

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

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1 Summary of regression test table

Table 1: Summary table of regression tests

#	test file #	integral #	Rubi 4.17.3 under Mathematica 13.3.1	Rubi 4.16.1 under Mathematica 13.3.1
1	55	208	0 (not solved)	1 (pass)
2	55	209	0 (not solved)	1 (pass)
3	55	210	0 (not solved)	1 (pass)
4	55	211	0 (not solved)	1 (pass)
5	55	212	0 (not solved)	1 (pass)
6	199	556	-1 (time out)	1 (pass)
7	199	557	-1 (time out)	1 (pass)
8	199	558	-1 (time out)	1 (pass)
9	199	559	-1 (time out)	1 (pass)
10	199	573	-1 (time out)	1 (pass)
11	199	574	-1 (time out)	1 (pass)
12	199	575	-1 (time out)	1 (pass)
13	199	576	-1 (time out)	1 (pass)
14	199	590	-1 (time out)	1 (pass)
15	199	591	-1 (time out)	1 (pass)
16	199	592	-1 (time out)	1 (pass)
17	199	593	-1 (time out)	1 (pass)
18	199	606	-1 (time out)	1 (pass)
19	199	607	-1 (time out)	1 (pass)
20	199	608	-1 (time out)	1 (pass)
21	199	609	-1 (time out)	1 (pass)
22	199	736	-1 (time out)	1 (pass)
23	199	737	-1 (time out)	1 (pass)
24	199	738	-1 (time out)	1 (pass)
25	209	294	0 (not solved)	1 (pass)
26	209	628	-1 (time out)	1 (pass)

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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
27	209	629	-1 (time out)	1 (pass)
28	209	795	0 (not solved)	1 (pass)
29	209	902	-1 (time out)	1 (pass)
30	209	982	-1 (time out)	1 (pass)
31	209	1054	0 (not solved)	1 (pass)
32	209	1255	0 (not solved)	1 (pass)
33	209	1606	0 (not solved)	1 (pass)
34	209	1607	0 (not solved)	1 (pass)
35	209	1754	0 (not solved)	1 (pass)
36	209	1755	0 (not solved)	1 (pass)
37	209	1788	0 (not solved)	1 (pass)
38	209	1893	0 (not solved)	1 (pass)
39	209	1944	-1 (time out)	1 (pass)
40	209	1945	-1 (time out)	1 (pass)
41	209	2053	0 (not solved)	1 (pass)
42	209	2059	0 (not solved)	1 (pass)
43	209	2140	-1 (time out)	1 (pass)
44	209	2324	-1 (time out)	1 (pass)
45	209	2325	-1 (time out)	1 (pass)
46	209	2382	-1 (time out)	1 (pass)
47	209	2491	0 (not solved)	1 (pass)
48	209	2700	0 (not solved)	1 (pass)
49	209	2799	0 (not solved)	1 (pass)
50	209	2935	0 (not solved)	1 (pass)
51	209	2953	0 (not solved)	1 (pass)
52	210	60	0 (not solved)	1 (pass)
53	210	95	0 (not solved)	1 (pass)

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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
54	210	286	0 (not solved)	1 (pass)
55	210	333	0 (not solved)	1 (pass)
56	210	426	0 (not solved)	1 (pass)
57	210	458	0 (not solved)	1 (pass)
58	210	577	0 (not solved)	1 (pass)
59	210	670	0 (not solved)	1 (pass)
60	210	710	0 (not solved)	1 (pass)
61	210	730	0 (not solved)	1 (pass)
62	210	848	0 (not solved)	1 (pass)
63	210	923	0 (not solved)	1 (pass)
64	210	1116	0 (not solved)	1 (pass)
65	210	1208	0 (not solved)	1 (pass)
66	210	1249	0 (not solved)	1 (pass)
67	210	1273	0 (not solved)	1 (pass)
68	210	1389	0 (not solved)	1 (pass)
69	210	1416	0 (not solved)	1 (pass)
70	210	1609	0 (not solved)	1 (pass)
71	210	1754	0 (not solved)	1 (pass)
72	210	1830	0 (not solved)	1 (pass)
73	210	2029	0 (not solved)	1 (pass)
74	210	2269	-1 (time out)	1 (pass)
75	210	2360	0 (not solved)	1 (pass)
76	210	2457	0 (not solved)	1 (pass)
77	210	2468	0 (not solved)	1 (pass)
78	210	2524	-1 (time out)	1 (pass)
79	210	2695	0 (not solved)	1 (pass)
80	210	2706	0 (not solved)	1 (pass)

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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
81	210	2758	0 (not solved)	1 (pass)
82	210	2806	-1 (time out)	1 (pass)
83	210	2968	0 (not solved)	1 (pass)
84	210	3064	0 (not solved)	1 (pass)
85	210	3082	0 (not solved)	1 (pass)
86	210	3083	0 (not solved)	1 (pass)
87	210	3205	0 (not solved)	1 (pass)
88	210	3305	0 (not solved)	1 (pass)
89	210	3316	0 (not solved)	1 (pass)
90	210	3361	0 (not solved)	1 (pass)
91	210	3371	0 (not solved)	1 (pass)
92	210	3375	0 (not solved)	1 (pass)
93	210	3429	0 (not solved)	1 (pass)
94	210	3454	0 (not solved)	1 (pass)
95	210	3481	0 (not solved)	1 (pass)
96	210	3487	0 (not solved)	1 (pass)
97	210	3520	0 (not solved)	1 (pass)
98	210	3533	0 (not solved)	1 (pass)
99	210	3576	0 (not solved)	1 (pass)
100	210	3755	0 (not solved)	1 (pass)
101	210	3803	0 (not solved)	1 (pass)
102	210	3820	0 (not solved)	1 (pass)
103	210	4133	0 (not solved)	1 (pass)
104	210	4330	0 (not solved)	1 (pass)
105	210	4416	0 (not solved)	1 (pass)
106	210	4445	0 (not solved)	1 (pass)
107	210	4476	0 (not solved)	1 (pass)

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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
108	210	4479	0 (not solved)	1 (pass)
109	210	4507	0 (not solved)	1 (pass)
110	210	4608	0 (not solved)	1 (pass)
111	210	4701	-1 (time out)	1 (pass)
112	210	4803	0 (not solved)	1 (pass)
113	210	4865	0 (not solved)	1 (pass)
114	210	4901	0 (not solved)	1 (pass)
115	210	4910	-1 (time out)	1 (pass)
116	210	4955	0 (not solved)	1 (pass)
117	210	5082	0 (not solved)	1 (pass)
118	210	5086	0 (not solved)	1 (pass)
119	210	5093	0 (not solved)	1 (pass)
120	210	5293	0 (not solved)	1 (pass)
121	210	5363	0 (not solved)	1 (pass)
122	210	5530	0 (not solved)	1 (pass)
123	210	5537	0 (not solved)	1 (pass)
124	210	5747	0 (not solved)	1 (pass)
125	210	5776	0 (not solved)	1 (pass)
126	210	5802	0 (not solved)	1 (pass)
127	210	5873	0 (not solved)	1 (pass)
128	210	5956	-1 (time out)	1 (pass)
129	210	5981	0 (not solved)	1 (pass)
130	210	6200	0 (not solved)	1 (pass)
131	210	6410	0 (not solved)	1 (pass)
132	210	6448	0 (not solved)	1 (pass)
133	210	6466	0 (not solved)	1 (pass)
134	210	6472	0 (not solved)	1 (pass)

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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
135	210	6474	0 (not solved)	1 (pass)
136	210	6603	0 (not solved)	1 (pass)
137	210	6684	0 (not solved)	1 (pass)
138	210	6810	0 (not solved)	1 (pass)
139	210	6966	0 (not solved)	1 (pass)
140	210	7014	0 (not solved)	1 (pass)
141	210	7016	0 (not solved)	1 (pass)
142	210	7133	0 (not solved)	1 (pass)
143	210	7186	0 (not solved)	1 (pass)
144	210	7215	0 (not solved)	1 (pass)
145	210	7263	-1 (time out)	1 (pass)
146	210	7336	0 (not solved)	1 (pass)
147	210	7576	0 (not solved)	1 (pass)
148	210	7585	0 (not solved)	1 (pass)
149	210	7592	0 (not solved)	1 (pass)
150	210	7792	0 (not solved)	1 (pass)
151	210	8462	0 (not solved)	1 (pass)
152	210	8574	0 (not solved)	1 (pass)
153	210	8591	0 (not solved)	1 (pass)
154	210	8595	0 (not solved)	1 (pass)
155	210	8689	0 (not solved)	1 (pass)
156	210	8809	0 (not solved)	1 (pass)
157	210	8936	0 (not solved)	1 (pass)
158	210	8945	-1 (time out)	1 (pass)
159	210	9197	0 (not solved)	1 (pass)
160	210	9403	0 (not solved)	1 (pass)
161	210	9502	0 (not solved)	1 (pass)

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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
162	210	9744	0 (not solved)	1 (pass)
163	210	9872	0 (not solved)	1 (pass)
164	210	10136	0 (not solved)	1 (pass)
165	210	10238	0 (not solved)	1 (pass)
166	210	10275	0 (not solved)	1 (pass)
167	213	10	0 (not solved)	1 (pass)
168	213	11	0 (not solved)	1 (pass)

2 Test file number 55

Test folder name:

test_cases/2_Exponentials/55_2.3_Exponential_functions

2.1 Problem number 208

$$\int e^{a^3+3a^2bx+3ab^2x^2+b^3x^3} x^4 dx$$

Optimal antiderivative

$$\begin{aligned} & \frac{2a^2 e^{(bx+a)^3}}{b^5} - \frac{a^4 (bx+a) \Gamma\left(\frac{1}{3}, -(bx+a)^3\right)}{3b^5 \left(-(bx+a)^3\right)^{\frac{1}{3}}} + \frac{4a^3 (bx+a)^2 \Gamma\left(\frac{2}{3}, -(bx+a)^3\right)}{3b^5 \left(-(bx+a)^3\right)^{\frac{2}{3}}} \\ & + \frac{4a (bx+a)^4 \Gamma\left(\frac{4}{3}, -(bx+a)^3\right)}{3b^5 \left(-(bx+a)^3\right)^{\frac{4}{3}}} - \frac{(bx+a)^5 \Gamma\left(\frac{5}{3}, -(bx+a)^3\right)}{3b^5 \left(-(bx+a)^3\right)^{\frac{5}{3}}} \end{aligned}$$

command

Int[E^(a^3 + 3*a^2*b*x + 3*a*b^2*x^2 + b^3*x^3)*x^4, x]

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int e^{a^3+3a^2bx+3ab^2x^2+b^3x^3} x^4 dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & -\frac{a^4 (a+bx) \Gamma\left(\frac{1}{3}, -(a+bx)^3\right)}{3b^5 \sqrt[3]{-(a+bx)^3}} + \frac{4a^3 (a+bx)^2 \Gamma\left(\frac{2}{3}, -(a+bx)^3\right)}{3b^5 \left(-(a+bx)^3\right)^{2/3}} + \frac{2a^2 e^{(a+bx)^3}}{b^5} \\ & - \frac{(a+bx)^5 \Gamma\left(\frac{5}{3}, -(a+bx)^3\right)}{3b^5 \left(-(a+bx)^3\right)^{5/3}} + \frac{4a (a+bx)^4 \Gamma\left(\frac{4}{3}, -(a+bx)^3\right)}{3b^5 \left(-(a+bx)^3\right)^{4/3}} \end{aligned}$$

2.2 Problem number 209

$$\int e^{a^3+3a^2bx+3ab^2x^2+b^3x^3} x^3 dx$$

Optimal antiderivative

$$\begin{aligned} & -\frac{a e^{(bx+a)^3}}{b^4} + \frac{a^3 (bx+a) \Gamma\left(\frac{1}{3}, -(bx+a)^3\right)}{3b^4 \left(-(bx+a)^3\right)^{\frac{1}{3}}} \\ & - \frac{a^2 (bx+a)^2 \Gamma\left(\frac{2}{3}, -(bx+a)^3\right)}{b^4 \left(-(bx+a)^3\right)^{\frac{2}{3}}} - \frac{(bx+a)^4 \Gamma\left(\frac{4}{3}, -(bx+a)^3\right)}{3b^4 \left(-(bx+a)^3\right)^{\frac{4}{3}}} \end{aligned}$$

command

`Int[E^(a^3 + 3*a^2*b*x + 3*a*b^2*x^2 + b^3*x^3)*x^3,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int e^{a^3+3a^2bx+3ab^2x^2+b^3x^3} x^3 dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{a^3(a+bx)\Gamma\left(\frac{1}{3}, -(a+bx)^3\right)}{3b^4\sqrt[3]{-(a+bx)^3}} - \frac{a^2(a+bx)^2\Gamma\left(\frac{2}{3}, -(a+bx)^3\right)}{b^4(-(a+bx)^3)^{2/3}} - \frac{ae^{(a+bx)^3}}{b^4} - \frac{(a+bx)^4\Gamma\left(\frac{4}{3}, -(a+bx)^3\right)}{3b^4(-(a+bx)^3)^{4/3}}$$

2.3 Problem number 210

$$\int e^{a^3+3a^2bx+3ab^2x^2+b^3x^3} x^2 dx$$

Optimal antiderivative

$$\frac{e^{(bx+a)^3}}{3b^3} - \frac{a^2(bx+a)\Gamma\left(\frac{1}{3}, -(bx+a)^3\right)}{3b^3(-(bx+a)^3)^{\frac{1}{3}}} + \frac{2a(bx+a)^2\Gamma\left(\frac{2}{3}, -(bx+a)^3\right)}{3b^3(-(bx+a)^3)^{\frac{2}{3}}}$$

command

`Int[E^(a^3 + 3*a^2*b*x + 3*a*b^2*x^2 + b^3*x^3)*x^2,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int e^{a^3+3a^2bx+3ab^2x^2+b^3x^3} x^2 dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{a^2(a+bx)\Gamma\left(\frac{1}{3}, -(a+bx)^3\right)}{3b^3\sqrt[3]{-(a+bx)^3}} + \frac{e^{(a+bx)^3}}{3b^3} + \frac{2a(a+bx)^2\Gamma\left(\frac{2}{3}, -(a+bx)^3\right)}{3b^3(-(a+bx)^3)^{2/3}}$$

2.4 Problem number 211

$$\int e^{a^3+3a^2bx+3ab^2x^2+b^3x^3} x dx$$

Optimal antiderivative

$$\frac{a(bx+a)\Gamma\left(\frac{1}{3}, -(bx+a)^3\right)}{3b^2\left(-(bx+a)^3\right)^{\frac{1}{3}}} - \frac{(bx+a)^2\Gamma\left(\frac{2}{3}, -(bx+a)^3\right)}{3b^2\left(-(bx+a)^3\right)^{\frac{2}{3}}}$$

command

`Int[E^(a^3 + 3*a^2*b*x + 3*a*b^2*x^2 + b^3*x^3)*x,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int e^{a^3+3a^2bx+3ab^2x^2+b^3x^3} x dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{a(a+bx)\Gamma\left(\frac{1}{3}, -(a+bx)^3\right)}{3b^2\sqrt[3]{-(a+bx)^3}} - \frac{(a+bx)^2\Gamma\left(\frac{2}{3}, -(a+bx)^3\right)}{3b^2\left(-(a+bx)^3\right)^{2/3}}$$

2.5 Problem number 212

$$\int e^{a^3+3a^2bx+3ab^2x^2+b^3x^3} dx$$

Optimal antiderivative

$$-\frac{(bx+a)\Gamma\left(\frac{1}{3}, -(bx+a)^3\right)}{3b\left(-(bx+a)^3\right)^{\frac{1}{3}}}$$

command

`Int[E^(a^3 + 3*a^2*b*x + 3*a*b^2*x^2 + b^3*x^3),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int e^{a^3+3a^2bx+3ab^2x^2+b^3x^3} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{(a+bx)\Gamma\left(\frac{1}{3}, -(a+bx)^3\right)}{3b\sqrt[3]{-(a+bx)^3}}$$

3 Test file number 199

Test folder name:

test_cases/7_Inverse_hyperbolic_functions/7.4_Inverse_hyperbolic_cotangent/199_7.4.2_Exponent

3.1 Problem number 556

$$\int e^{\coth^{-1}(ax)} (c - a^2 cx^2)^4 dx$$

Optimal antiderivative

$$\begin{aligned} & \frac{5a^6 c^4 \left(1 - \frac{1}{ax}\right)^{\frac{3}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{11}{2}} x^7}{72} - \frac{7a^7 c^4 \left(1 - \frac{1}{ax}\right)^{\frac{5}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{11}{2}} x^8}{72} \\ & + \frac{a^8 c^4 \left(1 - \frac{1}{ax}\right)^{\frac{7}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{11}{2}} x^9}{9} + \frac{35c^4 \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}\right)}{128a} \\ & + \frac{35a^4 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^2 \sqrt{1 - \frac{1}{ax}}}{384} + \frac{7a^2 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^3 \sqrt{1 - \frac{1}{ax}}}{192} + \frac{a^3 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{7}{2}} x^4 \sqrt{1 - \frac{1}{ax}}}{64} \\ & + \frac{a^4 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{9}{2}} x^5 \sqrt{1 - \frac{1}{ax}}}{144} - \frac{5a^5 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{11}{2}} x^6 \sqrt{1 - \frac{1}{ax}}}{144} + \frac{35c^4 x \sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}}{128} \end{aligned}$$

command

`Int[E^ArcCoth[a*x]*(c - a^2*c*x^2)^4,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & \frac{1}{9} a^8 c^4 x^9 \left(1 - \frac{1}{ax}\right)^{7/2} \left(\frac{1}{ax} + 1\right)^{11/2} \\ & - \frac{7}{72} a^7 c^4 x^8 \left(1 - \frac{1}{ax}\right)^{5/2} \left(\frac{1}{ax} + 1\right)^{11/2} + \frac{5}{72} a^6 c^4 x^7 \left(1 - \frac{1}{ax}\right)^{3/2} \left(\frac{1}{ax} + 1\right)^{11/2} - \frac{5}{144} a^5 c^4 x^6 \sqrt{1 - \frac{1}{ax}} \left(\frac{1}{ax} + 1\right)^{11/2} + \dots \end{aligned}$$

3.2 Problem number 557

$$\int e^{\coth^{-1}(ax)} (c - a^2 cx^2)^3 dx$$

Optimal antiderivative

$$\begin{aligned} & \frac{5a^5 c^3 \left(1 - \frac{1}{ax}\right)^{\frac{3}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{9}{2}} x^6}{42} - \frac{a^6 c^3 \left(1 - \frac{1}{ax}\right)^{\frac{5}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{9}{2}} x^7}{7} \\ & + \frac{5c^3 \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}\right)}{16a} + \frac{5a c^3 \left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^2 \sqrt{1 - \frac{1}{ax}}}{48} + \frac{a^2 c^3 \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^3 \sqrt{1 - \frac{1}{ax}}}{24} \\ & + \frac{a^3 c^3 \left(1 + \frac{1}{ax}\right)^{\frac{7}{2}} x^4 \sqrt{1 - \frac{1}{ax}}}{56} - \frac{a^4 c^3 \left(1 + \frac{1}{ax}\right)^{\frac{9}{2}} x^5 \sqrt{1 - \frac{1}{ax}}}{14} + \frac{5c^3 x \sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}}{16} \end{aligned}$$

command

`Int[E^ArcCoth[a*x]*(c - a^2*c*x^2)^3,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & -\frac{1}{7} a^6 c^3 x^7 \left(1 - \frac{1}{ax}\right)^{5/2} \left(\frac{1}{ax} + 1\right)^{9/2} \\ & + \frac{5}{42} a^5 c^3 x^6 \left(1 - \frac{1}{ax}\right)^{3/2} \left(\frac{1}{ax} + 1\right)^{9/2} - \frac{1}{14} a^4 c^3 x^5 \sqrt{1 - \frac{1}{ax}} \left(\frac{1}{ax} + 1\right)^{9/2} + \frac{1}{56} a^3 c^3 x^4 \sqrt{1 - \frac{1}{ax}} \left(\frac{1}{ax} + 1\right)^{7/2} + \frac{1}{24} a^2 c^3 x \end{aligned}$$

3.3 Problem number 558

$$\int e^{\coth^{-1}(ax)} (c - a^2 cx^2)^2 dx$$

Optimal antiderivative

$$\begin{aligned} & \frac{a^4 c^2 \left(1 - \frac{1}{ax}\right)^{\frac{3}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{7}{2}} x^5}{5} + \frac{3c^2 \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}\right)}{8a} + \frac{a c^2 \left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^2 \sqrt{1 - \frac{1}{ax}}}{8} \\ & + \frac{a^2 c^2 \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^3 \sqrt{1 - \frac{1}{ax}}}{20} - \frac{3a^3 c^2 \left(1 + \frac{1}{ax}\right)^{\frac{7}{2}} x^4 \sqrt{1 - \frac{1}{ax}}}{20} + \frac{3c^2 x \sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}}{8} \end{aligned}$$

command

`Int[E^ArcCoth[a*x]*(c - a^2*c*x^2)^2,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{1}{5}a^4c^2x^5\left(1-\frac{1}{ax}\right)^{3/2}\left(\frac{1}{ax}+1\right)^{7/2}-\frac{3}{20}a^3c^2x^4\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{7/2}$$

$$+\frac{1}{20}a^2c^2x^3\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{5/2}+\frac{3c^2\operatorname{arctanh}\left(\sqrt{1-\frac{1}{ax}}\sqrt{\frac{1}{ax}+1}\right)}{8a}+\frac{1}{8}ac^2x^2\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{3/2}+\frac{3}{8}c^2x\sqrt{1-\frac{1}{ax}}$$

3.4 Problem number 559

$$\int e^{\coth^{-1}(ax)}(c-a^2cx^2) dx$$

Optimal antiderivative

$$\frac{c \operatorname{arctanh}\left(\sqrt{1-\frac{1}{ax}}\sqrt{1+\frac{1}{ax}}\right)}{2a} + \frac{ac\left(1+\frac{1}{ax}\right)^{\frac{3}{2}}x^2\sqrt{1-\frac{1}{ax}}}{6}$$

$$-\frac{a^2c\left(1+\frac{1}{ax}\right)^{\frac{5}{2}}x^3\sqrt{1-\frac{1}{ax}}}{3} + \frac{cx\sqrt{1-\frac{1}{ax}}\sqrt{1+\frac{1}{ax}}}{2}$$

command

`Int[E^ArcCoth[a*x]*(c - a^2*c*x^2),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{1}{3}a^2cx^3\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{5/2} + \frac{c\operatorname{arctanh}\left(\sqrt{1-\frac{1}{ax}}\sqrt{\frac{1}{ax}+1}\right)}{2a}$$

$$+\frac{1}{6}acx^2\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{3/2} + \frac{1}{2}cx\sqrt{1-\frac{1}{ax}}\sqrt{\frac{1}{ax}+1}$$

3.5 Problem number 573

$$\int e^{3 \coth^{-1}(ax)} (c - a^2 cx^2)^4 dx$$

Optimal antiderivative

$$\begin{aligned} & -\frac{5a^7 c^4 \left(1 - \frac{1}{ax}\right)^{\frac{3}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{13}{2}} x^8}{72} + \frac{a^8 c^4 \left(1 - \frac{1}{ax}\right)^{\frac{5}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{13}{2}} x^9}{9} \\ & - \frac{55c^4 \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}\right)}{128a} - \frac{55a c^4 \left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^2 \sqrt{1 - \frac{1}{ax}}}{384} \\ & - \frac{11a^2 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^3 \sqrt{1 - \frac{1}{ax}}}{192} - \frac{11a^3 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{7}{2}} x^4 \sqrt{1 - \frac{1}{ax}}}{448} \\ & - \frac{11a^4 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{9}{2}} x^5 \sqrt{1 - \frac{1}{ax}}}{1008} - \frac{5a^5 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{11}{2}} x^6 \sqrt{1 - \frac{1}{ax}}}{1008} \\ & + \frac{5a^6 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{13}{2}} x^7 \sqrt{1 - \frac{1}{ax}}}{168} - \frac{55c^4 x \sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}}{128} \end{aligned}$$

