}}{3b}+\frac{Bc(b\,x^2+a)^{\frac{3}{2}}}{3b}+Ac\left(\sqrt{b\,x^2+a}-\sqrt{a}\ln\left(\frac{2a+2\sqrt{}}{}\right.\right.$

```
[In] int((B*x^2+A)*(d*x^2+c)*(b*x^2+a)^(1/2)/x,x,method=_RETURNVERBOSE)
```

```
[Out] 1/3*(-3*A*a^(1/2)*b^2*c*arctanh((b*x^2+a)^(1/2)/a^(1/2))+((x^2*(3/5*d*x^2+c
)*B+3*(1/3*d*x^2+c)*A)*b^2+((1/5*d*x^2+c)*B+A*d)*a*b-2/5*B*a^2*d)*(b*x^2+a)
^(1/2))/b^2
```

Fricas [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 231, normalized size of antiderivative = 2.75

$$\int \frac{\sqrt{a+bx^2}(A+Bx^2)\,(c+dx^2)}{x}\,dx$$
$$= \left[\frac{15\,A\sqrt{a}b^2c\log\left(-\frac{bx^2-2\,\sqrt{bx^2+a}\sqrt{a}+2\,a}{x^2}\right)+2\,(3\,Bb^2dx^4+(5\,Bb^2c+(Bab+5\,Ab^2)d)x^2+5\,(Bab+3\,Ab^2)c-}{30\,b^2}\right.$$

```
[In] integrate((B*x^2+A)*(d*x^2+c)*(b*x^2+a)^(1/2)/x,x, algorithm="fricas")
```

```
[Out] [1/30*(15*A*sqrt(a)*b^2*c*log(-(b*x^2 - 2*sqrt(b*x^2 + a)*sqrt(a) + 2*a)/x^
2) + 2*(3*B*b^2*d*x^4 + (5*B*b^2*c + (B*a*b + 5*A*b^2)*d)*x^2 + 5*(B*a*b +
3*A*b^2)*c - (2*B*a^2 - 5*A*a*b)*d)*sqrt(b*x^2 + a))/b^2, 1/15*(15*A*sqrt(-
a)*b^2*c*arctan(sqrt(-a)/sqrt(b*x^2 + a)) + (3*B*b^2*d*x^4 + (5*B*b^2*c + (
B*a*b + 5*A*b^2)*d)*x^2 + 5*(B*a*b + 3*A*b^2)*c - (2*B*a^2 - 5*A*a*b)*d)*sq
rt(b*x^2 + a))/b^2]
```

Sympy [A] (verification not implemented)

Time = 9.66 (sec) , antiderivative size = 151, normalized size of antiderivative = 1.80

$$\int \frac{\sqrt{a+bx^2}(A+Bx^2)\,(c+dx^2)}{x}\,dx$$
$$= \frac{\begin{cases} \frac{2Aac\operatorname{atan}\left(\frac{\sqrt{a+bx^2}}{\sqrt{-a}}\right)}{\sqrt{-a}}+2Ac\sqrt{a+bx^2}+\frac{2Bd(a+bx^2)^{\frac{5}{2}}}{5b^2}+\frac{2(a+bx^2)^{\frac{3}{2}}(Abd-Bad+Bbc)}{3b^2} & \text{for } b\neq 0 \\ A\sqrt{a}c\log\left(x^2\right)+A\sqrt{a}dx^2+B\sqrt{a}cx^2+\frac{B\sqrt{a}dx^4}{2} & \text{otherwise} \end{cases}}{2}$$

```
[In] integrate((B*x**2+A)*(d*x**2+c)*(b*x**2+a)**(1/2)/x,x)
```

```
[Out] Piecewise((2*A*a*c*atan(sqrt(a + b*x**2)/sqrt(-a))/sqrt(-a) + 2*A*c*sqrt(a
+ b*x**2) + 2*B*d*(a + b*x**2)**(5/2)/(5*b**2) + 2*(a + b*x**2)**(3/2)*(A*b
*d - B*a*d + B*b*c)/(3*b**2), Ne(b, 0)), (A*sqrt(a)*c*log(x**2) + A*sqrt(a)
*d*x**2 + B*sqrt(a)*c*x**2 + B*sqrt(a)*d*x**4/2, True))/2
```

