

# Reverse regression test report. CAS integration tests. Rubi 4.17.3 vs. Rubi 4.16.1 under Mathematica 13.3.1

Nasser M. Abbasi

November 17, 2023

Compiled on November 17, 2023 at 3:46am

## Contents

<b>1</b>	<b>Table summary of progress report</b>	<b>2</b>
<b>2</b>	<b>Test file number 209</b>	<b>5</b>
<b>3</b>	<b>Test file number 210</b>	<b>23</b>
<b>4</b>	<b>Test file number 211</b>	<b>48</b>

# 1 Table summary of progress report

Table 1: Table summary of progress report

#	test file #	integral #	Rubi 4.17.3 under Mathematica 13.3.1	Rubi 4.16.1 under Mathematica 13.3.1
1	209	514	1 (pass)	-1 (time out)
2	209	539	1 (pass)	0 (not solved)
3	209	540	1 (pass)	0 (not solved)
4	209	568	1 (pass)	-1 (time out)
5	209	637	1 (pass)	0 (not solved)
6	209	638	1 (pass)	0 (not solved)
7	209	657	1 (pass)	0 (not solved)
8	209	677	1 (pass)	0 (not solved)
9	209	874	1 (pass)	0 (not solved)
10	209	946	1 (pass)	0 (not solved)
11	209	972	1 (pass)	0 (not solved)
12	209	985	1 (pass)	0 (not solved)
13	209	1009	1 (pass)	0 (not solved)
14	209	1045	1 (pass)	0 (not solved)
15	209	1061	1 (pass)	0 (not solved)
16	209	1125	1 (pass)	0 (not solved)
17	209	1770	1 (pass)	0 (not solved)
18	209	1771	1 (pass)	0 (not solved)
19	209	2229	1 (pass)	0 (not solved)
20	209	2230	1 (pass)	0 (not solved)
21	209	2231	1 (pass)	0 (not solved)
22	209	2232	1 (pass)	0 (not solved)
23	209	2357	1 (pass)	0 (not solved)
24	209	2667	1 (pass)	0 (not solved)

Continued on next page

Table 1 – continued from previous page

#	test file #	integral #	Rubi 4.17.3 under Mathematica 13.3.1	Rubi 4.16.1 under Mathematica 13.3.1
25	209	2668	1 (pass)	0 (not solved)
26	209	2964	1 (pass)	0 (not solved)
27	209	2965	1 (pass)	0 (not solved)
28	210	98	1 (pass)	0 (not solved)
29	210	327	1 (pass)	0 (not solved)
30	210	374	1 (pass)	0 (not solved)
31	210	856	1 (pass)	0 (not solved)
32	210	1137	1 (pass)	0 (not solved)
33	210	1241	1 (pass)	-1 (time out)
34	210	1451	1 (pass)	0 (not solved)
35	210	1465	1 (pass)	0 (not solved)
36	210	1677	1 (pass)	0 (not solved)
37	210	1711	1 (pass)	0 (not solved)
38	210	1761	1 (pass)	0 (not solved)
39	210	1911	1 (pass)	0 (not solved)
40	210	2067	1 (pass)	0 (not solved)
41	210	2159	1 (pass)	-1 (time out)
42	210	2167	1 (pass)	0 (not solved)
43	210	2218	1 (pass)	0 (not solved)
44	210	2239	1 (pass)	0 (not solved)
45	210	3222	1 (pass)	0 (not solved)
46	210	3912	1 (pass)	0 (not solved)
47	210	4078	1 (pass)	0 (not solved)
48	210	4594	1 (pass)	0 (not solved)
49	210	4711	1 (pass)	0 (not solved)
50	210	4744	1 (pass)	0 (not solved)

Continued on next page

Table 1 – continued from previous page

#	test file #	integral #	Rubi 4.17.3 under Mathematica 13.3.1	Rubi 4.16.1 under Mathematica 13.3.1
51	210	5610	1 (pass)	0 (not solved)
52	210	5924	1 (pass)	0 (not solved)
53	210	6144	1 (pass)	-1 (time out)
54	210	7238	1 (pass)	0 (not solved)
55	210	7254	1 (pass)	0 (not solved)
56	210	7500	1 (pass)	0 (not solved)
57	210	7715	1 (pass)	0 (not solved)
58	210	7758	1 (pass)	0 (not solved)
59	210	7911	1 (pass)	0 (not solved)
60	210	8564	1 (pass)	0 (not solved)
61	210	8627	1 (pass)	0 (not solved)
62	210	8679	1 (pass)	0 (not solved)
63	210	8755	1 (pass)	0 (not solved)
64	210	8869	1 (pass)	0 (not solved)
65	210	9068	1 (pass)	0 (not solved)
66	210	9153	1 (pass)	-1 (time out)
67	210	9410	1 (pass)	0 (not solved)
68	210	9671	1 (pass)	0 (not solved)
69	210	9738	1 (pass)	0 (not solved)
70	210	10166	1 (pass)	-1 (time out)
71	211	20	1 (pass)	0 (not solved)
72	211	257	1 (pass)	0 (not solved)

## 2 Test file number 209

Test folder name:

test\_cases/209\_Blake\_problems

### 2.1 Problem number 514

$$\int \frac{(2 + x^3) \sqrt{-1 + x^2 + x^3}}{(-1 + x^3)^2} dx$$

Optimal antiderivative

$$-\frac{x\sqrt{x^3 + x^2 - 1}}{x^3 - 1} - \operatorname{arctanh}\left(\frac{x}{\sqrt{x^3 + x^2 - 1}}\right)$$

command

```
Int[((2 + x^3)*Sqrt[-1 + x^2 + x^3])/(-1 + x^3)^2,x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

\$Aborted

### 2.2 Problem number 539

$$\int \frac{(-1 + x^3) \sqrt{-1 + x^6}}{x^7(1 + x^3)} dx$$

Optimal antiderivative

$$\frac{(-4x^3 + 1) \sqrt{x^6 - 1}}{6x^6} - \arctan\left(\frac{x^3 + 1}{\sqrt{x^6 - 1}}\right)$$

command

```
Int[((-1 + x^3)*Sqrt[-1 + x^6])/(x^7*(1 + x^3)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{\sqrt{x^6 - 1} \arctan(\sqrt{x^3 - 1}\sqrt{x^3 + 1})}{2\sqrt{x^3 - 1}\sqrt{x^3 + 1}} + \frac{\sqrt{x^6 - 1}(1 - x^3)}{6x^6} - \frac{\sqrt{x^6 - 1}}{2x^3}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{(-1 + x^3) \sqrt{-1 + x^6}}{x^7 (1 + x^3)} dx$$

## 2.3 Problem number 540

$$\int \frac{(1 + x^3) \sqrt{-1 + x^6}}{x^7 (-1 + x^3)} dx$$

Optimal antiderivative

$$\frac{(4x^3 + 1) \sqrt{x^6 - 1}}{6x^6} - \arctan\left(\frac{x^3 + 1}{\sqrt{x^6 - 1}}\right)$$

command

`Int[((1 + x^3)*Sqrt[-1 + x^6])/(x^7*(-1 + x^3)),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{\sqrt{x^6 - 1} \arctan(\sqrt{x^3 - 1}\sqrt{x^3 + 1})}{2\sqrt{x^3 - 1}\sqrt{x^3 + 1}} + \frac{\sqrt{x^6 - 1}(x^3 + 1)}{6x^6} + \frac{\sqrt{x^6 - 1}}{2x^3}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{(1 + x^3) \sqrt{-1 + x^6}}{x^7 (-1 + x^3)} dx$$

## 2.4 Problem number 568

$$\int \frac{(-2 + x^3) \sqrt{1 - x^2 + x^3}}{(1 + x^3)^2} dx$$

Optimal antiderivative

$$-\frac{x\sqrt{x^3 - x^2 + 1}}{x^3 + 1} - \arctan\left(\frac{x}{\sqrt{x^3 - x^2 + 1}}\right)$$

command

```
Int[((-2 + x^3)*Sqrt[1 - x^2 + x^3])/(1 + x^3)^2,x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

\$Aborted

## 2.5 Problem number 637

$$\int \frac{(-1 + x^3) \sqrt{-1 + x^6}}{x(1 + x^3)} dx$$

Optimal antiderivative

$$\frac{\sqrt{x^6 - 1}}{3} + \frac{2 \arctan(x^3 + \sqrt{x^6 - 1})}{3} - \frac{2 \ln(x^3 + \sqrt{x^6 - 1})}{3}$$

command

```
Int[((-1 + x^3)*Sqrt[-1 + x^6])/(x*(1 + x^3)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$-\frac{2\sqrt{x^6 - 1} \operatorname{arccosh}(x^3)}{3\sqrt{x^3 - 1}\sqrt{x^3 + 1}} + \frac{\sqrt{x^6 - 1} \arctan(\sqrt{x^3 - 1}\sqrt{x^3 + 1})}{3\sqrt{x^3 - 1}\sqrt{x^3 + 1}} + \frac{\sqrt{x^6 - 1}}{3}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{(-1 + x^3) \sqrt{-1 + x^6}}{x(1 + x^3)} dx$$

## 2.6 Problem number 638

$$\int \frac{(1 + x^3) \sqrt{-1 + x^6}}{x(-1 + x^3)} dx$$

Optimal antiderivative

$$\frac{\sqrt{x^6-1}}{3} + \frac{2 \arctan(x^3 + \sqrt{x^6-1})}{3} + \frac{2 \ln(x^3 + \sqrt{x^6-1})}{3}$$

command

`Int[((1 + x^3)*Sqrt[-1 + x^6])/(x*(-1 + x^3)),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{2\sqrt{x^6-1} \operatorname{arccosh}(x^3)}{3\sqrt{x^3-1}\sqrt{x^3+1}} + \frac{\sqrt{x^6-1} \arctan(\sqrt{x^3-1}\sqrt{x^3+1})}{3\sqrt{x^3-1}\sqrt{x^3+1}} + \frac{\sqrt{x^6-1}}{3}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{(1+x^3)\sqrt{-1+x^6}}{x(-1+x^3)} dx$$

## 2.7 Problem number 657

$$\int \frac{(1+x^3)\sqrt{-1+x^6}}{x^{13}(-1+x^3)} dx$$

Optimal antiderivative

$$\frac{\sqrt{x^6-1}(32x^9 + 21x^6 + 16x^3 + 6)}{72x^{12}} + \frac{7 \arctan(x^3 + \sqrt{x^6-1})}{12}$$

command

`Int[((1 + x^3)*Sqrt[-1 + x^6])/(x^13*(-1 + x^3)),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{7\sqrt{x^6-1} \arctan(\sqrt{x^3-1}\sqrt{x^3+1})}{24\sqrt{x^3-1}\sqrt{x^3+1}} + \frac{7\sqrt{x^6-1}}{24x^6} + \frac{\sqrt{x^6-1}}{12x^{12}} + \frac{2\sqrt{x^6-1}}{9x^9} + \frac{4\sqrt{x^6-1}}{9x^3}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{(1+x^3)\sqrt{-1+x^6}}{x^{13}(-1+x^3)} dx$$



## 2.8 Problem number 677

$$\int \frac{(-1 + x^3) \sqrt{-1 + x^6}}{x^4 (1 + x^3)} dx$$

Optimal antiderivative

$$\frac{\sqrt{x^6 - 1}}{3x^3} - \frac{4 \arctan(x^3 + \sqrt{x^6 - 1})}{3} + \frac{\ln(x^3 + \sqrt{x^6 - 1})}{3}$$

command

`Int[((-1 + x^3)*Sqrt[-1 + x^6])/(x^4*(1 + x^3)),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{\sqrt{x^6 - 1} \operatorname{arccosh}(x^3)}{3\sqrt{x^3 - 1}\sqrt{x^3 + 1}} - \frac{2\sqrt{x^6 - 1} \arctan(\sqrt{x^3 - 1}\sqrt{x^3 + 1})}{3\sqrt{x^3 - 1}\sqrt{x^3 + 1}} + \frac{\sqrt{x^6 - 1}}{3x^3}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{(-1 + x^3) \sqrt{-1 + x^6}}{x^4 (1 + x^3)} dx$$

## 2.9 Problem number 874

$$\int \frac{(-a + x)(-b + x)(-ab + x^2)}{x \sqrt{x(-a + x)(-b + x)} (ab - (a + b + d)x + x^2)} dx$$