command

```
Int[E^(3*ArcCoth[a*x])*(c - a^2*c*x^2)^4,x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & \frac{1}{9} a^8 c^4 x^9 \left(1 - \frac{1}{ax}\right)^{5/2} \left(\frac{1}{ax} + 1\right)^{13/2} \\ & - \frac{5}{72} a^7 c^4 x^8 \left(1 - \frac{1}{ax}\right)^{3/2} \left(\frac{1}{ax} + 1\right)^{13/2} + \frac{5}{168} a^6 c^4 x^7 \sqrt{1 - \frac{1}{ax}} \left(\frac{1}{ax} + 1\right)^{13/2} \\ & - \frac{5a^5 c^4 x^6 \sqrt{1 - \frac{1}{ax}} \left(\frac{1}{ax} + 1\right)^{11/2}}{1008} - \frac{11a^4 c^4}{1008} \end{aligned}$$

3.6 Problem number 574

$$\int e^{3 \coth^{-1}(ax)} (c - a^2 cx^2)^3 dx$$

Optimal antiderivative

$$\begin{aligned} & \frac{a^6 c^3 \left(1 - \frac{1}{ax}\right)^{\frac{3}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{11}{2}} x^7}{7} - \frac{9c^3 \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}\right)}{16a} \\ & - \frac{3a c^3 \left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^2 \sqrt{1 - \frac{1}{ax}}}{16} - \frac{3a^2 c^3 \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^3 \sqrt{1 - \frac{1}{ax}}}{40} - \frac{9a^3 c^3 \left(1 + \frac{1}{ax}\right)^{\frac{7}{2}} x^4 \sqrt{1 - \frac{1}{ax}}}{280} \\ & - \frac{a^4 c^3 \left(1 + \frac{1}{ax}\right)^{\frac{9}{2}} x^5 \sqrt{1 - \frac{1}{ax}}}{70} + \frac{a^5 c^3 \left(1 + \frac{1}{ax}\right)^{\frac{11}{2}} x^6 \sqrt{1 - \frac{1}{ax}}}{14} - \frac{9c^3 x \sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}}{16} \end{aligned}$$

command

`Int[E^(3*ArcCoth[a*x])*(c - a^2*c*x^2)^3,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{1}{7}a^6c^3x^7\left(1-\frac{1}{ax}\right)^{3/2}\left(\frac{1}{ax}+1\right)^{11/2}+\frac{1}{14}a^5c^3x^6\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{11/2}$$

$$-\frac{1}{70}a^4c^3x^5\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{9/2}-\frac{9}{280}a^3c^3x^4\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{7/2}-\frac{3}{40}a^2c^3x^3\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{5/2}-\frac{9c^3\arctan\left(\sqrt{1-\frac{1}{ax}}\sqrt{\frac{1}{ax}+1}\right)}{8}$$

3.7 Problem number 575

$$\int e^{3\coth^{-1}(ax)}(c-a^2cx^2)^2 dx$$

Optimal antiderivative

$$-\frac{7c^2\operatorname{arctanh}\left(\sqrt{1-\frac{1}{ax}}\sqrt{1+\frac{1}{ax}}\right)}{8a}-\frac{7ac^2\left(1+\frac{1}{ax}\right)^{\frac{3}{2}}x^2\sqrt{1-\frac{1}{ax}}}{24}-\frac{7a^2c^2\left(1+\frac{1}{ax}\right)^{\frac{5}{2}}x^3\sqrt{1-\frac{1}{ax}}}{60}$$

$$-\frac{a^3c^2\left(1+\frac{1}{ax}\right)^{\frac{7}{2}}x^4\sqrt{1-\frac{1}{ax}}}{20}+\frac{a^4c^2\left(1+\frac{1}{ax}\right)^{\frac{9}{2}}x^5\sqrt{1-\frac{1}{ax}}}{5}-\frac{7c^2x\sqrt{1-\frac{1}{ax}}\sqrt{1+\frac{1}{ax}}}{8}$$

command

`Int[E^(3*ArcCoth[a*x])*(c - a^2*c*x^2)^2,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{1}{5}a^4c^2x^5\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{9/2}-\frac{1}{20}a^3c^2x^4\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{7/2}$$

$$-\frac{7}{60}a^2c^2x^3\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{5/2}-\frac{7c^2\operatorname{arctanh}\left(\sqrt{1-\frac{1}{ax}}\sqrt{\frac{1}{ax}+1}\right)}{8a}$$

$$-\frac{7}{24}ac^2x^2\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{3/2}-\frac{7}{8}c^2x\sqrt{1-\frac{1}{ax}}\sqrt{\frac{1}{ax}+1}$$

3.8 Problem number 576

$$\int e^{3 \coth^{-1}(ax)} (c - a^2 cx^2) dx$$

Optimal antiderivative

$$\begin{aligned} & - \frac{5c \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}\right)}{2a} - \frac{5ac\left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^2 \sqrt{1 - \frac{1}{ax}}}{6} \\ & - \frac{a^2 c \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^3 \sqrt{1 - \frac{1}{ax}}}{3} - \frac{5cx \sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}}{2} \end{aligned}$$

command

`Int[E^(3*ArcCoth[a*x])*(c - a^2*c*x^2), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & - \frac{1}{3} a^2 c x^3 \sqrt{1 - \frac{1}{ax}} \left(\frac{1}{ax} + 1\right)^{5/2} - \frac{5c \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}} \sqrt{\frac{1}{ax} + 1}\right)}{2a} \\ & - \frac{5}{6} a c x^2 \sqrt{1 - \frac{1}{ax}} \left(\frac{1}{ax} + 1\right)^{3/2} - \frac{5}{2} c x \sqrt{1 - \frac{1}{ax}} \sqrt{\frac{1}{ax} + 1} \end{aligned}$$

3.9 Problem number 590

$$\int e^{-\coth^{-1}(ax)} (c - a^2 cx^2)^4 dx$$

Optimal antiderivative

$$\begin{aligned} & - \frac{5a^5 c^4 \left(1 - \frac{1}{ax}\right)^{\frac{3}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{9}{2}} x^6}{48} + \frac{a^6 c^4 \left(1 - \frac{1}{ax}\right)^{\frac{5}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{9}{2}} x^7}{8} \\ & - \frac{a^7 c^4 \left(1 - \frac{1}{ax}\right)^{\frac{7}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{9}{2}} x^8}{8} + \frac{a^8 c^4 \left(1 - \frac{1}{ax}\right)^{\frac{9}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{9}{2}} x^9}{9} \\ & - \frac{35c^4 \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}\right)}{128a} - \frac{35a c^4 \left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^2 \sqrt{1 - \frac{1}{ax}}}{384} \\ & - \frac{7a^2 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^3 \sqrt{1 - \frac{1}{ax}}}{192} - \frac{a^3 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{7}{2}} x^4 \sqrt{1 - \frac{1}{ax}}}{64} \\ & + \frac{a^4 c^4 \left(1 + \frac{1}{ax}\right)^{\frac{9}{2}} x^5 \sqrt{1 - \frac{1}{ax}}}{16} - \frac{35c^4 x \sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}}{128} \end{aligned}$$

command

`Int[(c - a^2*c*x^2)^4/E^ArcCoth[a*x], x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{1}{9}a^8c^4x^9\left(1-\frac{1}{ax}\right)^{9/2}\left(\frac{1}{ax}+1\right)^{9/2}$$

$$-\frac{1}{8}a^7c^4x^8\left(1-\frac{1}{ax}\right)^{7/2}\left(\frac{1}{ax}+1\right)^{9/2}+\frac{1}{8}a^6c^4x^7\left(1-\frac{1}{ax}\right)^{5/2}\left(\frac{1}{ax}+1\right)^{9/2}-\frac{5}{48}a^5c^4x^6\left(1-\frac{1}{ax}\right)^{3/2}\left(\frac{1}{ax}+1\right)^{9/2}+\frac{1}{16}a^4c^4x^5\left(1-\frac{1}{ax}\right)^{1/2}\left(\frac{1}{ax}+1\right)^{9/2}$$

3.10 Problem number 591

$$\int e^{-\coth^{-1}(ax)}(c-a^2cx^2)^3 dx$$

Optimal antiderivative

$$-\frac{a^4c^3\left(1-\frac{1}{ax}\right)^{\frac{3}{2}}\left(1+\frac{1}{ax}\right)^{\frac{7}{2}}x^5}{6}+\frac{a^5c^3\left(1-\frac{1}{ax}\right)^{\frac{5}{2}}\left(1+\frac{1}{ax}\right)^{\frac{7}{2}}x^6}{6}-\frac{a^6c^3\left(1-\frac{1}{ax}\right)^{\frac{7}{2}}\left(1+\frac{1}{ax}\right)^{\frac{7}{2}}x^7}{7}$$

$$-\frac{5c^3\operatorname{arctanh}\left(\sqrt{1-\frac{1}{ax}}\sqrt{1+\frac{1}{ax}}\right)}{16a}-\frac{5a^5c^3\left(1+\frac{1}{ax}\right)^{\frac{3}{2}}x^2\sqrt{1-\frac{1}{ax}}}{48}$$

$$-\frac{a^2c^3\left(1+\frac{1}{ax}\right)^{\frac{5}{2}}x^3\sqrt{1-\frac{1}{ax}}}{24}+\frac{a^3c^3\left(1+\frac{1}{ax}\right)^{\frac{7}{2}}x^4\sqrt{1-\frac{1}{ax}}}{8}-\frac{5c^3x\sqrt{1-\frac{1}{ax}}\sqrt{1+\frac{1}{ax}}}{16}$$

command

`Int[(c - a^2*c*x^2)^3/E^ArcCoth[a*x], x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{1}{7}a^6c^3x^7\left(1-\frac{1}{ax}\right)^{7/2}\left(\frac{1}{ax}+1\right)^{7/2}$$

$$+\frac{1}{6}a^5c^3x^6\left(1-\frac{1}{ax}\right)^{5/2}\left(\frac{1}{ax}+1\right)^{7/2}-\frac{1}{6}a^4c^3x^5\left(1-\frac{1}{ax}\right)^{3/2}\left(\frac{1}{ax}+1\right)^{7/2}+\frac{1}{8}a^3c^3x^4\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{7/2}-\frac{1}{24}a^2c^3x^3\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{7/2}$$

3.11 Problem number 592

$$\int e^{-\coth^{-1}(ax)}(c - a^2cx^2)^2 dx$$

Optimal antiderivative

$$\begin{aligned} & -\frac{a^3c^2\left(1 - \frac{1}{ax}\right)^{\frac{3}{2}}\left(1 + \frac{1}{ax}\right)^{\frac{5}{2}}x^4}{4} + \frac{a^4c^2\left(1 - \frac{1}{ax}\right)^{\frac{5}{2}}\left(1 + \frac{1}{ax}\right)^{\frac{5}{2}}x^5}{5} \\ & - \frac{3c^2 \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}}\sqrt{1 + \frac{1}{ax}}\right)}{8a} - \frac{ac^2\left(1 + \frac{1}{ax}\right)^{\frac{3}{2}}x^2\sqrt{1 - \frac{1}{ax}}}{8} \\ & + \frac{a^2c^2\left(1 + \frac{1}{ax}\right)^{\frac{5}{2}}x^3\sqrt{1 - \frac{1}{ax}}}{4} - \frac{3c^2x\sqrt{1 - \frac{1}{ax}}\sqrt{1 + \frac{1}{ax}}}{8} \end{aligned}$$

command

`Int[(c - a^2*c*x^2)^2/E^ArcCoth[a*x], x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & \frac{1}{5}a^4c^2x^5\left(1 - \frac{1}{ax}\right)^{5/2}\left(\frac{1}{ax} + 1\right)^{5/2} \\ & - \frac{1}{4}a^3c^2x^4\left(1 - \frac{1}{ax}\right)^{3/2}\left(\frac{1}{ax} + 1\right)^{5/2} + \frac{1}{4}a^2c^2x^3\sqrt{1 - \frac{1}{ax}}\left(\frac{1}{ax} + 1\right)^{5/2} - \frac{3c^2 \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}}\sqrt{\frac{1}{ax} + 1}\right)}{8a} - \frac{1}{8}ac^2x^2\sqrt{\dots} \end{aligned}$$

3.12 Problem number 593

$$\int e^{-\coth^{-1}(ax)}(c - a^2cx^2) dx$$

Optimal antiderivative

$$\begin{aligned} & -\frac{a^2c\left(1 - \frac{1}{ax}\right)^{\frac{3}{2}}\left(1 + \frac{1}{ax}\right)^{\frac{3}{2}}x^3}{3} - \frac{c \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}}\sqrt{1 + \frac{1}{ax}}\right)}{2a} \\ & + \frac{ac\left(1 + \frac{1}{ax}\right)^{\frac{3}{2}}x^2\sqrt{1 - \frac{1}{ax}}}{2} - \frac{cx\sqrt{1 - \frac{1}{ax}}\sqrt{1 + \frac{1}{ax}}}{2} \end{aligned}$$

command

`Int[(c - a^2*c*x^2)/E^ArcCoth[a*x], x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{1}{3}a^2cx^3\left(1-\frac{1}{ax}\right)^{3/2}\left(\frac{1}{ax}+1\right)^{3/2}-\frac{\operatorname{carctanh}\left(\sqrt{1-\frac{1}{ax}}\sqrt{\frac{1}{ax}+1}\right)}{2a}$$

$$+\frac{1}{2}acx^2\sqrt{1-\frac{1}{ax}}\left(\frac{1}{ax}+1\right)^{3/2}-\frac{1}{2}cx\sqrt{1-\frac{1}{ax}}\sqrt{\frac{1}{ax}+1}$$

3.13 Problem number 606

$$\int e^{-3\operatorname{coth}^{-1}(ax)}(c-a^2cx^2)^4 dx$$

Optimal antiderivative

$$\frac{11a^4c^4\left(1-\frac{1}{ax}\right)^{\frac{3}{2}}\left(1+\frac{1}{ax}\right)^{\frac{7}{2}}x^5}{48}-\frac{11a^5c^4\left(1-\frac{1}{ax}\right)^{\frac{5}{2}}\left(1+\frac{1}{ax}\right)^{\frac{7}{2}}x^6}{48}$$

$$+\frac{11a^6c^4\left(1-\frac{1}{ax}\right)^{\frac{7}{2}}\left(1+\frac{1}{ax}\right)^{\frac{7}{2}}x^7}{56}-\frac{11a^7c^4\left(1-\frac{1}{ax}\right)^{\frac{9}{2}}\left(1+\frac{1}{ax}\right)^{\frac{7}{2}}x^8}{72}$$

$$+\frac{a^8c^4\left(1-\frac{1}{ax}\right)^{\frac{11}{2}}\left(1+\frac{1}{ax}\right)^{\frac{7}{2}}x^9}{9}+\frac{55c^4\operatorname{arctanh}\left(\sqrt{1-\frac{1}{ax}}\sqrt{1+\frac{1}{ax}}\right)}{128a}$$

$$+\frac{55a^4c^4\left(1+\frac{1}{ax}\right)^{\frac{3}{2}}x^2\sqrt{1-\frac{1}{ax}}}{384}+\frac{11a^2c^4\left(1+\frac{1}{ax}\right)^{\frac{5}{2}}x^3\sqrt{1-\frac{1}{ax}}}{192}$$

$$-\frac{11a^3c^4\left(1+\frac{1}{ax}\right)^{\frac{7}{2}}x^4\sqrt{1-\frac{1}{ax}}}{64}+\frac{55c^4x\sqrt{1-\frac{1}{ax}}\sqrt{1+\frac{1}{ax}}}{128}$$

command

`Int[(c - a^2*c*x^2)^4/E^(3*ArcCoth[a*x]), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{1}{9}a^8c^4x^9\left(1-\frac{1}{ax}\right)^{11/2}\left(\frac{1}{ax}+1\right)^{7/2}$$

$$-\frac{11}{72}a^7c^4x^8\left(1-\frac{1}{ax}\right)^{9/2}\left(\frac{1}{ax}+1\right)^{7/2}+\frac{11}{56}a^6c^4x^7\left(1-\frac{1}{ax}\right)^{7/2}\left(\frac{1}{ax}+1\right)^{7/2}-\frac{11}{48}a^5c^4x^6\left(1-\frac{1}{ax}\right)^{5/2}\left(\frac{1}{ax}+1\right)^{7/2}+\frac{1}{2}a^4c^4x^5\left(1-\frac{1}{ax}\right)^{3/2}\left(\frac{1}{ax}+1\right)^{7/2}$$

3.14 Problem number 607

$$\int e^{-3 \coth^{-1}(ax)} (c - a^2 cx^2)^3 dx$$

Optimal antiderivative

$$\begin{aligned} & \frac{3a^3 c^3 \left(1 - \frac{1}{ax}\right)^{\frac{3}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^4}{8} - \frac{3a^4 c^3 \left(1 - \frac{1}{ax}\right)^{\frac{5}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^5}{10} + \frac{3a^5 c^3 \left(1 - \frac{1}{ax}\right)^{\frac{7}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^6}{14} \\ & - \frac{a^6 c^3 \left(1 - \frac{1}{ax}\right)^{\frac{9}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^7}{7} + \frac{9c^3 \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}\right)}{16a} \\ & + \frac{3a c^3 \left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^2 \sqrt{1 - \frac{1}{ax}}}{16} - \frac{3a^2 c^3 \left(1 + \frac{1}{ax}\right)^{\frac{5}{2}} x^3 \sqrt{1 - \frac{1}{ax}}}{8} + \frac{9c^3 x \sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}}{16} \end{aligned}$$

command

```
Int[(c - a^2*c*x^2)^3/E^(3*ArcCoth[a*x]),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & -\frac{1}{7} a^6 c^3 x^7 \left(1 - \frac{1}{ax}\right)^{9/2} \left(\frac{1}{ax} + 1\right)^{5/2} \\ & + \frac{3}{14} a^5 c^3 x^6 \left(1 - \frac{1}{ax}\right)^{7/2} \left(\frac{1}{ax} + 1\right)^{5/2} - \frac{3}{10} a^4 c^3 x^5 \left(1 - \frac{1}{ax}\right)^{5/2} \left(\frac{1}{ax} + 1\right)^{5/2} + \frac{3}{8} a^3 c^3 x^4 \left(1 - \frac{1}{ax}\right)^{3/2} \left(\frac{1}{ax} + 1\right)^{5/2} - \frac{3}{8} a \end{aligned}$$

3.15 Problem number 608

$$\int e^{-3 \coth^{-1}(ax)} (c - a^2 cx^2)^2 dx$$

Optimal antiderivative

$$\begin{aligned} & \frac{7a^2 c^2 \left(1 - \frac{1}{ax}\right)^{\frac{3}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^3}{12} - \frac{7a^3 c^2 \left(1 - \frac{1}{ax}\right)^{\frac{5}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^4}{20} + \frac{a^4 c^2 \left(1 - \frac{1}{ax}\right)^{\frac{7}{2}} \left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^5}{5} \\ & + \frac{7c^2 \operatorname{arctanh}\left(\sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}\right)}{8a} - \frac{7a c^2 \left(1 + \frac{1}{ax}\right)^{\frac{3}{2}} x^2 \sqrt{1 - \frac{1}{ax}}}{8} + \frac{7c^2 x \sqrt{1 - \frac{1}{ax}} \sqrt{1 + \frac{1}{ax}}}{8} \end{aligned}$$

command

```
Int[(c - a^2*c*x^2)^2/E^(3*ArcCoth[a*x]),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{1}{5}a^4c^2x^5\left(1-\frac{1}{ax}\right)^{7/2}\left(\frac{1}{ax}+1\right)^{3/2}$$

$$-\frac{7}{20}a^3c^2x^4\left(1-\frac{1}{ax}\right)^{5/2}\left(\frac{1}{ax}+1\right)^{3/2}+\frac{7}{12}a^2c^2x^3\left(1-\frac{1}{ax}\right)^{3/2}\left(\frac{1}{ax}+1\right)^{3/2}+\frac{7c^2\operatorname{arctanh}\left(\sqrt{1-\frac{1}{ax}}\sqrt{\frac{1}{ax}+1}\right)}{8a}-\frac{7}{8}ac$$

3.16 Problem number 609

$$\int e^{-3\operatorname{coth}^{-1}(ax)}(c-a^2cx^2)dx$$

Optimal antiderivative

$$\frac{5c\operatorname{arctanh}\left(\sqrt{1-\frac{1}{ax}}\sqrt{1+\frac{1}{ax}}\right)}{2a}+\frac{5ac\left(1-\frac{1}{ax}\right)^{\frac{3}{2}}x^2\sqrt{1+\frac{1}{ax}}}{6}$$

$$-\frac{a^2c\left(1-\frac{1}{ax}\right)^{\frac{5}{2}}x^3\sqrt{1+\frac{1}{ax}}}{3}-\frac{5cx\sqrt{1-\frac{1}{ax}}\sqrt{1+\frac{1}{ax}}}{2}$$

command

`Int[(c - a^2*c*x^2)/E^(3*ArcCoth[a*x]), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{1}{3}a^2cx^3\left(1-\frac{1}{ax}\right)^{5/2}\sqrt{\frac{1}{ax}+1}+\frac{5c\operatorname{arctanh}\left(\sqrt{1-\frac{1}{ax}}\sqrt{\frac{1}{ax}+1}\right)}{2a}$$

$$+\frac{5}{6}acx^2\left(1-\frac{1}{ax}\right)^{3/2}\sqrt{\frac{1}{ax}+1}-\frac{5}{2}cx\sqrt{1-\frac{1}{ax}}\sqrt{\frac{1}{ax}+1}$$

3.17 Problem number 736

$$\int e^{n \coth^{-1}(ax)} (c - a^2 cx^2)^3 dx$$

Optimal antiderivative

$$\frac{256c^3 \left(1 - \frac{1}{ax}\right)^{4-\frac{n}{2}} \left(1 + \frac{1}{ax}\right)^{-4+\frac{n}{2}} {}_2F_1\left(8, 4 - \frac{n}{2}; 5 - \frac{n}{2}; \frac{a-\frac{1}{x}}{a+\frac{1}{x}}\right)}{a(8-n)}$$

command

```
Int[E^(n*ArcCoth[a*x])*(c - a^2*c*x^2)^3,x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{256c^3 \left(1 - \frac{1}{ax}\right)^{4-\frac{n}{2}} \left(\frac{1}{ax} + 1\right)^{\frac{n-8}{2}} \text{Hypergeometric2F1}\left(8, 4 - \frac{n}{2}, 5 - \frac{n}{2}, \frac{a-\frac{1}{x}}{a+\frac{1}{x}}\right)}{a(8-n)}$$

3.18 Problem number 737

$$\int e^{n \coth^{-1}(ax)} (c - a^2 cx^2)^2 dx$$

Optimal antiderivative

$$\frac{64c^2 \left(1 - \frac{1}{ax}\right)^{3-\frac{n}{2}} \left(1 + \frac{1}{ax}\right)^{-3+\frac{n}{2}} {}_2F_1\left(6, 3 - \frac{n}{2}; 4 - \frac{n}{2}; \frac{a-\frac{1}{x}}{a+\frac{1}{x}}\right)}{a(6-n)}$$

command

```
Int[E^(n*ArcCoth[a*x])*(c - a^2*c*x^2)^2,x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{64c^2 \left(1 - \frac{1}{ax}\right)^{3-\frac{n}{2}} \left(\frac{1}{ax} + 1\right)^{\frac{n-6}{2}} \text{Hypergeometric2F1}\left(6, 3 - \frac{n}{2}, 4 - \frac{n}{2}, \frac{a-\frac{1}{x}}{a+\frac{1}{x}}\right)}{a(6-n)}$$

3.19 Problem number 738

$$\int e^{n \coth^{-1}(ax)} (c - a^2 cx^2) dx$$

Optimal antiderivative

$$\frac{16c \left(1 - \frac{1}{ax}\right)^{2 - \frac{n}{2}} \left(1 + \frac{1}{ax}\right)^{-2 + \frac{n}{2}} {}_2F_1\left(4, 2 - \frac{n}{2}; 3 - \frac{n}{2}; \frac{a - \frac{1}{x}}{a + \frac{1}{x}}\right)}{a(4 - n)}$$

command

`Int[E^(n*ArcCoth[a*x])*(c - a^2*c*x^2),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{16c \left(1 - \frac{1}{ax}\right)^{2 - \frac{n}{2}} \left(\frac{1}{ax} + 1\right)^{\frac{n-4}{2}} \text{Hypergeometric2F1}\left(4, 2 - \frac{n}{2}, 3 - \frac{n}{2}, \frac{a - \frac{1}{x}}{a + \frac{1}{x}}\right)}{a(4 - n)}$$

4 Test file number 209

Test folder name:

test_cases/209_Blake_problems

4.1 Problem number 294

$$\int \frac{(-1 + x^3 - x^5 - 2x^7)^{2/3} (1 - x^3 + x^5 + 2x^7) (-3 + 2x^5 + 8x^7)}{x^9} dx$$

Optimal antiderivative

$$\frac{3(-2x^7 - x^5 + x^3 - 1)^{8/3}}{8x^8}$$

command

`Int[((-1 + x^3 - x^5 - 2*x^7)^(2/3)*(1 - x^3 + x^5 + 2*x^7)*(-3 + 2*x^5 + 8*x^7))/x^9,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(-1 + x^3 - x^5 - 2x^7)^{2/3} (1 - x^3 + x^5 + 2x^7) (-3 + 2x^5 + 8x^7)}{x^9} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{3(-2x^7 - x^5 + x^3 - 1)^{8/3}}{8x^8}$$

4.2 Problem number 628

$$\int \frac{1 + x^6}{\sqrt[4]{-x^3 + x^5} (1 + x^3 - x^6)} dx$$

Optimal antiderivative

Unintegrable

command

```
Int[(1 + x^6)/((-x^3 + x^5)^(1/4)*(1 + x^3 - x^6)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