Maxima [A] (verification not implemented)

none

Time = 0.20 (sec) , antiderivative size = 100, normalized size of antiderivative = 1.19

$$\int \frac{\sqrt{a+bx^2}(A+Bx^2)\,(c+dx^2)}{x}\,dx = \frac{(bx^2+a)^{\frac{3}{2}}Bdx^2}{5\,b} - A\sqrt{a}c\,\mathrm{arsinh}\left(\frac{a}{\sqrt{ab}|x|}\right) + \sqrt{bx^2+a}Ac + \frac{(bx^2+a)^{\frac{3}{2}}Bc}{3\,b} - \frac{2\,(bx^2+a)^{\frac{3}{2}}Bad}{15\,b^2} + \frac{(bx^2+a)^{\frac{3}{2}}Ad}{3\,b}$$

```
[In] integrate((B*x^2+A)*(d*x^2+c)*(b*x^2+a)^(1/2)/x,x, algorithm="maxima")
```

```
[Out] 1/5*(b*x^2 + a)^(3/2)*B*d*x^2/b - A*sqrt(a)*c*arcsinh(a/(sqrt(a*b)*abs(x)))
 + sqrt(b*x^2 + a)*A*c + 1/3*(b*x^2 + a)^(3/2)*B*c/b - 2/15*(b*x^2 + a)^(3/
2)*B*a*d/b^2 + 1/3*(b*x^2 + a)^(3/2)*A*d/b
```

Giac [A] (verification not implemented)

none

Time = 0.28 (sec) , antiderivative size = 113, normalized size of antiderivative = 1.35

$$\int \frac{\sqrt{a+bx^2}(A+Bx^2)\,(c+dx^2)}{x}\,dx = \frac{Aac\arctan\left(\frac{\sqrt{bx^2+a}}{\sqrt{-a}}\right)}{\sqrt{-a}} + \frac{5\,(bx^2+a)^{\frac{3}{2}}Bb^9c + 15\,\sqrt{bx^2+a}Ab^{10}c + 3\,(bx^2+a)^{\frac{5}{2}}Bb^8d - 5\,(bx^2+a)^{\frac{3}{2}}Bab^8d + 5\,(bx^2+a)^{\frac{3}{2}}Ab^9d}{15\,b^{10}}$$

```
[In] integrate((B*x^2+A)*(d*x^2+c)*(b*x^2+a)^(1/2)/x,x, algorithm="giac")
```

```
[Out] A*a*c*arctan(sqrt(b*x^2 + a)/sqrt(-a))/sqrt(-a) + 1/15*(5*(b*x^2 + a)^(3/2)
*B*b^9*c + 15*sqrt(b*x^2 + a)*A*b^10*c + 3*(b*x^2 + a)^(5/2)*B*b^8*d - 5*(b
*x^2 + a)^(3/2)*B*a*b^8*d + 5*(b*x^2 + a)^(3/2)*A*b^9*d)/b^10
```

Mupad [B] (verification not implemented)

Time = 5.99 (sec) , antiderivative size = 101, normalized size of antiderivative = 1.20

$$\int \frac{\sqrt{a+bx^2}(A+Bx^2)\,(c+dx^2)}{x}\,dx = \sqrt{b\,x^2+a}\left(\frac{B\,d\,x^4}{5}-\frac{B\,a\,(2\,a\,d-5\,b\,c)}{15\,b^2}+\frac{B\,x^2\,(a\,d+5\,b\,c)}{15\,b}\right)+A\,c\,\sqrt{b\,x^2+a}+\frac{A\,d\,{(b\,x^2+a)}^{3/2}}{3\,b}-A\,\sqrt{a}\,c\,\mathrm{atanh}\left(\frac{\sqrt{b\,x^2+a}}{\sqrt{a}}\right)$$

```
[In] int(((A + B*x^2)*(a + b*x^2)^(1/2)*(c + d*x^2))/x,x)
```

```
[Out] (a + b*x^2)^(1/2)*((B*d*x^4)/5 - (B*a*(2*a*d - 5*b*c))/(15*b^2) + (B*x^2*(a
*d + 5*b*c))/(15*b)) + A*c*(a + b*x^2)^(1/2) + (A*d*(a + b*x^2)^(3/2))/(3*b
) - A*a^(1/2)*c*atanh((a + b*x^2)^(1/2)/a^(1/2))
```