Optimal antiderivative

$$\frac{2\sqrt{abx + (-a - b)x^2 + x^3}}{x} - 2\sqrt{d} \operatorname{arctanh}\left(\frac{\sqrt{d}x}{\sqrt{abx + (-a - b)x^2 + x^3}}\right)$$

command

`Int[((-a + x)*(-b + x)*(-a*b) + x^2))/(x*Sqrt[x*(-a + x)*(-b + x)]*(a*b - (a + b + d)*`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\begin{aligned}
& \frac{2(x^2 - (a+b)x + ab)}{\sqrt{(a-x)(b-x)x}} - \frac{2\sqrt{d}\sqrt{x}\operatorname{arctanh}\left(\frac{\sqrt{d}\sqrt{x}}{\sqrt{x^2-(a+b)x+ab}}\right)\sqrt{x^2-(a+b)x+ab}}{\sqrt{(a-x)(b-x)x}} \\
& + \frac{d\sqrt{x}(x + \sqrt{a}\sqrt{b})\sqrt{\frac{x^2-(a+b)x+ab}{(x+\sqrt{a}\sqrt{b})^2}}\operatorname{EllipticF}\left(2\arctan\left(\frac{\sqrt{x}}{\sqrt[4]{a}\sqrt[4]{b}}\right), \frac{1}{4}\left(\frac{a+b}{\sqrt{a}\sqrt{b}} + 2\right)\right)}{\sqrt[4]{a}\sqrt[4]{b}\sqrt{(a-x)(b-x)x}} \\
& - \frac{d(a+b+d - \sqrt{a^2 - 2(b-d)a + (b+d)^2})\sqrt{x}(x + \sqrt{a}\sqrt{b})\sqrt{\frac{x^2-(a+b)x+ab}{(x+\sqrt{a}\sqrt{b})^2}}\operatorname{EllipticF}\left(2\arctan\left(\frac{\sqrt{x}}{\sqrt[4]{a}\sqrt[4]{b}}\right)\right)}{\sqrt[4]{a}\sqrt[4]{b}(a + 2\sqrt{b}\sqrt{a} + b + d - \sqrt{a^2 - 2(b-d)a + (b+d)^2})\sqrt{(a-x)(b-x)x}} \\
& - \frac{d(a+b+d + \sqrt{a^2 - 2(b-d)a + (b+d)^2})\sqrt{x}(x + \sqrt{a}\sqrt{b})\sqrt{\frac{x^2-(a+b)x+ab}{(x+\sqrt{a}\sqrt{b})^2}}\operatorname{EllipticF}\left(2\arctan\left(\frac{\sqrt{x}}{\sqrt[4]{a}\sqrt[4]{b}}\right)\right)}{\sqrt[4]{a}\sqrt[4]{b}(a + 2\sqrt{b}\sqrt{a} + b + d + \sqrt{a^2 - 2(b-d)a + (b+d)^2})\sqrt{(a-x)(b-x)x}} \\
& + \frac{d(a - 2\sqrt{b}\sqrt{a} + b + d - \sqrt{a^2 - 2(b-d)a + (b+d)^2})\sqrt{x}(x + \sqrt{a}\sqrt{b})\sqrt{\frac{x^2-(a+b)x+ab}{(x+\sqrt{a}\sqrt{b})^2}}\operatorname{EllipticPi}\left(\frac{a+2\sqrt{b}\sqrt{a}}{4\sqrt{a}}\right)}{2\sqrt[4]{a}\sqrt[4]{b}(a + 2\sqrt{b}\sqrt{a} + b + d - \sqrt{a^2 - 2(b-d)a + (b+d)^2})\sqrt{(a-x)x}} \\
& + \frac{d(a - 2\sqrt{b}\sqrt{a} + b + d + \sqrt{a^2 - 2(b-d)a + (b+d)^2})\sqrt{x}(x + \sqrt{a}\sqrt{b})\sqrt{\frac{x^2-(a+b)x+ab}{(x+\sqrt{a}\sqrt{b})^2}}\operatorname{EllipticPi}\left(\frac{a+2\sqrt{b}\sqrt{a}}{4\sqrt{a}}\right)}{2\sqrt[4]{a}\sqrt[4]{b}(a + 2\sqrt{b}\sqrt{a} + b + d + \sqrt{a^2 - 2(b-d)a + (b+d)^2})\sqrt{(a-x)x}}
\end{aligned}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{(-a+x)(-b+x)(-ab+x^2)}{x\sqrt{x(-a+x)(-b+x)}(ab-(a+b+d)x+x^2)} dx$$

## 2.10 Problem number 946

$$\int \frac{\sqrt[3]{1+2x+x^2}}{4+x+x^2+x^3} dx$$

Optimal antiderivative

Unintegrable

command

`Int[(1 + 2*x + x^2)^(1/3)/(4 + x + x^2 + x^3), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{\sqrt[3]{1+2x+x^2}}{4+x+x^2+x^3} dx$$

## 2.11 Problem number 972

$$\int \frac{\sqrt[4]{-1+3x-3x^2+x^3}}{-1-2x+x^2+3x^3} dx$$

Optimal antiderivative

Unintegrable

command

```
Int[(-1 + 3*x - 3*x^2 + x^3)^(1/4)/(-1 - 2*x + x^2 + 3*x^3),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{\sqrt[4]{-1+3x-3x^2+x^3}}{-1-2x+x^2+3x^3} dx$$

## 2.12 Problem number 985

$$\int \frac{1}{\sqrt[4]{-1+3x-3x^2+x^3}(-1-2x+x^2+3x^3)} dx$$

Optimal antiderivative

Unintegrable

command

```
Int[1/((-1 + 3*x - 3*x^2 + x^3)^(1/4)*(-1 - 2*x + x^2 + 3*x^3)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{1}{\sqrt[4]{-1+3x-3x^2+x^3}(-1-2x+x^2+3x^3)} dx$$

### 2.13 Problem number 1009

$$\int \frac{x(-b+x)(ab-2ax+x^2)}{(-a+x)\sqrt{x(-a+x)(-b+x)}(ad+(-b-d)x+x^2)} dx$$

Optimal antiderivative

$$-\frac{2\sqrt{abx+(-a-b)x^2+x^3}}{a-x} + 2\sqrt{d} \operatorname{arctanh}\left(\frac{\sqrt{abx+(-a-b)x^2+x^3}}{\sqrt{d}(a-x)}\right)$$

command

```
Int[(x*(-b+x)*(a*b-2*a*x+x^2))/((-a+x)*Sqrt[x*(-a+x)*(-b+x)]*(a*d+(-b-d)*x+x^2)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{x(-b+x)(ab-2ax+x^2)}{(-a+x)\sqrt{x(-a+x)(-b+x)}(ad+(-b-d)x+x^2)} dx$$

### 2.14 Problem number 1045

$$\int \frac{-abx+x^3}{(-a+x)(-b+x)\sqrt{x(-a+x)(-b+x)}(abd-(1+ad+bd)x+dx^2)} dx$$

Optimal antiderivative

$$\frac{2\sqrt{abx-ax^2-bx^2+x^3}}{(-a+x)(-b+x)} - 2\sqrt{d} \operatorname{arctanh}\left(\frac{x}{\sqrt{d}\sqrt{abx+(-a-b)x^2+x^3}}\right)$$

command

```
Int[(-a*b*x+x^3)/((-a+x)*(-b+x)*Sqrt[x*(-a+x)*(-b+x)]*(a*b*d-(1+a*d+b*d)*x+dx^2)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-abx+x^3}{(-a+x)(-b+x)\sqrt{x(-a+x)(-b+x)}(abd-(1+ad+bd)x+dx^2)} dx$$

## 2.15 Problem number 1061

$$\int \frac{-a^2b + a(2a + b)x - 3ax^2 + x^3}{x(-b + x)\sqrt{x(-a + x)(-b + x)(a - (1 + bd)x + dx^2)}} dx$$

Optimal antiderivative

$$\frac{2\sqrt{abx + (-a - b)x^2 + x^3}}{x(-b + x)} + 2\sqrt{d} \operatorname{arctanh}\left(\frac{\sqrt{d}\sqrt{abx + (-a - b)x^2 + x^3}}{a - x}\right)$$

command

```
Int[(-(a^2*b) + a*(2*a + b)*x - 3*a*x^2 + x^3)/(x*(-b + x)*Sqrt[x*(-a + x)*(-b + x)]*(a - (1 + b*d)*x + d*x^2)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\begin{aligned}
& \frac{2\left(bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{b}} E\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right) \middle| \frac{b}{a}\right) (a-x)}{\sqrt{b} \left(-bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x} \sqrt{1 - \frac{x}{a}}} \\
& + \frac{2\left(bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{b}} E\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right) \middle| \frac{b}{a}\right) (a-x)}{\sqrt{b} \left(-bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x} \sqrt{1 - \frac{x}{a}}} \\
& - \frac{4\sqrt{x} \sqrt{1 - \frac{x}{b}} E\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right) \middle| \frac{b}{a}\right) (a-x)}{\sqrt{b} \sqrt{(a-x)(b-x)x} \sqrt{1 - \frac{x}{a}}} - \frac{4(b-x)(a-x)}{b \sqrt{(a-x)(b-x)x}} - \frac{4x(a-x)}{b \sqrt{(a-x)(b-x)x}} \\
& + \frac{2(a-x)}{\sqrt{(a-x)(b-x)x}} - \frac{4\sqrt{ad}(b-x) \sqrt{x} \sqrt{1 - \frac{x}{a}} E\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{a}}\right) \middle| \frac{a}{b}\right)}{\left(-bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x} \sqrt{1 - \frac{x}{b}}} \\
& - \frac{4\sqrt{ad}(b-x) \sqrt{x} \sqrt{1 - \frac{x}{a}} E\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{a}}\right) \middle| \frac{a}{b}\right)}{\left(-bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x} \sqrt{1 - \frac{x}{b}}} \\
& + \frac{2\sqrt{b} \left(-2ad + bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right), \frac{b}{a}\right)}{\left(-bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x}} \\
& + \frac{2\sqrt{b} \left(-2ad + bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right), \frac{b}{a}\right)}{\left(-bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x}} \\
& - \frac{4a\sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right), \frac{b}{a}\right)}{\sqrt{b} \sqrt{(a-x)(b-x)x}} \\
& + \frac{2(2a-b) \sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right), \frac{b}{a}\right)}{\sqrt{b} \sqrt{(a-x)(b-x)x}} \\
& - \frac{\sqrt{a} \left(-bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticPi}\left(\frac{2ad}{bd - \sqrt{(bd+1)^2 - 4ad} + 1}, \arcsin\left(\frac{\sqrt{x}}{\sqrt{a}}\right), \frac{a}{b}\right)}{\sqrt{(a-x)(b-x)x}} \\
& - \frac{\sqrt{a} \left(-bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticPi}\left(\frac{2ad}{bd + \sqrt{(bd+1)^2 - 4ad} + 1}, \arcsin\left(\frac{\sqrt{x}}{\sqrt{a}}\right), \frac{a}{b}\right)}{\sqrt{(a-x)(b-x)x}}
\end{aligned}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-a^2b + a(2a+b)x - 3ax^2 + x^3}{x(-b+x) \sqrt{x(-a+x)(-b+x)} (a - (1+bd)x + dx^2)} dx$$

## 2.16 Problem number 1125

$$\int \frac{a^2b - a(2a + b)x + 3ax^2 - x^3}{x(-b + x)\sqrt{x(-a + x)(-b + x)}(a + (-1 - bd)x + dx^2)} dx$$

Optimal antiderivative

$$\frac{2\sqrt{abx - ax^2 - bx^2 + x^3}}{(b - x)x} + 2\sqrt{d} \operatorname{arctanh} \left( \frac{\sqrt{abx + (-a - b)x^2 + x^3}}{\sqrt{d}x(-b + x)} \right)$$

command

```
Int[(a^2*b - a*(2*a + b)*x + 3*a*x^2 - x^3)/(x*(-b + x)*Sqrt[x*(-a + x)*(-b + x)]*(a + 1 - b*d)*x + d*x^2),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\begin{aligned}
& \frac{2\left(bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{b}} E\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right) \middle| \frac{b}{a}\right) (a-x)}{\sqrt{b} \left(-bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x} \sqrt{1 - \frac{x}{a}}} \\
& - \frac{2\left(bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{b}} E\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right) \middle| \frac{b}{a}\right) (a-x)}{\sqrt{b} \left(-bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x} \sqrt{1 - \frac{x}{a}}} \\
& + \frac{4\sqrt{x} \sqrt{1 - \frac{x}{b}} E\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right) \middle| \frac{b}{a}\right) (a-x)}{\sqrt{b} \sqrt{(a-x)(b-x)x} \sqrt{1 - \frac{x}{a}}} + \frac{4(b-x)(a-x)}{b \sqrt{(a-x)(b-x)x}} + \frac{4x(a-x)}{b \sqrt{(a-x)(b-x)x}} \\
& - \frac{2(a-x)}{\sqrt{(a-x)(b-x)x}} + \frac{4\sqrt{ad}(b-x) \sqrt{x} \sqrt{1 - \frac{x}{a}} E\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{a}}\right) \middle| \frac{a}{b}\right)}{\left(-bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x} \sqrt{1 - \frac{x}{b}}} \\
& + \frac{4\sqrt{ad}(b-x) \sqrt{x} \sqrt{1 - \frac{x}{a}} E\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{a}}\right) \middle| \frac{a}{b}\right)}{\left(-bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x} \sqrt{1 - \frac{x}{b}}} \\
& - \frac{2\sqrt{b} \left(-2ad + bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right), \frac{b}{a}\right)}{\left(-bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x}} \\
& - \frac{2\sqrt{b} \left(-2ad + bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right), \frac{b}{a}\right)}{\left(-bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{(a-x)(b-x)x}} \\
& + \frac{4a\sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right), \frac{b}{a}\right)}{\sqrt{b} \sqrt{(a-x)(b-x)x}} \\
& - \frac{2(2a-b) \sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticF}\left(\arcsin\left(\frac{\sqrt{x}}{\sqrt{b}}\right), \frac{b}{a}\right)}{\sqrt{b} \sqrt{(a-x)(b-x)x}} \\
& + \frac{\sqrt{a} \left(-bd - \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticPi}\left(\frac{2ad}{bd - \sqrt{(bd+1)^2 - 4ad} + 1}, \arcsin\left(\frac{\sqrt{x}}{\sqrt{a}}\right), \frac{a}{b}\right)}{\sqrt{(a-x)(b-x)x}} \\
& + \frac{\sqrt{a} \left(-bd + \sqrt{(bd+1)^2 - 4ad} + 1\right) \sqrt{x} \sqrt{1 - \frac{x}{a}} \sqrt{1 - \frac{x}{b}} \operatorname{EllipticPi}\left(\frac{2ad}{bd + \sqrt{(bd+1)^2 - 4ad} + 1}, \arcsin\left(\frac{\sqrt{x}}{\sqrt{a}}\right), \frac{a}{b}\right)}{\sqrt{(a-x)(b-x)x}}
\end{aligned}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{a^2b - a(2a+b)x + 3ax^2 - x^3}{x(-b+x)\sqrt{x(-a+x)(-b+x)}(a+(-1-bd)x+dx^2)} dx$$