output too large to display

4.3 Problem number 629

$$\int \frac{1 + x^6}{\sqrt[4]{-x^3 + x^5} (1 + x^3 - x^6)} dx$$

Optimal antiderivative

Unintegrable

command

```
Int[(1 + x^6)/((-x^3 + x^5)^(1/4)*(1 + x^3 - x^6)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

output too large to display

4.4 Problem number 795

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

Optimal antiderivative

$$\frac{\arctan\left(\frac{2^{\frac{3}{4}}(x^3+x)^{\frac{1}{4}}}{1+x}\right) 2^{\frac{3}{4}}}{4} - \frac{\operatorname{arctanh}\left(\frac{2^{\frac{3}{4}}(x^3+x)^{\frac{1}{4}}}{1+x}\right) 2^{\frac{3}{4}}}{4}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{4\sqrt[4]{x^2+1}x^2 \operatorname{AppellF1}\left(\frac{7}{8}, 1, \frac{1}{4}, \frac{15}{8}, x^2, -x^2\right)}{7\sqrt[4]{x^3+x}} - \frac{4\sqrt[4]{x^2+1}x \operatorname{AppellF1}\left(\frac{3}{8}, 1, \frac{1}{4}, \frac{11}{8}, x^2, -x^2\right)}{3\sqrt[4]{x^3+x}}$$

4.5 Problem number 902

$$\int \frac{(1+x^2)\sqrt[4]{x^2+x^6}}{x^2(-1+x^2)} dx$$

Optimal antiderivative

$$\frac{2(x^6+x^2)^{\frac{1}{4}}}{x} + 2^{\frac{1}{4}} \arctan\left(\frac{2^{\frac{1}{4}}x}{(x^6+x^2)^{\frac{1}{4}}}\right) - 2^{\frac{1}{4}} \operatorname{arctanh}\left(\frac{2^{\frac{1}{4}}x}{(x^6+x^2)^{\frac{1}{4}}}\right)$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{8\sqrt[4]{x^6+x^2}x \operatorname{AppellF1}\left(\frac{3}{8}, 1, \frac{3}{4}, \frac{11}{8}, x^4, -x^4\right)}{3\sqrt[4]{x^4+1}} - \frac{8\sqrt[4]{x^6+x^2}x^3 \operatorname{AppellF1}\left(\frac{7}{8}, 1, \frac{3}{4}, \frac{15}{8}, x^4, -x^4\right)}{7\sqrt[4]{x^4+1}} + \frac{4\sqrt[4]{x^6+x^2}x \operatorname{Hypergeometric2F1}\left(\frac{3}{8}, \frac{3}{4}, \frac{11}{8}, -x^4\right)}{3\sqrt[4]{x^4+1}} + \frac{2\sqrt[4]{x^6+x^2}}{x}$$

4.6 Problem number 982

$$\int \frac{\sqrt[4]{-1+2x^4}(-2+x^8)}{x^6(-1+x^4)^2} dx$$

Optimal antiderivative

$$\frac{(2x^4-1)^{\frac{1}{4}}(69x^8-56x^4-8)}{20x^5(x^4-1)} + \frac{15 \arctan\left(\frac{x}{(2x^4-1)^{\frac{1}{4}}}\right)}{8} - \frac{15 \operatorname{arctanh}\left(\frac{x}{(2x^4-1)^{\frac{1}{4}}}\right)}{8}$$

command

`Int[((-1 + 2*x^4)^(1/4)*(-2 + x^8))/(x^6*(-1 + x^4)^2), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & -\frac{4\sqrt[4]{2x^4-1}x^3 \operatorname{AppellF1}\left(\frac{3}{4}, -\frac{1}{4}, 1, \frac{7}{4}, 2x^4, x^4\right)}{3\sqrt[4]{1-2x^4}} \\ & + 2\sqrt[4]{2} \arctan\left(\frac{\sqrt[4]{2}x}{\sqrt[4]{2x^4-1}}\right) - 2\sqrt[4]{2} \operatorname{arctanh}\left(\frac{\sqrt[4]{2}x}{\sqrt[4]{2x^4-1}}\right) \\ & - \frac{\sqrt[4]{2x^4-1}x^3 \operatorname{Hypergeometric2F1}\left(-\frac{1}{4}, \frac{3}{4}, \frac{7}{4}, \frac{x^4}{1-x^4}\right)}{3\sqrt[4]{1-2x^4}(1-x^4)^{3/4}} + \frac{4\sqrt[4]{2x^4-1}}{x} - \frac{2(2x^4-1)^{5/4}}{5x^5} \end{aligned}$$

4.7 Problem number 1054

$$\int \frac{x+x^7}{(-1+x^6)^{2/3}(-1+x^3+x^6)} dx$$

Optimal antiderivative

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

command

`Int[(x + x^7)/((-1 + x^6)^(2/3)*(-1 + x^3 + x^6)), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{x + x^7}{(-1 + x^6)^{2/3} (-1 + x^3 + x^6)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & \frac{(5 - \sqrt{5}) (1 - x^6)^{2/3} x^5 \operatorname{AppellF1}\left(\frac{5}{6}, \frac{2}{3}, 1, \frac{11}{6}, x^6, \frac{2x^6}{3 - \sqrt{5}}\right)}{25 (3 - \sqrt{5}) (x^6 - 1)^{2/3}} \\ & - \frac{4(1 - x^6)^{2/3} x^5 \operatorname{AppellF1}\left(\frac{5}{6}, \frac{2}{3}, 1, \frac{11}{6}, x^6, \frac{2x^6}{3 - \sqrt{5}}\right)}{5\sqrt{5} (3 - \sqrt{5}) (x^6 - 1)^{2/3}} \\ & + \frac{(5 + \sqrt{5}) (1 - x^6)^{2/3} x^5 \operatorname{AppellF1}\left(\frac{5}{6}, \frac{2}{3}, 1, \frac{11}{6}, x^6, \frac{2x^6}{3 + \sqrt{5}}\right)}{25 (3 + \sqrt{5}) (x^6 - 1)^{2/3}} \\ & + \frac{4(1 - x^6)^{2/3} x^5 \operatorname{AppellF1}\left(\frac{5}{6}, \frac{2}{3}, 1, \frac{11}{6}, x^6, \frac{2x^6}{3 + \sqrt{5}}\right)}{5\sqrt{5} (3 + \sqrt{5}) (x^6 - 1)^{2/3}} \\ & - \frac{(5 - \sqrt{5}) (1 - x^6)^{2/3} x^2 \operatorname{AppellF1}\left(\frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, x^6, \frac{2x^6}{3 - \sqrt{5}}\right)}{5 (3 - \sqrt{5}) (x^6 - 1)^{2/3}} \\ & + \frac{(1 - x^6)^{2/3} x^2 \operatorname{AppellF1}\left(\frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, x^6, \frac{2x^6}{3 - \sqrt{5}}\right)}{2\sqrt{5} (x^6 - 1)^{2/3}} \\ & - \frac{(5 + \sqrt{5}) (1 - x^6)^{2/3} x^2 \operatorname{AppellF1}\left(\frac{1}{3}, 1, \frac{2}{3}, \frac{4}{3}, \frac{2x^6}{3 + \sqrt{5}}, x^6\right)}{5 (3 + \sqrt{5}) (x^6 - 1)^{2/3}} \\ & - \frac{(1 - x^6)^{2/3} x^2 \operatorname{AppellF1}\left(\frac{1}{3}, 1, \frac{2}{3}, \frac{4}{3}, \frac{2x^6}{3 + \sqrt{5}}, x^6\right)}{2\sqrt{5} (x^6 - 1)^{2/3}} \\ & + \frac{(1 - x^6)^{2/3} x^2 \operatorname{Hypergeometric2F1}\left(\frac{1}{3}, \frac{2}{3}, \frac{4}{3}, x^6\right)}{2 (x^6 - 1)^{2/3}} \end{aligned}$$

4.8 Problem number 1255

$$\int \frac{\sqrt[3]{-1 + x^6} (1 + x^6)}{x^2 (-1 + x^3 + x^6)} dx$$

Optimal antiderivative

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

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\sqrt[3]{-1+x^6}(1+x^6)}{x^2(-1+x^3+x^6)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & \frac{2(5-\sqrt{5})\sqrt[3]{x^6-1}x^5 \operatorname{AppellF1}\left(\frac{5}{6}, -\frac{1}{3}, 1, \frac{11}{6}, x^6, \frac{2x^6}{3-\sqrt{5}}\right)}{25(3-\sqrt{5})\sqrt[3]{1-x^6}} \\ & - \frac{2\sqrt[3]{x^6-1}x^5 \operatorname{AppellF1}\left(\frac{5}{6}, -\frac{1}{3}, 1, \frac{11}{6}, x^6, \frac{2x^6}{3-\sqrt{5}}\right)}{5\sqrt{5}(3-\sqrt{5})\sqrt[3]{1-x^6}} \\ & - \frac{2(5+\sqrt{5})\sqrt[3]{x^6-1}x^5 \operatorname{AppellF1}\left(\frac{5}{6}, -\frac{1}{3}, 1, \frac{11}{6}, x^6, \frac{2x^6}{3+\sqrt{5}}\right)}{25(3+\sqrt{5})\sqrt[3]{1-x^6}} \\ & + \frac{2\sqrt[3]{x^6-1}x^5 \operatorname{AppellF1}\left(\frac{5}{6}, -\frac{1}{3}, 1, \frac{11}{6}, x^6, \frac{2x^6}{3+\sqrt{5}}\right)}{5\sqrt{5}(3+\sqrt{5})\sqrt[3]{1-x^6}} \\ & - \frac{(5-\sqrt{5})\sqrt[3]{x^6-1}x^2 \operatorname{AppellF1}\left(\frac{1}{3}, -\frac{1}{3}, 1, \frac{4}{3}, x^6, \frac{2x^6}{3-\sqrt{5}}\right)}{10(3-\sqrt{5})\sqrt[3]{1-x^6}} \\ & - \frac{\sqrt[3]{x^6-1}x^2 \operatorname{AppellF1}\left(\frac{1}{3}, -\frac{1}{3}, 1, \frac{4}{3}, x^6, \frac{2x^6}{3-\sqrt{5}}\right)}{\sqrt{5}\sqrt[3]{1-x^6}} \\ & - \frac{(5+\sqrt{5})\sqrt[3]{x^6-1}x^2 \operatorname{AppellF1}\left(\frac{1}{3}, 1, -\frac{1}{3}, \frac{4}{3}, \frac{2x^6}{3+\sqrt{5}}, x^6\right)}{10(3+\sqrt{5})\sqrt[3]{1-x^6}} \\ & + \frac{\sqrt[3]{x^6-1}x^2 \operatorname{AppellF1}\left(\frac{1}{3}, 1, -\frac{1}{3}, \frac{4}{3}, \frac{2x^6}{3+\sqrt{5}}, x^6\right)}{\sqrt{5}\sqrt[3]{1-x^6}} \\ & + \frac{\sqrt[3]{x^6-1} \operatorname{Hypergeometric2F1}\left(-\frac{1}{3}, -\frac{1}{6}, \frac{5}{6}, x^6\right)}{\sqrt[3]{1-x^6}x} \end{aligned}$$

4.9 Problem number 1606

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

Optimal antiderivative

$$\frac{\sqrt{3} \arctan\left(\frac{\sqrt{3}(x^3-x)^{\frac{1}{3}}}{-1-x+(x^3-x)^{\frac{1}{3}}}\right)}{4} + \frac{\ln\left(1+x+2(x^3-x)^{\frac{1}{3}}\right)}{4} - \frac{\ln\left(1+2x+x^2+(-2-2x)(x^3-x)^{\frac{1}{3}}+4(x^3-x)^{\frac{2}{3}}\right)}{8}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{9\sqrt[3]{1-x^2}x^2 \operatorname{AppellF1}\left(\frac{5}{6}, 1, \frac{1}{3}, \frac{11}{6}, 9x^2, x^2\right)}{5\sqrt[3]{x^3-x}} - \frac{\sqrt{3}\sqrt[3]{x^2-1}\sqrt[3]{x} \arctan\left(\frac{1-\frac{4x^{2/3}}{\sqrt[3]{x^2-1}}}{\sqrt{3}}\right)}{4\sqrt[3]{x^3-x}} \\ - \frac{\sqrt[3]{x^2-1}\sqrt[3]{x} \log(1-9x^2)}{8\sqrt[3]{x^3-x}} + \frac{3\sqrt[3]{x^2-1}\sqrt[3]{x} \log\left(2x^{2/3} + \sqrt[3]{x^2-1}\right)}{8\sqrt[3]{x^3-x}}$$

4.10 Problem number 1607

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

Optimal antiderivative

$$\frac{\sqrt{3} \arctan\left(\frac{\sqrt{3}(x^3-x)^{\frac{1}{3}}}{1-x+(x^3-x)^{\frac{1}{3}}}\right)}{4} + \frac{\ln\left(-1+x+2(x^3-x)^{\frac{1}{3}}\right)}{4} \\ - \frac{\ln\left(1-2x+x^2+(2-2x)(x^3-x)^{\frac{1}{3}}+4(x^3-x)^{\frac{2}{3}}\right)}{8}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{9\sqrt[3]{1-x^2}x^2 \operatorname{AppellF1}\left(\frac{5}{6}, 1, \frac{1}{3}, \frac{11}{6}, 9x^2, x^2\right)}{5\sqrt[3]{x^3-x}} - \frac{\sqrt{3}\sqrt[3]{x^2-1}\sqrt[3]{x} \arctan\left(\frac{1-\frac{4x^{2/3}}{\sqrt[3]{x^2-1}}}{\sqrt{3}}\right)}{4\sqrt[3]{x^3-x}} \\ - \frac{\sqrt[3]{x^2-1}\sqrt[3]{x} \log(1-9x^2)}{8\sqrt[3]{x^3-x}} + \frac{3\sqrt[3]{x^2-1}\sqrt[3]{x} \log\left(2x^{2/3} + \sqrt[3]{x^2-1}\right)}{8\sqrt[3]{x^3-x}}$$

4.11 Problem number 1754

$$\int \frac{(-1+x^2)\sqrt[4]{x^2+x^6}}{x^2(1+x^2)} dx$$

Optimal antiderivative

$$\frac{2(x^6+x^2)^{\frac{1}{4}}}{x} - \frac{\arctan\left(\frac{2^{\frac{3}{4}}x(x^6+x^2)^{\frac{1}{4}}}{\sqrt{2}x^2-\sqrt{x^6+x^2}}\right)2^{\frac{3}{4}}}{2} - \frac{\operatorname{arctanh}\left(\frac{\frac{x^2 2^{\frac{3}{4}}}{2} + \sqrt{x^6+x^2} 2^{\frac{1}{4}}}{x(x^6+x^2)^{\frac{1}{4}}}\right)2^{\frac{3}{4}}}{2}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(-1+x^2)\sqrt[4]{x^2+x^6}}{x^2(1+x^2)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{8\sqrt[4]{x^6+x^2}x \operatorname{AppellF1}\left(\frac{3}{8}, 1, \frac{3}{4}, \frac{11}{8}, x^4, -x^4\right)}{3\sqrt[4]{x^4+1}} - \frac{8\sqrt[4]{x^6+x^2}x^3 \operatorname{AppellF1}\left(\frac{7}{8}, 1, \frac{3}{4}, \frac{15}{8}, x^4, -x^4\right)}{7\sqrt[4]{x^4+1}} \\ - \frac{4\sqrt[4]{x^6+x^2}x \operatorname{Hypergeometric2F1}\left(\frac{3}{8}, \frac{3}{4}, \frac{11}{8}, -x^4\right)}{3\sqrt[4]{x^4+1}} + \frac{2\sqrt[4]{x^6+x^2}}{x}$$

4.12 Problem number 1755

$$\int \frac{(-1+x^2)\sqrt[4]{x^2+x^6}}{x^2(1+x^2)} dx$$

Optimal antiderivative

$$\frac{2(x^6+x^2)^{\frac{1}{4}}}{x} - \frac{\arctan\left(\frac{2^{\frac{3}{4}}x(x^6+x^2)^{\frac{1}{4}}}{\sqrt{2}x^2-\sqrt{x^6+x^2}}\right)2^{\frac{3}{4}}}{2} - \frac{\operatorname{arctanh}\left(\frac{\frac{x^2 2^{\frac{3}{4}}}{2} + \sqrt{x^6+x^2} 2^{\frac{1}{4}}}{x(x^6+x^2)^{\frac{1}{4}}}\right)2^{\frac{3}{4}}}{2}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(-1+x^2)\sqrt[4]{x^2+x^6}}{x^2(1+x^2)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{8\sqrt[4]{x^6+x^2}x \operatorname{AppellF1}\left(\frac{3}{8}, 1, \frac{3}{4}, \frac{11}{8}, x^4, -x^4\right)}{3\sqrt[4]{x^4+1}} - \frac{8\sqrt[4]{x^6+x^2}x^3 \operatorname{AppellF1}\left(\frac{7}{8}, 1, \frac{3}{4}, \frac{15}{8}, x^4, -x^4\right)}{7\sqrt[4]{x^4+1}}$$

$$- \frac{4\sqrt[4]{x^6+x^2}x \operatorname{Hypergeometric2F1}\left(\frac{3}{8}, \frac{3}{4}, \frac{11}{8}, -x^4\right)}{3\sqrt[4]{x^4+1}} + \frac{2\sqrt[4]{x^6+x^2}}{x}$$

4.13 Problem number 1788

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

Optimal antiderivative

$$\frac{\arctan\left(\frac{2^{\frac{3}{4}}a^{\frac{1}{4}}b^{\frac{1}{4}}(a^2x^3+b^2x)^{\frac{1}{4}}}{ax+b}\right)2^{\frac{3}{4}}}{4a^{\frac{3}{4}}b^{\frac{3}{4}}} - \frac{\operatorname{arctanh}\left(\frac{2^{\frac{3}{4}}a^{\frac{1}{4}}b^{\frac{1}{4}}(a^2x^3+b^2x)^{\frac{1}{4}}}{ax+b}\right)2^{\frac{3}{4}}}{4a^{\frac{3}{4}}b^{\frac{3}{4}}}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{4ax^2\sqrt[4]{\frac{a^2x^2}{b^2}+1} \operatorname{AppellF1}\left(\frac{7}{8}, 1, \frac{1}{4}, \frac{15}{8}, \frac{a^2x^2}{b^2}, -\frac{a^2x^2}{b^2}\right)}{7b^2\sqrt[4]{a^2x^3+b^2x}}$$

$$- \frac{4x\sqrt[4]{\frac{a^2x^2}{b^2}+1} \operatorname{AppellF1}\left(\frac{3}{8}, 1, \frac{1}{4}, \frac{11}{8}, \frac{a^2x^2}{b^2}, -\frac{a^2x^2}{b^2}\right)}{3b\sqrt[4]{a^2x^3+b^2x}}$$

4.14 Problem number 1893

$$\int \frac{(-2 + x^6) \sqrt[3]{2 + x^6}}{x^2 (2 + 2x^3 + x^6)} dx$$

Optimal antiderivative

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

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(-2 + x^6) \sqrt[3]{2 + x^6}}{x^2 (2 + 2x^3 + x^6)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{ix^5 \operatorname{AppellF1}\left(\frac{5}{6}, 1, -\frac{1}{3}, \frac{11}{6}, -\frac{ix^6}{2}, -\frac{x^6}{2}\right)}{5 \cdot 2^{2/3}} - \frac{ix^5 \operatorname{AppellF1}\left(\frac{5}{6}, 1, -\frac{1}{3}, \frac{11}{6}, \frac{ix^6}{2}, -\frac{x^6}{2}\right)}{5 \cdot 2^{2/3}} + \frac{\left(\frac{1}{2} - \frac{i}{2}\right) x^2 \operatorname{AppellF1}\left(\frac{1}{3}, 1, -\frac{1}{3}, \frac{4}{3}, -\frac{ix^6}{2}, -\frac{x^6}{2}\right)}{2^{2/3}} + \frac{\left(\frac{1}{2} + \frac{i}{2}\right) x^2 \operatorname{AppellF1}\left(\frac{1}{3}, 1, -\frac{1}{3}, \frac{4}{3}, \frac{ix^6}{2}, -\frac{x^6}{2}\right)}{2^{2/3}} + \frac{\sqrt[3]{2} \operatorname{Hypergeometric2F1}\left(-\frac{1}{3}, -\frac{1}{6}, \frac{5}{6}, -\frac{x^6}{2}\right)}{x}$$

4.15 Problem number 1944

$$\int \frac{(-1 + x^4) \sqrt[4]{x^2 + x^6}}{1 + x^4 + x^8} dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{x}{(x^6 + x^2)^{\frac{1}{4}}}\right)}{2} - \frac{\arctan\left(\frac{\sqrt{2}x(x^6 + x^2)^{\frac{1}{4}}}{-x^2 + \sqrt{x^6 + x^2}}\right) \sqrt{2}}{4} - \frac{\operatorname{arctanh}\left(\frac{x}{(x^6 + x^2)^{\frac{1}{4}}}\right)}{2} + \frac{\operatorname{arctanh}\left(\frac{\frac{\sqrt{2}x^2 + \sqrt{x^6 + x^2}\sqrt{2}}{2}}{x(x^6 + x^2)^{\frac{1}{4}}}\right) \sqrt{2}}{4}$$

command

`Int[((-1 + x^4)*(x^2 + x^6)^(1/4))/(1 + x^4 + x^8),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{2(-\sqrt{3} + i) x^4 \sqrt{x^6 + x^2} \operatorname{AppellF1}\left(\frac{3}{8}, -\frac{1}{4}, 1, \frac{11}{8}, -x^4, -\frac{2x^4}{1-i\sqrt{3}}\right)}{3(\sqrt{3} + i) \sqrt[4]{x^4 + 1}} + \frac{2(\sqrt{3} + i) x^4 \sqrt{x^6 + x^2} \operatorname{AppellF1}\left(\frac{3}{8}, -\frac{1}{4}, 1, \frac{11}{8}, -x^4, -\frac{2x^4}{1+i\sqrt{3}}\right)}{3(-\sqrt{3} + i) \sqrt[4]{x^4 + 1}}$$

4.16 Problem number 1945

$$\int \frac{(-1 + x^4) \sqrt[4]{x^2 + x^6}}{1 + x^4 + x^8} dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{x}{(x^6+x^2)^{\frac{1}{4}}}\right)}{2} - \frac{\arctan\left(\frac{\sqrt{2}x(x^6+x^2)^{\frac{1}{4}}}{-x^2+\sqrt{x^6+x^2}}\right)\sqrt{2}}{4} - \frac{\operatorname{arctanh}\left(\frac{x}{(x^6+x^2)^{\frac{1}{4}}}\right)}{2} + \frac{\operatorname{arctanh}\left(\frac{\frac{\sqrt{2}x^2 + \sqrt{x^6+x^2}\sqrt{2}}{2}}{x(x^6+x^2)^{\frac{1}{4}}}\right)\sqrt{2}}{4}$$

command

`Int[((-1 + x^4)*(x^2 + x^6)^(1/4))/(1 + x^4 + x^8),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{2(-\sqrt{3} + i) x^4 \sqrt{x^6 + x^2} \operatorname{AppellF1}\left(\frac{3}{8}, -\frac{1}{4}, 1, \frac{11}{8}, -x^4, -\frac{2x^4}{1-i\sqrt{3}}\right)}{3(\sqrt{3} + i) \sqrt[4]{x^4 + 1}} + \frac{2(\sqrt{3} + i) x^4 \sqrt{x^6 + x^2} \operatorname{AppellF1}\left(\frac{3}{8}, -\frac{1}{4}, 1, \frac{11}{8}, -x^4, -\frac{2x^4}{1+i\sqrt{3}}\right)}{3(-\sqrt{3} + i) \sqrt[4]{x^4 + 1}}$$

4.17 Problem number 2053

$$\int \frac{\sqrt[3]{b - ax^6}(b + ax^6)}{x^2(-b + cx^3 + ax^6)} dx$$

Optimal antiderivative

$$\frac{(-ax^6 + b)^{\frac{1}{3}}}{x} + \frac{c^{\frac{1}{3}} \arctan\left(\frac{\sqrt{3}c^{\frac{1}{3}}x}{c^{\frac{1}{3}}x + 2(-ax^6 + b)^{\frac{1}{3}}}\right) \sqrt{3}}{3} + \frac{c^{\frac{1}{3}} \ln\left(-c^{\frac{1}{3}}x + (-ax^6 + b)^{\frac{1}{3}}\right)}{3} - \frac{c^{\frac{1}{3}} \ln\left(c^{\frac{2}{3}}x^2 + c^{\frac{1}{3}}x(-ax^6 + b)^{\frac{1}{3}} + (-ax^6 + b)^{\frac{2}{3}}\right)}{6}$$

command

```
Int[((b - a*x^6)^(1/3)*(b + a*x^6))/(x^2*(-b + c*x^3 + a*x^6)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\sqrt[3]{b - ax^6}(b + ax^6)}{x^2(-b + cx^3 + ax^6)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned}
& \frac{2a^2c\sqrt[3]{b-ax^6} \operatorname{AppellF1}\left(\frac{5}{6}, 1, -\frac{1}{3}, \frac{11}{6}, \frac{2a^2x^6}{c^2-\sqrt{c^2+4abc+2ab}}, \frac{ax^6}{b}\right) x^5}{5\sqrt{c^2+4ab}\left(c^2-\sqrt{c^2+4abc+2ab}\right)\sqrt[3]{1-\frac{ax^6}{b}}} \\
& \frac{2a^2\left(1-\frac{c}{\sqrt{c^2+4ab}}\right)\sqrt[3]{b-ax^6} \operatorname{AppellF1}\left(\frac{5}{6}, 1, -\frac{1}{3}, \frac{11}{6}, \frac{2a^2x^6}{c^2-\sqrt{c^2+4abc+2ab}}, \frac{ax^6}{b}\right) x^5}{5\left(2ab+c\left(c-\sqrt{c^2+4ab}\right)\right)\sqrt[3]{1-\frac{ax^6}{b}}} \\
& \frac{2a^2\left(\frac{c}{\sqrt{c^2+4ab}}+1\right)\sqrt[3]{b-ax^6} \operatorname{AppellF1}\left(\frac{5}{6}, 1, -\frac{1}{3}, \frac{11}{6}, \frac{2a^2x^6}{2ab+c\left(c+\sqrt{c^2+4ab}\right)}, \frac{ax^6}{b}\right) x^5}{5\left(2ab+c\left(c+\sqrt{c^2+4ab}\right)\right)\sqrt[3]{1-\frac{ax^6}{b}}} \\
& + \frac{2a^2c\sqrt[3]{b-ax^6} \operatorname{AppellF1}\left(\frac{5}{6}, 1, -\frac{1}{3}, \frac{11}{6}, \frac{2a^2x^6}{2ab+c\left(c+\sqrt{c^2+4ab}\right)}, \frac{ax^6}{b}\right) x^5}{5\sqrt{c^2+4ab}\left(2ab+c\left(c+\sqrt{c^2+4ab}\right)\right)\sqrt[3]{1-\frac{ax^6}{b}}} \\
& \frac{a\sqrt[3]{b-ax^6} \operatorname{AppellF1}\left(\frac{1}{3}, 1, -\frac{1}{3}, \frac{4}{3}, \frac{2a^2x^6}{c^2-\sqrt{c^2+4abc+2ab}}, \frac{ax^6}{b}\right) x^2}{\sqrt{c^2+4ab}\sqrt[3]{1-\frac{ax^6}{b}}} \\
& \frac{ac\left(1-\frac{c}{\sqrt{c^2+4ab}}\right)\sqrt[3]{b-ax^6} \operatorname{AppellF1}\left(\frac{1}{3}, 1, -\frac{1}{3}, \frac{4}{3}, \frac{2a^2x^6}{c^2-\sqrt{c^2+4abc+2ab}}, \frac{ax^6}{b}\right) x^2}{2\left(2ab+c\left(c-\sqrt{c^2+4ab}\right)\right)\sqrt[3]{1-\frac{ax^6}{b}}} \\
& \frac{a\sqrt[3]{b-ax^6} \operatorname{AppellF1}\left(\frac{1}{3}, 1, -\frac{1}{3}, \frac{4}{3}, \frac{2a^2x^6}{2ab+c\left(c+\sqrt{c^2+4ab}\right)}, \frac{ax^6}{b}\right) x^2}{\sqrt{c^2+4ab}\sqrt[3]{1-\frac{ax^6}{b}}} \\
& + \frac{ac\left(\frac{c}{\sqrt{c^2+4ab}}+1\right)\sqrt[3]{b-ax^6} \operatorname{AppellF1}\left(\frac{1}{3}, 1, -\frac{1}{3}, \frac{4}{3}, \frac{2a^2x^6}{2ab+c\left(c+\sqrt{c^2+4ab}\right)}, \frac{ax^6}{b}\right) x^2}{2\left(2ab+c\left(c+\sqrt{c^2+4ab}\right)\right)\sqrt[3]{1-\frac{ax^6}{b}}} \\
& + \frac{\sqrt[3]{b-ax^6} \operatorname{Hypergeometric2F1}\left(-\frac{1}{3}, -\frac{1}{6}, \frac{5}{6}, \frac{ax^6}{b}\right)}{\sqrt[3]{1-\frac{ax^6}{b}}x}
\end{aligned}$$

4.18 Problem number 2059

$$\int \frac{(ax + \sqrt{-bx + a^2x^2})^{3/4}}{\sqrt{-bx + a^2x^2}} dx$$

Optimal antiderivative

$$\frac{4(ax + \sqrt{a^2x^2 - bx})^{3/4}}{3a} + \frac{2^{1/4}b^{3/4} \arctan\left(\frac{2^{1/4}a^{1/4}(ax + \sqrt{a^2x^2 - bx})^{1/4}}{b^{1/4}}\right)}{a^{7/4}} - \frac{2^{1/4}b^{3/4} \operatorname{arctanh}\left(\frac{2^{1/4}a^{1/4}(ax + \sqrt{a^2x^2 - bx})^{1/4}}{b^{1/4}}\right)}{a^{7/4}}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(ax + \sqrt{-bx + a^2x^2})^{3/4}}{\sqrt{-bx + a^2x^2}} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{4(\sqrt{a^2x^2 - bx} + ax)^{3/4}}{3a} + \frac{\sqrt[4]{2}b^{3/4} \arctan\left(\frac{\sqrt[4]{2}\sqrt[4]{a}\sqrt[4]{\sqrt{a^2x^2 - bx} + ax}}{\sqrt[4]{b}}\right)}{a^{7/4}} - \frac{\sqrt[4]{2}b^{3/4} \operatorname{arctanh}\left(\frac{\sqrt[4]{2}\sqrt[4]{a}\sqrt[4]{\sqrt{a^2x^2 - bx} + ax}}{\sqrt[4]{b}}\right)}{a^{7/4}}$$

4.19 Problem number 2140

$$\int \frac{(1+x)^4 \sqrt{x^3+x^5}}{x(-1+x^3)} dx$$

Optimal antiderivative

$$\frac{2 \cdot 2^{1/4} \arctan\left(\frac{2^{1/4}x}{(x^5+x^3)^{1/4}}\right)}{3} - \frac{\sqrt{2} \arctan\left(\frac{\sqrt{2}x(x^5+x^3)^{1/4}}{-x^2+\sqrt{x^5+x^3}}\right)}{3} - \frac{2 \cdot 2^{1/4} \operatorname{arctanh}\left(\frac{2^{1/4}x}{(x^5+x^3)^{1/4}}\right)}{3} + \frac{\sqrt{2} \operatorname{arctanh}\left(\frac{\frac{\sqrt{2}x^2 + \sqrt{x^5+x^3}\sqrt{2}}{2}}{x(x^5+x^3)^{1/4}}\right)}{3}$$

command

`Int[((1 + x)*(x^3 + x^5)^(1/4))/(x*(-1 + x^3)),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & \frac{4(1 - \sqrt[3]{-1}) \sqrt[4]{x^5 + x^3} \operatorname{AppellF1}\left(\frac{3}{8}, -\frac{1}{4}, 1, \frac{11}{8}, -x^2, -\sqrt[3]{-1}x^2\right)}{9 \sqrt[4]{x^2 + 1}} \\ & - \frac{4(1 + (-1)^{2/3}) \sqrt[4]{x^5 + x^3} \operatorname{AppellF1}\left(\frac{3}{8}, -\frac{1}{4}, 1, \frac{11}{8}, -x^2, (-1)^{2/3}x^2\right)}{9 \sqrt[4]{x^2 + 1}} \\ & - \frac{8 \sqrt[4]{x^5 + x^3} \operatorname{AppellF1}\left(\frac{3}{8}, 1, -\frac{1}{4}, \frac{11}{8}, x^2, -x^2\right)}{9 \sqrt[4]{x^2 + 1}} \\ & - \frac{4(1 + (-1)^{2/3}) x \sqrt[4]{x^5 + x^3} \operatorname{AppellF1}\left(\frac{7}{8}, -\frac{1}{4}, 1, \frac{15}{8}, -x^2, -\sqrt[3]{-1}x^2\right)}{21 \sqrt[4]{x^2 + 1}} \\ & - \frac{4(1 - \sqrt[3]{-1}) x \sqrt[4]{x^5 + x^3} \operatorname{AppellF1}\left(\frac{7}{8}, -\frac{1}{4}, 1, \frac{15}{8}, -x^2, (-1)^{2/3}x^2\right)}{21 \sqrt[4]{x^2 + 1}} \\ & - \frac{8x \sqrt[4]{x^5 + x^3} \operatorname{AppellF1}\left(\frac{7}{8}, 1, -\frac{1}{4}, \frac{15}{8}, x^2, -x^2\right)}{21 \sqrt[4]{x^2 + 1}} \end{aligned}$$

4.20 Problem number 2324

$$\int \frac{\sqrt[4]{x^2 + x^6}(1 + x^8)}{x^4(-1 + x^4)} dx$$

Optimal antiderivative

$$\begin{aligned} & \frac{2(x^4 + 1)(x^6 + x^2)^{\frac{1}{4}}}{5x^3} + \frac{2^{\frac{1}{4}} \arctan\left(\frac{2^{\frac{1}{4}}x}{(x^6 + x^2)^{\frac{1}{4}}}\right)}{2} + \frac{\arctan\left(\frac{2^{\frac{3}{4}}x(x^6 + x^2)^{\frac{1}{4}}}{\sqrt{2}x^2 - \sqrt{x^6 + x^2}}\right)}{4} 2^{\frac{3}{4}} \\ & - \frac{2^{\frac{1}{4}} \operatorname{arctanh}\left(\frac{2^{\frac{1}{4}}x}{(x^6 + x^2)^{\frac{1}{4}}}\right)}{2} + \frac{\operatorname{arctanh}\left(\frac{\frac{x^2 2^{\frac{3}{4}}}{2} + \sqrt{x^6 + x^2} 2^{\frac{1}{4}}}{x(x^6 + x^2)^{\frac{1}{4}}}\right)}{4} 2^{\frac{3}{4}} \end{aligned}$$

command

`Int[((x^2 + x^6)^(1/4)*(1 + x^8))/(x^4*(-1 + x^4)),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{4\sqrt[4]{x^6+x^2} \operatorname{AppellF1}\left(-\frac{5}{8}, 1, -\frac{1}{4}, \frac{3}{8}, x^4, -x^4\right)}{5\sqrt[4]{x^4+1}x^3} + \frac{8\sqrt[4]{x^6+x^2}x \operatorname{Hypergeometric2F1}\left(\frac{3}{8}, \frac{3}{4}, \frac{11}{8}, -x^4\right)}{15\sqrt[4]{x^4+1}} + \frac{2\sqrt[4]{x^6+x^2}x}{5} - \frac{2\sqrt[4]{x^6+x^2}}{5x^3}$$

4.21 Problem number 2325

$$\int \frac{\sqrt[4]{x^2+x^6}(1+x^8)}{x^4(-1+x^4)} dx$$

Optimal antiderivative

$$\frac{2(x^4+1)(x^6+x^2)^{\frac{1}{4}}}{5x^3} + \frac{2^{\frac{1}{4}} \arctan\left(\frac{2^{\frac{1}{4}}x}{(x^6+x^2)^{\frac{1}{4}}}\right)}{2} + \frac{\arctan\left(\frac{2^{\frac{3}{4}}x(x^6+x^2)^{\frac{1}{4}}}{\sqrt{2}x^2-\sqrt{x^6+x^2}}\right) 2^{\frac{3}{4}}}{4} - \frac{2^{\frac{1}{4}} \operatorname{arctanh}\left(\frac{2^{\frac{1}{4}}x}{(x^6+x^2)^{\frac{1}{4}}}\right)}{2} + \frac{\operatorname{arctanh}\left(\frac{\frac{x^2 2^{\frac{3}{4}}}{2} + \frac{\sqrt{x^6+x^2} 2^{\frac{1}{4}}}{2}}{x(x^6+x^2)^{\frac{1}{4}}}\right) 2^{\frac{3}{4}}}{4}$$