3.51 $\int \frac{(a+bx^2)(A+Bx^2)\sqrt{c+dx^2}}{x}\,dx$

Optimal result

Integrand size = 29, antiderivative size = 84

$$\int \frac{(a+bx^2)(A+Bx^2)\sqrt{c+dx^2}}{x}\,dx = aA\sqrt{c+dx^2} - \frac{(c+dx^2)^{3/2}(2bBc-5(Ab+aB)d-3bBdx^2)}{15d^2} - aA\sqrt{c}\,\text{arctanh}\left(\frac{\sqrt{c+dx^2}}{\sqrt{c}}\right)$$

```
[Out] -1/15*(d*x^2+c)^(3/2)*(2*B*b*c-5*(A*b+B*a)*d-3*b*B*d*x^2)/d^2-a*A*arctanh((
d*x^2+c)^(1/2)/c^(1/2))*c^(1/2)+a*A*(d*x^2+c)^(1/2)
```

Rubi [A] (verified)

Time = 0.06 (sec) , antiderivative size = 84, normalized size of antiderivative = 1.00, number of steps used = 5, number of rules used = 5, $\frac{\text{number of rules}}{\text{integrand size}} = 0.172$, Rules used = {587, 152, 52, 65, 214}

$$\int \frac{(a+bx^2)(A+Bx^2)\sqrt{c+dx^2}}{x}\,dx = -aA\sqrt{c}\,\text{arctanh}\left(\frac{\sqrt{c+dx^2}}{\sqrt{c}}\right) - \frac{(c+dx^2)^{3/2}(-5d(aB+Ab)+2bBc-3bBdx^2)}{15d^2} + aA\sqrt{c+dx^2}$$

```
[In] Int[((a + b*x^2)*(A + B*x^2)*Sqrt[c + d*x^2])/x,x]
```

```
[Out] a*A*Sqrt[c + d*x^2] - ((c + d*x^2)^(3/2)*(2*b*B*c - 5*(A*b + a*B)*d - 3*b*B
*d*x^2))/(15*d^2) - a*A*Sqrt[c]*ArcTanh[Sqrt[c + d*x^2]/Sqrt[c]]
```

Rule 52

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> Simp[
(a + b*x)^(m + 1)*((c + d*x)^n/(b*(m + n + 1))), x] + Dist[n*((b*c - a*d)/(
b*(m + n + 1))), Int[(a + b*x)^m*(c + d*x)^(n - 1), x], x] /; FreeQ[{a, b,
c, d}, x] && NeQ[b*c - a*d, 0] && GtQ[n, 0] && NeQ[m + n + 1, 0] &&  !(IGtQ
[m, 0] && ( !IntegerQ[n] || (GtQ[m, 0] && LtQ[m - n, 0]))) &&  !ILtQ[m + n
+ 2, 0] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 65

```
Int[((a_.) + (b_.)*(x_))^(m_)*((c_.) + (d_.)*(x_))^(n_), x_Symbol] :> With[
{p = Denominator[m]}, Dist[p/b, Subst[Int[x^(p*(m + 1) - 1)*(c - a*(d/b) +
d*(x^p/b))^n, x], x, (a + b*x)^(1/p)], x]] /; FreeQ[{a, b, c, d}, x] && NeQ
[b*c - a*d, 0] && LtQ[-1, m, 0] && LeQ[-1, n, 0] && LeQ[Denominator[n], Den
ominator[m]] && IntLinearQ[a, b, c, d, m, n, x]
```

Rule 152

```
Int[((a_.) + (b_.)*(x_))^(m_.)*((c_.) + (d_.)*(x_))^(n_.)*((e_) + (f_.)*(x_
))*((g_.) + (h_.)*(x_)), x_Symbol] :> Simp[(-(a*d*f*h*(n + 2) + b*c*f*h*(m
+ 2) - b*d*(f*g + e*h)*(m + n + 3) - b*d*f*h*(m + n + 2)*x))*(a + b*x)^(m +
 1)*((c + d*x)^(n + 1)/(b^2*d^2*(m + n + 2)*(m + n + 3))), x] + Dist[(a^2*d
^2*f*h*(n + 1)*(n + 2) + a*b*d*(n + 1)*(2*c*f*h*(m + 1) - d*(f*g + e*h)*(m
+ n + 3)) + b^2*(c^2*f*h*(m + 1)*(m + 2) - c*d*(f*g + e*h)*(m + 1)*(m + n +
 3) + d^2*e*g*(m + n + 2)*(m + n + 3)))/(b^2*d^2*(m + n + 2)*(m + n + 3)),
Int[(a + b*x)^m*(c + d*x)^n, x], x] /; FreeQ[{a, b, c, d, e, f, g, h, m, n}
, x] && NeQ[m + n + 2, 0] && NeQ[m + n + 3, 0]
```