## 2.17 Problem number 1770

$$\int \frac{-1 + x^{10}}{\sqrt{1 + x^4} (1 + x^{10})} dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{\sqrt{2}x}{\sqrt{x^4+1}}\right)\sqrt{2}}{10} - \frac{\sqrt{2+2\sqrt{5}}\arctan\left(\frac{\sqrt{-2+2\sqrt{5}}x}{2\sqrt{x^4+1}}\right)}{5} - \frac{\sqrt{-2+2\sqrt{5}}\operatorname{arctanh}\left(\frac{\sqrt{2+2\sqrt{5}}x}{2\sqrt{x^4+1}}\right)}{5}$$

command

```
Int[(-1 + x^10)/(Sqrt[1 + x^4]*(1 + x^10)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-1 + x^{10}}{\sqrt{1 + x^4} (1 + x^{10})} dx$$

## 2.18 Problem number 1771

$$\int \frac{1 + x^{10}}{\sqrt{1 + x^4} (-1 + x^{10})} dx$$

Optimal antiderivative

$$\frac{\sqrt{-2+2\sqrt{5}}\arctan\left(\frac{\sqrt{2+2\sqrt{5}}x}{2\sqrt{x^4+1}}\right)}{5} - \frac{\operatorname{arctanh}\left(\frac{\sqrt{2}x}{\sqrt{x^4+1}}\right)\sqrt{2}}{10} - \frac{\sqrt{2+2\sqrt{5}}\operatorname{arctanh}\left(\frac{\sqrt{-2+2\sqrt{5}}x}{2\sqrt{x^4+1}}\right)}{5}$$

command

```
Int[(1 + x^10)/(Sqrt[1 + x^4]*(-1 + x^10)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\begin{aligned}
& \frac{(-1)^{4/5} (1 + \sqrt[5]{-1}) (1 + (-1)^{4/5}) \arctan\left(\frac{\sqrt{\sqrt[5]{-1} - (-1)^{4/5} x}}{\sqrt{x^4+1}}\right) - \arctan\left(\frac{\sqrt{\sqrt[5]{-1} - (-1)^{4/5} x}}{\sqrt{x^4+1}}\right)}{5(1 + (-1)^{3/5}) \sqrt{\sqrt[5]{-1} - (-1)^{4/5}} - 5\sqrt{\sqrt[5]{-1} - (-1)^{4/5}}} \\
& - \frac{\operatorname{arctanh}\left(\frac{\sqrt{2}x}{\sqrt{x^4+1}}\right) - (1 - \sqrt[5]{-1} + (-1)^{2/5}) (1 - (-1)^{3/5}) \operatorname{arctanh}\left(\frac{\sqrt{(-1)^{2/5} - (-1)^{3/5} x}}{\sqrt{x^4+1}}\right)}{5\sqrt{2} - 5\sqrt{(-1)^{2/5} - (-1)^{3/5}}} \\
& - \frac{\operatorname{arctanh}\left(\frac{\sqrt{(-1)^{2/5} - (-1)^{3/5} x}}{\sqrt{x^4+1}}\right) - (1 - (-1)^{4/5}) (x^2 + 1) \sqrt{\frac{x^4+1}{(x^2+1)^2}} \operatorname{EllipticF}\left(2 \arctan(x), \frac{1}{2}\right)}{5\sqrt{(-1)^{2/5} - (-1)^{3/5}} - 5(1 + (-1)^{3/5}) \sqrt{x^4 + 1}} \\
& - \frac{(1 - \sqrt[5]{-1} + (-1)^{2/5}) (x^2 + 1) \sqrt{\frac{x^4+1}{(x^2+1)^2}} \operatorname{EllipticF}\left(2 \arctan(x), \frac{1}{2}\right)}{5\sqrt{x^4 + 1}} \\
& - \frac{(x^2 + 1) \sqrt{\frac{x^4+1}{(x^2+1)^2}} \operatorname{EllipticF}\left(2 \arctan(x), \frac{1}{2}\right) - (x^2 + 1) \sqrt{\frac{x^4+1}{(x^2+1)^2}} \operatorname{EllipticF}\left(2 \arctan(x), \frac{1}{2}\right)}{5(1 + (-1)^{2/5}) \sqrt{x^4 + 1} - 5(1 - \sqrt[5]{-1}) \sqrt{x^4 + 1}} \\
& + \frac{2(x^2 + 1) \sqrt{\frac{x^4+1}{(x^2+1)^2}} \operatorname{EllipticF}\left(2 \arctan(x), \frac{1}{2}\right)}{5\sqrt{x^4 + 1}} \\
& + \frac{\sqrt[5]{-1}(1 + \sqrt[5]{-1}) (1 + (-1)^{2/5}) (x^2 + 1) \sqrt{\frac{x^4+1}{(x^2+1)^2}} \operatorname{EllipticPi}\left(\frac{1}{4}(-1)^{4/5} (1 - \sqrt[5]{-1})^2, 2 \arctan(x), \frac{1}{2}\right)}{10\sqrt{x^4 + 1}} \\
& + \frac{(1 - (-1)^{2/5}) (x^2 + 1) \sqrt{\frac{x^4+1}{(x^2+1)^2}} \operatorname{EllipticPi}\left(-\frac{1}{4}(-1)^{3/5} (1 + (-1)^{2/5})^2, 2 \arctan(x), \frac{1}{2}\right)}{10(1 + (-1)^{2/5}) \sqrt{x^4 + 1}} \\
& + \frac{(-1)^{3/5} (1 - \sqrt[5]{-1}) (1 + (-1)^{3/5}) (x^2 + 1) \sqrt{\frac{x^4+1}{(x^2+1)^2}} \operatorname{EllipticPi}\left(\frac{1}{4}(-1)^{2/5} (1 - (-1)^{3/5})^2, 2 \arctan(x), \frac{1}{2}\right)}{10\sqrt{x^4 + 1}} \\
& + \frac{(1 - (-1)^{4/5})^2 (x^2 + 1) \sqrt{\frac{x^4+1}{(x^2+1)^2}} \operatorname{EllipticPi}\left(-\frac{1}{4}\sqrt[5]{-1}(1 + (-1)^{4/5})^2, 2 \arctan(x), \frac{1}{2}\right)}{10(1 + (-1)^{3/5}) \sqrt{x^4 + 1}}
\end{aligned}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{1 + x^{10}}{\sqrt{1 + x^4} (-1 + x^{10})} dx$$

## 2.19 Problem number 2229

$$\int \frac{-1 + x^5}{\sqrt{1 + x^4} (1 + x^5)} dx$$

Optimal antiderivative

Unintegrable

command

```
Int[(-1 + x^5)/(Sqrt[1 + x^4]*(1 + x^5)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-1 + x^5}{\sqrt{1 + x^4} (1 + x^5)} dx$$

## 2.20 Problem number 2230

$$\int \frac{-1 + x^5}{\sqrt{1 + x^4} (1 + x^5)} dx$$

Optimal antiderivative

Unintegrable

command

```
Int[(-1 + x^5)/(Sqrt[1 + x^4]*(1 + x^5)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-1 + x^5}{\sqrt{1 + x^4} (1 + x^5)} dx$$

## 2.21 Problem number 2231

$$\int \frac{1 + x^5}{\sqrt{1 + x^4}(-1 + x^5)} dx$$

Optimal antiderivative

Unintegrable

command

```
Int[(1 + x^5)/(Sqrt[1 + x^4]*(-1 + x^5)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{1 + x^5}{\sqrt{1 + x^4}(-1 + x^5)} dx$$

## 2.22 Problem number 2232

$$\int \frac{1 + x^5}{\sqrt{1 + x^4}(-1 + x^5)} dx$$

Optimal antiderivative

Unintegrable

command

```
Int[(1 + x^5)/(Sqrt[1 + x^4]*(-1 + x^5)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{1 + x^5}{\sqrt{1 + x^4}(-1 + x^5)} dx$$

## 2.23 Problem number 2357

$$\int \frac{1}{\sqrt[4]{-1+3x-3x^2+x^3}(-1-2x+x^2+3x^3)^4} dx$$

Optimal antiderivative

Unintegrable

command

`Int[1/((-1 + 3*x - 3*x^2 + x^3)^(1/4)*(-1 - 2*x + x^2 + 3*x^3)^4), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{1}{\sqrt[4]{-1+3x-3x^2+x^3}(-1-2x+x^2+3x^3)^4} dx$$

## 2.24 Problem number 2667

$$\int \frac{-b^5 + a^5 x^5}{\sqrt{b^2 x + a^2 x^3} (b^5 + a^5 x^5)} dx$$

Optimal antiderivative

$$\begin{aligned} & -\frac{\sqrt{2} \arctan\left(\frac{\sqrt{2}\sqrt{a}\sqrt{b}\sqrt{a^2x^3+b^2x}}{a^2x^2+b^2}\right)}{5\sqrt{a}\sqrt{b}} - \frac{2\sqrt{2+2\sqrt{5}} \arctan\left(\frac{\sqrt{-2+2\sqrt{5}}\sqrt{a}\sqrt{b}\sqrt{a^2x^3+b^2x}}{2a^2x^2+2b^2}\right)}{5\sqrt{a}\sqrt{b}} \\ & - \frac{2\sqrt{-2+2\sqrt{5}} \operatorname{arctanh}\left(\frac{\sqrt{2+2\sqrt{5}}\sqrt{a}\sqrt{b}\sqrt{a^2x^3+b^2x}}{2a^2x^2+2b^2}\right)}{5\sqrt{a}\sqrt{b}} \end{aligned}$$

command

`Int[(-b^5 + a^5*x^5)/(Sqrt[b^2*x + a^2*x^3]*(b^5 + a^5*x^5)), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-b^5 + a^5 x^5}{\sqrt{b^2 x + a^2 x^3} (b^5 + a^5 x^5)} dx$$

## 2.25 Problem number 2668

$$\int \frac{b^5 + a^5 x^5}{\sqrt{b^2 x + a^2 x^3} (-b^5 + a^5 x^5)} dx$$

Optimal antiderivative

$$\frac{2\sqrt{-2+2\sqrt{5}} \arctan\left(\frac{\sqrt{2+2\sqrt{5}}\sqrt{a}\sqrt{b}\sqrt{a^2x^3+b^2x}}{2a^2x^2+2b^2}\right)}{5\sqrt{a}\sqrt{b}} - \frac{\sqrt{2} \operatorname{arctanh}\left(\frac{\sqrt{2}\sqrt{a}\sqrt{b}\sqrt{a^2x^3+b^2x}}{a^2x^2+b^2}\right)}{5\sqrt{a}\sqrt{b}} - \frac{2\sqrt{2+2\sqrt{5}} \operatorname{arctanh}\left(\frac{\sqrt{-2+2\sqrt{5}}\sqrt{a}\sqrt{b}\sqrt{a^2x^3+b^2x}}{2a^2x^2+2b^2}\right)}{5\sqrt{a}\sqrt{b}}$$

command

```
Int[(b^5 + a^5*x^5)/(Sqrt[b^2*x + a^2*x^3]*(-b^5 + a^5*x^5)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{b^5 + a^5 x^5}{\sqrt{b^2 x + a^2 x^3} (-b^5 + a^5 x^5)} dx$$

## 2.26 Problem number 2964

$$\int \frac{-b^{10} + a^{10} x^{10}}{\sqrt{b^4 + a^4 x^4} (b^{10} + a^{10} x^{10})} dx$$

Optimal antiderivative

Unintegrable

command

```
Int[(-b^10 + a^10*x^10)/(Sqrt[b^4 + a^4*x^4]*(b^10 + a^10*x^10)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-b^{10} + a^{10} x^{10}}{\sqrt{b^4 + a^4 x^4} (b^{10} + a^{10} x^{10})} dx$$