command

```
Int[((x^2 + x^6)^(1/4)*(1 + x^8))/(x^4*(-1 + x^4)),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{4\sqrt[4]{x^6+x^2} \operatorname{AppellF1}\left(-\frac{5}{8}, 1, -\frac{1}{4}, \frac{3}{8}, x^4, -x^4\right)}{5\sqrt[4]{x^4+1}x^3} + \frac{8\sqrt[4]{x^6+x^2}x \operatorname{Hypergeometric2F1}\left(\frac{3}{8}, \frac{3}{4}, \frac{11}{8}, -x^4\right)}{15\sqrt[4]{x^4+1}} + \frac{2\sqrt[4]{x^6+x^2}x}{5} - \frac{2\sqrt[4]{x^6+x^2}}{5x^3}$$

4.22 Problem number 2382

$$\int \frac{\sqrt[4]{x^3 + x^5}(1 + x^4 + x^8)}{x^4(-1 + x^4)} dx$$

Optimal antiderivative

$$\begin{aligned} & \frac{4(x^4 + 2x^2 + 1)(x^5 + x^3)^{\frac{1}{4}}}{9x^3} + \frac{3 \cdot 2^{\frac{1}{4}} \arctan\left(\frac{2^{\frac{1}{4}}x}{(x^5 + x^3)^{\frac{1}{4}}}\right)}{4} - \frac{3 \arctan\left(\frac{2^{\frac{3}{4}}x(x^5 + x^3)^{\frac{1}{4}}}{\sqrt{2x^2 - \sqrt{x^5 + x^3}}}\right) 2^{\frac{3}{4}}}{8} \\ & - \frac{3 \cdot 2^{\frac{1}{4}} \operatorname{arctanh}\left(\frac{2^{\frac{1}{4}}x}{(x^5 + x^3)^{\frac{1}{4}}}\right)}{4} - \frac{3 \operatorname{arctanh}\left(\frac{x^2 2^{\frac{3}{4}} + \sqrt{x^5 + x^3} 2^{\frac{1}{4}}}{x(x^5 + x^3)^{\frac{1}{4}}}\right) 2^{\frac{3}{4}}}{8} \end{aligned}$$

command

`Int[((x^3 + x^5)^(1/4)*(1 + x^4 + x^8))/(x^4*(-1 + x^4)),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & \frac{4 \sqrt[4]{x^5 + x^3} \operatorname{AppellF1}\left(-\frac{9}{8}, 1, \frac{3}{4}, -\frac{1}{8}, x^2, -x^2\right)}{3 \sqrt[4]{x^2 + 1} x^3} \\ & + \frac{4 \sqrt[4]{x^5 + x^3} x^3 \operatorname{Hypergeometric2F1}\left(\frac{3}{4}, \frac{15}{8}, \frac{23}{8}, -x^2\right)}{15 \sqrt[4]{x^2 + 1}} \\ & + \frac{4 \sqrt[4]{x^5 + x^3} x \operatorname{Hypergeometric2F1}\left(\frac{3}{4}, \frac{7}{8}, \frac{15}{8}, -x^2\right)}{7 \sqrt[4]{x^2 + 1}} \\ & - \frac{8 \sqrt[4]{x^5 + x^3} \operatorname{Hypergeometric2F1}\left(-\frac{1}{8}, \frac{3}{4}, \frac{7}{8}, -x^2\right)}{\sqrt[4]{x^2 + 1} x} \\ & - \frac{8 \sqrt[4]{x^5 + x^3} \operatorname{Hypergeometric2F1}\left(-\frac{9}{8}, \frac{3}{4}, -\frac{1}{8}, -x^2\right)}{9 \sqrt[4]{x^2 + 1} x^3} \end{aligned}$$

4.23 Problem number 2491

$$\int \frac{1}{\sqrt[3]{-8 + 12x + 54x^2 - 135x^3 + 81x^4}} dx$$

Optimal antiderivative

$$\frac{\arctan\left(\frac{-23^{\frac{5}{6}} + 3x3^{\frac{5}{6}}}{-23^{\frac{1}{3}} + 33^{\frac{1}{3}}x + 2(81x^4 - 135x^3 + 54x^2 + 12x - 8)^{\frac{1}{3}}}\right) 3^{\frac{1}{6}}}{3} + \frac{\ln\left(6 - 9x + 3^{\frac{2}{3}}(81x^4 - 135x^3 + 54x^2 + 12x - 8)^{\frac{1}{3}}\right) 3^{\frac{2}{3}}}{9} - \frac{\ln\left(12 - 36x + 27x^2 + \left(-23^{\frac{2}{3}} + 33^{\frac{2}{3}}x\right)(81x^4 - 135x^3 + 54x^2 + 12x - 8)^{\frac{1}{3}} + 3^{\frac{1}{3}}(81x^4 - 135x^3 + 54x^2 + 12x - 8)^{\frac{1}{3}}\right)}{18}$$

command

`Int[(-8 + 12*x + 54*x^2 - 135*x^3 + 81*x^4)^(-1/3), x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{1}{\sqrt[3]{-8 + 12x + 54x^2 - 135x^3 + 81x^4}} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{(2-3x)\sqrt[3]{3x+1}\arctan\left(\frac{2\sqrt[3]{3x+1}+\sqrt[3]{3}}{3^{5/6}}\right)}{3^{5/6}\sqrt[3]{-(2-3x)^3(3x+1)}} + \frac{(2-3x)\sqrt[3]{3x+1}\log(2-3x)}{6\sqrt[3]{3}\sqrt[3]{-(2-3x)^3(3x+1)}} - \frac{(2-3x)\sqrt[3]{3x+1}\log\left(\sqrt[3]{3}-\sqrt[3]{3x+1}\right)}{2\sqrt[3]{3}\sqrt[3]{-(2-3x)^3(3x+1)}}$$

4.24 Problem number 2700

$$\int \frac{\sqrt{b+ax}(-g+fx^2)}{(e+dx^2)\sqrt{c+\sqrt{b+ax}}} dx$$

Optimal antiderivative

Unintegrable

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\sqrt{b+ax}(-g+fx^2)}{(e+dx^2)\sqrt{c+\sqrt{b+ax}}} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

output too large to display

4.25 Problem number 2799

$$\int \frac{(1-x^4) \sqrt[4]{1-x-4x^2+4x^3+6x^4-6x^5-4x^6+4x^7+x^8-x^9}}{1+x^4} dx$$

Optimal antiderivative

Unintegrable

command

`Int[((1 - x^4)*(1 - x - 4*x^2 + 4*x^3 + 6*x^4 - 6*x^5 - 4*x^6 + 4*x^7 + x^8 - x^9)^(1/4))/(1`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(1-x^4) \sqrt[4]{1-x-4x^2+4x^3+6x^4-6x^5-4x^6+4x^7+x^8-x^9}}{1+x^4} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned}
& \frac{\sqrt[4]{-4 - (2 + 2i)\sqrt{2}} \sqrt[4]{(1-x)^5(x+1)^4} \arctan\left(\frac{\sqrt[4]{x-1}}{\sqrt[4]{-1 - \sqrt[4]{-1}}}\right)}{(x-1)^{5/4}(x+1)} \\
& - \frac{\sqrt[4]{-4 + (2 + 2i)\sqrt{2}} \sqrt[4]{(1-x)^5(x+1)^4} \arctan\left(\frac{\sqrt[4]{x-1}}{\sqrt[4]{\sqrt[4]{-1} - 1}}\right)}{(x-1)^{5/4}(x+1)} \\
& - \frac{\sqrt[4]{-4 + (2 - 2i)\sqrt{2}} \sqrt[4]{(1-x)^5(x+1)^4} \arctan\left(\frac{\sqrt[4]{x-1}}{\sqrt[4]{-1 - (-1)^{3/4}}}\right)}{(x-1)^{5/4}(x+1)} \\
& + \frac{\sqrt[4]{-4 - (2 - 2i)\sqrt{2}} \sqrt[4]{(1-x)^5(x+1)^4} \arctan\left(\frac{\sqrt[4]{x-1}}{\sqrt[4]{(-1)^{3/4} - 1}}\right)}{(x-1)^{5/4}(x+1)} \\
& + \frac{\sqrt[4]{-4 - (2 + 2i)\sqrt{2}} \sqrt[4]{(1-x)^5(x+1)^4} \operatorname{arctanh}\left(\frac{\sqrt[4]{x-1}}{\sqrt[4]{-1 - \sqrt[4]{-1}}}\right)}{(x-1)^{5/4}(x+1)} \\
& - \frac{\sqrt[4]{-4 + (2 + 2i)\sqrt{2}} \sqrt[4]{(1-x)^5(x+1)^4} \operatorname{arctanh}\left(\frac{\sqrt[4]{x-1}}{\sqrt[4]{\sqrt[4]{-1} - 1}}\right)}{(x-1)^{5/4}(x+1)} \\
& - \frac{\sqrt[4]{-4 + (2 - 2i)\sqrt{2}} \sqrt[4]{(1-x)^5(x+1)^4} \operatorname{arctanh}\left(\frac{\sqrt[4]{x-1}}{\sqrt[4]{-1 - (-1)^{3/4}}}\right)}{(x-1)^{5/4}(x+1)} \\
& + \frac{\sqrt[4]{-4 - (2 - 2i)\sqrt{2}} \sqrt[4]{(1-x)^5(x+1)^4} \operatorname{arctanh}\left(\frac{\sqrt[4]{x-1}}{\sqrt[4]{(-1)^{3/4} - 1}}\right)}{(x-1)^{5/4}(x+1)} \\
& - \frac{4 \sqrt[4]{(1-x)^5(x+1)^4} (1-x)^2}{13(x+1)} + \frac{8 \sqrt[4]{(1-x)^5(x+1)^4} (1-x)}{9(x+1)}
\end{aligned}$$

4.26 Problem number 2935

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

Optimal antiderivative

$$\frac{\arctan\left(\frac{2a^{\frac{1}{4}}b^{\frac{1}{4}}(a^2x^3+b^2x)^{\frac{1}{4}}}{2^{\frac{3}{4}}b-2^{\frac{3}{4}}ax+2a^{\frac{1}{4}}b^{\frac{1}{4}}(a^2x^3+b^2x)^{\frac{1}{4}}}\right)2^{\frac{1}{4}}}{4a^{\frac{3}{4}}b^{\frac{3}{4}}}-\frac{\arctan\left(\frac{2a^{\frac{1}{4}}b^{\frac{1}{4}}(a^2x^3+b^2x)^{\frac{1}{4}}}{-2^{\frac{3}{4}}b+2^{\frac{3}{4}}ax+2a^{\frac{1}{4}}b^{\frac{1}{4}}(a^2x^3+b^2x)^{\frac{1}{4}}}\right)2^{\frac{1}{4}}}{4a^{\frac{3}{4}}b^{\frac{3}{4}}}$$

$$-\frac{\operatorname{arctanh}\left(\frac{-\frac{2^{\frac{3}{4}}b^2}{2}+2^{\frac{3}{4}}abx-\frac{a^2x^22^{\frac{3}{4}}}{2}-22^{\frac{1}{4}}\sqrt{a}\sqrt{b}\sqrt{a^2x^3+b^2x}}{-2a^{\frac{1}{4}}b^{\frac{5}{4}}(a^2x^3+b^2x)^{\frac{1}{4}}+2a^{\frac{5}{4}}b^{\frac{1}{4}}x(a^2x^3+b^2x)^{\frac{1}{4}}}\right)2^{\frac{1}{4}}}{4a^{\frac{3}{4}}b^{\frac{3}{4}}}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{4x\sqrt[4]{\frac{a^2x^2}{b^2}+1}\operatorname{AppellF1}\left(\frac{3}{8},1,\frac{1}{4},\frac{11}{8},\frac{a^2x^2}{b^2},-\frac{a^2x^2}{b^2}\right)}{3b^4\sqrt[4]{a^2x^3+b^2x}}-\frac{4ax^2\sqrt[4]{\frac{a^2x^2}{b^2}+1}\operatorname{AppellF1}\left(\frac{7}{8},1,\frac{1}{4},\frac{15}{8},\frac{a^2x^2}{b^2},-\frac{a^2x^2}{b^2}\right)}{7b^2\sqrt[4]{a^2x^3+b^2x}}$$

4.27 Problem number 2953

$$\int \frac{x^3}{\sqrt[3]{x^2+x^4(-1+x^6)}} dx$$

Optimal antiderivative

$$-\frac{\arctan\left(\frac{\sqrt{3}x^2}{x^2+2(x^4+x^2)^{\frac{2}{3}}}\right)\sqrt{3}}{6}+\frac{\arctan\left(\frac{\sqrt{3}x^2}{x^2+2^{\frac{2}{3}}(x^4+x^2)^{\frac{2}{3}}}\right)2^{\frac{2}{3}}\sqrt{3}}{24}$$

$$-\frac{\ln\left(-x+(x^4+x^2)^{\frac{1}{3}}\right)}{6}-\frac{\ln\left(x+(x^4+x^2)^{\frac{1}{3}}\right)}{6}+\frac{\ln\left(-2x+2^{\frac{2}{3}}(x^4+x^2)^{\frac{1}{3}}\right)2^{\frac{2}{3}}}{24}$$

$$+\frac{\ln\left(2x+2^{\frac{2}{3}}(x^4+x^2)^{\frac{1}{3}}\right)2^{\frac{2}{3}}}{24}+\frac{\ln\left(x^2-x(x^4+x^2)^{\frac{1}{3}}+(x^4+x^2)^{\frac{2}{3}}\right)}{12}$$

$$+\frac{\ln\left(x^2+x(x^4+x^2)^{\frac{1}{3}}+(x^4+x^2)^{\frac{2}{3}}\right)}{12}-\frac{\ln\left(-2x^2+2^{\frac{2}{3}}x(x^4+x^2)^{\frac{1}{3}}-2^{\frac{1}{3}}(x^4+x^2)^{\frac{2}{3}}\right)2^{\frac{2}{3}}}{48}$$

$$-\frac{\ln\left(2x^2+2^{\frac{2}{3}}x(x^4+x^2)^{\frac{1}{3}}+2^{\frac{1}{3}}(x^4+x^2)^{\frac{2}{3}}\right)2^{\frac{2}{3}}}{48}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{x^3}{\sqrt[3]{x^2 + x^4}(-1 + x^6)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & \frac{\sqrt[3]{x^2 + 1}x^4 \operatorname{AppellF1}\left(\frac{5}{3}, \frac{1}{3}, 1, \frac{8}{3}, -x^2, -\sqrt[3]{-1}x^2\right)}{10\sqrt[3]{x^4 + x^2}} \\ & - \frac{\sqrt[3]{x^2 + 1}x^4 \operatorname{AppellF1}\left(\frac{5}{3}, \frac{1}{3}, 1, \frac{8}{3}, -x^2, (-1)^{2/3}x^2\right)}{10\sqrt[3]{x^4 + x^2}} \\ & - \frac{\sqrt[3]{x^2 + 1}x^{2/3} \arctan\left(\frac{1 - \sqrt[3]{2}(x^{2/3+1})}{\sqrt[3]{x^2 + 1}}\right)}{2\sqrt[3]{2}\sqrt[3]{x^4 + x^2}} - \frac{\sqrt[3]{x^2 + 1}x^{2/3} \arctan\left(\frac{\sqrt[3]{2}(x^{2/3+1})}{\sqrt[3]{x^2 + 1}} + 1\right)}{4\sqrt[3]{2}\sqrt[3]{x^4 + x^2}} \\ & + \frac{\sqrt[3]{x^2 + 1}x^2 \operatorname{Hypergeometric2F1}\left(\frac{1}{3}, \frac{2}{3}, \frac{5}{3}, -x^2\right)}{4\sqrt[3]{x^4 + x^2}} \\ & - \frac{\sqrt[3]{x^2 + 1}x^{2/3} \log\left((1 - x^{2/3})^2(x^{2/3} + 1)\right)}{24\sqrt[3]{2}\sqrt[3]{x^4 + x^2}} \\ & - \frac{\sqrt[3]{x^2 + 1}x^{2/3} \log\left(\frac{2^{2/3}(x^{2/3+1})^2}{(x^2+1)^{2/3}} - \frac{\sqrt[3]{2}(x^{2/3+1})}{\sqrt[3]{x^2 + 1}} + 1\right)}{12\sqrt[3]{2}\sqrt[3]{x^4 + x^2}} \\ & + \frac{\sqrt[3]{x^2 + 1}x^{2/3} \log\left(\frac{\sqrt[3]{2}(x^{2/3+1})}{\sqrt[3]{x^2 + 1}} + 1\right)}{6\sqrt[3]{2}\sqrt[3]{x^4 + x^2}} + \frac{\sqrt[3]{x^2 + 1}x^{2/3} \log\left(x^{2/3} - 2^{2/3}\sqrt[3]{x^2 + 1} + 1\right)}{8\sqrt[3]{2}\sqrt[3]{x^4 + x^2}} \end{aligned}$$

5 Test file number 210

Test folder name:

test_cases/210_Hebisch

5.1 Problem number 60

$$\int \frac{2x - 12ex^2 - 12x^3 + (-3e - 3x) \log(e^2 + 2ex + x^2)}{12ex^3 + 12x^4 + (ex + x^2) \log(e^2 + 2ex + x^2)} dx$$

Optimal antiderivative

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

command

`Int[(2*x - 12*E*x^2 - 12*x^3 + (-3*E - 3*x)*Log[E^2 + 2*E*x + x^2])/(12*E*x^3 + 12*x^4 + (E*x + x^2)*Log[E^2 + 2*E*x + x^2])]`
Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{2x - 12ex^2 - 12x^3 + (-3e - 3x) \log(e^2 + 2ex + x^2)}{12ex^3 + 12x^4 + (ex + x^2) \log(e^2 + 2ex + x^2)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log(12x^2 + \log((x+e)^2)) - 3\log(x)$$

5.2 Problem number 95

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

Optimal antiderivative

$$e^{5 - \frac{x}{\ln(xe^{6x})} + x^3}$$

command

`Int[(E^((-x + (5 + x^3)*Log[E^E^(6*x)*x])/Log[E^E^(6*x)*x]))/Log[E^E^(6*x)*x]*(1 + 6*E^(6*x)*x - Log[E^E^(6*x)*x])]`
Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\exp \left(\frac{-x+(5+x^3) \log(e^{6x} x)}{\log(e^{6x} x)} \right) \left(1 + 6e^{6x} x - \log(e^{6x} x) + 3x^2 \log^2(e^{6x} x) \right)}{\log^2(e^{6x} x)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{x^3 - \frac{x}{\log(e^{6x} x)} + 5}$$

5.3 Problem number 286

$$\int e^{\frac{5 + (-2 - 36x^2 - e^{2x}x^2 - 24x^3 - 4x^4 + e^x(12x^2 + 4x^3)) \log\left(\frac{1}{2}(4 + e^x)\right)}{\log\left(\frac{1}{2}(4 + e^x)\right)}} \frac{(-5e^x + (-288x - 288x^2 - 64x^3 + e^{3x}(-2x - 2x^2)) + e^x(24x - 24x^2))}{(4 + e^x) \log^2\left(\frac{1}{2}(4 + e^x)\right)}$$

Optimal antiderivative

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

command

```
Int[(E^((5 + (-2 - 36*x^2 - E^(2*x))*x^2 - 24*x^3 - 4*x^4 + E^x*(12*x^2 + 4*x^3))*Log[(4 + E^x)/2])*E^x + (-288*x - 288*x^2 - 64*x^3 + E^(3*x))*(-2*x - 2*x^2) + E^x*(24*x - 24*x^2))/(4 + E^x)*Log^2[(4 + E^x)/2]]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\exp\left(\frac{5 + (-2 - 36x^2 - e^{2x}x^2 - 24x^3 - 4x^4 + e^x(12x^2 + 4x^3)) \log\left(\frac{1}{2}(4 + e^x)\right)}{\log\left(\frac{1}{2}(4 + e^x)\right)}\right) (-5e^x + (-288x - 288x^2 - 64x^3 + e^{3x}(-2x - 2x^2)) + e^x(24x - 24x^2))}{(4 + e^x) \log^2\left(\frac{1}{2}(4 + e^x)\right)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.4 Problem number 333

$$\int \frac{e^{2 \log^2(x)} (64x + 32x^2 - 96x^3 + (64x + 32x^2 - 96x^3) \log(15) + (16x + 8x^2 - 24x^3) \log^2(15) + (128x - 64x^2 + 64x^3) \log^3(15))}{32 - 80x + 160x^2 - 200x^3 + 210x^4 - 161x^5 + 105x^6 - 50x^7}$$

Optimal antiderivative

$$\frac{(4 + 2 \ln(15))^2 e^{2 \ln(x)^2} x^2}{(x^2 - x + 2)^4}$$

command

```
Int[(E^(2*Log[x]^2))*(64*x + 32*x^2 - 96*x^3 + (64*x + 32*x^2 - 96*x^3)*Log[15] + (16*x + 8*x^2 - 24*x^3)*Log^2[15] + (128*x - 64*x^2 + 64*x^3)*Log^3[15])/(32 - 80*x + 160*x^2 - 200*x^3 + 210*x^4 - 161*x^5 + 105*x^6 - 50*x^7)]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{2 \log^2(x)} (64x + 32x^2 - 96x^3 + (64x + 32x^2 - 96x^3) \log(15) + (16x + 8x^2 - 24x^3) \log^2(15) + (128x - 64x^2 + 64x^3) \log^3(15))}{32 - 80x + 160x^2 - 200x^3 + 210x^4 - 161x^5 + 105x^6 - 50x^7}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{4xe^{2 \log^2(x)} (4x^3 - 4x^2 + (x^3 - x^2 + 2x) \log^2(15) + 4(x^3 - x^2 + 2x) \log(15) + 8x)}{x^{10} - 5x^9 + 20x^8 - 50x^7 + 105x^6 - 161x^5 + 210x^4 - 200x^3 + 160x^2 - 80x + 32}$$

5.5 Problem number 426

$$\int \frac{-10x^2 - 2e^3x^2 + e^{e^{\frac{5x+25x^4+5e^3x^4}{5+e^3}} + \frac{5x+25x^4+5e^3x^4}{5+e^3}} (5x + 100x^4 + 20e^3x^4) + \left(e^{e^{\frac{5x+25x^4+5e^3x^4}{5+e^3}}} (-5 - e^3) + 5x^2 + e^3x^2 \right)}{-5x^4 - e^3x^4 + e^{e^{\frac{5x+25x^4+5e^3x^4}{5+e^3}}} (5x^2 + e^3x^2)} dx$$

Optimal antiderivative

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

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-10x^2 - 2e^3x^2 + \exp\left(e^{\frac{5x+25x^4+5e^3x^4}{5+e^3}} + \frac{5x+25x^4+5e^3x^4}{5+e^3}\right) (5x + 100x^4 + 20e^3x^4) + \left(e^{e^{\frac{5x+25x^4+5e^3x^4}{5+e^3}}} (-5 - e^3) + 5x^2 + e^3x^2 \right)}{-5x^4 - e^3x^4 + e^{e^{\frac{5x+25x^4+5e^3x^4}{5+e^3}}} (5x^2 + e^3x^2)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.6 Problem number 458

$$\int \frac{e^{-1+e^{x^2}} \left(-10 + e^{x^2} (40x - 20x^2 + e^x (8x - 4x^2)) \right) + e^{-1+e^{x^2}+x^2} (10x + 2e^x x) \log(25 + 10e^x + e^{2x})}{5 + e^x} dx$$

Optimal antiderivative

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

command

```
Int[(E^(-1 + E^x^2))*(-10 + E^x^2*(40*x - 20*x^2 + E^x*(8*x - 4*x^2))) + E^(-1 + E^x^2 + x^2)*
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{-1+e^{x^2}} \left(-10 + e^{x^2} (40x - 20x^2 + e^x (8x - 4x^2)) \right) + e^{-1+e^{x^2}+x^2} (10x + 2e^x x) \log(25 + 10e^x + e^{2x})}{5 + e^x} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{e^{-x^2+e^{x^2}-1} \left(10e^{x^2} (2-x)x + 2e^{x^2+x} (2-x)x + e^{x^2} (e^x + 5) x \log((e^x + 5)^2) \right)}{(e^x + 5) x}$$

5.7 Problem number 577

$$\int \frac{24e^{4+2x} + 8e^x x^2 + (4e^x x^2 + e^{2x} (12e^4 x + 21x^2 - 3e^{2x})) \log\left(\frac{e^{-2x} (16x^2 + e^x (96e^4 x + 168x^2 - 24e^{2x})) + e^{2x} (144e^8 + 441x^2 - 126e^{2x} + 9e^2 x^2 + e^{2x})}{9x^2}\right)}{(4x^2 + e^x (12e^4 x + 21x^2 - 3e^{2x})) \log^2\left(\frac{e^{-2x} (16x^2 + e^x (96e^4 x + 168x^2 - 24e^{2x})) + e^{2x} (144e^8 + 441x^2 - 126e^{2x} + 9e^2 x^2 + e^{2x})}{9x^2}\right)}$$

Optimal antiderivative

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

command

`Int[(24*E^(4 + 2*x) + 8*E^x*x^2 + (4*E^x*x^2 + E^(2*x))*(12*E^4*x + 21*x^2 - 3*E*x^2))*Log[(16`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{24e^{4+2x} + 8e^x x^2 + (4e^x x^2 + e^{2x} (12e^4 x + 21x^2 - 3e^{2x})) \log\left(\frac{e^{-2x} (16x^2 + e^x (96e^4 x + 168x^2 - 24e^{2x})) + e^{2x} (144e^8 + 441x^2 - 126e^{2x} + 9e^2 x^2 + e^{2x})}{9x^2}\right)}{(4x^2 + e^x (12e^4 x + 21x^2 - 3e^{2x})) \log^2\left(\frac{e^{-2x} (16x^2 + e^x (96e^4 x + 168x^2 - 24e^{2x})) + e^{2x} (144e^8 + 441x^2 - 126e^{2x} + 9e^2 x^2 + e^{2x})}{9x^2}\right)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{e^x (21e^x x - 3e^{x+1} x + 4x + 12e^{x+4}) \log\left(\frac{e^{-2x} (21e^x x - 3e^{x+1} x + 4x + 12e^{x+4})^2}{9x^2}\right)}{(3(7-e)e^x x + 4x + 12e^{x+4}) \log^2\left(\frac{e^{-2x} (3(7-e)e^x x + 4x + 12e^{x+4})^2}{9x^2}\right)}$$

5.8 Problem number 670

$$\int \frac{e^{\frac{3x + (100+25x)\log(x) + (-4-x)\log^3(x)}{(4+x)\log(x)}} \left(\frac{3(-4x-x^2)}{e} + \frac{12x\log(x)}{e} + (-32 - 16x - 2x^2) \log^3(x) \right)}{(16x + 8x^2 + x^3) \log^2(x)} dx$$

Optimal antiderivative

$$e^{\frac{\ln(3)-1}{\ln(x)} x} - \ln(x)^2 + 25$$

command

```
Int[(E^(((3*x)/E + (100 + 25*x)*Log[x] + (-4 - x)*Log[x]^3)/((4 + x)*Log[x]))*((3*(-4*x - x^2))/E + (12*x*Log[x])/E + (-32 - 16*x - 2*x^2)*Log[x]^3))/((16*x + 8*x^2 + x^3)*Log[x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\exp\left(\frac{\frac{3x}{e} + (100 + 25x)\log(x) + (-4 - x)\log^3(x)}{(4 + x)\log(x)}\right) \left(\frac{3(-4x - x^2)}{e} + \frac{12x\log(x)}{e} + (-32 - 16x - 2x^2)\log^3(x)\right)}{(16x + 8x^2 + x^3)\log^2(x)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\exp\left(-\log^2(x) + \frac{3x}{ex\log(x) + 4e\log(x)} + 25\right)$$

5.9 Problem number 710

$$\int \frac{-15 + 29x + 4x^2 - 4x^3 + (-3 + 7x - 2x^2)\log(5) + e^{2x^2}(-25x + 55x^2 - 128x^3 + 12x^4 + 8x^5 + (-5x + 12x^2 - 45x - 21x^2 - x^3 + x^4 + (9x - 6x^2 + x^3)\log(5))}{45x - 21x^2 - x^3 + x^4 + (9x - 6x^2 + x^3)\log(5)}$$

Optimal antiderivative

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

command

```
Int[(-15 + 29*x + 4*x^2 - 4*x^3 + (-3 + 7*x - 2*x^2)*Log[5] + E^(2*x^2)*(-25*x + 55*x^2 - 128*5*x + 12*x^2 - 28*x^3 + 8*x^4)*Log[5]) + (25*x + 5*x^2 + 5*x*Log[5])*Log[5*x + x^2 + x*Log[5]]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-15 + 29x + 4x^2 - 4x^3 + (-3 + 7x - 2x^2)\log(5) + e^{2x^2}(-25x + 55x^2 - 128x^3 + 12x^4 + 8x^5 + (-5x + 12x^2 - 45x - 21x^2 - x^3 + x^4 + (9x - 6x^2 + x^3)\log(5))}{45x - 21x^2 - x^3 + x^4 + (9x - 6x^2 + x^3)\log(5)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

output too large to display

5.10 Problem number 730

$$\int \frac{e^{5+x}(-80x + (-960x + 384x^2 + 48x^3) \log(2)) + e^{5+x}(1280 - 1200x - 80x^2 + (-1024 + 1984x - 1152x^2 + 176x^3 - 80x^2 - 5x^3 + (64x^2 - 60x^3 + 12x^4 + x^5) \log(2)))}{-80x^2 - 5x^3 + (64x^2 - 60x^3 + 12x^4 + x^5) \log(2)}$$

Optimal antiderivative

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

command

```
Int[(E^(5 + x)*(-80*x + (-960*x + 384*x^2 + 48*x^3)*Log[2]) + E^(5 + x)*(1280 - 1200*x - 80*x^2 - 1024 + 1984*x - 1152*x^2 + 176*x^3 + 16*x^4)*Log[2])*Log[-80 - 5*x + (64 - 60*x + 12*x^2 + x^5)*Log[2]],x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{5+x}(-80x + (-960x + 384x^2 + 48x^3) \log(2)) + e^{5+x}(1280 - 1200x - 80x^2 + (-1024 + 1984x - 1152x^2 + 176x^3 - 80x^2 - 5x^3 + (64x^2 - 60x^3 + 12x^4 + x^5) \log(2)))}{-80x^2 - 5x^3 + (64x^2 - 60x^3 + 12x^4 + x^5) \log(2)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & \frac{8e^{7+\frac{\sqrt{\log(32)}}{\log(2)}} \left(2400 \log^3(2) + 20 \log^2(2) \left(155 - 27 \log(16) - 60\sqrt{\log(32)}\right) - \log(8)(5 - \log(16))^2 + 4\sqrt{\log(32)}(\log(2) - 5 - \log(16))\right)}{(5 - \log(16))(5 - 320 \log(2))} \\ & + \frac{8e^{7-\frac{\sqrt{\log(32)}}{\log(2)}} \left(2400 \log^3(2) + 20 \log^2(2) \left(155 - 27 \log(16) + 60\sqrt{\log(32)}\right) - \log(8)(5 - \log(16))^2 - 4\sqrt{\log(32)}(\log(2) - 5 - \log(16))\right)}{(5 - \log(16))(5 - 320 \log(2))} \\ & - \frac{8e^{7-\frac{\sqrt{\log(32)}}{\log(2)}} \left(2560 \log^3(2) + \log(2) (25 + \log^2(16)) + 8 \log^2(2) \left(390 - 79 \log(16) + 160\sqrt{\log(32)}\right) + (\log^2(16) - 4) \log(2)\right)}{(5 - \log(16))(5 - 320 \log(2)) - \log(16)} \\ & + \frac{8e^{7+\frac{\sqrt{\log(32)}}{\log(2)}} \left(4 \log^{\frac{3}{2}}(32) + 2560 \log^3(2) + 8 \log^2(2) \left(390 - 79 \log(16) - 160\sqrt{\log(32)}\right) + \log(2) \left(25 + \log^2(16) - 4\right)\right)}{(5 - \log(16))(5 - 320 \log(2)) - \log(16)} \\ & + \frac{5e^5(1 + \log(4096)) \operatorname{ExpIntegralEi}(x)}{5 - \log(16)} - \frac{e^5(5 + 64 \log(2) - \log(16)) \operatorname{ExpIntegralEi}(x)}{5 - \log(16)} \\ & + \frac{16e^{x+5} \log\left(-((x+16)(x^2(-\log(2)) + 4x \log(2) + 5 - \log(16)))\right)}{x} \end{aligned}$$

5.11 Problem number 848

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

Optimal antiderivative

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

command

```
Int[(E^E^(-4 + 4*x^2))*(-8 + 8*x - 2*x^2 + E^(-4 + 4*x^2)*(64*x^2 - 64*x^3 + 16*x^4)) + x^2*Lo
```

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.12 Problem number 923

$$\int \frac{25 - 20x - 20x^2 + 4x^4 + (-25 + 10x + 20x^2 - 4x^3 - 4x^4) \log\left(\frac{-10x + 4x^2 + 4x^3}{-5 + 2x^2}\right) + (-10x + 4x^2 + 4x^3) \log\left(\frac{-10x + 4x^2 + 4x^3}{-5 + 2x^2}\right)}{1125x^2 - 450x^3 - 900x^4 + 180x^5 + 180x^6 + (-750x + 300x^2 + 600x^3 - 120x^4 - 120x^5) \log\left(\frac{-10x + 4x^2 + 4x^3}{-5 + 2x^2}\right) + (-10x + 4x^2 + 4x^3) \log\left(\frac{-10x + 4x^2 + 4x^3}{-5 + 2x^2}\right)}$$

Optimal antiderivative

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

command

```
Int[(25 - 20*x - 20*x^2 + 4*x^4 + (-25 + 10*x + 20*x^2 - 4*x^3 - 4*x^4)*Log[(-10*x + 4*x^2 + 4*x^3)/(-5 + 2*x^2)])/(1125*x^2 - 450*x^3 - 900*x^4 + 180*x^5 + 180*x^6 + (-750*x + 300*x^2 + 600*x^3 - 120*x^4 - 120*x^5) * Log[(-10*x + 4*x^2 + 4*x^3)/(-5 + 2*x^2)] + (-10*x + 4*x^2 + 4*x^3) * Log[(-10*x + 4*x^2 + 4*x^3)/(-5 + 2*x^2)]^2), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{25 - 20x - 20x^2 + 4x^4 + (-25 + 10x + 20x^2 - 4x^3 - 4x^4) \log\left(\frac{-10x + 4x^2 + 4x^3}{-5 + 2x^2}\right) + (-10x + 4x^2 + 4x^3) \log\left(\frac{-10x + 4x^2 + 4x^3}{-5 + 2x^2}\right)}{1125x^2 - 450x^3 - 900x^4 + 180x^5 + 180x^6 + (-750x + 300x^2 + 600x^3 - 120x^4 - 120x^5) \log\left(\frac{-10x + 4x^2 + 4x^3}{-5 + 2x^2}\right) + (-10x + 4x^2 + 4x^3) \log\left(\frac{-10x + 4x^2 + 4x^3}{-5 + 2x^2}\right)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.13 Problem number 1116

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

Optimal antiderivative

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

command

```
Int[(4 + 4*Log[(5*Log[3])/(E^2*x)] + (-4 - 8*x)*Log[(5*Log[3])/(E^2*x)]^2 + (-2 - 2*Log[(5*Log[3])/(E^2*x)] + (2 + 4*x)*Log^2[(5*Log[3])/(E^2*x)])*Log[(x + (-x - x^2))/Log[(5*Log[3])/(E^2*x)]])/Log[(5*Log[3])/(E^2*x)])/(-x*Log[(5*Log[3])/(E^2*x)] + (x + x^2)*Log^2[(5*Log[3])/(E^2*x)]) + C
```

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\left(2 - \log\left(-x \left(x + \frac{1}{2 - \log\left(\frac{\log(243)}{x}\right)} + 1\right)\right)\right)^2$$

5.14 Problem number 1208

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

Optimal antiderivative

$$-e^{\frac{2}{x} - x - \ln(x)} x e^{12}$$

command

`Int[(E^(12 + (2 - x^2 - x*Log[x])/x)*(2 + x^2))]/x,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-e^{-x + \frac{2}{x} + 12}$$