Rule 214

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

Rule 587

```
Int[(x_)^(m_.)*((a_) + (b_.)*(x_)^(n_))^(p_.)*((c_) + (d_.)*(x_)^(n_))^(q_.
)*((e_) + (f_.)*(x_)^(n_))^(r_.), x_Symbol] :> Dist[1/n, Subst[Int[x^(Simpl
ify[(m + 1)/n] - 1)*(a + b*x)^p*(c + d*x)^q*(e + f*x)^r, x], x, x^n], x] /;
 FreeQ[{a, b, c, d, e, f, m, n, p, q, r}, x] && IntegerQ[Simplify[(m + 1)/n
]]
```

Rubi steps

$$\text{integral} = \frac{1}{2}\text{Subst}\left(\int \frac{(a+bx)(A+Bx)\sqrt{c+dx}}{x}\,dx, x, x^2\right)$$

$$= -\frac{(c+dx^2)^{3/2}\,(2bBc-5(Ab+aB)d-3bBdx^2)}{15d^2} + \frac{1}{2}(aA)\text{Subst}\left(\int \frac{\sqrt{c+dx}}{x}\,dx, x, x^2\right)$$

$$= aA\sqrt{c+dx^2} - \frac{(c+dx^2)^{3/2}\,(2bBc-5(Ab+aB)d-3bBdx^2)}{15d^2} + \frac{1}{2}(aAc)\text{Subst}\left(\int \frac{1}{x\sqrt{c+dx}}\,dx, x, x^2\right)$$

$$= aA\sqrt{c+dx^2} - \frac{(c+dx^2)^{3/2}\,(2bBc-5(Ab+aB)d-3bBdx^2)}{15d^2} + \frac{(aAc)\text{Subst}\left(\int \frac{1}{-\frac{c}{d}+\frac{x^2}{d}}\,dx, x, \sqrt{c+dx^2}\right)}{d}$$

$$= aA\sqrt{c+dx^2} - \frac{(c+dx^2)^{3/2}\,(2bBc-5(Ab+aB)d-3bBdx^2)}{15d^2} - aA\sqrt{c}\tanh^{-1}\left(\frac{\sqrt{c+dx^2}}{\sqrt{c}}\right)$$

Mathematica [A] (verified)

Time = 0.12 (sec) , antiderivative size = 91, normalized size of antiderivative = 1.08

$$\int \frac{(a+bx^2)\,(A+Bx^2)\,\sqrt{c+dx^2}}{x}\,dx = \frac{\sqrt{c+dx^2}(-b(c+dx^2)\,(2Bc-5Ad-3Bdx^2)+5ad(3Ad+B(c+dx^2)))}{15d^2} - aA\sqrt{c}\text{arctanh}\left(\frac{\sqrt{c+dx^2}}{\sqrt{c}}\right)$$

```
[In] Integrate[((a + b*x^2)*(A + B*x^2)*Sqrt[c + d*x^2])/x,x]
```

```
[Out] (Sqrt[c + d*x^2]*(-(b*(c + d*x^2)*(2*B*c - 5*A*d - 3*B*d*x^2)) + 5*a*d*(3*A
*d + B*(c + d*x^2))))/(15*d^2) - a*A*Sqrt[c]*ArcTanh[Sqrt[c + d*x^2]/Sqrt[c
]]
```

Maple [A] (verified)

Time = 3.41 (sec) , antiderivative size = 95, normalized size of antiderivative = 1.13

method	result
pseudoelliptic	$\frac{-Aa\sqrt{c}\,d^2\,\mathrm{arctanh}\left(\frac{\sqrt{d\,x^2+c}}{\sqrt{c}}\right)+\sqrt{d\,x^2+c}\left(\left(\left(\frac{3b\,x^2}{5}+a\right)x^2B}{3}+A\left(\frac{b\,x^2}{3}+a\right)\right)d^2+\frac{c\left(\left(\frac{b\,x^2}{5}+a\right)B+Ab\right)d}{3}-\frac{2Bb\,c^2}{15}\right)}{d^2}$
default	$Bb\left(\frac{x^2(d\,x^2+c)^{\frac{3}{2}}}{5d}-\frac{2c(d\,x^2+c)^{\frac{3}{2}}}{15d^2}\right)+\frac{Ab(d\,x^2+c)^{\frac{3}{2}}}{3d}+\frac{Ba(d\,x^2+c)^{\frac{3}{2}}}{3d}+Aa\left(\sqrt{d\,x^2+c}-\sqrt{c}\,\ln\left(\frac{2c+2\sqrt{c}\ldots}{\ldots}\right.\right.$

```
[In] int((b*x^2+a)*(B*x^2+A)*(d*x^2+c)^(1/2)/x,x,method=_RETURNVERBOSE)
```

```
[Out] (-A*a*c^(1/2)*d^2*arctanh((d*x^2+c)^(1/2)/c^(1/2))+(d*x^2+c)^(1/2)*((1/3*(3
/5*b*x^2+a)*x^2*B+A*(1/3*b*x^2+a))*d^2+1/3*c*((1/5*b*x^2+a)*B+A*b)*d-2/15*B
*b*c^2))/d^2
```