## 2.27 Problem number 2965

$$\int \frac{-b^{10} + a^{10}x^{10}}{\sqrt{b^4 + a^4x^4} (b^{10} + a^{10}x^{10})} dx$$

Optimal antiderivative

Unintegrable

command

```
Int[(-b^10 + a^10*x^10)/(Sqrt[b^4 + a^4*x^4]*(b^10 + a^10*x^10)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-b^{10} + a^{10}x^{10}}{\sqrt{b^4 + a^4x^4} (b^{10} + a^{10}x^{10})} dx$$

## 3 Test file number 210

Test folder name:

test\_cases/210\_Hebisch

### 3.1 Problem number 98

$$\int \frac{e^{\frac{-e^5 - 720x^3 + 160x^4 + 160x^3 \log(x)}{16x^3}} (3e^5 + 160x^3 + 160x^4)}{16x^4} dx$$

Optimal antiderivative

$$e^{-45 + 10 \ln(x) + 10x - \frac{e^5}{16x^3}}$$

command

```
Int[(E^((-E^5 - 720*x^3 + 160*x^4 + 160*x^3*Log[x]))/(16*x^3))*(3*E^5 + 160*x^3 + 160*x^4)/16*x^4,x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$e^{-\frac{160x^4 + 720x^3 + e^5}{16x^3}} x^{10}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{-e^5 - 720x^3 + 160x^4 + 160x^3 \log(x)}{16x^3}} (3e^5 + 160x^3 + 160x^4)}{16x^4} dx$$

### 3.2 Problem number 327

$$\int \frac{16e^{e^x} - 16e^{e^x} \log(x) \log(\log(x)) \log(\log(\log(x))) - 16e^{e^x+x} x \log(x) \log(\log(x)) \log(\log(\log(x))) \log\left(\frac{\log(\log(\log(x)))}{x}\right)}{x \log(x) \log(\log(x)) \log(\log(\log(x))) \log^2\left(\frac{\log(\log(\log(x)))}{x}\right)}$$

Optimal antiderivative

$$-82 - \frac{16e^{e^x}}{\ln\left(\frac{\ln(\ln(\ln(x)))}{x}\right)}$$

command

`Int[(16*E^E^x - 16*E^E^x*Log[x]*Log[Log[x]]*Log[Log[Log[x]]] - 16*E^(E^x + x)*x*Log[x]*`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$-\frac{16e^{e^x}}{\log\left(\frac{\log(\log(\log(x)))}{x}\right)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{16e^{e^x} - 16e^{e^x} \log(x) \log(\log(x)) \log(\log(\log(x))) - 16e^{e^x+x} x \log(x) \log(\log(x)) \log(\log(\log(x))) \log\left(\frac{\log(\log(\log(x)))}{x}\right)}{x \log(x) \log(\log(x)) \log(\log(\log(x))) \log^2\left(\frac{\log(\log(\log(x)))}{x}\right)}$$

### 3.3 Problem number 374

$$\int \frac{e^{-x} \left( e^x (2x^2 + 4x^3 + 2x^4) + e^{\frac{2e^{-x}(e^{16} + \log(4))}{x}} (e^x x^2 + e^{16}(2 + 4x + 2x^2) + (2 + 4x + 2x^2) \log(4)) \right)}{2x^2 + 4x^3 + 2x^4} dx$$

Optimal antiderivative

$$x - \frac{e^{\frac{2(2\ln(2) + e^{16})e^{-x}}{x}}}{2 + 2x}$$

command

`Int[(E^x*(2*x^2 + 4*x^3 + 2*x^4) + E^((2*(E^16 + Log[4]))/(E^x*x)))*(E^x*x^2 + E^16*(2 +`

Rubi 4.17.3 under Mathematica 13.3.1 output



$$x - \frac{2 \frac{4e^{-x}}{x} - 3 e^{\frac{2e^{16-x}}{x}} - x (x^2 \log(16) + 4x \log(4) + \log(16))}{\left(\frac{e^{-x}}{x^2} + \frac{e^{-x}}{x}\right) x^2 (x+1)^2 \log(2)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{e^{-x} \left( e^x (2x^2 + 4x^3 + 2x^4) + e^{\frac{2e^{-x}(e^{16} + \log(4))}{x}} (e^x x^2 + e^{16}(2 + 4x + 2x^2) + (2 + 4x + 2x^2) \log(4)) \right)}{2x^2 + 4x^3 + 2x^4} dx$$

### 3.4 Problem number 856

$$\int \frac{e^{\frac{-x^2 + x \log(x^2) + \log\left(\frac{16 - \log(3+x)}{e}\right)}}{x} \left( 95x - 16x^2 - 16x^3 + (-6x + x^2 + x^3) \log(3+x) + (-48 - 16x + (3+x) \log(3+x)) \right)}{-48x^2 - 16x^3 + (3x^2 + x^3) \log(3+x)}$$

Optimal antiderivative

$$-e^{\ln(x^2) + \frac{\ln\left(\frac{-\ln(3+x) + 16}{e}\right)}{x}} - x$$

command

```
Int[(E^((-x^2 + x*Log[x^2] + Log[(16 - Log[3 + x])/E])/x)*(95*x - 16*x^2 - 16*x^3 + (-6*x + x^2 + x^3)*Log[3 + x] + (-48 - 16*x + (3 + x)*Log[3 + x])*Log[(16 - Log[3 + x])/E] - 48*x^2 - 16*x^3 + (3*x^2 + x^3)*Log[3 + x]),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$-e^{-x - \frac{1}{x} x^2 (16 - \log(x+3)) \frac{1}{x}}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{-x^2 + x \log(x^2) + \log\left(\frac{16 - \log(3+x)}{e}\right)}}{x} \left( 95x - 16x^2 - 16x^3 + (-6x + x^2 + x^3) \log(3+x) + (-48 - 16x + (3+x) \log(3+x)) \right)}{-48x^2 - 16x^3 + (3x^2 + x^3) \log(3+x)}$$

### 3.5 Problem number 1137

$$\int \frac{e^{\frac{5x - \log\left(\frac{1}{9}(-100 + 9\log(\log(-2+x)))\right)}{x}}}{(200x^2 - 100x^3)\log(-2+x) + (-18x^2 + 9x^3)\log(-2+x)\log(\log(-2+x))} (-9e^4x + (e^4(200 - 100x)\log(-2+x) + e^4(-18 + 9x)\log(-2+x)\log(\log(-2+x)))) dx$$

Optimal antiderivative

$$e^4 e^{5 - \frac{\ln(\ln(\ln(-2+x)) - \frac{100}{9})}{x}}$$

command

```
Int[(E^((5*x - Log[(-100 + 9*Log[Log[-2 + x]])/9])/x)*(-9*E^4*x + (E^4*(200 - 100*x)*Log[-2 + x] + E^4*(-18 + 9*x)*Log[-2 + x]*Log[Log[-2 + x]])*Log[(-100 + 9*Log[Log[-2 + x]])/9]))/((200*x^2 - 100*x^3)*Log[-2 + x] + (-18*x^2 + 9*x^3)*Log[-2 + x]*Log[Log[-2 + x]]), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\exp\left(\frac{5x - \log\left(\frac{1}{9}(9\log(\log(x-2)) - 100)\right)}{x} + 4\right)$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{\exp\left(\frac{5x - \log\left(\frac{1}{9}(-100 + 9\log(\log(-2+x)))\right)}{x}\right) (-9e^4x + (e^4(200 - 100x)\log(-2+x) + e^4(-18 + 9x)\log(-2+x)\log(\log(-2+x))))}{(200x^2 - 100x^3)\log(-2+x) + (-18x^2 + 9x^3)\log(-2+x)\log(\log(-2+x))} dx$$

### 3.6 Problem number 1241

$$\int \frac{20x^5 + e^{15}(-800 - 640x^2 + 2x^5 - 20x^6) + e^{30}(500x + 480x^3 + 64x^5 + 5x^7)}{4x^5 - 4e^{15}x^6 + e^{30}x^7} dx$$

Optimal antiderivative

$$\frac{4\left(4 + \frac{5}{x^2}\right)^2 + x}{2e^{-15} - x} + 5x$$

command

```
Int[(20*x^5 + E^15*(-800 - 640*x^2 + 2*x^5 - 20*x^6) + E^30*(500*x + 480*x^3 + 64*x^5 + 5*x^7))/(4*x^5 - 4*E^15*x^6 + E^30*x^7), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{50e^{15}}{x^4} + \frac{25e^{30}}{x^3} + \frac{5e^{15}(32 + 5e^{30})}{2x^2} + 5x + \frac{8 + 256e^{15} + 160e^{45} + 25e^{75}}{4(2 - e^{15}x)} + \frac{5e^{30}(32 + 5e^{30})}{4x}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

\$Aborted

### 3.7 Problem number 1451

$$\int \frac{-80e^{\frac{2}{5}(10-7x)} + e^{\frac{2}{5}(10-7x)}(-40 - 56x) \log(x^2)}{5x^3 \log^3(x^2) \log(\log(5))} dx$$

Optimal antiderivative

$$\frac{4e^{-\frac{14x}{5}+4}}{\ln(x^2)^2 \ln(\ln(5)) x^2}$$

command

`Int[(-80*E^((2*(10 - 7*x))/5) + E^((2*(10 - 7*x))/5)*(-40 - 56*x)*Log[x^2])/(5*x^3*Log[`

`Rubi 4.17.3 under Mathematica 13.3.1 output`

$$\frac{4e^{4-\frac{14x}{5}}}{x^2 \log(\log(5)) \log^2(x^2)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-80e^{\frac{2}{5}(10-7x)} + e^{\frac{2}{5}(10-7x)}(-40 - 56x) \log(x^2)}{5x^3 \log^3(x^2) \log(\log(5))} dx$$

### 3.8 Problem number 1465

$$\int \frac{-\frac{3}{5}e^{2x} \log(x) + \left(\frac{e^{2x}}{5} + \frac{2}{5}e^{2x}x \log(x)\right) \log(x^3)}{5x \log^2(x^3)} dx$$

Optimal antiderivative

$$\frac{\ln(x) e^{-\ln(5)+2x}}{5 \ln(x^3)}$$

command

`Int[((-3*E^(2*x)*Log[x])/5 + (E^(2*x)/5 + (2*E^(2*x)*x*Log[x])/5)*Log[x^3])/(5*x*Log[x^`

`Rubi 4.17.3 under Mathematica 13.3.1 output`

$$\frac{e^{2x} \log(x)}{25 \log(x^3)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-\frac{3}{5}e^{2x} \log(x) + \left(\frac{e^{2x}}{5} + \frac{2}{5}e^{2x}x \log(x)\right) \log(x^3)}{5x \log^2(x^3)} dx$$

### 3.9 Problem number 1677

$$\int \frac{e^{\frac{1+2x+x^2}{4x^2}}(-1-x-4x^2) + 4x^2 \log(2) + \left(-2e^{\frac{1+2x+x^2}{4x^2}}x^2 + 2x^2 \log(2)\right) \log\left(\frac{e^{e^2}}{e^{\frac{1+2x+x^2}{4x^2}} - \log(2)}\right)}{2e^{\frac{1+2x+x^2}{4x^2}}x^2 - 2x^2 \log(2)} dx$$

Optimal antiderivative

$$1 - \ln\left(\frac{e^{e^2}}{e^{\frac{(1+x)^2}{4x^2}} - \ln(2)}\right) x - 2x$$

command

`Int[(E^((1 + 2*x + x^2)/(4*x^2)))*(-1 - x - 4*x^2) + 4*x^2*Log[2] + (-2*E^((1 + 2*x + x^2)/(4*x^2))*x^2 + 2*x^2*Log[2])*Log[E^e^2/(E^((1 + 2*x + x^2)/(4*x^2)) - Log[2])]]/((2*E^((1 + 2*x + x^2)/(4*x^2))*x^2 - 2*x^2*Log[2]))`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$x\left(-\log\left(\frac{e^{e^2}}{e^{\frac{(x+1)^2}{4x^2}} - \log(2)}\right)\right) - 2x$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{1+2x+x^2}{4x^2}}(-1-x-4x^2) + 4x^2 \log(2) + \left(-2e^{\frac{1+2x+x^2}{4x^2}}x^2 + 2x^2 \log(2)\right) \log\left(\frac{e^{e^2}}{e^{\frac{1+2x+x^2}{4x^2}} - \log(2)}\right)}{2e^{\frac{1+2x+x^2}{4x^2}}x^2 - 2x^2 \log(2)} dx$$

### 3.10 Problem number 1711

$$\int \frac{-e^{x^2} + 2e^{x^2}x^2 \log(x) + (-3x + x \log(6)) \log^2(x)}{(-3x + x \log(6)) \log^2(x)} dx$$

Optimal antiderivative

$$x - \frac{2e^{x^2}}{(6 - 2\ln(6)) \ln(x)}$$

command

`Int[(-E^x^2 + 2*E^x^2*x^2*Log[x] + (-3*x + x*Log[6])*Log[x]^2)/((-3*x + x*Log[6])*Log[x]^2)]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$x - \frac{e^{x^2}}{(3 - \log(6)) \log(x)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-e^{x^2} + 2e^{x^2} x^2 \log(x) + (-3x + x \log(6)) \log^2(x)}{(-3x + x \log(6)) \log^2(x)} dx$$

### 3.11 Problem number 1761

$$\int \frac{4 + x - 16x^5 - 8x^6 - x^7 + (1 - 8x^5 - 2x^6) \log(3) - x^5 \log^2(3) + (-16 - 5x - 4 \log(3)) \log(x)}{-16x^6 - 8x^7 - x^8 + (-8x^6 - 2x^7) \log(3) - x^6 \log^2(3) + (4x + x^2 + x \log(3)) \log(x)} dx$$

Optimal antiderivative

$$2 + \ln \left( x - \frac{\ln(x)}{(\ln(3) + 4 + x) x^4} \right)$$

command