5.15 Problem number 1249

$$\int \frac{-14950 + 17450x + 32400x^2 + 209952x^3 + (7475x + 88776x^2 - 104976x^3) \log\left(\frac{89401x^2 - 193752x^3 + 104976x^4}{625 + 16200x + 104976x^2}\right)}{14950x + 177552x^2 - 209952x^3 + (-7475x - 88776x^2 + 104976x^3) \log\left(\frac{89401x^2 - 193752x^3 + 104976x^4}{625 + 16200x + 104976x^2}\right)} dx$$

Optimal antiderivative

$$\ln\left(\ln\left(\left(\frac{x}{x + \frac{25}{324}} - x\right)^2\right) - 2\right) - x$$

command

`Int[(-14950 + 17450*x + 32400*x^2 + 209952*x^3 + (7475*x + 88776*x^2 - 104976*x^3)*Log[(89401*7475*x - 88776*x^2 + 104976*x^3)*Log[(89401*x^2 - 193752*x^3 + 104976*x^4)/(625 + 16200*x + 104976*x^2)]])]/x,x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-14950 + 17450x + 32400x^2 + 209952x^3 + (7475x + 88776x^2 - 104976x^3) \log\left(\frac{89401x^2 - 193752x^3 + 104976x^4}{625 + 16200x + 104976x^2}\right)}{14950x + 177552x^2 - 209952x^3 + (-7475x - 88776x^2 + 104976x^3) \log\left(\frac{89401x^2 - 193752x^3 + 104976x^4}{625 + 16200x + 104976x^2}\right)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log\left(2 - \log\left(\frac{(299 - 324x)^2 x^2}{(324x + 25)^2}\right)\right) - x$$

5.16 Problem number 1273

$$\int \frac{e^{5x^2}(2+4x) + e^{5x^2}(-30x+10x^2+10x^3) \log(6561-4374x-3645x^2+1458x^3+729x^4)}{-3+x+x^2} dx$$

Optimal antiderivative

$$\ln(27(x^2+x-3)(27x^2+27x-81))e^{5x^2}$$

command

```
Int[(E^(5*x^2)*(2+4*x) + E^(5*x^2)*(-30*x + 10*x^2 + 10*x^3)*Log[6561 - 4374*x - 3645*x^2 + 3 + x + x^2]),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{5x^2}(2+4x) + e^{5x^2}(-30x+10x^2+10x^3) \log(6561-4374x-3645x^2+1458x^3+729x^4)}{-3+x+x^2} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{5x^2} \log\left(729(-x^2-x+3)^2\right)$$

5.17 Problem number 1389

$$\int \frac{e^x(25+10x+21x^2+4x^3+4x^4) + e^{\frac{e^3+5x+x^2+2x^3}{5+x+2x^2}}(25+e^3(-1-4x)+10x+21x^2+4x^3+4x^4)}{25+10x+21x^2+4x^3+4x^4} dx$$

Optimal antiderivative

$$e^{\frac{e^3}{2x^2+x+5}+x} + e^x - e^5 - 1$$

command

```
Int[(E^x*(25 + 10*x + 21*x^2 + 4*x^3 + 4*x^4) + E^((E^3 + 5*x + x^2 + 2*x^3)/(5 + x + 2*x^2)) * (1 - 4*x) + 10*x + 21*x^2 + 4*x^3 + 4*x^4))/(25 + 10*x + 21*x^2 + 4*x^3 + 4*x^4),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^x(25+10x+21x^2+4x^3+4x^4) + e^{\frac{e^3+5x+x^2+2x^3}{5+x+2x^2}}(25+e^3(-1-4x)+10x+21x^2+4x^3+4x^4)}{25+10x+21x^2+4x^3+4x^4} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{\frac{e^3}{2x^2+x+5}+x} + e^x$$

5.18 Problem number 1416

$$\int e^{-40+e^{-40+8x}(16e^5+4e^{45-8x})+8x}(e^{40-8x}+128e^5x) dx$$

Optimal antiderivative

$$e^{e^5(16e^{8x-40}+4)}x$$

command

`Int[E^(-40 + E^(-40 + 8*x))*(16*E^5 + 4*E^(45 - 8*x)) + 8*x)*(E^(40 - 8*x) + 128*E^5*x),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \exp(-40 + e^{-40+8x}(16e^5 + 4e^{45-8x}) + 8x)(e^{40-8x} + 128e^5x) dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{16e^{8x-35}+4e^5}x$$

5.19 Problem number 1609

$$\int \frac{e(32x + 8x^2 - 50x^5)}{768 + 768x + 960x^2 + 384x^3 + 2592x^4 + 1200x^5 + 1200x^6 + 1875x^8} dx$$

Optimal antiderivative

$$\frac{e}{21 + \frac{3(4+x)^2}{x^2} + 75x^2}$$

command

`Int[(E*(32*x + 8*x^2 - 50*x^5))/(768 + 768*x + 960*x^2 + 384*x^3 + 2592*x^4 + 1200*x^5 + 1200*x^6 + 1875*x^8),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e(32x + 8x^2 - 50x^5)}{768 + 768x + 960x^2 + 384x^3 + 2592x^4 + 1200x^5 + 1200x^6 + 1875x^8} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{ex^2}{3(25x^4 + 8x^2 + 8x + 16)}$$

5.20 Problem number 1754

$$\int \frac{2e^{-11+x-x^2} + e^{-11+x-x^2}(2x - 3x^2 - 2x^3) \log\left(\frac{x}{4+2x}\right)}{e^2(2x+x^2)} dx$$

Optimal antiderivative

$$\ln\left(\frac{x}{4+2x}\right) e^{-2} e^{-x^2+x-11}$$

command

```
Int[(2*E^(-11 + x - x^2) + E^(-11 + x - x^2)*(2*x - 3*x^2 - 2*x^3)*Log[x/(4 + 2*x)])/(E^2*(2*
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{2e^{-11+x-x^2} + e^{-11+x-x^2}(2x - 3x^2 - 2x^3) \log\left(\frac{x}{4+2x}\right)}{e^2(2x+x^2)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{e^{-x^2+x-13}(-2x^2 - 3x + 2) \log\left(\frac{x}{2(x+2)}\right)}{(1-2x)(x+2)}$$

5.21 Problem number 1830

$$\int \frac{e^3x^2 - 5e^8x^3 + e^5(-e^6 + 10e^{11}x - 25e^{16}x^2) + (-e^3x^2 + e^5(-e^6 + 10e^{11}x - 25e^{16}x^2)) \log(x)}{(-e^3x^3 + 5e^8x^4 + e^5(e^6x - 10e^{11}x^2 + 25e^{16}x^3)) \log(x)} dx$$

Optimal antiderivative

$$\ln\left(\frac{\frac{x}{5xe^8 - e^3} + \frac{e^5}{x}}{\ln(x)}\right)$$

command

```
Int[(E^3*x^2 - 5*E^8*x^3 + E^5*(-E^6 + 10*E^11*x - 25*E^16*x^2) + (-E^3*x^2) + E^5*(-E^6 + 10*E^11*x - 25*E^16*x^2))*Log[x]]/((-E^3*x^3) + 5*E^8*x^4 + E^5*(E^6*x - 10*E^11*x^2 +
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^3x^2 - 5e^8x^3 + e^5(-e^6 + 10e^{11}x - 25e^{16}x^2) + (-e^3x^2 + e^5(-e^6 + 10e^{11}x - 25e^{16}x^2)) \log(x)}{(-e^3x^3 + 5e^8x^4 + e^5(e^6x - 10e^{11}x^2 + 25e^{16}x^3)) \log(x)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log(-x^2 - 5e^{13}x + e^8) - \log(x) - \log(1 - 5e^5x) - \log(\log(x))$$

5.22 Problem number 2029

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

Optimal antiderivative

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

command

`Int[(15*E^(5 + x/3) + E^5*(6 + 2*x))/((-6*x + E^(x/3)*(-15*x + 3*x^2))*Log[(2 + E^(x/3))*(5 -`

`Rubi 4.17.3 under Mathematica 13.3.1 output`

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

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.23 Problem number 2269

$$\int \frac{x^3 + (-24 + 3x) \log(\log(2))}{x^3} dx$$

Optimal antiderivative

$$x - \frac{3(x-4) \ln(\ln(2))}{x^2} - 7 + e$$

command

`Int[(x^3 + (-24 + 3*x)*Log[Log[2]])/x^3, x]`

`Rubi 4.17.3 under Mathematica 13.3.1 output`

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Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{12 \log(\log(2))}{x^2} + x - \frac{3 \log(\log(2))}{x}$$

5.24 Problem number 2360

$$\int \frac{e^{e^x} \left(e^x (8 + 2e^{x-x^2}) + e^{x-x^2} (-1 + 2x) \right) + e^{e^x+x} (-4 - e^{x-x^2}) \log(4 + e^{x-x^2})}{4 + e^{x-x^2}} dx$$

Optimal antiderivative

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

command

`Int[(E^E^x*(E^x*(8 + 2*E^(x - x^2)) + E^(x - x^2)*(-1 + 2*x)) + E^(E^x + x)*(-4 - E^(x - x^2))`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{e^x} \left(e^x (8 + 2e^{x-x^2}) + e^{x-x^2} (-1 + 2x) \right) + e^{e^x+x} (-4 - e^{x-x^2}) \log(4 + e^{x-x^2})}{4 + e^{x-x^2}} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.25 Problem number 2457

$$\int \frac{96x^2 + 24x^3 + 3x^5 + (32 + 8x + x^3) \log(2) + (32 + 16x + 2x^2 - 2x^3) \log(2) \log\left(\frac{16+8x+x^2-x^3}{x^2}\right)}{(-48x^3 - 24x^4 - 3x^5 + 3x^6 + (-16x - 8x^2 - x^3 + x^4) \log(2)) \log\left(\frac{16+8x+x^2-x^3}{x^2}\right)} dx$$

Optimal antiderivative

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

command

`Int[(96*x^2 + 24*x^3 + 3*x^5 + (32 + 8*x + x^3)*Log[2] + (32 + 16*x + 2*x^2 - 2*x^3)*Log[2]*L`
`48*x^3 - 24*x^4 - 3*x^5 + 3*x^6 + (-16*x - 8*x^2 - x^3 + x^4)*Log[2])*Log[(16 + 8*x + x^2 - x`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{96x^2 + 24x^3 + 3x^5 + (32 + 8x + x^3) \log(2) + (32 + 16x + 2x^2 - 2x^3) \log(2) \log\left(\frac{16+8x+x^2-x^3}{x^2}\right)}{(-48x^3 - 24x^4 - 3x^5 + 3x^6 + (-16x - 8x^2 - x^3 + x^4) \log(2)) \log\left(\frac{16+8x+x^2-x^3}{x^2}\right)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{\log(4) \log(3x^2 + \log(2))}{2 \log(2)} + \log\left(\log\left(\frac{16}{x^2} - x + \frac{8}{x} + 1\right)\right) - \frac{\log(4) \log(x)}{\log(2)}$$

5.26 Problem number 2468

$$\int \frac{16384x^5 + e^{\frac{256+e^{16}+768x+864x^2+176x^3-495x^4-432x^5-12x^6+144x^7+54x^8-16x^9-12x^{10}+x^{12}+e^{12}(16+12x-4x^3)+e^8(96+144x+54x^2-48x^3-36x^4+16-9x+x^3)+E^8(-96-108x-27x^2+12x^3+3x^6)+E^4(-256-432x-216x^2+256-E^{16}-576x-432x^2-44x^3-108x^5-6x^6+108x^7+54x^8-20x^9-18x^{10})}{65536x^4}}{e^{\frac{(4-x^2+\frac{e^4}{x}+\frac{-x+4}{x})^2}{256}} + x}} dx$$

Optimal antiderivative

$$e^{\frac{(4-x^2+\frac{e^4}{x}+\frac{-x+4}{x})^2}{256}} + x$$

command

```
Int[(16384*x^5 + E^((256 + E^16 + 768*x + 864*x^2 + 176*x^3 - 495*x^4 - 432*x^5 - 12*x^6 + 144*x^7 + 54*x^8 - 16*x^9 - 12*x^10 + x^12 + E^12(16+12x-4x^3)+E^8(96+144x+54x^2-48x^3-36x^4+16-9x+x^3)+E^8(-96-108x-27*x^2+12*x^3+3*x^6)+E^4*(-256-432*x-216*x^2+256-E^16-576*x-432*x^2-44*x^3-108*x^5-6*x^6+108*x^7+54*x^8-20*x^9-18*x^10)))/65536x^4)]/e^((4-x^2+e^4/x+(-x+4)/x)^2/256) + x
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{16384x^5 + \exp\left(\frac{256+e^{16}+768x+864x^2+176x^3-495x^4-432x^5-12x^6+144x^7+54x^8-16x^9-12x^{10}+x^{12}+e^{12}(16+12x-4x^3)+e^8(96+144x+54x^2-48x^3-36x^4+16-9x+x^3)+E^8(-96-108x-27x^2+12x^3+3x^6)+E^4(-256-432x-216x^2+256-E^{16}-576x-432x^2-44x^3-108x^5-6x^6+108x^7+54x^8-20x^9-18x^{10})}{65536x^4}}\right)}{e^{\frac{(-x^3+3x+e^4+4)^4}{65536x^4}} + x}} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{\frac{(-x^3+3x+e^4+4)^4}{65536x^4}} + x$$

5.27 Problem number 2524

$$\int \frac{625000x - 625000x^4 + e^{13}(4 - 2x + 8x^3 - 4x^4) + e^5(-2500 + 1250x - 5000x^3 + 2500x^4 + e^3(-1000x + 1000x^4))}{e^{13}(4 - 2x + 8x^3 - 4x^4) + e^5(-2500 + 1250x - 5000x^3 + 2500x^4 + e^3(-1000x + 1000x^4))}} dx$$

Optimal antiderivative

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

command

```
Int[(625000*x - 625000*x^4 + E^13*(4 - 2*x + 8*x^3 - 4*x^4) + E^5*(-2500 + 1250*x - 5000*x^3 + 2500*x^4 + E^3*(-1000*x + 1000*x^4)))/E^13*(4 - 2*x + 8*x^3 - 4*x^4) + E^5*(-2500 + 1250*x - 5000*x^3 + 2500*x^4 + E^3*(-1000*x + 1000*x^4)))]/e^13*(4 - 2*x + 8*x^3 - 4*x^4) + E^5*(-2500 + 1250*x - 5000*x^3 + 2500*x^4 + E^3*(-1000*x + 1000*x^4))
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{\left(e^5 \log\left(-\frac{1-x^3}{x}\right) + \log^4(x-2) - 20 \log^3(x-2) + 150 \log^2(x-2) - 500 \log(x-2) - e^8 + 625\right)^2}{e^{10}}$$

5.28 Problem number 2695

$$\int \frac{-8x^7 + 4x^8 + 6x^9 - 5x^{10} + x^{11} + e^{\frac{256+32x+x^2}{4x^6-4x^7+x^8}}(-8x^7 + 12x^8 - 6x^9 + x^{10}) + e^{\frac{256+32x+x^2}{4x^6-4x^7+x^8}}(3072 + 1344x - 1944x^2)}{-8x^7 + 4x^8 + 6x^9 - 5x^{10} + x^{11}}$$

Optimal antiderivative

$$\ln(1+x) e^{\frac{(x+16)^2}{x^6(2-x)^2}} + x - 5$$

command

```
Int[(-8*x^7 + 4*x^8 + 6*x^9 - 5*x^10 + x^11 + E^((256 + 32*x + x^2)/(4*x^6 - 4*x^7 + x^8)))*(-8*x^7 + 12*x^8 - 6*x^9 + x^10) + E^((256 + 32*x + x^2)/(4*x^6 - 4*x^7 + x^8))*(3072 + 1344*x - 1944*x^2), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-8x^7 + 4x^8 + 6x^9 - 5x^{10} + x^{11} + e^{\frac{256+32x+x^2}{4x^6-4x^7+x^8}}(-8x^7 + 12x^8 - 6x^9 + x^{10}) + e^{\frac{256+32x+x^2}{4x^6-4x^7+x^8}}(3072 + 1344x - 1944x^2)}{-8x^7 + 4x^8 + 6x^9 - 5x^{10} + x^{11}}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

x

$$\frac{3e^{\frac{(x+16)^2}{(2-x)^2x^6}}(x^4(-\log(x+1)) - 37x^3 \log(x+1) - 324x^2 \log(x+1) + 224x \log(x+1) + 512 \log(x+1))}{(2-x)^3x^7(x+1) \left(-\frac{3(x+16)^2}{(2-x)^2x^7} + \frac{(x+16)^2}{(2-x)^3x^6} + \frac{x+16}{(2-x)^2x^6}\right)}$$

5.29 Problem number 2706

$$\int \frac{e^{\frac{100+e^3}{1+2x+x^2}} (-999 + e^3(-10 - 2x) - 197x + 3x^2 + x^3)}{1 + 3x + 3x^2 + x^3} dx$$

Optimal antiderivative

$$e^{\frac{e^3+100}{(1+x)^2}} (5 + x)$$

command

`Int[(E^((100 + E^3)/(1 + 2*x + x^2)))*(-999 + E^3*(-10 - 2*x) - 197*x + 3*x^2 + x^3)]/(1 + 3*x`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{100+e^3}{1+2x+x^2}} (-999 + e^3(-10 - 2x) - 197x + 3x^2 + x^3)}{1 + 3x + 3x^2 + x^3} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{\frac{100+e^3}{(x+1)^2}} (x + 1) + 4e^{\frac{100+e^3}{(x+1)^2}}$$

5.30 Problem number 2758

$$\int \frac{e^{\frac{-2+(-14+2x)\log(\log(x))}{\log(\log(x))}} (1 + x \log(x) \log^2(\log(x)))}{2x \log(x) \log^2(\log(x))} dx$$

Optimal antiderivative

$$\frac{e^{-14+2x-\frac{2}{\ln(\ln(x))}}}{4} + 8$$

command

`Int[(E^((-2 + (-14 + 2*x)*Log[Log[x]])/Log[Log[x]]))*(1 + x*Log[x]*Log[Log[x]]^2)]/(2*x*Log[x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{-2+(-14+2x)\log(\log(x))}{\log(\log(x))}} (1 + x \log(x) \log^2(\log(x)))}{2x \log(x) \log^2(\log(x))} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{1}{4} e^{-2\left(-x + \frac{1}{\log(\log(x))} + 7\right)}$$

5.31 Problem number 2806

$$\int \frac{(4x^6 + 8x^3 \log(4)) \log\left(\frac{121x^4 - 110x^5 + 25x^6 + (110x^2 - 50x^3) \log(4) + 25 \log^2(4)}{4x^4 - 4x^5 + x^6 + (4x^2 - 2x^3) \log(4) + \log^2(4)}\right) + (44x^5 - 42x^6 + 10x^7 + (42x^3 - 20x^4) \log(4)) \log(4)}{22x^4 - 21x^5 + 5x^6 + (21x^2 - 10x^3) \log(4) + 5 \log^2(4)} dx$$

Optimal antiderivative

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

command

```
Int[((4*x^6 + 8*x^3*Log[4])*Log[(121*x^4 - 110*x^5 + 25*x^6 + (110*x^2 - 50*x^3)*Log[4] + 25*Log[4]^2)] + (44*x^5 - 42*x^6 + 10*x^7 + (42*x^3 - 20*x^4)*Log[4])*Log[4])/(22*x^4 - 21*x^5 + 5*x^6 + (21*x^2 - 10*x^3)*Log[4] + 5*Log[4]^2)]/x
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$x^2 \log^2\left(\frac{(-5x^3 + 11x^2 + 5 \log(4))^2}{(-x^3 + 2x^2 + \log(4))^2}\right)$$

5.32 Problem number 2968

$$\int \frac{-600 - 300x + 67x^2 + 8x^3 - x^4}{-1800x + 150x^2 + 99x^3 - 2x^4 - x^5 + (600x - 150x^2 - 8x^3 + 2x^4) \log\left(\frac{300 - 75x - 4x^2 + x^3}{x}\right)} dx$$

Optimal antiderivative

$$\ln\left(\ln\left(\left(\frac{75}{x} - x\right)(-x + 4)\right) - \frac{x}{2} - 3\right)$$

command

```
Int[(-600 - 300*x + 67*x^2 + 8*x^3 - x^4)/(-1800*x + 150*x^2 + 99*x^3 - 2*x^4 - x^5 + (600*x - 150*x^2 - 8*x^3 + 2*x^4)*Log[(300 - 75*x - 4*x^2 + x^3)/x]]/x
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-600 - 300x + 67x^2 + 8x^3 - x^4}{-1800x + 150x^2 + 99x^3 - 2x^4 - x^5 + (600x - 150x^2 - 8x^3 + 2x^4) \log\left(\frac{300 - 75x - 4x^2 + x^3}{x}\right)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log\left(-2 \log\left(x^2 - 4x + \frac{300}{x} - 75\right) + x + 6\right)$$

5.33 Problem number 3064

$$\int \frac{e^{\frac{1}{\log^2(4-40x+36x^2+320x^3+256x^4)}} (-20 - 44x + 64x^2 + (-1 + 5x + 8x^2) \log^3(4 - 40x + 36x^2 + 320x^3 + 256x^4))}{(-1 + 7x - 3x^2 - 11x^3 + 8x^4) \log^3(4 - 40x + 36x^2 + 320x^3 + 256x^4)} dx$$

Optimal antiderivative

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

command

Int[(E^Log[4 - 40*x + 36*x^2 + 320*x^3 + 256*x^4]^(-2))*(-20 - 44*x + 64*x^2 + (-1 + 5*x + 8*x^2) * Log[4 - 40*x + 36*x^2 + 320*x^3 + 256*x^4]^3), x]

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{1}{\log^2(4-40x+36x^2+320x^3+256x^4)}} (-20 - 44x + 64x^2 + (-1 + 5x + 8x^2) \log^3(4 - 40x + 36x^2 + 320x^3 + 256x^4))}{(-1 + 7x - 3x^2 - 11x^3 + 8x^4) \log^3(4 - 40x + 36x^2 + 320x^3 + 256x^4)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{(-16x^2 + 11x + 5)(64x^4 + 80x^3 + 9x^2 - 10x + 1) e^{\frac{1}{\log^2(256x^4+320x^3+36x^2-40x+4)}}}{(-128x^3 - 120x^2 - 9x + 5)(-8x^4 + 11x^3 + 3x^2 - 7x + 1)}$$

5.34 Problem number 3082

$$\int \frac{-x^2 - 4x^3 - 4x^4 + e^2(-1 - 4x - 4x^2) + e^{\frac{2-x}{-x-2x^2+e(1+2x)}}(-4 + 10e - 16x + 4x^2) + e^{\frac{2(2-x)}{-x-2x^2+e(1+2x)}}(-4 + 10e - 16x + 4x^2) + e^{2(2-x)}(-4 + 10e - 16x + 4x^2)}{x^2 + 4x^3 + 4x^4 + e^2(1 + 4x + 4x^2) + e(-2x - 8x^2 - 8x^3)}$$

Optimal antiderivative

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

command

Int[(-x^2 - 4*x^3 - 4*x^4 + E^2*(-1 - 4*x - 4*x^2) + E^((2 - x)/(-x - 2*x^2 + E*(1 + 2*x)))*(-4 + 10*E - 16*x + 4*x^2) + E^((2*(2 - x))/(-x - 2*x^2 + E*(1 + 2*x)))*(-4 + 10*E - 16*x + 4*x^2) + E^(2*(2-x))*(-4 + 10*E - 16*x + 4*x^2)), x]

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-x^2 - 4x^3 - 4x^4 + e^2(-1 - 4x - 4x^2) + e^{\frac{2-x}{-x-2x^2+e(1+2x)}}(-4 + 10e - 16x + 4x^2) + e^{\frac{2(2-x)}{-x-2x^2+e(1+2x)}}(-4 + 10e - 16x + 4x^2) + e^{2(2-x)}(-4 + 10e - 16x + 4x^2)}{x^2 + 4x^3 + 4x^4 + e^2(1 + 4x + 4x^2) + e(-2x - 8x^2 - 8x^3)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned}
 & -x - 2e^{\frac{2-x}{(e-x)(2x+1)}} - e^{\frac{2(2-x)}{(e-x)(2x+1)}} - \frac{4e^4}{(1+2e)^2(e-x)} - \frac{4e^3}{(1+2e)^2(e-x)} - \frac{e^2}{(1+2e)^2(e-x)} \\
 & + \frac{e^2}{e-x} - \frac{4e^2(3+2e)\log(e-x)}{(1+2e)^3} - \frac{16e^3(1+e)\log(e-x)}{(1+2e)^3} - \frac{2e\log(e-x)}{(1+2e)^3} \\
 & + 2e\log(e-x) - \frac{(1+6e)\log(2x+1)}{(1+2e)^3} + \frac{(1+4e)\log(2x+1)}{(1+2e)^3} + \frac{2e\log(2x+1)}{(1+2e)^3}
 \end{aligned}$$

5.35 Problem number 3083

$$\int \frac{(80 - 20x) \log\left(\frac{1}{3}e^{-16+8x-x^2}(-1 - 15e^{16-8x+x^2})\right)}{3 + 45e^{16-8x+x^2}} dx$$

Optimal antiderivative

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

command

`Int[((80 - 20*x)*Log[(E^(-16 + 8*x - x^2))*(-1 - 15*E^(16 - 8*x + x^2))]/3)]/(3 + 45*E^(16 - 8*x + x^2))`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(80 - 20x) \log\left(\frac{1}{3}e^{-16+8x-x^2}(-1 - 15e^{16-8x+x^2})\right)}{3 + 45e^{16-8x+x^2}} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.36 Problem number 3205

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

Optimal antiderivative

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

command

Int[(E^(-4 + E^x)*(16 - 16*x) + E^(-4 + E^x)*(E^x*(16*x - 16*x^2) + 4*E^x*x*Log[-x^4])*Log[4*x^4])]/(4*x - 4*x^2 + x*Log[-x^4]),x]

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$4e^{e^x-4} \log(\log(-x^4) - 4x + 4)$$

5.37 Problem number 3305

$$\int \frac{e^{\frac{e^3 x + e^{2x} x^2 \log(e^4 + 64x)}{e^3}} (e^7 + 64e^3 x + 64e^{2x} x^2 + e^{2x} (128x^2 + 128x^3 + e^4(2x + 2x^2)) \log(e^4 + 64x))}{e^7 + 64e^3 x} dx$$

Optimal antiderivative

$$e^{e^{2x} x^2 \ln(e^4 + 64x)} e^{-3+x}$$

command

Int[(E^((E^3*x + E^(2*x))*x^2*Log[E^4 + 64*x])/E^3)*(E^7 + 64*E^3*x + 64*E^(2*x))*x^2 + E^(2*x)]

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{e^3 x + e^{2x} x^2 \log(e^4 + 64x)}{e^3}} (e^7 + 64e^3 x + 64e^{2x} x^2 + e^{2x} (128x^2 + 128x^3 + e^4(2x + 2x^2)) \log(e^4 + 64x))}{e^7 + 64e^3 x} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^x (64x + e^4) e^{2x-3x^2}$$

5.38 Problem number 3316

$$\int \frac{\left(-2x^2 + e^{e^{e^x+x^2} + e^{x+x^2} + x+x^2} (2x^2 + 4x^3)\right) \log\left(-e^{e^{e^x+x^2}} + x\right) + \left(2e^{e^{e^x+x^2}} x - 2x^2\right) \log^2\left(-e^{e^{e^x+x^2}} + x\right)}{27e^{e^{e^x+x^2}} - 27x} dx$$

Optimal antiderivative

$$\frac{\ln\left(-e^{e^{e^x+x^2}} + x\right)^2 x^2}{27}$$

command

```
Int[((-2*x^2 + E^(E^E^(x + x^2) + E^(x + x^2) + x + x^2)*(2*x^2 + 4*x^3))*Log[-E^E^E^(x + x^2)
E^E^E^(x + x^2) + x]^2)/(27*E^E^E^(x + x^2) - 27*x),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\left(-2x^2 + e^{e^{e^{x+x^2}} + e^{x+x^2} + x + x^2}(2x^2 + 4x^3)\right) \log\left(-e^{e^{e^{x+x^2}}} + x\right) + \left(2e^{e^{e^{x+x^2}}}x - 2x^2\right) \log^2\left(-e^{e^{e^{x+x^2}}} + x\right)}{27e^{e^{e^{x+x^2}}} - 27x} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{1}{27}x^2 \log^2\left(x - e^{e^{e^{x^2+x}}}\right)$$

5.39 Problem number 3361

$$\int \frac{-4096x - 64x^3 + (-256x + 60x^3 + x^5) \log(-4 + x^2) + (4096x + (256x - 64x^3) \log(-4 + x^2)) \log(\log(-4 + x^2))}{(-4096 + 1024x^2) \log(-4 + x^2)}$$

Optimal antiderivative

$$\left(1 + \frac{x^2}{64} - \ln(\ln(x^2 - 4))\right)^2$$

command

```
Int[(-4096*x - 64*x^3 + (-256*x + 60*x^3 + x^5)*Log[-4 + x^2] + (4096*x + (256*x - 64*x^3)*Lo
4 + x^2))*Log[Log[-4 + x^2]]/((-4096 + 1024*x^2)*Log[-4 + x^2]),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-4096x - 64x^3 + (-256x + 60x^3 + x^5) \log(-4 + x^2) + (4096x + (256x - 64x^3) \log(-4 + x^2)) \log(\log(-4 + x^2))}{(-4096 + 1024x^2) \log(-4 + x^2)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{(x^2 - 64 \log(\log(x^2 - 4)) + 64)^2}{4096}$$

5.40 Problem number 3371

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

Optimal antiderivative

$$e^{\frac{x}{x+\frac{x^2+x}{x^2}}}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{\frac{x^2}{x^2+x+1}}$$

5.41 Problem number 3375

$$\int \frac{(-2x^3 + 10x^4) \log^2\left(\frac{4}{x}\right) - 8x^3 \log^2\left(\frac{4}{x}\right) \log(x) + e^{\frac{1}{2}\left(-10 + e^{\frac{3}{\log\left(\frac{4}{x}\right)}\right)}} \left((-2x + 6x^2) \log^2\left(\frac{4}{x}\right) - 4x \log^2\left(\frac{4}{x}\right) \log(x) + \right)}{2 \log^2\left(\frac{4}{x}\right)}$$

Optimal antiderivative

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

command

`Int[((-2*x^3+10*x^4)*Log[4/x]^2-8*x^3*Log[4/x]^2*Log[x]+E^((-10+E^(3/Log[4/x]))/2)*((-2*x+6*x^2)*Log[4/x]^2-4*x*Log[4/x]^2*Log[x]+E^(3/Log[4/x])*(3*x^2-3*x*Log[x])))/(2*Log[4/x]^2),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(-2x^3 + 10x^4) \log^2\left(\frac{4}{x}\right) - 8x^3 \log^2\left(\frac{4}{x}\right) \log(x) + e^{\frac{1}{2}\left(-10 + e^{\frac{3}{\log\left(\frac{4}{x}\right)}\right)}} \left((-2x + 6x^2) \log^2\left(\frac{4}{x}\right) - 4x \log^2\left(\frac{4}{x}\right) \log(x) + \right)}{2 \log^2\left(\frac{4}{x}\right)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$x^5 - x^4 \log(x) + x^2 e^{\frac{1}{2}\left(e^{\frac{3}{\log\left(\frac{4}{x}\right)}} - 10\right)} (x - \log(x))$$

5.42 Problem number 3429

$$\int \frac{e^x(-220 - 20x + 40 \log(2)) + e^x(44 + 4x) \log(2) \log(11 + x) + (e^x(-220 - 240x - 20x^2 + (-44x - 48x^2 - 4x^3) \log(2)) + e^x(44 + 4x) \log(2) \log(11 + x))}{-55 - 60x - 5x^2 + (-11x - 12x^2 - x^3) \log(2) + (11 + x) \log(2)}$$

Optimal antiderivative

$$4 \ln \left(\frac{1 + x}{\ln(11 + x) - x - \frac{5}{\ln(2)}} \right) e^x$$

command

