CAS integration tests regression report
Maple 2022.1 vs. Maple 2021.1

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Contents

1 Summary of regression test table

Table 1: Summary table of regression tests

#	test file #	integral #	Maple 2022.1	Maple 2021.1
1	61	74	0 (not solved)	1 (pass)
2	70	604	0 (not solved)	1 (pass)
3	70	605	0 (not solved)	1 (pass)
4	70	607	0 (not solved)	1 (pass)
5	70	609	0 (not solved)	1 (pass)
6	70	610	0 (not solved)	1 (pass)
7	70	611	0 (not solved)	1 (pass)
8	70	614	0 (not solved)	1 (pass)
9	107	19	-1 (time out)	1 (pass)
10	135	176	0 (not solved)	1 (pass)
11	135	178	-1 (time out)	1 (pass)
12	135	179	-1 (time out)	1 (pass)
13	158	109	-1 (time out)	1 (pass)
14	163	276	0 (not solved)	1 (pass)
15	163	277	0 (not solved)	1 (pass)
16	163	278	0 (not solved)	1 (pass)
17	169	249	0 (not solved)	1 (pass)
18	169	250	0 (not solved)	1 (pass)
19	169	251	0 (not solved)	1 (pass)
20	178	59	0 (not solved)	1 (pass)
21	182	58	0 (not solved)	1 (pass)
22	186	12	0 (not solved)	1 (pass)
23	186	13	0 (not solved)	1 (pass)
24	186	14	0 (not solved)	1 (pass)
25	186	22	0 (not solved)	1 (pass)
26	186	23	0 (not solved)	1 (pass)
27	186	24	0 (not solved)	1 (pass)

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#	test file #	integral #	Maple 2022.1	Maple 2021.1
28	186	32	0 (not solved)	1 (pass)
29	186	33	0 (not solved)	1 (pass)
30	186	34	0 (not solved)	1 (pass)
31	186	35	0 (not solved)	1 (pass)
32	187	55	0 (not solved)	1 (pass)
33	187	57	0 (not solved)	1 (pass)
34	187	63	0 (not solved)	1 (pass)
35	187	64	0 (not solved)	1 (pass)
36	187	65	0 (not solved)	1 (pass)
37	187	66	0 (not solved)	1 (pass)
38	187	71	0 (not solved)	1 (pass)
39	187	72	0 (not solved)	1 (pass)
40	187	73	0 (not solved)	1 (pass)
41	187	74	0 (not solved)	1 (pass)
42	187	80	0 (not solved)	1 (pass)
43	187	81	0 (not solved)	1 (pass)
44	187	82	0 (not solved)	1 (pass)
45	187	198	0 (not solved)	1 (pass)
46	187	199	0 (not solved)	1 (pass)
47	187	200	0 (not solved)	1 (pass)
48	187	201	0 (not solved)	1 (pass)
49	187	202	0 (not solved)	1 (pass)
50	187	207	0 (not solved)	1 (pass)
51	187	208	0 (not solved)	1 (pass)
52	187	209	0 (not solved)	1 (pass)
53	187	210	0 (not solved)	1 (pass)
54	187	211	0 (not solved)	1 (pass)
55	187	216	0 (not solved)	1 (pass)
56	187	217	0 (not solved)	1 (pass)

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#	test file #	integral #	Maple 2022.1	Maple 2021.1
57	187	218	0 (not solved)	1 (pass)
58	187	219	0 (not solved)	1 (pass)
59	187	220	0 (not solved)	1 (pass)
60	187	252	0 (not solved)	1 (pass)
61	187	253	0 (not solved)	1 (pass)
62	187	282	0 (not solved)	1 (pass)
63	187	283	0 (not solved)	1 (pass)
64	187	328	0 (not solved)	1 (pass)
65	187	329	0 (not solved)	1 (pass)
66	187	330	0 (not solved)	1 (pass)
67	187	342	0 (not solved)	1 (pass)
68	187	343	0 (not solved)	1 (pass)
69	188	12	0 (not solved)	1 (pass)
70	188	67	0 (not solved)	1 (pass)
71	188	68	0 (not solved)	1 (pass)
72	188	75	0 (not solved)	1 (pass)
73	188	266	0 (not solved)	1 (pass)
74	189	12	0 (not solved)	1 (pass)
75	189	14	0 (not solved)	1 (pass)
76	189	22	0 (not solved)	1 (pass)
77	189	23	0 (not solved)	1 (pass)
78	189	24	0 (not solved)	1 (pass)
79	189	32	0 (not solved)	1 (pass)
80	189	33	0 (not solved)	1 (pass)
81	189	34	0 (not solved)	1 (pass)
82	189	35	0 (not solved)	1 (pass)
83	190	164	0 (not solved)	1 (pass)
84	190	165	0 (not solved)	1 (pass)
85	190	240	0 (not solved)	1 (pass)