Fricas [A] (verification not implemented)

none

Time = 0.26 (sec) , antiderivative size = 217, normalized size of antiderivative = 2.58

$$\int \frac{(a+bx^2)(A+Bx^2)\sqrt{c+dx^2}}{x}\,dx = \left[\frac{15\,Aa\sqrt{c}d^2\log\left(-\frac{dx^2-2\,\sqrt{dx^2+c}\sqrt{c}+2\,c}{x^2}\right)+2\,(3\,Bbd^2x^4-2\,Bbc^2+15\,Aad^2+5\,(Ba+Ab)cd+(Bbcd+5\,(B\ldots}{30\,d^2}\right.$$

```
[In] integrate((b*x^2+a)*(B*x^2+A)*(d*x^2+c)^(1/2)/x,x, algorithm="fricas")
```

```
[Out] [1/30*(15*A*a*sqrt(c)*d^2*log(-(d*x^2 - 2*sqrt(d*x^2 + c)*sqrt(c) + 2*c)/x^
2) + 2*(3*B*b*d^2*x^4 - 2*B*b*c^2 + 15*A*a*d^2 + 5*(B*a + A*b)*c*d + (B*b*c
*d + 5*(B*a + A*b)*d^2)*x^2)*sqrt(d*x^2 + c))/d^2, 1/15*(15*A*a*sqrt(-c)*d^
2*arctan(sqrt(-c)/sqrt(d*x^2 + c)) + (3*B*b*d^2*x^4 - 2*B*b*c^2 + 15*A*a*d^
2 + 5*(B*a + A*b)*c*d + (B*b*c*d + 5*(B*a + A*b)*d^2)*x^2)*sqrt(d*x^2 + c))
/d^2]
```

Sympy [A] (verification not implemented)

Time = 9.67 (sec) , antiderivative size = 151, normalized size of antiderivative = 1.80

$$\int \frac{(a+bx^2)(A+Bx^2)\sqrt{c+dx^2}}{x}\,dx = \frac{\begin{cases} \frac{2Aac\,\mathrm{atan}\left(\frac{\sqrt{c+dx^2}}{\sqrt{-c}}\right)}{\sqrt{-c}}+2Aa\sqrt{c+dx^2}+\frac{2Bb(c+dx^2)^{\frac{5}{2}}}{5d^2}+\frac{2(c+dx^2)^{\frac{3}{2}}(Abd+Bad-Bbc)}{3d^2} & \text{for } d\neq 0 \\ Aa\sqrt{c}\log(x^2)+Ab\sqrt{c}x^2+Ba\sqrt{c}x^2+\frac{Bb\sqrt{c}x^4}{2} & \text{otherwise} \end{cases}}{2}$$

```
[In] integrate((b*x**2+a)*(B*x**2+A)*(d*x**2+c)**(1/2)/x,x)
```

```
[Out] Piecewise((2*A*a*c*atan(sqrt(c + d*x**2)/sqrt(-c))/sqrt(-c) + 2*A*a*sqrt(c
+ d*x**2) + 2*B*b*(c + d*x**2)**(5/2)/(5*d**2) + 2*(c + d*x**2)**(3/2)*(A*b
*d + B*a*d - B*b*c)/(3*d**2), Ne(d, 0)), (A*a*sqrt(c)*log(x**2) + A*b*sqrt(
c)*x**2 + B*a*sqrt(c)*x**2 + B*b*sqrt(c)*x**4/2, True))/2
```