```
Int[(E^x*(-220 - 20*x + 40*Log[2]) + E^x*(44 + 4*x)*Log[2]*Log[11 + x] + (E^x*(-220 - 240*x - 44*x - 48*x^2 - 4*x^3)*Log[2]) + E^x*(44 + 48*x + 4*x^2)*Log[2]*Log[11 + x])*Log[((1 + x)*Log[5 - x*Log[2] + Log[2]*Log[11 + x]])]/(-55 - 60*x - 5*x^2 + (-11*x - 12*x^2 - x^3)*Log[2] + (11 + x)*Log[2])]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^x(-220 - 20x + 40 \log(2)) + e^x(44 + 4x) \log(2) \log(11 + x) + (e^x(-220 - 240x - 20x^2 + (-44x - 48x^2 - 4x^3) \log(2)) + e^x(44 + 4x) \log(2) \log(11 + x))}{-55 - 60x - 5x^2 + (-11x - 12x^2 - x^3) \log(2) + (11 + x) \log(2)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$4e^x \log \left(-\frac{(x + 1) \log(2)}{x \log(2) - \log(2) \log(x + 11) + 5} \right)$$

5.43 Problem number 3454

$$\int \frac{-120 - 120e^2 + e^{e^{3x^2}}(-24 - 24e^2 - 288e^{3x^2}x)}{125e^{x+e^2x} + 75e^{e^{3x^2}+x+e^2x} + 15e^{2e^{3x^2}+x+e^2x} + e^{3e^{3x^2}+x+e^2x}} dx$$

Optimal antiderivative

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

command

```
Int[(-120 - 120*E^2 + E^E^(3*x^2))*(-24 - 24*E^2 - 288*E^(3*x^2)*x)/(125*E^(x + E^2*x) + 75*E^(E^3*x^2 + x + E^2*x) + 15*E^(2*E^3*x^2 + x + E^2*x) + E^(3*E^3*x^2 + x + E^2*x))]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-120 - 120e^2 + e^{e^{3x^2}}(-24 - 24e^2 - 288e^{3x^2}x)}{125e^{x+e^2x} + 75e^{e^{3x^2}+x+e^2x} + 15e^{2e^{3x^2}+x+e^2x} + e^{3e^{3x^2}+x+e^2x}} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{24e^{-((1+e^2)x)}}{\left(e^{e^{3x^2}} + 5\right)^2}$$

5.44 Problem number 3481

$$\int \frac{e^{-\frac{2}{-45x^3+9x^4+e^6(-45x+9x^2)+e^3(90x^2-18x^3)}} (30x - 8x^2 + e^3(-10 + 4x))}{-225x^5 + 90x^6 - 9x^7 + e^9(225x^2 - 90x^3 + 9x^4) + e^6(-675x^3 + 270x^4 - 27x^5) + e^3(675x^4 - 270x^5 + 27x^6)} dx$$

Optimal antiderivative

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

command

```
Int[(30*x - 8*x^2 + E^3*(-10 + 4*x))/(E^(2/(-45*x^3 + 9*x^4 + E^6*(-45*x + 9*x^2) + E^3*(90*x^2 - 225*x^5 + 90*x^6 - 9*x^7 + E^9*(225*x^2 - 90*x^3 + 9*x^4) + E^6*(-675*x^3 + 270*x^4 - 27*x^5) + E^3*(675*x^4 - 270*x^5 + 27*x^6)))]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\exp\left(-\frac{2}{-45x^3+9x^4+e^6(-45x+9x^2)+e^3(90x^2-18x^3)}\right) (30x - 8x^2 + e^3(-10 + 4x))}{-225x^5 + 90x^6 - 9x^7 + e^9(225x^2 - 90x^3 + 9x^4) + e^6(-675x^3 + 270x^4 - 27x^5) + e^3(675x^4 - 270x^5 + 27x^6)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{\frac{2}{9(5-x)(e^3-x)^2x}}$$

5.45 Problem number 3487

$$\int \frac{e^{\frac{10x^5-2x^6}{81-432x+864x^2-768x^3+256x^4}} (-150x^4 + 76x^5 - 16x^6)}{-243 + 1620x - 4320x^2 + 5760x^3 - 3840x^4 + 1024x^5} dx$$

Optimal antiderivative

$$e^{\frac{2x(5-x)}{(4-\frac{3}{x})^4}}$$

command

```
Int[(E^((10*x^5 - 2*x^6)/(81 - 432*x + 864*x^2 - 768*x^3 + 256*x^4)))*(-150*x^4 + 76*x^5 - 16*x^6)/(-243 + 1620*x - 4320*x^2 + 5760*x^3 - 3840*x^4 + 1024*x^5), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\exp\left(\frac{10x^5-2x^6}{81-432x+864x^2-768x^3+256x^4}\right) (-150x^4 + 76x^5 - 16x^6)}{-243 + 1620x - 4320x^2 + 5760x^3 - 3840x^4 + 1024x^5} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{\frac{2(5-x)x^5}{(3-4x)^4}}$$

5.46 Problem number 3520

$$\int \frac{e^{\frac{1}{x}}(-104x + 26x^2 - 2x^4 + 2x^5 + (-52x - x^4)\log(3)) + e^{\frac{1}{x}}(52 - 26x - 2x^3 + x^4 + (26 - x^3)\log(3))\log\left(\frac{52-26x}{x^2}\right)}{(-52x^2 + 26x^3 + 2x^5 - x^6 + (-26x^2 + x^5)\log(3))\log^2\left(\frac{52-26x-2x^3+x^4+(26-x^3)\log(3)}{x^2}\right)}$$

Optimal antiderivative

$$\frac{e^{\frac{1}{x}}}{\ln\left(\left(\frac{26}{x^2} - x\right)(\ln(3) - x + 2)\right)}$$

command

```
Int[(E^x^(-1))*(-104*x + 26*x^2 - 2*x^4 + 2*x^5 + (-52*x - x^4)*Log[3]) + E^x^(-1)*(52 - 26*x
52*x^2 + 26*x^3 + 2*x^5 - x^6 + (-26*x^2 + x^5)*Log[3])*Log[(52 - 26*x - 2*x^3 + x^4 + (26 -
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{1}{x}}(-104x + 26x^2 - 2x^4 + 2x^5 + (-52x - x^4)\log(3)) + e^{\frac{1}{x}}(52 - 26x - 2x^3 + x^4 + (26 - x^3)\log(3))\log\left(\frac{52-26x}{x^2}\right)}{(-52x^2 + 26x^3 + 2x^5 - x^6 + (-26x^2 + x^5)\log(3))\log^2\left(\frac{52-26x-2x^3+x^4+(26-x^3)\log(3)}{x^2}\right)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{e^{\frac{1}{x}}}{\log\left(\frac{(26-x^3)(-x+2+\log(3))}{x^2}\right)}$$

5.47 Problem number 3533

$$\int e^{\frac{92416 - 184832x^2 - 92416x^3 + 138624x^4 + 138624x^5 - 11552x^6 - 69312x^7 - 28880x^8 + 5776x^9 + 8664x^{10} + 2888x^{11} + 361x^{12} + e(-9728 + 19456x^2 + 9728x^3 - 14592x^4 - 1024 + 1024x^2 + 256x^3 + 384x^5 - 64x^6 - 576x^7 - 320x^8 + 80x^9 + 144x^{10} + 56x^{11})}{x^4}}$$

Optimal antiderivative

$$e^{x^4\left(2+x-\frac{4}{x^2}\right)^4}(e-19)^2$$

command

```
Int[(E^((92416 - 184832*x^2 - 92416*x^3 + 138624*x^4 + 138624*x^5 - 11552*x^6 - 69312*x^7 - 2
9728 + 19456*x^2 + 9728*x^3 - 14592*x^4 - 14592*x^5 + 1216*x^6 + 7296*x^7 + 3040*x^8 - 608*x^
369664 + 369664*x^2 + 92416*x^3 + 138624*x^5 - 23104*x^6 - 207936*x^7 - 115520*x^8 + 28880*x^
1024 + 1024*x^2 + 256*x^3 + 384*x^5 - 64*x^6 - 576*x^7 - 320*x^8 + 80*x^9 + 144*x^10 + 56*x^11
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \exp\left(\frac{92416 - 184832x^2 - 92416x^3 + 138624x^4 + 138624x^5 - 11552x^6 - 69312x^7 - 28880x^8 + 5776x^9 + 8664x^{10} + 2888x^{11} + 361x^{12} + e(-9728 + 19456x)}{e^x}\right) dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{\frac{(19-e)^2(-x^3-2x^2+4)^4}{x^4}}$$

5.48 Problem number 3576

$$\int \frac{-4 + 13x - 11x^2 + 2x^3 + (4 - 9x + 2x^2) \log(4) + (-2 - 3x + x^2 + x^3 + (-2 - 2x + 2x^2) \log(4)) \log(1 + x - x^2)}{(-4 + x + 8x^2 - 6x^3 + x^4 + (4 + 3x - 5x^2 + x^3) \log(4)) \log(1 + x - x^2)} dx$$

Optimal antiderivative

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

command

```
Int[(-4 + 13*x - 11*x^2 + 2*x^3 + (4 - 9*x + 2*x^2)*Log[4] + (-2 - 3*x + x^2 + x^3 + (-2 - 2*x + 2*x^2)*Log[4])*Log[1 + x - x^2])/((-4 + x + 8*x^2 - 6*x^3 + x^4 + (4 + 3*x - 5*x^2 + x^3)*Log[4])*Log[1 + x - x^2])]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-4 + 13x - 11x^2 + 2x^3 + (4 - 9x + 2x^2) \log(4) + (-2 - 3x + x^2 + x^3 + (-2 - 2x + 2x^2) \log(4)) \log(1 + x - x^2)}{(-4 + x + 8x^2 - 6x^3 + x^4 + (4 + 3x - 5x^2 + x^3) \log(4)) \log(1 + x - x^2)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log(\log(-x^2+x+1)) + \frac{(6+\log(16))\log(4-x)}{3+\log(4)} - \log(-x+1-\log(4))$$

5.49 Problem number 3755

$$\int \frac{e^{2x}(200 + 100x - 50x^2) + e^x(-4 + 18x - 6x^2) + (e^{2x}(-200x + 50x^2) + e^x(4x - 9x^2 + 2x^3)) \log(-4x + 9x^2 - 2x^3 + e^x(200x - 50x^2))}{(4x - 9x^2 + 2x^3 + e^x(-200x + 50x^2)) \log^2(-4x + 9x^2 - 2x^3 + e^x(200x - 50x^2))} dx$$

Optimal antiderivative

$$1 + \frac{e^x}{\ln(2(x + 25e^x - \frac{1}{2}))(-x+4)x}$$

command

`Int[(E^(2*x))*(200 + 100*x - 50*x^2) + E^x*(-4 + 18*x - 6*x^2) + (E^(2*x))*(-200*x + 50*x^2) + 4*x + 9*x^2 - 2*x^3 + E^x*(200*x - 50*x^2)]/((4*x - 9*x^2 + 2*x^3 + E^x*(-200*x + 50*x^2))*L[4*x + 9*x^2 - 2*x^3 + E^x*(200*x - 50*x^2)]^2),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{2x}(200 + 100x - 50x^2) + e^x(-4 + 18x - 6x^2) + (e^{2x}(-200x + 50x^2) + e^x(4x - 9x^2 + 2x^3)) \log(-4x + 9x^2 - 2x^3 + e^x(200x - 50x^2))}{(4x - 9x^2 + 2x^3 + e^x(-200x + 50x^2)) \log^2(-4x + 9x^2 - 2x^3 + e^x(200x - 50x^2))} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{e^x}{\log(-((-2x - 50e^x + 1)(4 - x)x))}$$

5.50 Problem number 3803

$$\int \frac{-1500 + 525x + 45x^2 - 33x^3 + 3x^4 + (-375x + 205x^2 - 50x^3 + 3x^4) \log(x)}{(-1500x + 525x^2 + 45x^3 - 33x^4 + 3x^5) \log(x)} dx$$

Optimal antiderivative

$$7 + \frac{x^2}{6(5-x)^2} + \ln((4+x) \ln(x))$$

command

`Int[(-1500 + 525*x + 45*x^2 - 33*x^3 + 3*x^4 + (-375*x + 205*x^2 - 50*x^3 + 3*x^4)*Log[x])/((-1500*x + 525*x^2 + 45*x^3 - 33*x^4 + 3*x^5)*Log[x]),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-1500 + 525x + 45x^2 - 33x^3 + 3x^4 + (-375x + 205x^2 - 50x^3 + 3x^4) \log(x)}{(-1500x + 525x^2 + 45x^3 - 33x^4 + 3x^5) \log(x)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{5}{3(5-x)} + \frac{25}{6(5-x)^2} + \log(x+4) + \log(\log(x))$$

5.51 Problem number 3820

$$\int \frac{e^x(-2 + 64x + 27x^2 - 66x^3 - 30x^4 + 17x^5 + 8x^6) + e^x(-32 + 2x + 32x^2 - x^3 - 8x^4) \log\left(\frac{-4+2x^2}{-80+5x+40x^2}\right)}{32 - 2x - 32x^2 + x^3 + 8x^4} dx$$

Optimal antiderivative

$$\left(x^2 - \ln\left(\frac{2}{40 + \frac{5x}{x^2-2}}\right)\right) e^x$$

command

```
Int[(E^x*(-2 + 64*x + 27*x^2 - 66*x^3 - 30*x^4 + 17*x^5 + 8*x^6) + E^x*(-32 + 2*x + 32*x^2 - 4 + 2*x^2)/(-80 + 5*x + 40*x^2)]/(32 - 2*x - 32*x^2 + x^3 + 8*x^4),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^x(-2 + 64x + 27x^2 - 66x^3 - 30x^4 + 17x^5 + 8x^6) + e^x(-32 + 2x + 32x^2 - x^3 - 8x^4) \log\left(\frac{-4+2x^2}{-80+5x+40x^2}\right)}{32 - 2x - 32x^2 + x^3 + 8x^4} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

output too large to display

5.52 Problem number 4133

$$\int \frac{-11x + e^{\sqrt[4]{e}}(11x + 12x^2) + (2x + e^{\sqrt[4]{e}}(-2x - 2x^2)) \log(x + e^{\sqrt[4]{e}}(-x - x^2))}{-25 - 5x^2 + e^{\sqrt[4]{e}}(25 + 25x + 5x^2 + 5x^3) + (10 + x^2 + e^{\sqrt[4]{e}}(-10 - 10x - x^2 - x^3)) \log(x + e^{\sqrt[4]{e}}(-x - x^2))} +$$

Optimal antiderivative

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

command

```
Int[(-11*x + E^E^(1/4)*(11*x + 12*x^2) + (2*x + E^E^(1/4)*(-2*x - 2*x^2))*Log[x + E^E^(1/4)*(x - x^2)])/(-25 - 5*x^2 + E^E^(1/4)*(25 + 25*x + 5*x^2 + 5*x^3) + (10 + x^2 + E^E^(1/4)*(-10 - 10*x - x^2 - x^3))*Log[x + E^E^(1/4)*(-x - x^2)] + (-1 + E^E^(1/4)*(1 + x))*Log[x + E^E^(1/4)*(x - x^2)]^2),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-11x + e^{\sqrt[4]{e}}(11x + 12x^2) + (2x + e^{\sqrt[4]{e}}(-2x - 2x^2)) \log(x + e^{\sqrt[4]{e}}(-x - x^2))}{-25 - 5x^2 + e^{\sqrt[4]{e}}(25 + 25x + 5x^2 + 5x^3) + (10 + x^2 + e^{\sqrt[4]{e}}(-10 - 10x - x^2 - x^3)) \log(x + e^{\sqrt[4]{e}}(-x - x^2))} +$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log\left(x^2 - \log\left(x - e^{\sqrt[4]{e}}x(x+1)\right) + 5\right) - \log\left(5 - \log\left(x - e^{\sqrt[4]{e}}x(x+1)\right)\right)$$

5.53 Problem number 4330

$$\int \frac{54 - 6x^2 + (72x + 8x^2 + 8x^3) \log\left(\frac{9+x+x^2}{x}\right) \log^2\left(\log\left(\frac{9+x+x^2}{x}\right)\right)}{\left((27x + 3x^2 + 3x^3) \log\left(\frac{9+x+x^2}{x}\right) \log\left(\log\left(\frac{9+x+x^2}{x}\right)\right) + (-45x + 31x^2 - x^3 + 4x^4) \log\left(\frac{9+x+x^2}{x}\right) \log^2\left(\log\left(\frac{9+x+x^2}{x}\right)\right)\right)} dx$$

Optimal antiderivative

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

command

```
Int[(54 - 6*x^2 + (72*x + 8*x^2 + 8*x^3)*Log[(9 + x + x^2)/x]*Log[Log[(9 + x + x^2)/x]]^2)/((45*x + 31*x^2 - x^3 + 4*x^4)*Log[(9 + x + x^2)/x]*Log[Log[(9 + x + x^2)/x]]^2*Log[(3 + (-5 + 4*x)*Log[Log[(9 + x + x^2)/x]])/Log[Log[(9 + x + x^2)/x]]],x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{54 - 6x^2 + (72x + 8x^2 + 8x^3) \log\left(\frac{9+x+x^2}{x}\right) \log^2\left(\log\left(\frac{9+x+x^2}{x}\right)\right)}{\left((27x + 3x^2 + 3x^3) \log\left(\frac{9+x+x^2}{x}\right) \log\left(\log\left(\frac{9+x+x^2}{x}\right)\right) + (-45x + 31x^2 - x^3 + 4x^4) \log\left(\frac{9+x+x^2}{x}\right) \log^2\left(\log\left(\frac{9+x+x^2}{x}\right)\right)\right)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$2 \log\left(\log\left(4x + \frac{3}{\log\left(\log\left(x + \frac{9}{x} + 1\right)\right)} - 5\right)\right)$$

5.54 Problem number 4416

$$\int \frac{e^{-x} \left(e^x (84 + 132x - 108x^2 - 72x^3) + e^{2+e^{e^{2-x}}} + e^{2-x} (81 - 81x - 54x^2 + 51x^3 + 18x^4 - 9x^5 - 3x^6) \right)}{-27 + 27x + 18x^2 - 17x^3 - 6x^4 + 3x^5 + x^6} dx$$

Optimal antiderivative

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

command

```
Int[(E^-x*(84 + 132*x - 108*x^2 - 72*x^3) + E^(2 + E^E^(2 - x)) + E^(2 - x))*(81 - 81*x - 54*x^2 + 51*x^3 + 18*x^4 - 9*x^5 - 3*x^6)/(-27 + 27*x + 18*x^2 - 17*x^3 - 6*x^4 + 3*x^5 + x^6),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{-x} \left(e^x (84 + 132x - 108x^2 - 72x^3) + e^{2+e^{2-x}} + e^{2-x} (81 - 81x - 54x^2 + 51x^3 + 18x^4 - 9x^5 - 3x^6) \right)}{-27 + 27x + 18x^2 - 17x^3 - 6x^4 + 3x^5 + x^6} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\frac{36}{-x^2 - x + 3} + \frac{12}{(-x^2 - x + 3)^2} + 3e^{e^{2-x}}$$

5.55 Problem number 4445

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

Optimal antiderivative

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

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.56 Problem number 4476

$$\int \frac{e^{-4 + \frac{-2x + e^4 \log(x+x^2) \log(\log(x))}{e^4 \log(x+x^2)}}}{((12x + 24x^2) \log(x) + (-12x - 12x^2) \log(x) \log(x+x^2) + e^4(6 + 6x) \log^2(x+x^2))} \frac{1}{(x+x^2) \log(x) \log^2(x+x^2)}$$

Optimal antiderivative

$$6e^{\frac{\ln(\ln(x)) - \frac{2e^{-4x}}{\ln(x^2+x)}}{}}$$

command

Int[(E^(-4 + (-2*x + E^4*Log[x + x^2])*Log[Log[x]])/(E^4*Log[x + x^2]))*((12*x + 24*x^2)*Log[x] - 12*x - 12*x^2)*Log[x]*Log[x + x^2] + E^4*(6 + 6*x)*Log[x + x^2]^2)/((x + x^2)*Log[x]*Log[x +

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\exp\left(-4 + \frac{-2x + e^4 \log(x+x^2) \log(\log(x))}{e^4 \log(x+x^2)}\right) \left((12x + 24x^2) \log(x) + (-12x - 12x^2) \log(x) \log(x+x^2) + e^4(6 + 6x) \log(x+x^2)\right)}{(x+x^2) \log(x) \log^2(x+x^2)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.57 Problem number 4479

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

Optimal antiderivative

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

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.58 Problem number 4507

$$\int \frac{e^{-6+x^2+2e^{4/x}x^2+e^{8/x}x^2} \left(e^2(-1+2x^2) + e^{2+\frac{8}{x}}(-8x+2x^2) + e^{2+\frac{4}{x}}(-8x+4x^2) \right)}{x^2} dx$$

Optimal antiderivative

$$\frac{e^2 e^{-6+(x+x e^{\frac{4}{x}})^2}}{x}$$

command

```
Int[(E^(-6 + x^2 + 2*E^(4/x)*x^2 + E^(8/x)*x^2)*(E^2*(-1 + 2*x^2) + E^(2 + 8/x)*(-8*x + 2*x^2) + E^(2 + 4/x)*(-8*x + 4*x^2)))/x^2,x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{-6+x^2+2e^{4/x}x^2+e^{8/x}x^2} \left(e^2(-1+2x^2) + e^{2+\frac{8}{x}}(-8x+2x^2) + e^{2+\frac{4}{x}}(-8x+4x^2) \right)}{x^2} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{e^{(e^{4/x}+1)^2 x^2-4} (-x^2 + 2e^{4/x}(2-x)x + e^{8/x}(4-x)x)}{x^2 \left(4e^{4/x} (e^{4/x} + 1) - (e^{4/x} + 1)^2 x \right)}$$

5.59 Problem number 4608

$$\int \frac{-14 + 2x + 6x^2}{48 - 56x + 4x^2 + 8x^3 + (12 - 14x + x^2 + 2x^3) \log(-12 + 14x - x^2 - 2x^3)} dx$$

Optimal antiderivative

$$\ln(4 + \ln((-3 + 2x)(4 + (-2 - x)x)))$$

command

```
Int[(-14 + 2*x + 6*x^2)/(48 - 56*x + 4*x^2 + 8*x^3 + (12 - 14*x + x^2 + 2*x^3)*Log[-12 + 14*x - x^2 - 2*x^3]),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-14 + 2x + 6x^2}{48 - 56x + 4x^2 + 8x^3 + (12 - 14x + x^2 + 2x^3) \log(-12 + 14x - x^2 - 2x^3)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log(\log(-2x^3 - x^2 + 14x - 12) + 4)$$

5.60 Problem number 4701

$$\int \frac{240x + 768x^4}{25 - 320x^3 + 64e^2x^4 + 1024x^6 + e(80x^2 - 512x^5) + (-80x^2 - 128ex^4 + 512x^5)\log(4) + 64x^4\log^2(4)} dx$$

Optimal antiderivative

$$-\frac{3}{2\ln(2) - e - \frac{5}{8x^2} + 4x}$$

command

```
Int[(240*x + 768*x^4)/(25 - 320*x^3 + 64*E^2*x^4 + 1024*x^6 + E*(80*x^2 - 512*x^5) + (-80*x^2 - 128*E*x^4 + 512*x^5)*Log[4] + 64*x^4*Log[4]^2),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{24x^2}{-32x^3 + 8x^2(e - \log(4)) + 5}$$

5.61 Problem number 4803

$$\int \frac{-30x^2 + e^{\frac{25+10x+x^2}{x}}(-125 + 5x^2) + 6x^2\log(2)}{-75x^2 + 5e^{\frac{25+10x+x^2}{x}}x^2 - 30x^3 + (15x^2 + 6x^3)\log(2)} dx$$

Optimal antiderivative

$$\ln(2) + \ln\left(6x + 15 + \frac{5e^{\frac{(5+x)^2}{x}}}{\ln(2) - 5}\right)$$

command

```
Int[(-30*x^2 + E^((25 + 10*x + x^2)/x)*(-125 + 5*x^2) + 6*x^2*Log[2])/(-75*x^2 + 5*E^((25 + 10*x + x^2)/x)*x^2 - 30*x^3 + (15*x^2 + 6*x^3)*Log[2]),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-30x^2 + e^{\frac{25+10x+x^2}{x}}(-125 + 5x^2) + 6x^2\log(2)}{-75x^2 + 5e^{\frac{25+10x+x^2}{x}}x^2 - 30x^3 + (15x^2 + 6x^3)\log(2)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log\left(5e^{\frac{(x+5)^2}{x}} - (x(30 - \log(64))) - 15(5 - \log(2))\right)$$

5.62 Problem number 4865

$$\int \frac{32 - 72x + 72x^2 - 30x^3 + 4x^4 + (8x - 20x^2 + 2x^3 + 2x^4) \log(x^2)}{(16x - 36x^2 + 36x^3 - 15x^4 + 2x^5) \log(x^2)} dx$$

Optimal antiderivative

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

command

`Int[(32 - 72*x + 72*x^2 - 30*x^3 + 4*x^4 + (8*x - 20*x^2 + 2*x^3 + 2*x^4)*Log[x^2])/((16*x -`

`Rubi 4.17.3 under Mathematica 13.3.1 output`

$$\int \frac{32 - 72x + 72x^2 - 30x^3 + 4x^4 + (8x - 20x^2 + 2x^3 + 2x^4) \log(x^2)}{(16x - 36x^2 + 36x^3 - 15x^4 + 2x^5) \log(x^2)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\log(2x^2 - 3x + 2) + \log(\log(x^2)) + \log(2 - x) + 2\log(4 - x)$$

5.63 Problem number 4901

$$\int \frac{e^{16x} (6 - 12x^2 + e^{16x} (96x + 704x^2 + 192x^3))}{9 + 132x + 520x^2 + 264x^3 + 36x^4} dx$$

Optimal antiderivative

$$\frac{e^{16x}}{\frac{3}{2x} + 11 + 3x}$$

command

`Int[(E^E^(16*x))*(6 - 12*x^2 + E^(16*x)*(96*x + 704*x^2 + 192*x^3))]/(9 + 132*x + 520*x^2 + 264*x^3 + 36*x^4)`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{16x} (6 - 12x^2 + e^{16x} (96x + 704x^2 + 192x^3))}{9 + 132x + 520x^2 + 264x^3 + 36x^4} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{2e^{16x} (6x^3 + 22x^2 + 3x)}{36x^4 + 264x^3 + 520x^2 + 132x + 9}$$

5.64 Problem number 4910

$$\int \frac{e^x(-4 + 111x - 48x^2 - 125x^3 + 3x^4 + 111x^5 - 59x^6 + 9x^7) + \left(e^x(x + 3x^2 + 57x^3 + 113x^4 - 84x^5 - 57x^6 + 50x^7 - 9x^8 + (-1 - 3x - 57x^2 - \dots)\right)}{(x + 3x^2 + 57x^3 + 113x^4 - 84x^5 - 57x^6 + 50x^7 - 9x^8 + (-1 - 3x - 57x^2 - \dots))} dx$$

Optimal antiderivative

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

command

```
Int[(E^x*(-4 + 111*x - 48*x^2 - 125*x^3 + 3*x^4 + 111*x^5 - 59*x^6 + 9*x^7) + (E^x*(x + 3*x^2 + 57*x^3 + 113*x^4 - 84*x^5 - 57*x^6 + 50*x^7 - 9*x^8 + (-1 - 3*x - 57*x^2 - 113*x^3 + 84*x^4 + 57*x^5 - 50*x^6 + 9*x^7)*Log[(1 + x + 56*x^2 + 2*x^3 - 32*x^4 + 9*x^5)/(9 + 36*x + 18*x^2 - 36*x^3 + 9*x^4)])))/(x + Log[(1 + x + 56*x^2 + 2*x^3 - 32*x^4 + 9*x^5)/(9 + 36*x + 18*x^2 - 36*x^3 + 9*x^4)]^2), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{e^x}{\log\left(\log\left(\frac{9x^5 - 32x^4 + 2x^3 + 56x^2 + x + 1}{9(-x^2 + 2x + 1)^2}\right) - x\right)}$$

5.65 Problem number 4955

$$\int \frac{e^x(-7 + x + 9x^2 + x^3 - x^4) + e^x(7 - 9x - 2x^2 + x^3) \log(x)}{49x^2 - 14x^3 - 13x^4 + 2x^5 + x^6} dx$$

Optimal antiderivative

$$\frac{e^x(x - \ln(x))}{x(x + 8 - (1 + x)^2)}$$

command

```
Int[(E^x*(-7 + x + 9*x^2 + x^3 - x^4) + E^x*(7 - 9*x - 2*x^2 + x^3)*Log[x])/(49*x^2 - 14*x^3 - 13*x^4 + 2*x^5 + x^6), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^x(-7 + x + 9x^2 + x^3 - x^4) + e^x(7 - 9x - 2x^2 + x^3) \log(x)}{49x^2 - 14x^3 - 13x^4 + 2x^5 + x^6} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

output too large to display

5.66 Problem number 5082

$$\int \frac{(20 - 48x + 12x^2) \log^4(3) + (5x - 6x^2 + x^3) \log^4(3) \log(5) + (5x - 6x^2 + x^3) \log^4(3) \log(-5x + 6x^2 - x^3)}{(5x - 6x^2 + x^3) \log(5) + (5x - 6x^2 + x^3) \log(-5x + 6x^2 - x^3)} dx$$