```
Int[(4 + x - 16*x^5 - 8*x^6 - x^7 + (1 - 8*x^5 - 2*x^6)*Log[3] - x^5*Log[3]^2 + (-16 - 5*x - 4*Log[3])*Log[x])/(-16*x^6 - 8*x^7 - x^8 + (-8*x^6 - 2*x^7)*Log[3] - x^6*Log[3]^2 + (4*x + x^2 + x*Log[3])*Log[x]]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\log(x^6 + x^5(4 + \log(3)) - \log(x)) - \frac{(16 + \log(81)) \log(x)}{4 + \log(3)} - \log(x + 4 + \log(3))$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{4 + x - 16x^5 - 8x^6 - x^7 + (1 - 8x^5 - 2x^6) \log(3) - x^5 \log^2(3) + (-16 - 5x - 4 \log(3)) \log(x)}{-16x^6 - 8x^7 - x^8 + (-8x^6 - 2x^7) \log(3) - x^6 \log^2(3) + (4x + x^2 + x \log(3)) \log(x)} dx$$

### 3.12 Problem number 1911

$$\int \frac{2^{\frac{1}{4+e^{3-x+i\pi+x+\log(5-\log(5))}}} e^{2^{\frac{1}{4+e^{3-x+i\pi+x+\log(5-\log(5))}}} (-\log(2) + e^{3-x} \log(2))}}{16 + e^{6-2x} + 8x + x^2 + e^{3-x}(8 + 2x) + (8 + 2e^{3-x} + 2x)(i\pi + \log(5 - \log(5))) + (i\pi + \log(5 - \log(5)))^2}$$

Optimal antiderivative

$$e^{\frac{\ln(2)}{e^{\ln(\ln(5)-5)+e^2} e^{1-x+4+x}}}$$

command

`Int[(2^(4 + E^(3 - x) + I*Pi + x + Log[5 - Log[5]]))^(-1)*E^(2^(4 + E^(3 - x) + I*Pi + x + 1)*(-Log[2] + E^(3 - x)*Log[2]))/(16 + E^(6 - 2*x) + 8*x + x^2 + E^(3 - x)*(8 + 2*x) +`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$e^{\frac{1}{2^{x+e^{3-x}+i\pi+4+\log(5-\log(5))}}}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{2^{\frac{1}{4+e^{3-x}+i\pi+x+\log(5-\log(5))}} e^{2^{\frac{1}{4+e^{3-x}+i\pi+x+\log(5-\log(5))}}} (-\log(2) + e^{3-x} \log(2))}{16 + e^{6-2x} + 8x + x^2 + e^{3-x}(8 + 2x) + (8 + 2e^{3-x} + 2x)(i\pi + \log(5 - \log(5))) + (i\pi + \log(5 - \log(5)))^2} dx$$

### 3.13 Problem number 2067

$$\int \frac{e^{5e^{-\frac{-2-3x+x^2}{-3+x}}} (-275 + 150x - 25x^2)}{e^{5e^{-\frac{-2-3x+x^2}{-3+x}}} + \frac{-2-3x+x^2}{-3+x} (9 - 6x + x^2) + e^{-\frac{-2-3x+x^2}{-3+x}} (63 - 42x + 7x^2)} dx$$

Optimal antiderivative

$$5 \ln \left( -7 - e^{5e^{-x - \frac{2}{x+3}}} \right)$$

command

`Int[(E^(5/E^((-2 - 3*x + x^2)/(-3 + x)))*(-275 + 150*x - 25*x^2))/(E^(5/E^((-2 - 3*x + x^2)/(-3 + x)) + (-2 - 3*x + x^2)/(-3 + x))*(9 - 6*x + x^2) + E^((-2 - 3*x + x^2)/(-3 + x))*(63 - 42*x + 7*x^2)),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$5 \log \left( e^{5e^{\frac{x^2}{3-x} - \frac{3x}{3-x} - \frac{2}{3-x}}} + 7 \right)$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{e^{5e^{-\frac{-2-3x+x^2}{-3+x}}} (-275 + 150x - 25x^2)}{\exp \left( 5e^{-\frac{-2-3x+x^2}{-3+x}} + \frac{-2-3x+x^2}{-3+x} (9 - 6x + x^2) + e^{-\frac{-2-3x+x^2}{-3+x}} (63 - 42x + 7x^2) \right)} dx$$

### 3.14 Problem number 2159

$$\int \frac{2e^{-4+x+\frac{2(2+5x^2)}{x}} x^2 \log(1+e^{-4+x}) + e^{\frac{2(2+5x^2)}{x}} (-4+10x^2+e^{-4+x}(-4+10x^2)) \log^2(1+e^{-4+x})}{e^{\frac{2(2+5x^2)}{x}} (x^2+e^{-4+x}x^2) \log^2(1+e^{-4+x}) + (-2x^2-2e^{-4+x}x^2) \log(\log(4))} dx$$

Optimal antiderivative

$$\ln \left( \frac{\ln(e^{x-4}+1)^2 e^{\frac{4}{x}+10x}}{2} - \ln(2 \ln(2)) \right)$$

command

```
Int[(2*E^(-4 + x + (2*(2 + 5*x^2))/x))*x^2*Log[1 + E^(-4 + x)] + E^((2*(2 + 5*x^2))/x)*(4 + 10*x^2 + E^(-4 + x)*(-4 + 10*x^2))*Log[1 + E^(-4 + x)]^2/(E^((2*(2 + 5*x^2))/x)*(x^2 + x)*x^2)*Log[1 + E^(-4 + x)]^2 + (-2*x^2 - 2*E^(-4 + x)*x^2)*Log[Log[4]]],x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\log \left( e^{10x+\frac{4}{x}} \log^2(e^{x-4}+1) - 2 \log(\log(4)) \right)$$

Rubi 4.16.1 under Mathematica 13.3.1 output

\$Aborted

### 3.15 Problem number 2167

$$\int \frac{9-6x^2+x^4+e^{-\frac{3x}{-3+x^2}}(9x+3x^3)}{e^{-\frac{3x}{-3+x^2}}(9x-6x^3+x^5)+(9x-6x^3+x^5)\log(x)} dx$$

Optimal antiderivative

$$\ln \left( \ln(x) + e^{-\frac{3x}{-3+x^2}} \right)$$

command

```
Int[(9 - 6*x^2 + x^4 + (9*x + 3*x^3)/E^((3*x)/(-3 + x^2)))/(9*x - 6*x^3 + x^5)/E^((3*x)/(-3 + x^2)) + (9*x - 6*x^3 + x^5)*Log[x]],x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{3x}{3-x^2} + \log \left( e^{-\frac{3x}{-3+x^2}} \log(x) + 1 \right)$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{9-6x^2+x^4+e^{-\frac{3x}{-3+x^2}}(9x+3x^3)}{e^{-\frac{3x}{-3+x^2}}(9x-6x^3+x^5)+(9x-6x^3+x^5)\log(x)} dx$$

### 3.16 Problem number 2218

$$\int e^{-e^{4x}x^2 + 4e^{2e^{4-e^x}} + 5x^2 - 6e^{4e^{4-e^x}} + 6x^2 + 4e^{6e^{4-e^x}} + 7x^2 - e^{8e^{4-e^x}} + 8x^2} \left( e^{4x}(-6x - 12x^2) \right. \\ \left. + e^{8e^{4-e^x} + 8x}(-6x - 24x^2 + 48e^{4-e^x+x^2}x^3) \right. \\ \left. + e^{4e^{4-e^x} + 4x}(144e^{4-e^x+2x+x^2}x^3 + e^{2x}(-36x - 108x^2)) \right. \\ \left. + e^{2e^{4-e^x} + 2x}(-48e^{4-e^x+3x+x^2}x^3 + e^{3x}(24x + 60x^2)) \right. \\ \left. + e^{6e^{4-e^x} + 6x}(-144e^{4-e^x+x+x^2}x^3 + e^x(24x + 84x^2)) \right) dx$$