Maxima [A] (verification not implemented)

none

Time = 0.22 (sec) , antiderivative size = 100, normalized size of antiderivative = 1.19

$$\int \frac{(a+bx^2)(A+Bx^2)\sqrt{c+dx^2}}{x}\,dx = \frac{(dx^2+c)^{\frac{3}{2}}Bbx^2}{5\,d} - Aa\sqrt{c}\,\mathrm{arsinh}\left(\frac{c}{\sqrt{cd}|x|}\right) + \sqrt{dx^2+c}Aa - \frac{2\,(dx^2+c)^{\frac{3}{2}}Bbc}{15\,d^2} + \frac{(dx^2+c)^{\frac{3}{2}}Ba}{3\,d} + \frac{(dx^2+c)^{\frac{3}{2}}Ab}{3\,d}$$

```
[In] integrate((b*x^2+a)*(B*x^2+A)*(d*x^2+c)^(1/2)/x,x, algorithm="maxima")
```

```
[Out] 1/5*(d*x^2 + c)^(3/2)*B*b*x^2/d - A*a*sqrt(c)*arcsinh(c/(sqrt(c*d)*abs(x)))
 + sqrt(d*x^2 + c)*A*a - 2/15*(d*x^2 + c)^(3/2)*B*b*c/d^2 + 1/3*(d*x^2 + c)
^(3/2)*B*a/d + 1/3*(d*x^2 + c)^(3/2)*A*b/d
```

Giac [A] (verification not implemented)

none

Time = 0.29 (sec) , antiderivative size = 113, normalized size of antiderivative = 1.35

$$\int \frac{(a+bx^2)(A+Bx^2)\sqrt{c+dx^2}}{x}\,dx = \frac{Aac\arctan\left(\frac{\sqrt{dx^2+c}}{\sqrt{-c}}\right)}{\sqrt{-c}} + \frac{3\,(dx^2+c)^{\frac{5}{2}}Bbd^8 - 5\,(dx^2+c)^{\frac{3}{2}}Bbcd^8 + 5\,(dx^2+c)^{\frac{3}{2}}Bad^9 + 5\,(dx^2+c)^{\frac{3}{2}}Abd^9 + 15\,\sqrt{dx^2+c}Aad^{10}}{15\,d^{10}}$$

```
[In] integrate((b*x^2+a)*(B*x^2+A)*(d*x^2+c)^(1/2)/x,x, algorithm="giac")
```

```
[Out] A*a*c*arctan(sqrt(d*x^2 + c)/sqrt(-c))/sqrt(-c) + 1/15*(3*(d*x^2 + c)^(5/2)
*B*b*d^8 - 5*(d*x^2 + c)^(3/2)*B*b*c*d^8 + 5*(d*x^2 + c)^(3/2)*B*a*d^9 + 5*
(d*x^2 + c)^(3/2)*A*b*d^9 + 15*sqrt(d*x^2 + c)*A*a*d^10)/d^10
```

Mupad [B] (verification not implemented)

Time = 5.94 (sec) , antiderivative size = 101, normalized size of antiderivative = 1.20

$$\int \frac{(a+bx^2)(A+Bx^2)\sqrt{c+dx^2}}{x}\,dx = \sqrt{d\,x^2+c}\left(\frac{B\,b\,x^4}{5}+\frac{B\,c\,(5\,a\,d-2\,b\,c)}{15\,d^2}+\frac{B\,x^2\,(5\,a\,d+b\,c)}{15\,d}\right)+A\,a\,\sqrt{d\,x^2+c}-A\,a\,\sqrt{c}\,\mathrm{atanh}\left(\frac{\sqrt{d\,x^2+c}}{\sqrt{c}}\right)+\frac{A\,b\,{\left(d\,x^2+c\right)}^{3/2}}{3\,d}$$

```
[In] int(((A + B*x^2)*(a + b*x^2)*(c + d*x^2)^(1/2))/x,x)
```

```
[Out] (c + d*x^2)^(1/2)*((B*b*x^4)/5 + (B*c*(5*a*d - 2*b*c))/(15*d^2) + (B*x^2*(5
*a*d + b*c))/(15*d)) + A*a*(c + d*x^2)^(1/2) - A*a*c^(1/2)*atanh((c + d*x^2
)^(1/2)/c^(1/2)) + (A*b*(c + d*x^2)^(3/2))/(3*d)
```

CHAPTER 4

APPENDIX

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,leafCou
    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 "<>T
            ,
            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_coun
              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(le
        else:
            grade = "C"
            grade_annotation ="Result contains higher order function than in optimal. Order "+str(ExpnType_
```

```
    #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-t
   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 ("cought 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 th
        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_resul


print("Before returning. grade=",grade, " grade_annotation=",grade_annotation)

return grade, grade_annotation
```