Optimal antiderivative

$$(x + 4 \ln(\ln((-1 + x)x(5 - x)) + \ln(5))) \ln(3)^4$$

command

```
Int[((20 - 48*x + 12*x^2)*Log[3]^4 + (5*x - 6*x^2 + x^3)*Log[3]^4*Log[5] + (5*x - 6*x^2 + x^3)*Log[3]^4*Log[-5*x + 6*x^2 - x^3])/((5*x - 6*x^2 + x^3)*Log[5] + (5*x - 6*x^2 + x^3)*Log[-5*x + 6*x^2 - x^3])
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(20 - 48x + 12x^2) \log^4(3) + (5x - 6x^2 + x^3) \log^4(3) \log(5) + (5x - 6x^2 + x^3) \log^4(3) \log(-5x + 6x^2 - x^3)}{(5x - 6x^2 + x^3) \log(5) + (5x - 6x^2 + x^3) \log(-5x + 6x^2 - x^3)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$4 \log^4(3) \log(\log(-x(x^2 - 6x + 5)) + \log(5)) + x \log^4(3)$$

5.67 Problem number 5086

$$\int \frac{2 - 33x + 16x^2 - 2x^3 + (16x - 8x^2 + x^3) \log\left(3e^{\frac{-1 + (-8x + 2x^2) \log(x)}{-8x + 2x^2}} x\right)}{(16x - 8x^2 + x^3) \log^2\left(3e^{\frac{-1 + (-8x + 2x^2) \log(x)}{-8x + 2x^2}} x\right)} dx$$

Optimal antiderivative

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

command

```
Int[(2 - 33*x + 16*x^2 - 2*x^3 + (16*x - 8*x^2 + x^3)*Log[3*E^((-1 + (-8*x + 2*x^2)*Log[x])/(-8*x + 2*x^2))*x])/((16*x - 8*x^2 + x^3)*Log[3*E^((-1 + (-8*x + 2*x^2)*Log[x])/(-8*x + 2*x^2))])
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{2 - 33x + 16x^2 - 2x^3 + (16x - 8x^2 + x^3) \log\left(3 \exp\left(\frac{-1 + (-8x + 2x^2) \log(x)}{-8x + 2x^2}\right) x\right)}{(16x - 8x^2 + x^3) \log^2\left(3 \exp\left(\frac{-1 + (-8x + 2x^2) \log(x)}{-8x + 2x^2}\right) x\right)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.68 Problem number 5093

$$\int \frac{6x^4 + 24x^9 + 12x^3 \log^2(2)}{x^3 + 3x^4 + 3x^5 + x^6 - 3x^8 - 6x^9 - 3x^{10} + 3x^{13} + 3x^{14} - x^{18} + (3x^2 + 6x^3 + 3x^4 - 6x^7 - 6x^8 + 3x^{12}) \log^2(2) + \dots}$$

Optimal antiderivative

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

command

Int[(6*x^4 + 24*x^9 + 12*x^3*Log[2]^2)/(x^3 + 3*x^4 + 3*x^5 + x^6 - 3*x^8 - 6*x^9 - 3*x^10 +
Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{6x^4 + 24x^9 + 12x^3 \log^2(2)}{x^3 + 3x^4 + 3x^5 + x^6 - 3x^8 - 6x^9 - 3x^{10} + 3x^{13} + 3x^{14} - x^{18} + (3x^2 + 6x^3 + 3x^4 - 6x^7 - 6x^8 + 3x^{12}) \log^2(2) + \dots}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.69 Problem number 5293

$$\int \frac{e^{162-36x+2x^2}(-17x^2 + 180x^3 - 20x^4 + e^x(-24x + 350x^2 - 40x^3)) + e^{162-36x+2x^2}(3x^2 - 36x^3 + 4x^4 + e^x(4x - 125 + 75 \log(x) - 15 \log^2(x) + \log^3(x)))}{-125 + 75 \log(x) - 15 \log^2(x) + \log^3(x)}$$

Optimal antiderivative

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

command

Int[(E^(162 - 36*x + 2*x^2)*(-17*x^2 + 180*x^3 - 20*x^4 + E^x*(-24*x + 350*x^2 - 40*x^3)) + E
125 + 75*Log[x] - 15*Log[x]^2 + Log[x]^3),x]

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{162-36x+2x^2}(-17x^2 + 180x^3 - 20x^4 + e^x(-24x + 350x^2 - 40x^3)) + e^{162-36x+2x^2}(3x^2 - 36x^3 + 4x^4 + e^x(4x - 125 + 75 \log(x) - 15 \log^2(x) + \log^3(x)))}{-125 + 75 \log(x) - 15 \log^2(x) + \log^3(x)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{e^{2(9-x)^2} x^2 (-5x^2 + x^2 \log(x) + 45x - 9x \log(x))}{(9-x)(5-\log(x))^3} - \frac{2e^{2(9-x)^2+x} x (-20x^2 + 4x^2 \log(x) + 175x - 35x \log(x))}{(1-4(9-x))(5-\log(x))^3}$$

5.70 Problem number 5363

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

Optimal antiderivative

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

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.71 Problem number 5530

$$\int \frac{-5x + 25x^2 + 5e^4x^2 + 20x^3 + 45x^4 - 30x^5 - 10x^6 + 5x^7 + (35 + 5e^4 + 5x + 5x^2 - 5x^3 - 10x^4 + 5x^5) \log(7 + x)}{7x^2 + e^4x^2 + x^3 + x^4 - x^5 - 2x^6 + x^7}$$

Optimal antiderivative

$$5x - \frac{5 \ln\left(7 + x\left((-x^2 + x + 1)^2 - x\right) + e^4\right)}{x}$$

command

```
Int[(-5*x + 25*x^2 + 5*E^4*x^2 + 20*x^3 + 45*x^4 - 30*x^5 - 10*x^6 + 5*x^7 + (35 + 5*E^4 + 5*x + 5*x^2 - 5*x^3 - 10*x^4 + 5*x^5)*Log[7 + x])/(7*x^2 + E^4*x^2 + x^3 + x^4 - x^5 - 2*x^6 + x^7)]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-5x + 25x^2 + 5e^4x^2 + 20x^3 + 45x^4 - 30x^5 - 10x^6 + 5x^7 + (35 + 5e^4 + 5x + 5x^2 - 5x^3 - 10x^4 + 5x^5) \log(7 + x)}{7x^2 + e^4x^2 + x^3 + x^4 - x^5 - 2x^6 + x^7}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$5x - \frac{5 \log(x^5 - 2x^4 - x^3 + x^2 + x + e^4 + 7)}{x}$$

5.72 Problem number 5537

$$\int \frac{e^{-\frac{(2x+x^2)\log(4)+\log^2(3)\log^2(\log(x))}{2+x}} \left(e^{\frac{(2x+x^2)\log(4)+\log^2(3)\log^2(\log(x))}{2+x}} (4+4x+x^2)\log(x) + (-20x-20x^2-5x^3)\log(4)\log(x) \right)}{(4x+4x^2+x^3)\log(x)} dx$$

Optimal antiderivative

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

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\exp\left(-\frac{(2x+x^2)\log(4)+\log^2(3)\log^2(\log(x))}{2+x}\right) \left(\exp\left(\frac{(2x+x^2)\log(4)+\log^2(3)\log^2(\log(x))}{2+x}\right) (4+4x+x^2)\log(x) + (-20x-20x^2-5x^3)\log(4)\log(x) \right)}{(4x+4x^2+x^3)\log(x)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.73 Problem number 5747

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

Optimal antiderivative

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

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.74 Problem number 5776

$$\int \frac{e^{-4+x}(-4+4x) + (-36e^{-3+x} + 4x) \log^2(e^{3-x}(-9e^{-3+x} + x))}{(9e^{-7+2x} - e^{-4+x}x) \log^2(e^{3-x}(-9e^{-3+x} + x))} dx$$

Optimal antiderivative

$$4e^{-x+4} - \frac{4}{\ln(xe^{-x+3} - 9)}$$

command

```
Int[(E^(-4 + x)*(-4 + 4*x) + (-36*E^(-3 + x) + 4*x)*Log[E^(3 - x)*(-9*E^(-3 + x) + x)]^2)/((9
7 + 2*x) - E^(-4 + x)*x)*Log[E^(3 - x)*(-9*E^(-3 + x) + x)]^2),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{-4+x}(-4+4x) + (-36e^{-3+x} + 4x) \log^2(e^{3-x}(-9e^{-3+x} + x))}{(9e^{-7+2x} - e^{-4+x}x) \log^2(e^{3-x}(-9e^{-3+x} + x))} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$4e^{4-x} - \frac{4}{\log(e^{3-x}x - 9)}$$

5.75 Problem number 5802

$$\int \frac{e^{-\frac{2x^4}{625+1050x+641x^2+168x^3+16x^4}}(-750x^3 - 315x^4)}{15625 + 39375x + 40575x^2 + 21861x^3 + 6492x^4 + 1008x^5 + 64x^6} dx$$

Optimal antiderivative

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

command

```
Int[(-750*x^3 - 315*x^4)/(E^((2*x^4)/(625 + 1050*x + 641*x^2 + 168*x^3 + 16*x^4))*(15625 + 39
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{-\frac{2x^4}{625+1050x+641x^2+168x^3+16x^4}}(-750x^3 - 315x^4)}{15625 + 39375x + 40575x^2 + 21861x^3 + 6492x^4 + 1008x^5 + 64x^6} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{15}{4} e^{-\frac{2x^4}{(4x^2+21x+25)^2}}$$

5.76 Problem number 5873

$$\int -\frac{1350e^{\frac{13x^2+675\log(3)}{x^2}}\log(3)}{x^3 + e^{\frac{13x^2+675\log(3)}{x^2}}x^3} dx$$

Optimal antiderivative

$$\ln\left(e^{13+\frac{675\ln(3)}{x^2}} + 1\right)$$

command

`Int[(-1350*E^((13*x^2 + 675*Log[3])/x^2)*Log[3])/(x^3 + E^((13*x^2 + 675*Log[3])/x^2)*x^3),x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int -\frac{1350e^{\frac{13x^2+675\log(3)}{x^2}}\log(3)}{x^3 + e^{\frac{13x^2+675\log(3)}{x^2}}x^3} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log\left(e^{13}3^{\frac{675}{x^2}} + 1\right)$$

5.77 Problem number 5956

$$\int \frac{(8e^{10}x + 4x^2 + 14x^3 + 16x^4 + 8x^5 + e^5(2x + 16x^2 + 16x^3)) \log\left(\frac{1+e^5(4-x)+4x+3x^2-x^3}{e^5x+x^2+x^3}\right) + (-2x^2 - 10x^3 - 14x^4)}{e^{10}(-4+x) - x - 5x^2 - 7x^3 - 2x^4 + x^5 + 1} dx$$

Optimal antiderivative

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

command

`Int[((8*E^10*x + 4*x^2 + 14*x^3 + 16*x^4 + 8*x^5 + E^5*(2*x + 16*x^2 + 16*x^3))*Log[(1 + E^5*(2*x^2 - 10*x^3 - 14*x^4 - 4*x^5 + 2*x^6 + E^10*(-8*x + 2*x^2) + E^5*(-2*x - 16*x^2 - 12*x^3 + 4 + x) - x - 5*x^2 - 7*x^3 - 2*x^4 + x^5 + E^5*(-1 - 8*x - 6*x^2 + 2*x^3))],x]`

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.78 Problem number 5981

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

Optimal antiderivative

$$2 \ln\left(\frac{3 \ln\left(4(-e^x + 5 - e^4)^2 e^{-10}\right)}{x}\right)$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$2 \log\left(-\log\left((e^x - 5 + e^4)^2\right) + 10 - \log(4)\right) - 2 \log(x)$$

5.79 Problem number 6200

$$\int \frac{5x - 121x^2 + 324x^3 + e^4(-81 + 324x) + (-18x^2 + 72x^3 + e^4(-18 + 72x)) \log(-x + 4x^2) + (-x^2 + 4x^3 + e^4(-81x^2 + 324x^3 + (-18x^2 + 72x^3) \log(-x + 4x^2) + (-x^2 + 4x^3) \log^2(-x + 4x^2))}{-81x^2 + 324x^3 + (-18x^2 + 72x^3) \log(-x + 4x^2) + (-x^2 + 4x^3) \log^2(-x + 4x^2)}$$

Optimal antiderivative

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

command

```
Int[(5*x - 121*x^2 + 324*x^3 + E^4*(-81 + 324*x) + (-18*x^2 + 72*x^3 + E^4*(-18 + 72*x))*Log[x + 4*x^2] + (-x^2 + 4*x^3 + E^4*(-1 + 4*x))*Log[-x + 4*x^2]^2)/(-81*x^2 + 324*x^3 + (-18*x^2 + 72*x^3)*Log[-x + 4*x^2] + (-x^2 + 4*x^3)*Log[-x + 4*x^2]^2), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{5x - 121x^2 + 324x^3 + e^4(-81 + 324x) + (-18x^2 + 72x^3 + e^4(-18 + 72x)) \log(-x + 4x^2) + (-x^2 + 4x^3 + e^4(-81x^2 + 324x^3 + (-18x^2 + 72x^3) \log(-x + 4x^2) + (-x^2 + 4x^3) \log^2(-x + 4x^2))}{-81x^2 + 324x^3 + (-18x^2 + 72x^3) \log(-x + 4x^2) + (-x^2 + 4x^3) \log^2(-x + 4x^2)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$x - \frac{e^4}{x} + \frac{5}{\log(-((1 - 4x)x)) + 9}$$

5.80 Problem number 6410

$$\int \frac{6e^{2x}x^2 + e^x(2 + 8x - 8x^2 + 16x^3) + (-2e^{2x}x^2 + e^x(-2x + x^2 - 4x^3)) \log\left(\frac{2-x+2e^xx+4x^2}{2x}\right)}{2x - x^2 + 2e^xx^2 + 4x^3} dx$$

Optimal antiderivative

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

command

```
Int[(6*E^(2*x)*x^2 + E^x*(2 + 8*x - 8*x^2 + 16*x^3) + (-2*E^(2*x)*x^2 + E^x*(-2*x + x^2 - 4*x^3)) Log[(2-x+2e^xx+4x^2)/(2x)]]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{6e^{2x}x^2 + e^x(2 + 8x - 8x^2 + 16x^3) + (-2e^{2x}x^2 + e^x(-2x + x^2 - 4x^3)) \log\left(\frac{2-x+2e^xx+4x^2}{2x}\right)}{2x - x^2 + 2e^xx^2 + 4x^3} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.81 Problem number 6448

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

Optimal antiderivative

$$\ln\left(30\left(\frac{2}{2\ln(2) - x} + x^2\right) x\right)$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log(-x^3 + x^2 \log(4) + 2) + \log(x) - \log(x - \log(4))$$

5.82 Problem number 6466

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

Optimal antiderivative

$$\ln(\ln(2) + x)^2 e^{-\frac{2x^2}{e^{e^{x^2}} + x} + 10} - 5$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.83 Problem number 6472

$$\int \frac{e^{-4+2x} (1 + 8x + e^{-4+2x} (10 - 2x - 8x^2))}{25 - 10x - 39x^2 + 8x^3 + 16x^4} dx$$

Optimal antiderivative

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

command

```
Int[(E^E^(-4 + 2*x))*(1 + 8*x + E^(-4 + 2*x)*(10 - 2*x - 8*x^2))]/(25 - 10*x - 39*x^2 + 8*x^4)
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{-4+2x} (1 + 8x + e^{-4+2x} (10 - 2x - 8x^2))}{25 - 10x - 39x^2 + 8x^3 + 16x^4} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{e^{2x-4} (-4x^2 - x + 5)}{16x^4 + 8x^3 - 39x^2 - 10x + 25}$$

5.84 Problem number 6474

$$\int \frac{e^{32-x} (e^x (2 - 9x) + e^4 (-2 + x)) x}{(-3e^4 + 3e^x) (e^8 + e^{2x} - 2e^{4+x})^4} dx$$

Optimal antiderivative

$$\frac{x^2 e^{-x}}{3 (e^{x-4} - 1)^8}$$

command

`Int[(E^(32 - x)*(E^x*(2 - 9*x) + E^4*(-2 + x))*x)/((-3*E^4 + 3*E^x)*(E^8 + E^(2*x) - 2*E^(4 +`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{32-x} (e^x (2 - 9x) + e^4 (-2 + x)) x}{(-3e^4 + 3e^x) (e^8 + e^{2x} - 2e^{4+x})^4} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & \frac{1}{3} e^{-x} x^2 + \frac{x^2}{3(e^4 - e^x)} + \frac{e^4 x^2}{3(e^4 - e^x)^2} + \frac{e^8 x^2}{3(e^4 - e^x)^3} + \frac{e^{12} x^2}{3(e^4 - e^x)^4} \\ & + \frac{e^{16} x^2}{3(e^4 - e^x)^5} + \frac{e^{20} x^2}{3(e^4 - e^x)^6} + \frac{e^{24} x^2}{3(e^4 - e^x)^7} + \frac{e^{28} x^2}{3(e^4 - e^x)^8} \end{aligned}$$

5.85 Problem number 6603

$$\int \frac{e^{\frac{45 + (25x^2 + 10x^3 + x^4) \log\left(\frac{19+x}{3}\right)}{x^2 \log\left(\frac{19+x}{3}\right)}} (-45x + (-1710 - 90x) \log\left(\frac{19+x}{3}\right) + (190x^3 + 48x^4 + 2x^5) \log^2\left(\frac{19+x}{3}\right))}{(19x^3 + x^4) \log^2\left(\frac{19+x}{3}\right)} dx$$

Optimal antiderivative

$$e^{(5+x)^2 + \frac{45}{x^2 \ln\left(\frac{x}{3} + \frac{19}{3}\right)}}$$

command

`Int[(E^((45 + (25*x^2 + 10*x^3 + x^4)*Log[(19 + x)/3]))/(x^2*Log[(19 + x)/3]))*(-45*x + (-1710 - 90*x)*Log[(19 + x)/3] + (190*x^3 + 48*x^4 + 2*x^5)*Log[(19 + x)/3]^2))/((19*x^3 + x^4)`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{\exp\left(\frac{45 + (25x^2 + 10x^3 + x^4) \log\left(\frac{19+x}{3}\right)}{x^2 \log\left(\frac{19+x}{3}\right)}\right) (-45x + (-1710 - 90x) \log\left(\frac{19+x}{3}\right) + (190x^3 + 48x^4 + 2x^5) \log^2\left(\frac{19+x}{3}\right))}{(19x^3 + x^4) \log^2\left(\frac{19+x}{3}\right)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{\frac{45}{x^2 \log\left(\frac{x+19}{3}\right)} + (x+5)^2}$$

5.86 Problem number 6684

$$\int \frac{(-6 - 60x + 24x^2 + e^x(-12x - 12x^2)) \log^2(x) + ((2 + 20x - 8x^2 + e^x(4x + 4x^2)) \log(x) + ((60x + 12e^x x - 1$$

Optimal antiderivative

$$1 + \left(3 - \frac{\ln(\ln((10 + 2e^x - 2x)x + \ln(x)))}{\ln(x)}\right)^2$$

command

`Int[((-6 - 60*x + 24*x^2 + E^x*(-12*x - 12*x^2))*Log[x]^2 + ((2 + 20*x - 8*x^2 + E^x*(4*x + 4*20*x - 4*E^x*x + 4*x^2 - 2*Log[x])*Log[10*x + 2*E^x*x - 2*x^2 + Log[x]])*Log[Log[10*x + 2*E^x*x`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(-6 - 60x + 24x^2 + e^x(-12x - 12x^2)) \log^2(x) + ((2 + 20x - 8x^2 + e^x(4x + 4x^2)) \log(x) + ((60x + 12e^x x - 1$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{\log^2(\log(2(-x + e^x + 5)x + \log(x)))}{\log^2(x)} - \frac{6 \log(\log(2(-x + e^x + 5)x + \log(x)))}{\log(x)}$$

5.87 Problem number 6810

$$\int \frac{-20 - 160x - 315x^2 - 195x^3 - 25x^4 + e^4(96 + 256x + 190x^2 + 25x^3) + (-20x - 45x^2 - 25x^3 + e^4(16 + 40x + 25x^2))}{-100x - 245x^2 - 170x^3 - 25x^4 + e^4(80 + 216x + 165x^2 + 25x^3) + (-20x - 45x^2 - 25x^3 + e^4(16 + 40x + 25x^2))} dx$$

Optimal antiderivative

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

command

```
Int[(-20 - 160*x - 315*x^2 - 195*x^3 - 25*x^4 + E^4*(96 + 256*x + 190*x^2 + 25*x^3) + (-20*x - 45*x^2 - 25*x^3 + E^4*(16 + 40*x + 25*x^2))*Log[(E^4*(-4 - 5*x) + 5*x + 5*x^2)/(4 + 5*x)] - (-100*x - 245*x^2 - 170*x^3 - 25*x^4 + E^4*(80 + 216*x + 165*x^2 + 25*x^3) + (-20*x - 45*x^2 - 25*x^3 + E^4*(16 + 40*x + 25*x^2)))]/x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-20 - 160x - 315x^2 - 195x^3 - 25x^4 + e^4(96 + 256x + 190x^2 + 25x^3) + (-20x - 45x^2 - 25x^3 + e^4(16 + 40x + 25x^2))}{-100x - 245x^2 - 170x^3 - 25x^4 + e^4(80 + 216x + 165x^2 + 25x^3) + (-20x - 45x^2 - 25x^3 + e^4(16 + 40x + 25x^2))} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.88 Problem number 6966

$$\int \frac{6x + 3x^2 + e^4(6x + 3x^2) + (6x + 3x^2) \log(3) + (-170 - 414x - 241x^2 - 53x^3 - 4x^4 + e^4(-170 - 244x - 82x^2 - 8x^3))}{(170x + 159x^2 + 45x^3 + 4x^4) \log\left(\frac{17+4x}{5+x}\right)} dx$$

Optimal antiderivative

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

command

```
Int[(6*x + 3*x^2 + E^4*(6*x + 3*x^2) + (6*x + 3*x^2)*Log[3] + (-170 - 414*x - 241*x^2 - 53*x^3 - 4*x^4 + E^4*(-170 - 244*x - 82*x^2 - 8*x^3))]/((170*x + 159*x^2 + 45*x^3 + 4*x^4)*Log[(17 + 4*x)/(5 + x)])]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{6x + 3x^2 + e^4(6x + 3x^2) + (6x + 3x^2) \log(3) + (-170 - 414x - 241x^2 - 53x^3 - 4x^4 + e^4(-170 - 244x - 82x^2))}{(170x + 159x^2 + 45x^3 + 4x^4) \log\left(\frac{17+4x}{5+x}\right)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-x - \frac{1}{2}(2 + 2e^4 + \log(9)) \log(x) - \frac{1}{2}(2 + 2e^4 + \log(9)) \log(x + 2) \\ + (1 + e^4 + \log(3)) \log\left(\log\left(\frac{4x + 17}{x + 5}\right)\right)$$

5.89 Problem number 7014

$$\int \frac{-25 + 20x^2 + (5x - 4x^3) \log(5) + (20x^2 - 4x^3 \log(5)) \log^2(x) + (-5 + x \log(5)) \log\left(\frac{5-x \log(5)}{\log(5)}\right) + \log(x) (-25 - 20x^2 + (4x + 4x^3) \log(5) + (-5 + x \log(5)) \log\left(\frac{5-x \log(5)}{\log(5)}\right))}{(60x^2 - 20e^3x^2 + 20x^3 + (-12x^3 + 4e^3x^3 - 4x^4) \log(5)) \log^2(x) + \log(x) (25x - 20x^3 + (-5x^2 + 4x^4) \log(5))}$$

Optimal antiderivative

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

command

```
Int[(-25 + 20*x^2 + (5*x - 4*x^3)*Log[5] + (20*x^2 - 4*x^3*Log[5])*Log[x]^2 + (-5 + x*Log[5])
25 - 20*x^2 + (4*x + 4*x^3)*Log[5] + (-5 + x*Log[5])*Log[(5 - x*Log[5])/Log[5]])/((60*x^2 -
12*x^3 + 4*E^3*x^3 - 4*x^4)*Log[5])*Log[x]^2 + Log[x]*(25*x - 20*x^3 + (-5*x^2 + 4*x^4)*Log[5]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-25 + 20x^2 + (5x - 4x^3) \log(5) + (20x^2 - 4x^3 \log(5)) \log^2(x) + (-5 + x \log(5)) \log\left(\frac{5-x \log(5)}{\log(5)}\right) + \log(x) (-25 - 20x^2 + (4x + 4x^3) \log(5) + (-5 + x \log(5)) \log\left(\frac{5-x \log(5)}{\log(5)}\right))}{(60x^2 - 20e^3x^2 + 20x^3 + (-12x^3 + 4e^3x^3 - 4x^4) \log(5)) \log^2(x) + \log(x) (25x - 20x^3 + (-5x^2 + 4x^4) \log(5))}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.90 Problem number 7016

$$\int \frac{(-864 - 288x^2 - 336x^4 + 256x^6 + 64x^8 + 16x^{10}) \log\left(\frac{9+6x^2+2x^4+x^6}{6x+2x^3+x^5}\right)}{54x + 54x^3 + 33x^5 + 16x^7 + 4x^9 + x^{11} + (216x + 216x^3 + 132x^5 + 64x^7 + 16x^9 + 4x^{11}) \log^2\left(\frac{9+6x^2+2x^4+x^6}{6x+2x^3+x^5}\right)} dx$$

Optimal antiderivative

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

command

`Int[(-864 - 288*x^2 - 336*x^4 + 256*x^6 + 64*x^8 + 16*x^10)*Log[(9 + 6*x^2 + 2*x^4 + x^6)/(6`

`Rubi 4.17.3 under Mathematica 13.3.1 output`

$$\int \frac{(-864 - 288x^2 - 336x^4 + 256x^6 + 64x^8 + 16x^{10}) \log\left(\frac{9+6x^2+2x^4+x^6}{6x+2x^3+x^5}\right)}{54x + 54x^3 + 33x^5 + 16x^7 + 4x^9 + x^{11} + (216x + 216x^3 + 132x^5 + 64x^7 + 16x^9 + 4x^{11}) \log^2\left(\frac{9+6x^2+2x^4+x^6}{6x+2x^3+x^5}\right)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$2 \log\left(4 \log^2\left(\frac{x^6 + 2x^4 + 6x^2 + 9}{x^5 + 2x^3 + 6x}\right) + 1\right)$$

5.91 Problem number 7133

$$\int \frac{24x^2 + 8x^4 - 2x^6}{48 + 96x^2 + 24x^3 + 72x^4 + 24x^5 + 27x^6 + 6x^7 + 3x^8} dx$$

Optimal antiderivative

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

command

`Int[(24*x^2 + 8*x^4 - 2*x^6)/(48 + 96*x^2 + 24*x^3 + 72*x^4 + 24*x^5 + 27*x^6 + 6*x^7 + 3*x^8`

`Rubi 4.17.3 under Mathematica 13.3.1 output`

$$\int \frac{24x^2 + 8x^4 - 2x^6}{48 + 96x^2 + 24x^3 + 72x^4 + 24x^5 + 27x^6 + 6x^7 + 3x^8} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{2x^3}{3(x^4 + x^3 + 4x^2 + 4)}$$

5.92 Problem number 7186

$$\int \frac{300 - 120x^2 + 12x^4 + 2^{-\frac{x}{-5+x^2}} (-75 + 150x - 45x^2 - 60x^3 + 27x^4 + 6x^5 - 3x^6 + (-15x + 30x^2 - 18x^3 + 6x^4 - 15x^5 + 30x^6 - 18x^7 + 6x^8))}{100 - 200x + 60x^2 + 80x^3 - 36x^4 - 8x^5 + 4x^6}$$

Optimal antiderivative

$$18 - \frac{3x}{x^2 - x} - \frac{3x e^{\frac{\ln(2)}{x-x^2}}}{4}$$

command

```
Int[(300 - 120*x^2 + 12*x^4 + (-75 + 150*x - 45*x^2 - 60*x^3 + 27*x^4 + 6*x^5 - 3*x^6 + (-15*x + 30*x^2 - 18*x^3 + 6*x^4 - 3*x^5)*Log[2])/2^(x/(-5 + x^2)))/(100 - 200*x + 60*x^2 + 80*x^3 - 36*x^4 - 8*x^5 + 4*x^6)]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{300 - 120x^2 + 12x^4 + 2^{-\frac{x}{-5+x^2}} (-75 + 150x - 45x^2 - 60x^3 + 27x^4 + 6x^5 - 3x^6 + (-15x + 30x^2 - 18x^3 + 6x^4 - 15x^5 + 30x^6 - 18x^7 + 6x^8))}{100 - 200x + 60x^2 + 80x^3 - 36x^4 - 8x^5 + 4x^6}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & -\frac{15(x+5)}{8(1-x)(5-x^2)} - \frac{15(3x+5)}{16(5-x^2)} - \frac{3 \cdot 2^{\frac{x}{5-x^2}-2} (x^3 \log(2) + x \log(32))}{(5-x^2)^2 \left(\frac{2x^2}{(5-x^2)^2} + \frac{1}{5-x^2} \right) \log(2)} + \frac{93}{16(1-x)} \\ & - \frac{3}{32} (25 + 13\sqrt{5}) \log(\sqrt{5}-x) + \frac{3}{16} (15 + 7\sqrt{5}) \log(\sqrt{5}-x) - \frac{3}{32} (5 + \sqrt{5}) \log(\sqrt{5}-x) \\ & - \frac{3}{32} (5 - \sqrt{5}) \log(x + \sqrt{5}) + \frac{3}{16} (15 - 7\sqrt{5}) \log(x + \sqrt{5}) - \frac{3}{32} (25 - 13\sqrt{5}) \log(x + \sqrt{5}) \end{aligned}$$

5.93 Problem number 7215

$$\int \frac{10 + 13x + 7x^2 + e(-10 - 8x + 2x^2 - 2x^3) + (-2 - 3x - 2x^2 + e(2 + 2x)) \log(4) + (7x + 4x^2 + x^3 + e(-2x - 2x^2 - 4x^3)) \log(4) - x \log(4) \log(2x)}{200x - 80x^2 - 72x^3 + 16x^4 + 8x^5 + (-80x + 16x^2 + 16x^3) \log(4) + 8x \log^2(4)}$$