Optimal antiderivative

$$3e^{-x^2 \left( e^x - e^{2e^{4-e^x} + 2x} \right)^4}$$

command

```
Int[E^(- (E^(4*x)*x^2) + 4*E^(2*E^(4 - E^x^2) + 5*x)*x^2 - 6*E^(4*E^(4 - E^x^2) + 6*x)*x^2 - 6*x - 12*x^2) + E^(8*E^(4 - E^x^2) + 8*x)*(-6*x - 24*x^2 + 48*E^(4 - E^x^2 + x^2)*x^3) + E^(2*E^(4 - E^x^2) + 2*x)*(-48*E^(4 - E^x^2 + 3*x + x^2)*x^3 + E^(3*144*E^(4 - E^x^2 + x + x^2)*x^3 + E^x*(24*x + 84*x^2))), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$3 \exp \left( -e^{4x}x^2 + 4e^{2e^{4-e^x} + 5x}x^2 - 6e^{4e^{4-e^x} + 6x}x^2 + 4e^{6e^{4-e^x} + 7x}x^2 - e^{8e^{4-e^x} + 8x}x^2 \right)$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \exp \left( -e^{4x}x^2 + 4e^{2e^{4-e^x} + 5x}x^2 - 6e^{4e^{4-e^x} + 6x}x^2 + 4e^{6e^{4-e^x} + 7x}x^2 \right. \\ \left. - e^{8e^{4-e^x} + 8x}x^2 \right) \left( e^{4x}(-6x - 12x^2) + e^{8e^{4-e^x} + 8x}(-6x - 24x^2 + 48e^{4-e^x+x^2}x^3) \right. \\ \left. + e^{4e^{4-e^x} + 4x}(144e^{4-e^x+2x+x^2}x^3 + e^{2x}(-36x - 108x^2)) \right. \\ \left. + e^{2e^{4-e^x} + 2x}(-48e^{4-e^x+3x+x^2}x^3 + e^{3x}(24x + 60x^2)) \right. \\ \left. + e^{6e^{4-e^x} + 6x}(-144e^{4-e^x+x+x^2}x^3 + e^x(24x + 84x^2)) \right) dx$$



### 3.17 Problem number 2239

$$\int \frac{-3x - x^2 + e^{5+x}(-9x - 3x^2) + (3x + 2x^2 + e^{5+x}(9 + 6x)) \log\left(\frac{\log(5)}{3e^{5+x}+x}\right)}{45e^{5+x} + 15x} dx$$

Optimal antiderivative

$$2 + x \ln\left(\frac{\ln(5)}{3e^{5+x} + x}\right) \left(\frac{1}{5} + \frac{x}{15}\right)$$

command

`Int[(-3*x - x^2 + E^(5 + x)*(-9*x - 3*x^2) + (3*x + 2*x^2 + E^(5 + x)*(9 + 6*x))*Log[Log[5]/(3e^(5+x)+x)]]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{1}{15}x^2 \log\left(\frac{\log(5)}{x + 3e^{x+5}}\right) + \frac{1}{5}x \log\left(\frac{\log(5)}{x + 3e^{x+5}}\right)$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-3x - x^2 + e^{5+x}(-9x - 3x^2) + (3x + 2x^2 + e^{5+x}(9 + 6x)) \log\left(\frac{\log(5)}{3e^{5+x}+x}\right)}{45e^{5+x} + 15x} dx$$

### 3.18 Problem number 3222

$$\int \frac{-25 - 10x - x^2 + 25x^3 + 10x^4 + x^5 + e^2(-5 - 15x^2 + 5x^3) + (10 + 2x - 10x^3 - 2x^4) \log(-2 + 2x^3) + (-1 + x^3) \log(-2 + 2x^3)^2}{-25 - 10x - x^2 + 25x^3 + 10x^4 + x^5 + (10 + 2x - 10x^3 - 2x^4) \log(-2 + 2x^3) + (-1 + x^3) \log(-2 + 2x^3)^2} dx$$

Optimal antiderivative

$$x - \frac{5e^2}{5 + x - \ln(\ln(e^{2x})x^2 - 2)} - 2$$

command

`Int[(-25 - 10*x - x^2 + 25*x^3 + 10*x^4 + x^5 + E^2*(-5 - 15*x^2 + 5*x^3) + (10 + 2*x - 10*x^3 - 2*x^4)*Log[-2 + 2*x^3] + (-1 + x^3)*Log[-2 + 2*x^3]^2)/(-25 - 10*x - x^2 + 25*x^3 + 10*x^4 + x^5 + (10 + 2*x - 10*x^3 - 2*x^4)*Log[-2 + 2*x^3] + (-1 + x^3)*Log[-2 + 2*x^3]^2), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$x - \frac{5e^2}{-\log(2x^3 - 2) + x + 5}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-25 - 10x - x^2 + 25x^3 + 10x^4 + x^5 + e^2(-5 - 15x^2 + 5x^3) + (10 + 2x - 10x^3 - 2x^4) \log(-2 + 2x^3) + (-1 + x^3) \log(-2 + 2x^3)^2}{-25 - 10x - x^2 + 25x^3 + 10x^4 + x^5 + (10 + 2x - 10x^3 - 2x^4) \log(-2 + 2x^3) + (-1 + x^3) \log(-2 + 2x^3)^2} dx$$

### 3.19 Problem number 3912

$$\int \frac{-4096x^3 - 768x^6 - 48x^9 - x^{12} + (-73728 + 442368x - 516096x^2 - 446976x^3 - 18432x^4 - 105984x^5 - \dots)}{\dots} dx$$

Optimal antiderivative

$$3 + e^5 - 9 \left( x - \frac{1}{\frac{1}{16}x^4 + x} + 3 \right)^2 \ln(x)^2 - x$$

command

Int[(-4096\*x^3 - 768\*x^6 - 48\*x^9 - x^12 + (-73728 + 442368\*x - 516096\*x^2 - 446976\*x^3 - 18432\*x^4 - 105984\*x^5 - ...)]

Rubi 4.17.3 under Mathematica 13.3.1 output

output too large to display

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-4096x^3 - 768x^6 - 48x^9 - x^{12} + (-73728 + 442368x - 516096x^2 - 446976x^3 - 18432x^4 - 105984x^5 - \dots)}{\dots} dx$$

### 3.20 Problem number 4078

$$\int \frac{2 \cdot 3^{e^x(12-6x)} + 3^{e^x(12-6x)}(2 + e^x(12x - 12x^2) \log(3)) \log(x) \log(\log(x))}{\log(x)} dx$$

Optimal antiderivative

$$2x e^{6 \ln(3)(2-x)e^x} \ln(\ln(x))$$

command

Int[(2\*3^(E^x\*(12 - 6\*x)) + 3^(E^x\*(12 - 6\*x))\*(2 + E^x\*(12\*x - 12\*x^2)\*Log[3])\*Log[x]\*Log[Log[x]])/Log[x]]

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{2 \cdot 3^{6e^x(2-x)}(e^x x \log(x) \log(\log(x)) - e^x x^2 \log(x) \log(\log(x)))}{(e^x - e^x(2-x)) \log(x)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{2 \cdot 3^{e^x(12-6x)} + 3^{e^x(12-6x)}(2 + e^x(12x - 12x^2) \log(3)) \log(x) \log(\log(x))}{\log(x)} dx$$

### 3.21 Problem number 4594

$$\int \frac{e^{\frac{1}{9}(2x^2+4x^3+2x^4+(4x+4x^2)\log(\frac{1}{8}(7x+8\log(x)))+2\log^2(\frac{1}{8}(7x+8\log(x))))} (32x + 60x^2 + 56x^3 + 84x^4 + 56x^5 + (32x^2 + 963x^2 + 72x \log(x)))}{63x^2 + 72x \log(x)}$$

Optimal antiderivative

$$e^{\frac{2(x^2+x+\ln(\ln(x)+\frac{7x}{8}))^2}{9}}$$

command

Int[(E^((2\*x^2 + 4\*x^3 + 2\*x^4 + (4\*x + 4\*x^2)\*Log[(7\*x + 8\*Log[x])/8] + 2\*Log[(7\*x + 8\*Log[x])/8]))\*(32\*x + 60\*x^2 + 56\*x^3 + 84\*x^4 + 56\*x^5 + (32\*x^2 + 963\*x^2 + 72\*x\*Log[x])))/(63\*x^2 + 72\*x\*Log[x])]

Rubi 4.17.3 under Mathematica 13.3.1 output

$$e^{\frac{2}{9}(x^2+x+\log(\frac{7x}{8}+\log(x)))^2}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{\exp\left(\frac{1}{9}(2x^2 + 4x^3 + 2x^4 + (4x + 4x^2)\log(\frac{1}{8}(7x + 8\log(x))) + 2\log^2(\frac{1}{8}(7x + 8\log(x))))\right) (32x + 60x^2 + 56x^3 + 84x^4 + 56x^5 + (32x^2 + 963x^2 + 72x \log(x)))}{63x^2 + 72x \log(x)}$$

### 3.22 Problem number 4711

$$\int \frac{e^{\frac{3x^2}{4e^x x - x \log(4)}} (-64e^{2x} x^2 - 12x^3 \log(4) - 4x^2 \log^2(4) + e^x x(48x^2 - 48x^3 + 32x \log(4)))}{16e^{2x} x^4 - 8e^x x^4 \log(4) + x^4 \log^2(4)} dx$$

Optimal antiderivative

$$\frac{4e^{-\frac{3x^2}{2x \ln(2) - 4e^x x}}}{x}$$

command

Int[(E^((3\*x^2)/(4\*E^x\*x - x\*Log[4]))\*(-64\*E^(2\*x)\*x^2 - 12\*x^3\*Log[4] - 4\*x^2\*Log[4]^2 + e^x\*x\*(48\*x^2 - 48\*x^3 + 32\*x\*Log[4])))/(16\*e^(2\*x)\*x^4 - 8\*e^x\*x^4\*Log[4] + x^4\*Log[4]^2)]

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{4e^{\frac{3x^2}{4e^x x - x \log(4)}} (-4e^x x^2 + 4e^x x - x \log(4))}{x^2 (4e^x - \log(4))^2 \left( \frac{x^2(4e^x x + 4e^x - \log(4))}{(4e^x x - x \log(4))^2} - \frac{2x}{4e^x x - x \log(4)} \right)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{3x^2}{4e^x x - x \log(4)}} (-64e^{2x} x^2 - 12x^3 \log(4) - 4x^2 \log^2(4) + e^x x(48x^2 - 48x^3 + 32x \log(4)))}{16e^{2x} x^4 - 8e^x x^4 \log(4) + x^4 \log^2(4)} dx$$

### 3.23 Problem number 4744

$$\int \frac{\frac{5(12-6e^x-18x)}{e^2} + \frac{25(-200+297x+18x^2+e^x(109+6x))}{e^4} + \frac{25(8-4e^x-12x)\log(e^x+x)}{e^4}}{9e^x + 9x + \frac{5(e^x(-300-18x)-300x-18x^2)}{e^2} + \frac{25(2500x+309x^2+9x^3+e^x(2500+309x+9x^2))}{e^4}} + \left( \frac{5(12e^x+12x)}{e^2} + \frac{25(e^x(-200-12x)-200x-12x^2)}{e^4} \right) \log(e^x+x)$$

Optimal antiderivative

$$\ln \left( x + \left( x - e^{2-\ln(5)} + \frac{50}{3} - \frac{2 \ln(e^x + x)}{3} \right)^2 \right)$$

command

```
Int[((5*(12 - 6*E^x - 18*x))/E^2 + (25*(-200 + 297*x + 18*x^2 + E^x*(109 + 6*x)))/E^4 + 300 - 18*x) - 300*x - 18*x^2)/E^2 + (25*(2500*x + 309*x^2 + 9*x^3 + E^x*(2500 + 309*x + 200 - 12*x) - 200*x - 12*x^2))/E^4)*Log[E^x + x] + (25*(4*E^x + 4*x)*Log[E^x + x]^2)/E^4
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\log \left( 225x^2 + 15(515 - 6e^2)x + 100 \log^2(x + e^x) - 300x \log(x + e^x) - 20(250 - 3e^2) \log(x + e^x) + (250 - 3e^2)^2 \right)$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{\frac{5(12-6e^x-18x)}{e^2} + \frac{25(-200+297x+18x^2+e^x(109+6x))}{e^4} + \frac{25(8-4e^x-12x)\log(e^x+x)}{e^4}}{9e^x + 9x + \frac{5(e^x(-300-18x)-300x-18x^2)}{e^2} + \frac{25(2500x+309x^2+9x^3+e^x(2500+309x+9x^2))}{e^4}} + \left( \frac{5(12e^x+12x)}{e^2} + \frac{25(e^x(-200-12x)-200x-12x^2)}{e^4} \right) \log(e^x+x)$$

### 3.24 Problem number 5610

$$\int \frac{e^{\frac{4x+e^{2/3}(-6-6x^2)+3e^{2/3}\log(\log(x^2))}{3e^{2/3}x}}}{x^2 \log(x^2)} (2 + (2 - 2x^2) \log(x^2) - \log(x^2) \log(\log(x^2))) dx$$

Optimal antiderivative

$$e^{\frac{4e^{-2/3}}{3} + \frac{\ln(\ln(x^2))}{x} - 2x} - 2x$$

command

```
Int[(E^((4*x + E^(2/3)*(-6 - 6*x^2) + 3*E^(2/3)*Log[Log[x^2]])/(3*E^(2/3)*x)))*(2 + (2 - 2*x^2)*Log[x^2] - Log[x^2]*Log[Log[x^2]])]/x^2
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\exp\left(\frac{2(2x - 3e^{2/3}(x^2 + 1))}{3e^{2/3}x}\right) \sqrt{x \log(x^2)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{\exp\left(\frac{4x + e^{2/3}(-6 - 6x^2) + 3e^{2/3} \log(\log(x^2))}{3e^{2/3}x}\right) (2 + (2 - 2x^2) \log(x^2) - \log(x^2) \log(\log(x^2)))}{x^2 \log(x^2)} dx$$

### 3.25 Problem number 5924

$$\int \frac{e^{\frac{46+2x+(8+x)\log(2)}{23+x+4\log(2)}} (-23\log(2) - 4\log^2(2))}{529 + 46x + x^2 + (184 + 8x)\log(2) + 16\log^2(2)} dx$$

Optimal antiderivative

$$e^{e^5} - 1 - e^{\frac{x}{4 + \frac{x+23}{\ln(2)}} + 2}$$

command

`Int[(E^((46 + 2*x + (8 + x)*Log[2]))/(23 + x + 4*Log[2]))*(-23*Log[2] - 4*Log[2]^2))/(529 + 46*x + x^2 + (184 + 8*x)*Log[2] + 16*Log[2]^2)]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$-2^{\frac{x+8}{x+23+\log(16)}} e^{\frac{2(x+23)}{x+23+\log(16)}}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{46+2x+(8+x)\log(2)}{23+x+4\log(2)}} (-23\log(2) - 4\log^2(2))}{529 + 46x + x^2 + (184 + 8x)\log(2) + 16\log^2(2)} dx$$

### 3.26 Problem number 6144

$$\int \frac{-2 + 8e^{4-60x+225x^2} - 12e^{8-120x+450x^2} + 8e^{12-180x+675x^2} - 2e^{16-240x+900x^2} + (10 + e^{12-180x+675x^2})(720x - 5)}{x^2 \log(x^2)}$$

Optimal antiderivative

$$\ln \left( \frac{e \left( 5 - \frac{(e^{(2-15x)^2} - 1)^2}{\ln(x)} \right)^2}{x} \right)$$

command

```
Int[(-2 + 8*E^(4 - 60*x + 225*x^2) - 12*E^(8 - 120*x + 450*x^2) + 8*E^(12 - 180*x + 675*x^2) + E^(16 - 240*x + 900*x^2))*(-240*x + 1800*x^2) + E^(8 - 120*x + 1200*x + 9000*x^2))*Log[x]^2 - Log[x]^3)/(x*Log[x]^3), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\begin{aligned} & -\frac{4e^{3(2-15x)^2}(2x \log(x) - 15x^2 \log(x))}{(2-15x)x \log^3(x)} + \frac{e^{4(2-15x)^2}(2x \log(x) - 15x^2 \log(x))}{(2-15x)x \log^3(x)} \\ & + \frac{2e^{2(2-15x)^2}(75x^2 \log^2(x) - 45x^2 \log(x) - 10x \log^2(x) + 6x \log(x))}{(2-15x)x \log^3(x)} \\ & - \frac{4e^{225x^2-60x+4}(75x^2 \log^2(x) - 15x^2 \log(x) - 10x \log^2(x) + 2x \log(x))}{(2-15x)x \log^3(x)} \\ & + \frac{1}{\log^2(x)} - \log(x) - \frac{10}{\log(x)} \end{aligned}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

\$Aborted

### 3.27 Problem number 7238

$$\int \frac{-x^2 + 2x \log(25) - \log^2(25) + (15x^2 - 20x \log(25) + 5 \log^2(25)) \log(x) + (-3x^2 + 4x \log(25) - \log^2(25)) \log(x) \log(25)}{(-2 - 5x^3 + 10x^2 \log(25) - 5x \log^2(25)) \log(x) + (x^3 - 2x^2 \log(25) + x \log^2(25)) \log(x) \log(25)}$$