Optimal antiderivative

$$\frac{(\ln(2x) + x) \left(\frac{e}{4} - \frac{1}{4} - \frac{x}{8} \right)}{x^2 + 2 \ln(2) + x - 5}$$

command

```
Int[(10 + 13*x + 7*x^2 + E*(-10 - 8*x + 2*x^2 - 2*x^3) + (-2 - 3*x - 2*x^2 + E*(2 + 2*x))*Log[2*x - 4*x^2] - x*Log[4])*Log[2*x]]/(200*x - 80*x^2 - 72*x^3 + 16*x^4 + 8*x^5 + (-80*x + 16*x^2 + 16*x^3)*Log[4] + 8*x*Log[4]^2)
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{10 + 13x + 7x^2 + e(-10 - 8x + 2x^2 - 2x^3) + (-2 - 3x - 2x^2 + e(2 + 2x)) \log(4) + (7x + 4x^2 + x^3 + e(-2x - 2x^2 - 4x^3)) \log(4) - x \log(4) \log(2x)}{200x - 80x^2 - 72x^3 + 16x^4 + 8x^5 + (-80x + 16x^2 + 16x^3) \log(4) + 8x \log^2(4)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

output too large to display

5.94 Problem number 7263

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

Optimal antiderivative

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

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

\$Aborted

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.95 Problem number 7336

$$\int \frac{e^4(4x^4 - 4x^5 + x^6) + e^{\frac{2x^2}{-2+x}}(-512x^3 + 128x^4 + e^4(-512 + 384x^2 - 128x^3)) + \left(e^{\frac{2x^2}{-2+x}}(-512x^2 + 128x^3) \right)}{e^4(4x^4 - 4x^5 + x^6) + e^4(12x^3 - 12x^4 + 3x^5) \log(x) + e^4(12x^2 - 12x^3 + 3x^4)}$$

Optimal antiderivative

$$\frac{64 e^{\frac{2x^2}{-2+x}}}{(x + \ln(x))^2} - 3 + x$$

command

$\text{Int}[(E^{4*(4*x^4 - 4*x^5 + x^6)} + E^{((2*x^2)/(E^4*(-2 + x)))})*(-512*x^3 + 128*x^4 + E^4*(-512 + 384*x^2 - 128*x^3)) + (E^{((2*x^2)/(E^4*(-2 + x)))})*(-512*x^2 + 128*x^3) + E^4*(12*x^3 -$

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^4(4x^4 - 4x^5 + x^6) + e^{\frac{2x^2}{e^4(-2+x)}}(-512x^3 + 128x^4 + e^4(-512 + 384x^2 - 128x^3)) + \left(e^{\frac{2x^2}{e^4(-2+x)}}(-512x^2 + 128x^3)\right)}{e^4(4x^4 - 4x^5 + x^6) + e^4(12x^3 - 12x^4 + 3x^5)\log(x) + e^4(12x^2 -$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{64e^{-\frac{2x^2}{e^4(2-x)}} - 4((4-x)x^3 + (4-x)x^2\log(x))}{(2-x)^2\left(\frac{x^2}{e^4(2-x)^2} + \frac{2x}{e^4(2-x)}\right)}x(x + \log(x))^3 + x$$

5.96 Problem number 7576

$$\int \frac{-4x + 8x^2 + 20x^3 + (-3x - 5x^2)\log(\log(2)) + (-8x - 16x^2 + (2 + 4x)\log(\log(2)))\log\left(\frac{1}{4}(4x - \log(\log(2)))\right)}{4x^3 + 4x^4 + (-x^2 - x^3)\log(\log(2)) + (-4x^2 - 4x^3 + (x + x^2)\log(\log(2)))\log\left(\frac{1}{4}(4x - \log(\log(2)))\right)}$$

Optimal antiderivative

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

command

$\text{Int}[(-4*x + 8*x^2 + 20*x^3 + (-3*x - 5*x^2)*\text{Log}[\text{Log}[2]]) + (-8*x - 16*x^2 + (2 + 4*x)*\text{Log}[\text{Log}[2]])*\text{Log}[\text{Log}[2]] + (-4*x^2 - 4*x^3 + (x + x^2)*\text{Log}[\text{Log}[2]])*\text{Log}[(4*x - \text{Log}[\text{Log}[2]])/4]]]$

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-4x + 8x^2 + 20x^3 + (-3x - 5x^2)\log(\log(2)) + (-8x - 16x^2 + (2 + 4x)\log(\log(2)))\log\left(\frac{1}{4}(4x - \log(\log(2)))\right)}{4x^3 + 4x^4 + (-x^2 - x^3)\log(\log(2)) + (-4x^2 - 4x^3 + (x + x^2)\log(\log(2)))\log\left(\frac{1}{4}(4x - \log(\log(2)))\right)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.97 Problem number 7585

$$\int \frac{81 + 216x + 90x^2 - 108x^3 - 39x^4 + 12x^5 + 4x^6 + e^2(9 + 18x - 3x^2 - 12x^3 + 4x^4) + e(-54 - 126x - 18x^2 + 78x^3 - 8x^4 + 12x^5 + 4x^6) + e^2(9x + 18x^2 - 3x^3 - 12x^4 + 4x^5) + e(-54x - 126x^2 - 18x^3 + 78x^4 - 8x^5)}{(81x + 216x^2 + 90x^3 - 108x^4 - 39x^5 + 12x^6 + 4x^7 + e^2(9x + 18x^2 - 3x^3 - 12x^4 + 4x^5) + e(-54x - 126x^2 - 18x^3 + 78x^4 - 8x^5)) \cdot \text{Log}[x]} dx$$

Optimal antiderivative

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

command

```
Int[(81 + 216*x + 90*x^2 - 108*x^3 - 39*x^4 + 12*x^5 + 4*x^6 + E^2*(9 + 18*x - 3*x^2 - 12*x^3 + 4*x^4) + e*(-54 - 126*x - 18*x^2 + 78*x^3 - 8*x^4 + 12*x^5 + 4*x^6) + e^2*(9*x + 18*x^2 - 3*x^3 - 12*x^4 + 4*x^5) + e*(-54*x - 126*x^2 - 18*x^3 + 78*x^4 - 8*x^5))*Log[x]]/(81*x + 216*x^2 + 90*x^3 - 108*x^4 - 39*x^5 + 12*x^6 + 4*x^7 + e^2*(9*x + 18*x^2 - 3*x^3 - 12*x^4 + 4*x^5) + e*(-54*x - 126*x^2 - 18*x^3 + 78*x^4 - 8*x^5))*Log[x]],x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{81 + 216x + 90x^2 - 108x^3 - 39x^4 + 12x^5 + 4x^6 + e^2(9 + 18x - 3x^2 - 12x^3 + 4x^4) + e(-54 - 126x - 18x^2 + 78x^3 - 8x^4 + 12x^5 + 4x^6) + e^2(9x + 18x^2 - 3x^3 - 12x^4 + 4x^5) + e(-54x - 126x^2 - 18x^3 + 78x^4 - 8x^5)}{(81x + 216x^2 + 90x^3 - 108x^4 - 39x^5 + 12x^6 + 4x^7 + e^2(9x + 18x^2 - 3x^3 - 12x^4 + 4x^5) + e(-54x - 126x^2 - 18x^3 + 78x^4 - 8x^5)) \cdot \text{Log}[x]} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.98 Problem number 7592

$$\int \frac{e^4(4 - 4x + 9x^2 - 9x^3) + (36x^3 - 36x^2 \log(x)) \log(48 + 108x^2) + (4 - 4x + 9x^2 - 9x^3) \log(x) + e^4(-4x^2 - 9x^4) + e^4(4x + 9x^3) \log(x) + (-4x^2 - 9x^4 + e^4(8x + 18x^3) + (4x + 9x^3) \log(x)) \log(x)}{e^8(4x + 9x^3) + e^4(-4x^2 - 9x^4) + e^4(4x + 9x^3) \log(x) + (-4x^2 - 9x^4 + e^4(8x + 18x^3) + (4x + 9x^3) \log(x)) \log(x)} dx$$

Optimal antiderivative

$$\ln\left(\frac{x - \ln(x)}{\ln(108x^2 + 48)^2 + e^4} - 1\right)$$

command

```
Int[(E^4*(4 - 4*x + 9*x^2 - 9*x^3) + (36*x^3 - 36*x^2*Log[x])*Log[48 + 108*x^2] + (4 - 4*x + 9*x^2 - 9*x^3)*Log[x] + E^4*(-4*x^2 - 9*x^4) + E^4*(4*x + 9*x^3)*Log[x] + (-4*x^2 - 9*x^4 + E^4*(8*x + 18*x^3) + (4*x + 9*x^3)*Log[x]))*Log[x]]/(e^8*(4*x + 9*x^3) + e^4*(-4*x^2 - 9*x^4) + e^4*(4*x + 9*x^3)*Log[x] + (-4*x^2 - 9*x^4 + e^4*(8*x + 18*x^3) + (4*x + 9*x^3)*Log[x]))*Log[x]],x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^4(4 - 4x + 9x^2 - 9x^3) + (36x^3 - 36x^2 \log(x)) \log(48 + 108x^2) + (4 - 4x + 9x^2 - 9x^3) \log(x) + e^4(-4x^2 - 9x^4) + e^4(4x + 9x^3) \log(x) + (-4x^2 - 9x^4 + e^4(8x + 18x^3) + (4x + 9x^3) \log(x)) \log(x)}{e^8(4x + 9x^3) + e^4(-4x^2 - 9x^4) + e^4(4x + 9x^3) \log(x) + (-4x^2 - 9x^4 + e^4(8x + 18x^3) + (4x + 9x^3) \log(x)) \log(x)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log(\log^2(12(9x^2 + 4)) - x + \log(x) + e^4) - \log(\log^2(12(9x^2 + 4)) + e^4)$$

5.99 Problem number 7792

$$\int \frac{-6e^x + e^x(-11 + 3x) \log(121 - 66x + 9x^2)}{e^{25}(-11 + 3x) \log^2(121 - 66x + 9x^2)} dx$$

Optimal antiderivative

$$\frac{e^x e^{-25}}{\ln((11 - 3x)^2)}$$

command

`Int[(-6*E^x + E^x*(-11 + 3*x))*Log[121 - 66*x + 9*x^2]]/(E^25*(-11 + 3*x))*Log[121 - 66*x + 9*x`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-6e^x + e^x(-11 + 3x) \log(121 - 66x + 9x^2)}{e^{25}(-11 + 3x) \log^2(121 - 66x + 9x^2)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{e^{x-25}}{\log((11 - 3x)^2)}$$

5.100 Problem number 8462

$$\int \frac{256 + 16x^4 + 32x^5 + x^9 + x^{10} + (256 + 80x^4 + 32x^5 + x^{10}) \log(x)}{(256x + 16x^5 + 32x^6 + x^{10} + x^{11}) \log(x)} dx$$

Optimal antiderivative

$$\ln\left(\frac{x}{x + \frac{16}{x^4}} + x\right) + \ln(\ln(x))$$

command

`Int[(256 + 16*x^4 + 32*x^5 + x^9 + x^10 + (256 + 80*x^4 + 32*x^5 + x^10))*Log[x]]/((256*x + 16`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{256 + 16x^4 + 32x^5 + x^9 + x^{10} + (256 + 80x^4 + 32x^5 + x^{10}) \log(x)}{(256x + 16x^5 + 32x^6 + x^{10} + x^{11}) \log(x)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\log(x^5 + 16) + \log(x^4 - x^3 + 2x^2 - 4x + 8) + \log(x) + \log(x + 2) + \log(\log(x))$$

5.101 Problem number 8574

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

Optimal antiderivative

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

command

```
Int[(3 + 2*x - 36*x^3 - 12*x^4 + E^4*(-1 + 12*x^3) + (-36*x^3 + 12*E^4*x^3 - 12*x^4)*Log[3*x
9*x^3 + 3*E^4*x^3 - 3*x^4])*Log[3*x - E^4*x + x^2]^2)/(-12*x + 4*E^4*x - 4*x^2 + (-
12*x + 4*E^4*x - 4*x^2)*Log[3*x - E^4*x + x^2] + (-3*x + E^4*x - x^2)*Log[3*x - E^4*x + x^2]^2]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.102 Problem number 8591

$$\int \frac{20x^2 + 24x^3 + 9x^4 + x^5 + (12 + 20x + 221x^2 + 208x^3 + 71x^4 + 8x^5) \log(x) + (60x^2 + 76x^3 + 31x^4 + 4x^5) \log^2(x)}{(4 + 4x + x^2) \log(x)}$$

Optimal antiderivative

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

command

```
Int[(20*x^2 + 24*x^3 + 9*x^4 + x^5 + (12 + 20*x + 221*x^2 + 208*x^3 + 71*x^4 + 8*x^5)*Log[x]
+ (60*x^2 + 76*x^3 + 31*x^4 + 4*x^5)*Log[x]^2)/(4 + 4*x + x^2)*Log[x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{20x^2 + 24x^3 + 9x^4 + x^5 + (12 + 20x + 221x^2 + 208x^3 + 71x^4 + 8x^5) \log(x) + (60x^2 + 76x^3 + 31x^4 + 4x^5) \log^2(x)}{(4 + 4x + x^2) \log(x)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$2x^4 + x^4 \log(\log(x)) + 13x^3 + 5x^3 \log(\log(x)) + 10x^2 - 15x - \frac{72}{x + 2}$$

5.103 Problem number 8595

$$\int \frac{98 - 28x + 30x^2 - 4x^3 + 2x^4 + 294x^5 - 84x^6 + 90x^7 - 12x^8 + 6x^9 + e^{\frac{1}{7-x+x^2}}(-1+2x)}{49 - 14x + 15x^2 - 2x^3 + x^4} dx$$

Optimal antiderivative

$$2 + 2x + x^6 - e^{\frac{1}{x^2-x+7}}$$

command

```
Int[(98 - 28*x + 30*x^2 - 4*x^3 + 2*x^4 + 294*x^5 - 84*x^6 + 90*x^7 - 12*x^8 + 6*x^9 + E^(7 - 1)*(-1 + 2*x))/(49 - 14*x + 15*x^2 - 2*x^3 + x^4),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{98 - 28x + 30x^2 - 4x^3 + 2x^4 + 294x^5 - 84x^6 + 90x^7 - 12x^8 + 6x^9 + e^{\frac{1}{7-x+x^2}}(-1+2x)}{49 - 14x + 15x^2 - 2x^3 + x^4} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$x^6 - e^{\frac{1}{x^2-x+7}} + 2x$$

5.104 Problem number 8689

$$\int \frac{1 - 676x - e^{2e^2}x - 104x^2 - 315x^3 - 16x^4 - 20x^5 + e^{e^2}(-52x - 4x^2 - 12x^3)}{-676x^2 - e^{2e^2}x^2 - 52x^3 - 105x^4 - 4x^5 - 4x^6 + e^{e^2}(-52x^2 - 2x^3 - 4x^4) + x \log(x)} dx$$

Optimal antiderivative

$$\ln\left(\ln(x) - x\left(2x^2 + 26 + x + e^{e^2}\right)^2\right)$$

command

```
Int[(1 - 676*x - E^(2*E^2)*x - 104*x^2 - 315*x^3 - 16*x^4 - 20*x^5 + E^E^2*(-52*x - 4*x^2 - 12*x^3) - 676*x^2 - E^(2*E^2)*x^2 - 52*x^3 - 105*x^4 - 4*x^5 - 4*x^6 + E^E^2*(-52*x^2 - 2*x^3 - 4*x^4) + x*log(x))]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{1 - 676x - e^{2e^2}x - 104x^2 - 315x^3 - 16x^4 - 20x^5 + e^{e^2}(-52x - 4x^2 - 12x^3)}{-676x^2 - e^{2e^2}x^2 - 52x^3 - 105x^4 - 4x^5 - 4x^6 + e^{e^2}(-52x^2 - 2x^3 - 4x^4) + x \log(x)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log\left(x\left(2x^2 + x + e^{e^2} + 26\right)^2 - \log(x)\right)$$

5.105 Problem number 8809

$$\int \frac{(32 + 32x - 32x^2 - 32x^3) \log^3(1+x) + (-6x^5 - 6x^7) \log^3\left(\frac{1+x^2}{x}\right) + (30x^3 + 12x^4 + 42x^5 + 12x^6 + 12x^7) \log^3\left(\frac{1+x^2}{x}\right)}{(x+x^2+x^3+x^4) \log^3(1+x) \log^3\left(\frac{1+x^2}{x}\right)} dx$$

Optimal antiderivative

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

command

```
Int[((32 + 32*x - 32*x^2 - 32*x^3)*Log[1 + x]^3 + (-6*x^5 - 6*x^7)*Log[(1 + x^2)/x]^3 + (30*x^3 + 12*x^4 + 42*x^5 + 12*x^6 + 12*x^7)*Log[(1 + x^2)/x]^3)/((x + x^2 + x^3 + x^4)*Log[1 + x]^3*Log[(1 + x^2)/x]^3), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(32 + 32x - 32x^2 - 32x^3) \log^3(1+x) + (-6x^5 - 6x^7) \log^3\left(\frac{1+x^2}{x}\right) + (30x^3 + 12x^4 + 42x^5 + 12x^6 + 12x^7) \log^3\left(\frac{1+x^2}{x}\right)}{(x+x^2+x^3+x^4) \log^3(1+x) \log^3\left(\frac{1+x^2}{x}\right)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & -\frac{12x^3(x+1)}{\log(x+1)} + \frac{16}{\log^2\left(\frac{x^2+1}{x}\right)} + \frac{3(x+1)^4}{\log^2(x+1)} - \frac{12(x+1)^3}{\log^2(x+1)} + \frac{18(x+1)^2}{\log^2(x+1)} - \frac{12(x+1)}{\log^2(x+1)} \\ & + \frac{3}{\log^2(x+1)} + \frac{12(x+1)^4}{\log(x+1)} - \frac{36(x+1)^3}{\log(x+1)} + \frac{36(x+1)^2}{\log(x+1)} - \frac{30x(x+1)}{\log(x+1)} + \frac{18(x+1)}{\log(x+1)} - \frac{30}{\log(x+1)} \end{aligned}$$

5.106 Problem number 8936

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

Optimal antiderivative

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

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.107 Problem number 8945

$$\int \frac{e^{-e^{\frac{80+e^x+36x+24x^2+4x^3}{16+4x+4x^2}}} \left(64 + 32x + 36x^2 + 8x^3 + 4x^4 + e^{\frac{80+e^x+36x+24x^2+4x^3}{16+4x+4x^2}} (-64x - 32x^2 - 36x^3 - 8x^4 - 4x^5 + e^{\frac{80+e^x+36x+24x^2+4x^3}{16+4x+4x^2}}) \right)}{16 + 8x + 9x^2 + 2x^3 + x^4} dx$$

Optimal antiderivative

$$3 + 4x e^{-e^{x + \frac{e^x}{4x^2 + 4x + 16} + 5}}$$

command

```
Int[(64 + 32*x + 36*x^2 + 8*x^3 + 4*x^4 + E^((80 + E^x + 36*x + 24*x^2 + 4*x^3)/(16 + 4*x + 4*
64*x - 32*x^2 - 36*x^3 - 8*x^4 - 4*x^5 + E^x*(-3*x + x^2 - x^3)))/(E^E^((80 + E^x + 36*x + 24*x^2 + 4*x^3)/(16 + 4*x + 4*x^2 + 4*x^3)))]/(16 + 8*x + 9*x^2 + 2*x^3 + x^4), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

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Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{4(4x^5 + 8x^4 + 36x^3 + 32x^2 + e^x(x^3 - x^2 + 3x) + 64x) \exp\left(-e^{\frac{4x^3 + 24x^2 + 36x + e^x + 80}{4(x^2 + x + 4)}}\right)}{(x^4 + 2x^3 + 9x^2 + 8x + 16) \left(\frac{12x^2 + 48x + e^x + 36}{x^2 + x + 4} - \frac{(2x+1)(4x^3 + 24x^2 + 36x + e^x + 80)}{(x^2 + x + 4)^2}\right)}$$

5.108 Problem number 9197

$$\int \frac{(-3 - 3 \log(x)) \log\left(\frac{3 + 16x \log(-2 + e^5) \log(x)}{4x \log(-2 + e^5) \log(x)}\right)}{6x \log(x) + 32x^2 \log(-2 + e^5) \log^2(x)} dx$$

Optimal antiderivative

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

command

```
Int[((-3 - 3*Log[x])*Log[(3 + 16*x*Log[-2 + E^5]*Log[x])/(4*x*Log[-2 + E^5]*Log[x])])/(6*x*Lo
2 + E^5]*Log[x]^2), x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(-3 - 3 \log(x)) \log\left(\frac{3 + 16x \log(-2 + e^5) \log(x)}{4x \log(-2 + e^5) \log(x)}\right)}{6x \log(x) + 32x^2 \log(-2 + e^5) \log^2(x)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.109 Problem number 9403

$$\int \frac{e^{5 + \frac{e^5}{-3-x-x^2+\log(5)}} (1+2x)}{9+6x+7x^2+2x^3+x^4 + (-6-2x-2x^2)\log(5) + \log^2(5)} dx$$

Optimal antiderivative

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

command

```
Int[(E^(5 + E^5/(-3 - x - x^2 + Log[5]))*(1 + 2*x))/(9 + 6*x + 7*x^2 + 2*x^3 + x^4 + (-6 - 2*x - 2*x^2)*Log[5] + Log[5]^2),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{5 + \frac{e^5}{-3-x-x^2+\log(5)}} (1+2x)}{9+6x+7x^2+2x^3+x^4 + (-6-2x-2x^2)\log(5) + \log^2(5)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.110 Problem number 9502

$$\int \frac{5832 - 3420x + 668x^2 - 58x^3 + 2x^4 + (-738x + 206x^2 - 27x^3 + x^4) \log\left(\frac{1}{x^2}\right)}{(2916x - 1710x^2 + 334x^3 - 29x^4 + x^5) \log\left(\frac{1}{x^2}\right)} dx$$

Optimal antiderivative

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

command

```
Int[(5832 - 3420*x + 668*x^2 - 58*x^3 + 2*x^4 + (-738*x + 206*x^2 - 27*x^3 + x^4)*Log[x^(-2)])/((2916*x - 1710*x^2 + 334*x^3 - 29*x^4 + x^5)*Log[x^(-2)]),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{5832 - 3420x + 668x^2 - 58x^3 + 2x^4 + (-738x + 206x^2 - 27x^3 + x^4) \log\left(\frac{1}{x^2}\right)}{(2916x - 1710x^2 + 334x^3 - 29x^4 + x^5) \log\left(\frac{1}{x^2}\right)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$-\log\left(\log\left(\frac{1}{x^2}\right)\right) + \log(-x^3 + 20x^2 - 154x + 324) - 2\log(9 - x)$$

5.111 Problem number 9744

$$\int \frac{(6 - 30x + 5x^2) \log(x) + (150x^2 - 25x^3 + (30x - 5x^2) \log(\frac{6-x}{x})) \log^2(x) + (30x - 5x^2 + (6-x) \log(\frac{6-x}{x})) \log(x)}{(150x^3 - 25x^4 + (30x^2 - 5x^3) \log(\frac{6-x}{x})) \log^2(x) + (-30x^2 + 5x^3 + (-6x + x^2) \log(\frac{6-x}{x})) \log(x) \log(5x - 6)}$$

Optimal antiderivative

$$\ln\left(\frac{\ln(\ln(\frac{6-x}{x}) + 5x)}{\ln(x)} - 5x\right)$$

command

```
Int[((6 - 30*x + 5*x^2)*Log[x] + (150*x^2 - 25*x^3 + (30*x - 5*x^2)*Log[(6 - x)/x])*Log[x]^2 + 30*x^2 + 5*x^3 + (-6*x + x^2)*Log[(6 - x)/x])*Log[x]*Log[5*x + Log[(6 - x)/x]],x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{(6 - 30x + 5x^2) \log(x) + (150x^2 - 25x^3 + (30x - 5x^2) \log(\frac{6-x}{x})) \log^2(x) + (30x - 5x^2 + (6-x) \log(\frac{6-x}{x})) \log(x)}{(150x^3 - 25x^4 + (30x^2 - 5x^3) \log(\frac{6-x}{x})) \log^2(x) + (-30x^2 + 5x^3 + (-6x + x^2) \log(\frac{6-x}{x})) \log(x) \log(5x - 6)}$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\log\left(5x \log(x) - \log\left(5x + \log\left(\frac{6}{x} - 1\right)\right)\right) - \log(\log(x))$$

5.112 Problem number 9872

$$\int \frac{-8x - 40x^2 + (-1 - 10x) \log^2(x) + (-4 - 20x + (1 + 5x) \log^2(x)) \log(x + 5x^2)}{(2x^2 + 10x^3) \log^2(x) + (x + 5x^2) \log^2(x) \log(x + 5x^2)} dx$$

Optimal antiderivative

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

command

```
Int[(-8*x - 40*x^2 + (-1 - 10*x)*Log[x]^2 + (-4 - 20*x + (1 + 5*x)*Log[x]^2)*Log[x + 5*x^2]),x]
```

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{-8x - 40x^2 + (-1 - 10x) \log^2(x) + (-4 - 20x + (1 + 5x) \log^2(x)) \log(x + 5x^2)}{(2x^2 + 10x^3) \log^2(x) + (x + 5x^2) \log^2(x) \log(x + 5x^2)} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.113 Problem number 10136

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

Optimal antiderivative

$$e^{e^3 \ln(xe^{-1+x}-3)}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$e^{-e^3}(e^x x - 3e)^{e^3}$$

5.114 Problem number 10238

$$\int \frac{e^{\frac{x^2}{6+14x+6x^2+4x^3}}(6x+7x^2-2x^4)}{18+84x+134x^2+108x^3+74x^4+24x^5+8x^6} dx$$

Optimal antiderivative

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

command

`Int[(E^(x^2/(6+14*x+6*x^2+4*x^3)))*(6*x+7*x^2-2*x^4))/(18+84*x+134*x^2+108*x^3`

Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{\frac{x^2}{6+14x+6x^2+4x^3}}(6x+7x^2-2x^4)}{18+84x+134x^2+108x^3+74x^4+24x^5+8x^6} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

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

5.115 Problem number 10275

$$\int \frac{e^{-e^x} ((20 + x^2) \log(2) + e^x (-20x + x^2 + x^3) \log(2))}{2000 - 200x - 195x^2 + 10x^3 + 5x^4} dx$$

Optimal antiderivative

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

command

`Int[((20 + x^2)*Log[2] + E^x*(-20*x + x^2 + x^3)*Log[2])/(E^E^x*(2000 - 200*x - 195*x^2 + 10*x^3 + 5*x^4)),x]`
Rubi 4.17.3 under Mathematica 13.3.1 output

$$\int \frac{e^{-e^x} ((20 + x^2) \log(2) + e^x (-20x + x^2 + x^3) \log(2))}{2000 - 200x - 195x^2 + 10x^3 + 5x^4} dx$$

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\frac{e^{-e^x} (-x^3 - x^2 + 20x) \log(2)}{5(x^4 + 2x^3 - 39x^2 - 40x + 400)}$$

6 Test file number 213

Test folder name:

test_cases/213_Goursat

6.1 Problem number 10

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

Optimal antiderivative

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

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned} & -\frac{18\sqrt[3]{1-x^2}x^2 \operatorname{AppellF1}\left(\frac{5}{6}, \frac{1}{3}, 1, \frac{11}{6}, x^2, 9x^2\right)}{5\sqrt[3]{x^3-x}} + \frac{\sqrt{3}\sqrt[3]{x^2-1}\sqrt[3]{x} \arctan\left(\frac{1-\frac{4x^{2/3}}{\sqrt[3]{x^2-1}}}{\sqrt{3}}\right)}{2\sqrt[3]{x^3-x}} \\ & + \frac{\sqrt{3}\sqrt[3]{x^2-1}\sqrt[3]{x} \arctan\left(\frac{\frac{2x^{2/3}}{\sqrt[3]{x^2-1}}+1}{\sqrt{3}}\right)}{2\sqrt[3]{x^3-x}} + \frac{\sqrt[3]{x^2-1}\sqrt[3]{x} \log(1-9x^2)}{4\sqrt[3]{x^3-x}} \\ & - \frac{3\sqrt[3]{x^2-1}\sqrt[3]{x} \log\left(x^{2/3}-\sqrt[3]{x^2-1}\right)}{4\sqrt[3]{x^3-x}} - \frac{3\sqrt[3]{x^2-1}\sqrt[3]{x} \log\left(2x^{2/3}+\sqrt[3]{x^2-1}\right)}{4\sqrt[3]{x^3-x}} \end{aligned}$$

6.2 Problem number 11

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

Optimal antiderivative

$$\begin{aligned} & -\sqrt{3} \arctan\left(\frac{612314840\sqrt{3}(x^3-x)^{1/3}(-1+x) + \sqrt{3}(1609127381x^2 + 1235276981x + 124616800) + 2605939922}{2990437623x^2 + 3108349623x - 39304000}\right) \\ & - \frac{\ln\left(\frac{3(-1+x)(x^3-x)^{1/3} + 3x - 3(x^3-x)^{2/3} - 1}{-1+3x}\right)}{2} \end{aligned}$$

command

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

Rubi 4.17.3 under Mathematica 13.3.1 output

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

Rubi 4.16.1 under Mathematica 13.3.1 output

$$\begin{aligned}
& \frac{4x(1-x^2)^{2/3} \operatorname{AppellF1}\left(\frac{1}{6}, \frac{2}{3}, 1, \frac{7}{6}, x^2, 9x^2\right)}{(x^3-x)^{2/3}} \\
& x(1-x^2) \left(1 - \frac{x^{2/3}}{\sqrt[3]{x^2-1}}\right) \sqrt{\frac{\frac{x^{4/3}}{(x^2-1)^{2/3}} + \frac{x^{2/3}}{\sqrt[3]{x^2-1}} + 1}{\left(1 - \frac{(1+\sqrt{3})x^{2/3}}{\sqrt[3]{x^2-1}}\right)^2}} \operatorname{EllipticF}\left(\arccos\left(\frac{1 - \frac{(1-\sqrt{3})x^{2/3}}{\sqrt[3]{x^2-1}}}{1 - \frac{(1+\sqrt{3})x^{2/3}}{\sqrt[3]{x^2-1}}}\right), \frac{1}{4}(2 + \sqrt{3})\right) \\
\hline
& 2^4 \sqrt{3} (x^3-x)^{2/3} \sqrt{-\frac{x^{2/3} \left(1 - \frac{x^{2/3}}{\sqrt[3]{x^2-1}}\right)}{\sqrt[3]{x^2-1} \left(1 - \frac{(1+\sqrt{3})x^{2/3}}{\sqrt[3]{x^2-1}}\right)^2}} \\
& \frac{\sqrt{3} x^{2/3} (x^2-1)^{2/3} \arctan\left(\frac{1 - \frac{4x^{2/3}}{\sqrt[3]{x^2-1}}}{\sqrt{3}}\right)}{2(x^3-x)^{2/3}} \\
\hline
& \frac{\sqrt{3} x^{2/3} (x^2-1)^{2/3} \arctan\left(\frac{\frac{2x^{2/3}}{\sqrt[3]{x^2-1}} + 1}{\sqrt{3}}\right)}{2(x^3-x)^{2/3}} + \frac{x^{2/3} (x^2-1)^{2/3} \log(1-9x^2)}{4(x^3-x)^{2/3}} \\
\hline
& \frac{3x^{2/3} (x^2-1)^{2/3} \log\left(x^{2/3} - \sqrt[3]{x^2-1}\right)}{4(x^3-x)^{2/3}} - \frac{3x^{2/3} (x^2-1)^{2/3} \log\left(2x^{2/3} + \sqrt[3]{x^2-1}\right)}{4(x^3-x)^{2/3}}
\end{aligned}$$