Optimal antiderivative

$$-\ln((x - 2 \ln(5))^2 x (5 - \ln(\ln(x))) + 2)$$

command

```
Int[(-x^2 + 2*x*Log[25] - Log[25]^2 + (15*x^2 - 20*x*Log[25] + 5*Log[25]^2)*Log[x] + (-3*x^2 + 4*x*Log[25] - Log[25]^2)*Log[x]*Log[Log[x]])/((-2 - 5*x^3 + 10*x^2*Log[25] - 5*x*Log[25]^2)*Log[x] + (x^3 - 2*x^2*Log[25] + x*Log[25]^2)*Log[x]*Log[Log[x]])]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\begin{aligned} & -\log(5x^3 + x^3(-\log(\log(x))) + 2x^2 \log(25) \log(\log(x))) \\ & - 10x^2 \log(25) - x \log^2(25) \log(\log(x)) + 5x \log^2(25) + 2 \end{aligned}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-x^2 + 2x \log(25) - \log^2(25) + (15x^2 - 20x \log(25) + 5 \log^2(25)) \log(x) + (-3x^2 + 4x \log(25) - \log^2(25)) \log(x) \log(x)}{(-2 - 5x^3 + 10x^2 \log(25) - 5x \log^2(25)) \log(x) + (x^3 - 2x^2 \log(25) + x \log^2(25)) \log(x) \log(x)} dx$$

### 3.28 Problem number 7254

$$\int \frac{(7x + 14e^{2x}x) \log\left(-\frac{10}{x}\right) + (-7e^{2x} - 7x + (-7e^{2x}x - 7x^2) \log\left(-\frac{10}{x}\right)) \log(e^{2x} + x)}{3e^{3x}x + 3e^x x^2} dx$$

Optimal antiderivative

$$\frac{7 \ln(e^{2x} + x) \ln\left(-\frac{10}{x}\right) e^{-x}}{3}$$

command

```
Int[((7*x + 14*E^(2*x))*x)*Log[-10/x] + (-7*E^(2*x) - 7*x + (-7*E^(2*x)*x - 7*x^2)*Log[-10/x])*Log[E^(2*x) + x]/(3*E^(3*x)*x + 3*E^x*x^2), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{7}{3} e^{-x} \log\left(-\frac{10}{x}\right) \log(x + e^{2x})$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{(7x + 14e^{2x}x) \log\left(-\frac{10}{x}\right) + (-7e^{2x} - 7x + (-7e^{2x}x - 7x^2) \log\left(-\frac{10}{x}\right)) \log(e^{2x} + x)}{3e^{3x}x + 3e^x x^2} dx$$

### 3.29 Problem number 7500

$$\int \frac{e^{\frac{1}{4}(-9+24x-16x^2-(-12+16x) \log(4x-x^2)-4 \log^2(4x-x^2))} (-36 - 6x + 90x^2 - 24x^3 + (24 + 36x - 12x^2) \log(4x - x^2))}{-4x + x^2} dx$$

Optimal antiderivative

$$1 + 3e^{-\left(\frac{3}{2} + 2x + \ln(-x^2 + 4x)\right)^2}$$

command

```
Int[(E^((-9 + 24*x - 16*x^2 - (-12 + 16*x)*Log[4*x - x^2] - 4*Log[4*x - x^2]^2)/4)*(-36 - 6*x + 90*x^2 - 24*x^3 + (24 + 36*x - 12*x^2)*Log[4*x - x^2]))/(-4*x + x^2),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$3 \exp\left(-\frac{1}{4}(-4x - 2 \log((4-x)x) + 3)^2\right)$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{\exp\left(\frac{1}{4}(-9 + 24x - 16x^2 - (-12 + 16x) \log(4x - x^2) - 4 \log^2(4x - x^2))\right) (-36 - 6x + 90x^2 - 24x^3 + (-12 + 16x) \log(4x - x^2) - 4 \log^2(4x - x^2))}{-4x + x^2} dx$$

### 3.30 Problem number 7715

$$\int \frac{2x + x^2 + x^3 + e^{8x^4}(-8 + 4x^2) \log^3\left(\frac{x}{2+x+x^2}\right) + e^{8x^4}(-64x^4 - 32x^5 - 32x^6) \log^4\left(\frac{x}{2+x+x^2}\right)}{2x + x^2 + x^3} dx$$

Optimal antiderivative

$$x - e^{8x^4} \ln\left(\frac{x}{x^2 + x + 2}\right)^4$$

command

```
Int[(2*x + x^2 + x^3 + E^(8*x^4)*(-8 + 4*x^2)*Log[x/(2 + x + x^2)]^3 + E^(8*x^4)*(-64*x^4 - 32*x^5 - 32*x^6)*Log[x/(2 + x + x^2)]^4)/(2*x + x^2 + x^3),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$x - \frac{e^{8x^4} \log^3\left(\frac{x}{x^2+x+2}\right) \left(x^6 \log\left(\frac{x}{x^2+x+2}\right) + x^5 \log\left(\frac{x}{x^2+x+2}\right) + 2x^4 \log\left(\frac{x}{x^2+x+2}\right)\right)}{x^4(x^2 + x + 2)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{2x + x^2 + x^3 + e^{8x^4}(-8 + 4x^2) \log^3\left(\frac{x}{2+x+x^2}\right) + e^{8x^4}(-64x^4 - 32x^5 - 32x^6) \log^4\left(\frac{x}{2+x+x^2}\right)}{2x + x^2 + x^3} dx$$



### 3.31 Problem number 7758

$$\int \frac{e^{\frac{-e+\log(3)}{-20-x+x\log(x)}} (e - \log(3)) \log(x)}{400 + 40x + x^2 + (-40x - 2x^2) \log(x) + x^2 \log^2(x)} dx$$

Optimal antiderivative

$$e^{\frac{-\ln(3)+e}{20+x-x\ln(x)}}$$

command

```
Int[(E^((-E + Log[3])/(-20 - x + x*Log[x]))*(E - Log[3])*Log[x])/(400 + 40*x + x^2 + (-40*x - 2*x^2)*Log[x] + x^2*Log[x]^2),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$3^{\frac{1}{-x+x\log(x)-20}} e^{\frac{e}{x+x(-\log(x))+20}}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{-e+\log(3)}{-20-x+x\log(x)}} (e - \log(3)) \log(x)}{400 + 40x + x^2 + (-40x - 2x^2) \log(x) + x^2 \log^2(x)} dx$$

### 3.32 Problem number 7911

$$\int \frac{-2 - 11x + 18x^2 + 75x^3 + 32x^4 + 3x^5 + (-9 + 45x^2 + 18x^3 + x^4) \log(x) + (-x + 9x^3 + 6x^4 + x^5 + (-x + 9x^3 + 6x^4 + x^5 + (-1 + 9x^2 + 6x^3 + x^4) \log(x))) \log(x)}{-x + 9x^3 + 6x^4 + x^5 + (-1 + 9x^2 + 6x^3 + x^4) \log(x)} dx$$

Optimal antiderivative

$$\left( \ln \left( \frac{(x + \ln(x))^2}{\left(-\frac{1}{x^2} + (3 + x)^2\right)^2} \right) + 5 \right) x$$

command

```
Int[(-2 - 11*x + 18*x^2 + 75*x^3 + 32*x^4 + 3*x^5 + (-9 + 45*x^2 + 18*x^3 + x^4)*Log[x] + x + 9*x^3 + 6*x^4 + x^5 + (-1 + 9*x^2 + 6*x^3 + x^4)*Log[x])*Log[(x^6 + 2*x^5*Log[x] + x + 9*x^3 + 6*x^4 + x^5 + (-1 + 9*x^2 + 6*x^3 + x^4)*Log[x]),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\begin{aligned}
& x \log \left( \frac{x^4(x + \log(x))^2}{(-x^4 - 6x^3 - 9x^2 + 1)^2} \right) + 5x + (3 - \sqrt{5}) \log(2x - \sqrt{5} + 3) \\
& + \frac{1}{12} (9 - 5\sqrt{5}) \log(2x - \sqrt{5} + 3) - \frac{1}{12} (45 - 17\sqrt{5}) \log(2x - \sqrt{5} + 3) \\
& - \frac{1}{12} (45 + 17\sqrt{5}) \log(2x + \sqrt{5} + 3) + \frac{1}{12} (9 + 5\sqrt{5}) \log(2x + \sqrt{5} + 3) \\
& + (3 + \sqrt{5}) \log(2x + \sqrt{5} + 3) + \frac{1}{12} (9 - \sqrt{13}) \log(2x - \sqrt{13} + 3) \\
& + (3 - \sqrt{13}) \log(2x - \sqrt{13} + 3) - \frac{1}{12} (45 - 13\sqrt{13}) \log(2x - \sqrt{13} + 3) \\
& - \frac{1}{12} (45 + 13\sqrt{13}) \log(2x + \sqrt{13} + 3) \\
& + \frac{1}{12} (9 + \sqrt{13}) \log(2x + \sqrt{13} + 3) + (3 + \sqrt{13}) \log(2x + \sqrt{13} + 3)
\end{aligned}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-2 - 11x + 18x^2 + 75x^3 + 32x^4 + 3x^5 + (-9 + 45x^2 + 18x^3 + x^4) \log(x) + (-x + 9x^3 + 6x^4 + x^5 + (-x + 9x^3 + 6x^4 + x^5 + (-1 + 9x^2 + 6x^3 + x^4) \log(x)))}{-x + 9x^3 + 6x^4 + x^5 + (-1 + 9x^2 + 6x^3 + x^4) \log(x)} dx$$

### 3.33 Problem number 8564

$$\int \frac{e^{\frac{x^2 + \log(x)}{x}} ((120 - 240x + 120x^2) \log(2) - 120 \log(2) \log(x))}{x^4} dx$$

Optimal antiderivative

$$\frac{120 e^{\frac{\ln(x)}{x} + x} \ln(2)}{x^2}$$

command

`Int[(E^((x^2 + Log[x])/x))*((120 - 240*x + 120*x^2)*Log[2] - 120*Log[2]*Log[x])/x^4, x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{120 e^x x^{\frac{1}{x} - 4} \log(2) (x^2 - \log(x) + 1)}{\frac{1}{x^2} - \frac{\log(x)}{x^2} + 1}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{x^2 + \log(x)}{x}} ((120 - 240x + 120x^2) \log(2) - 120 \log(2) \log(x))}{x^4} dx$$

### 3.34 Problem number 8627

$$\int \frac{216e^x x^3 + e^x(-864x^3 - 216x^4) \log(x) + e^x \log^2(x)}{\log^2(x)} dx$$

Optimal antiderivative

$$e^x - \frac{216 e^x x^4}{\ln(x)}$$

command

`Int[(216*E^x*x^3 + E^x*(-864*x^3 - 216*x^4)*Log[x] + E^x*Log[x]^2)/Log[x]^2,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$-\frac{e^x(216x^4 \log(x) - \log^2(x))}{\log^2(x)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{216e^x x^3 + e^x(-864x^3 - 216x^4) \log(x) + e^x \log^2(x)}{\log^2(x)} dx$$

### 3.35 Problem number 8679

$$\int \frac{e^{4e^{3/x}} \left( 10e^{2/x} - 5x^2 + e^{3/x + \frac{3}{x}} (-60 + 60e^{2/x} + 60x) \right)}{36x^2 + e^{4e^{3/x}} (-12x^2 + 12e^{2/x}x^2 + 12x^3) + e^{8e^{3/x}} (x^2 + e^{4/x}x^2 - 2x^3 + x^4 + e^{2/x}(-2x^2 + 2x^3))} dx$$

Optimal antiderivative

$$\frac{5}{e^{4e^{e^{\frac{3}{x}}}} \left( x + e^{\frac{2}{x}} - 1 \right) + 6}$$

command

`Int[(E^(4*E^E^(3/x)))*(10*E^(2/x) - 5*x^2 + E^(E^(3/x) + 3/x)*(-60 + 60*E^(2/x) + 60*x) + 12*x^2 + 12*E^(2/x)*x^2 + 12*x^3) + E^(8*E^E^(3/x))*(x^2 + E^(4/x)*x^2 - 2*x^3 + x^4 + 2*x^2 + 2*x^3)),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{5}{e^{4e^{e^{3/x}}} x - e^{4e^{e^{3/x}}} + e^{4e^{e^{3/x} + \frac{2}{x}}} + 6}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{e^{4e^{3/x}} \left( 10e^{2/x} - 5x^2 + e^{3/x + \frac{3}{x}} (-60 + 60e^{2/x} + 60x) \right)}{36x^2 + e^{4e^{3/x}} (-12x^2 + 12e^{2/x}x^2 + 12x^3) + e^{8e^{3/x}} (x^2 + e^{4/x}x^2 - 2x^3 + x^4 + e^{2/x}(-2x^2 + 2x^3))} dx$$

### 3.36 Problem number 8755

$$\int \frac{-10e^{\frac{1}{x}}x \log\left(\frac{1}{x^2}\right) + \left(-20e^{\frac{1}{x}}x + e^{\frac{1}{x}}(-10 - 10x) \log\left(\frac{1}{x^2}\right)\right) \log(x)}{x^3 \log^2(x)} dx$$

Optimal antiderivative

$$\frac{10e^{\frac{1}{x}} \ln\left(\frac{1}{x^2}\right)}{x \ln(x)}$$

command

```
Int[(-10*E^x^(-1)*x*Log[x^(-2)] + (-20*E^x^(-1)*x + E^x^(-1)*(-10 - 10*x)*Log[x^(-2)])*Log[x])/(x^3*Log[x]^2), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{10e^{\frac{1}{x}} \log\left(\frac{1}{x^2}\right)}{x \log(x)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-10e^{\frac{1}{x}}x \log\left(\frac{1}{x^2}\right) + \left(-20e^{\frac{1}{x}}x + e^{\frac{1}{x}}(-10 - 10x) \log\left(\frac{1}{x^2}\right)\right) \log(x)}{x^3 \log^2(x)} dx$$

### 3.37 Problem number 8869

$$\int \frac{e^{-\frac{1}{400x^5 + (2000x^4 + 400x^5) \log(x)}} (-5 + 4x + (-20 - 5x) \log(x))}{200x^7 + (-2000x^6 - 400x^7) \log(x) + (5000x^5 + 2000x^6 + 200x^7) \log^2(x)} dx$$

Optimal antiderivative

$$2e^{-\frac{1}{400x^4(x + (-x-5) \ln(x))}}$$

command

```
Int[(E^(-400*x^5 + (2000*x^4 + 400*x^5)*Log[x]))^(-1)*(-5 + 4*x + (-20 - 5*x)*Log[x])/(2000*x^6 - 400*x^7)*Log[x] + (5000*x^5 + 2000*x^6 + 200*x^7)*Log[x]^2), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$2e^{-\frac{1}{400x^4(x+x(-\log(x))-5\log(x))}}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{e^{-\frac{1}{400x^5 + (2000x^4 + 400x^5) \log(x)}} (-5 + 4x + (-20 - 5x) \log(x))}{200x^7 + (-2000x^6 - 400x^7) \log(x) + (5000x^5 + 2000x^6 + 200x^7) \log^2(x)} dx$$

### 3.38 Problem number 9068

$$\int \frac{-e^{\frac{1+e^{21}+2x}{x}} x + e^{\frac{1+e^{21}+2x}{x}} (-1 - e^{21} - x) \log(x)}{x^3 \log^2(x)} dx$$

Optimal antiderivative

$$\frac{e^{\frac{e^{21}+2x+1}{x}}}{x \ln(x)}$$

command

`Int[(-(E^((1 + E^21 + 2*x)/x)*x) + E^((1 + E^21 + 2*x)/x)*(-1 - E^21 - x)*Log[x])/(x^3`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{e^{\frac{1+e^{21}}{x}+2}}{x \log(x)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-e^{\frac{1+e^{21}+2x}{x}} x + e^{\frac{1+e^{21}+2x}{x}} (-1 - e^{21} - x) \log(x)}{x^3 \log^2(x)} dx$$

### 3.39 Problem number 9153

$$\int \frac{40 - 100x^2 - 4e^{32}x^4 + e^{16}(-16x + 40x^3)}{25x^2 - 10e^{16}x^3 + e^{32}x^4} dx$$

Optimal antiderivative

$$\frac{8}{x^2 \left( e^{16} - \frac{5}{x} \right)} - 4x$$

command

`Int[(40 - 100*x^2 - 4*E^32*x^4 + E^16*(-16*x + 40*x^3))/(25*x^2 - 10*E^16*x^3 + E^32*x^4)`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$-4x - \frac{8e^{16}}{5(5 - e^{16}x)} - \frac{8}{5x}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

\$Aborted

### 3.40 Problem number 9410

$$\int \frac{-4x^2 + 2e^{1+x}x^2 - 2x^4 + (4x^2 + 6x^4 + e^{1+x}(-2x^2 - 2x^3))\log(x) + (4 - 2x^2 + 2x^3 + e^{1+x}(-2 + 2x - x^2))\log^2(x)}{6x^2 \log^2(x)}$$

Optimal antiderivative

$$\left(x - \frac{e^{1+x} - 2}{x}\right) \left(\frac{x^2}{3 \ln(x)} - \frac{1}{3} + \frac{x}{6}\right)$$

command

```
Int[(-4*x^2 + 2*E^(1 + x)*x^2 - 2*x^4 + (4*x^2 + 6*x^4 + E^(1 + x)*(-2*x^2 - 2*x^3))*Log[x]^2 + (4 - 2*x^2 + 2*x^3 + E^(1 + x)*(-2 + 2*x - x^2))*Log[x]^2)/(6*x^2*Log[x]^2), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{x^3}{3 \log(x)} + \frac{x^2}{6} - \frac{e^{x+1}(2x^3 \log(x) + x^2 \log^2(x) - 2x \log^2(x))}{6x^2 \log^2(x)} - \frac{x}{3} - \frac{2}{3x} + \frac{2x}{3 \log(x)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-4x^2 + 2e^{1+x}x^2 - 2x^4 + (4x^2 + 6x^4 + e^{1+x}(-2x^2 - 2x^3))\log(x) + (4 - 2x^2 + 2x^3 + e^{1+x}(-2 + 2x - x^2))\log^2(x)}{6x^2 \log^2(x)}$$

### 3.41 Problem number 9671

$$\int \frac{2e \log(2) + (-4e \log(2) + 2ex \log(2) \log(3)) \log(x) + (e \log(2) - ex \log(2) \log(3)) \log^2(x)}{4 \cdot 3^x \log^2(x) - 4 \cdot 3^x \log^3(x) + 3^x \log^4(x)} dx$$

Optimal antiderivative

$$\frac{e e^{-x \ln(3)} x \ln(2)}{(\ln(x) - 2) \ln(x)}$$

command

```
Int[(2*E*Log[2] + (-4*E*Log[2] + 2*E*x*Log[2]*Log[3])*Log[x] + (E*Log[2] - E*x*Log[2]*Log[3])*Log[x]^2)/(4*3^x*Log[x]^2 - 4*3^x*Log[x]^3 + 3^x*Log[x]^4), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$-\frac{e 3^{-x} \log(2) (x \log(9) \log(x) - x \log(3) \log^2(x))}{\log(3)(2 - \log(x))^2 \log^2(x)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{2e \log(2) + (-4e \log(2) + 2ex \log(2) \log(3)) \log(x) + (e \log(2) - ex \log(2) \log(3)) \log^2(x)}{4 \cdot 3^x \log^2(x) - 4 \cdot 3^x \log^3(x) + 3^x \log^4(x)} dx$$

### 3.42 Problem number 9738

$$\int \frac{-5 - 22x - 4x^2 + 2e^{-2-x}(16 + 3x)}{-5x - x^2 + 2e^{-2-x}(5 + x)} dx$$

Optimal antiderivative

$$\ln(e^{2x}(5 + x)(e^{\ln(2)-x-2} - x)) + 2x + 1$$

command

`Int[(-5 - 22*x - 4*x^2 + 2*E^(-2 - x)*(16 + 3*x))/(-5*x - x^2 + 2*E^(-2 - x)*(5 + x)), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$3x + \log(x + 5) + \log(2 - e^{x+2}x)$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{-5 - 22x - 4x^2 + 2e^{-2-x}(16 + 3x)}{-5x - x^2 + 2e^{-2-x}(5 + x)} dx$$

### 3.43 Problem number 10166

$$\int \frac{25x + 25x^3 \log(3) + 10x^2 \log(3) \log(625) + x \log(3) \log^2(625) + (-25x + 25x^2 + 25x^3 \log(3) + (-5 + 10x + 10x^2 \log(3)) \log(625) + (1 + x \log(3)) \log^2(625))}{-50x + 50x^2 + 50x^3 \log(3) + (-10 + 20x + 20x^2 \log(3)) \log(625) + (2 + 2x \log(3)) \log^2(625)} dx$$

Optimal antiderivative

$$\frac{\ln\left(x \ln(3) + 1 - \frac{1}{\frac{4 \ln(5)}{5} + x}\right) x}{2}$$

command

`Int[(25*x + 25*x^3*Log[3] + 10*x^2*Log[3]*Log[625] + x*Log[3]*Log[625]^2 + (-25*x + 25*x^2 + 25*x^3*Log[3] + (-5 + 10*x + 10*x^2*Log[3])*Log[625] + (1 + x*Log[3])*Log[625]^2)/(5*x + 5*x^2*Log[3] + (1 + x*Log[3])*Log[625])/(5*x + Log[625]))/(-50*x + 50*x^2 + 10 + 20*x + 20*x^2*Log[3])*Log[625] + (2 + 2*x*Log[3])*Log[625]^2), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\begin{aligned}
& \frac{\log(625) \sqrt{25 + \log^2(3) \log^2(625) + 10 \log(3)(10 - \log(625))} \operatorname{arctanh} \left( \frac{10x \log(3) + 5 + \log(3) \log(625)}{\sqrt{25 + \log^2(3) \log^2(625) + 10 \log(3)(10 - \log(625))}} \right)}{50 \log(3)} \\
& + \frac{(5 - 4 \log(5)) \sqrt{25 + \log^2(3) \log^2(625) + 10 \log(3)(10 - \log(625))} \operatorname{arctanh} \left( \frac{10x \log(3) + 5 + \log(3) \log(625)}{\sqrt{25 + \log^2(3) \log^2(625) + 10 \log(3)(10 - \log(625))}} \right)}{50 \log(3)} \\
& - \frac{\sqrt{25 + \log^2(3) \log^2(625) + 10 \log(3)(10 - \log(625))} \operatorname{arctanh} \left( \frac{10x \log(3) + 5 + \log(3) \log(625)}{\sqrt{25 + \log^2(3) \log^2(625) + 10 \log(3)(10 - \log(625))}} \right)}{10 \log(3)} \\
& + \frac{1}{10} x \log(625) \log \left( -\frac{-5x^2 \log(3) - x(5 + \log(3) \log(625)) + 5 - \log(625)}{5x + \log(625)} \right) \\
& + \frac{1}{10} x(5 - \log(625)) \log \left( -\frac{-5x^2 \log(3) - x(5 + \log(3) \log(625)) + 5 - \log(625)}{5x + \log(625)} \right) \\
& + \frac{\log(625)(5 + \log(3) \log(625)) \log(-5x^2 \log(3) - x(5 + \log(3) \log(625)) + 5 - \log(625))}{100 \log(3)} \\
& + \frac{(5 - 4 \log(5))(5 + \log(3) \log(625)) \log(-5x^2 \log(3) - x(5 + \log(3) \log(625)) + 5 - \log(625))}{100 \log(3)} \\
& - \frac{(5 + \log(3) \log(625)) \log(-5x^2 \log(3) - x(5 + \log(3) \log(625)) + 5 - \log(625))}{20 \log(3)} \\
& + \frac{x}{2} - \frac{1}{50} \log^2(625) \log(5x + \log(625)) - \frac{1}{10} x \log(625) - \frac{1}{10} x(5 - \log(625)) \\
& - \frac{1}{50} (5 - 4 \log(5)) \log(625) \log(5x + \log(625)) + \frac{1}{10} \log(625) \log(5x + \log(625))
\end{aligned}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

\$Aborted

## 4 Test file number 211

Test folder name:

test\_cases/11\_MIT



## 4.1 Problem number 20

$$\int \frac{1}{\sec(x) + \sin(x)} dx$$

Optimal antiderivative

$$\arctan(\cos(x) + \sin(x)) - \frac{\sqrt{3} \operatorname{arctanh}\left(\frac{(\cos(x) - \sin(x))\sqrt{3}}{3}\right)}{3}$$

command

`Int[(Sec[x] + Sin[x])^(-1), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\frac{1}{3}(3+i\sqrt{3}) \arctan\left(\frac{-2i \tan\left(\frac{x}{2}\right) - \sqrt{3} + i}{\sqrt{2}(1+i\sqrt{3})}\right) - \frac{1}{3}(3-i\sqrt{3}) \arctan\left(\frac{-2i \tan\left(\frac{x}{2}\right) + \sqrt{3} + i}{\sqrt{2}(1-i\sqrt{3})}\right)$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{1}{\sec(x) + \sin(x)} dx$$

## 4.2 Problem number 257

$$\int \frac{\cos(x) - \sin(x)}{2 + \sin(2x)} dx$$

Optimal antiderivative

$$\arctan(\cos(x) + \sin(x))$$

command

`Int[(Cos[x] - Sin[x])/(2 + Sin[2*x]), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\begin{aligned}
& \frac{1}{6}(3 + i\sqrt{3}) \arctan \left( \frac{-2i \tan \left(\frac{x}{2}\right) - \sqrt{3} + i}{\sqrt{2(1 + i\sqrt{3})}} \right) \\
& + \frac{1}{6}(3 - i\sqrt{3}) \arctan \left( \frac{-2i \tan \left(\frac{x}{2}\right) - \sqrt{3} + i}{\sqrt{2(1 + i\sqrt{3})}} \right) \\
& - \frac{1}{6}(3 + i\sqrt{3}) \arctan \left( \frac{-2i \tan \left(\frac{x}{2}\right) + \sqrt{3} + i}{\sqrt{2(1 - i\sqrt{3})}} \right) \\
& - \frac{1}{6}(3 - i\sqrt{3}) \arctan \left( \frac{-2i \tan \left(\frac{x}{2}\right) + \sqrt{3} + i}{\sqrt{2(1 - i\sqrt{3})}} \right)
\end{aligned}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\int \frac{\cos(x) - \sin(x)}{2 + \sin(2x)} dx$$