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#	test file #	integral #	Maple 2022.1	Maple 2021.1
86	190	241	0 (not solved)	1 (pass)
87	190	527	0 (not solved)	1 (pass)
88	191	8	0 (not solved)	1 (pass)
89	191	9	0 (not solved)	1 (pass)
90	196	394	-1 (time out)	1 (pass)
91	198	147	0 (not solved)	1 (pass)
92	198	148	0 (not solved)	1 (pass)
93	198	149	0 (not solved)	1 (pass)
94	209	209	-1 (time out)	1 (pass)
95	209	759	0 (not solved)	1 (pass)
96	209	1554	0 (not solved)	1 (pass)
97	209	1669	0 (not solved)	1 (pass)
98	209	1778	0 (not solved)	1 (pass)
99	209	1779	0 (not solved)	1 (pass)
100	209	2194	0 (not solved)	1 (pass)
101	209	2274	0 (not solved)	1 (pass)
102	209	2276	0 (not solved)	1 (pass)
103	209	2277	0 (not solved)	1 (pass)
104	209	2531	0 (not solved)	1 (pass)
105	209	2622	0 (not solved)	1 (pass)
106	209	2728	-1 (time out)	1 (pass)
107	209	2737	0 (not solved)	1 (pass)
108	210	3909	0 (not solved)	1 (pass)
109	210	5812	0 (not solved)	1 (pass)
110	210	7306	0 (not solved)	1 (pass)
111	210	7352	0 (not solved)	1 (pass)
112	210	7552	0 (not solved)	1 (pass)
113	210	9256	0 (not solved)	1 (pass)
114	210	9321	0 (not solved)	1 (pass)

2 Test file number 61

Test folder name:

`test_cases/3_Logarithms/61_3.2.3_u_log-e-f-a+b_x-^p-c+d_x-^q-^r-^s`

2.1 Problem number 74

$$\int \left(\frac{1}{(c+dx)(-a+c+(-b+d)x)\log\left(\frac{a+bx}{c+dx}\right)} + \frac{\log\left(1-\frac{a+bx}{c+dx}\right)}{(a+bx)(c+dx)\log^2\left(\frac{a+bx}{c+dx}\right)} \right) dx$$

Optimal antiderivative

$$-\frac{\ln\left(1+\frac{-bx-a}{dx+c}\right)}{(-ad+bc)\ln\left(\frac{bx+a}{dx+c}\right)}$$

command

`int(1/(d*x+c)/(-a+c+(-b+d)*x)/ln((b*x+a)/(d*x+c))+ln(1+(-b*x-a)/(d*x+c))/(b*x+a)/(d*x+c)/ln((`

Maple 2022.1 output

$$\int \frac{1}{(dx+c)\,(-a+c+(-b+d)\,x)\ln\left(\frac{bx+a}{dx+c}\right)} + \frac{\ln\left(1+\frac{-bx-a}{dx+c}\right)}{(bx+a)\,(dx+c)\ln\left(\frac{bx+a}{dx+c}\right)^2}\,dx$$

Maple 2021.1 output

$$\frac{2i\ln\left(bx-dx+a-c\right)}{(ad-bc)\left(\pi\,\mathrm{csgn}\left(i\left(bx+a\right)\right)\mathrm{csgn}\left(\frac{i}{dx+c}\right)\mathrm{csgn}\left(\frac{i(bx+a)}{dx+c}\right)-\pi\,\mathrm{csgn}\left(i\left(bx+a\right)\right)\mathrm{csgn}\left(\frac{i(bx+a)}{dx+c}\right)^2-\pi\,\mathrm{csgn}\left(\frac{i}{dx+c}\right)\mathrm{csgn}\right.}$$
$$-\frac{-i\pi\,\mathrm{csgn}(i(bx+a))\,\mathrm{csgn}\left(\frac{i}{dx+c}\right)\mathrm{csgn}\left(\frac{i(bx+a)}{dx+c}\right)+i\pi\,\mathrm{csgn}(i(bx+a))\,\mathrm{csgn}\left(\frac{i(bx+a)}{dx+c}\right)^2+i\pi\,\mathrm{csgn}\left(\frac{i}{dx+c}\right)\mathrm{csgn}(i(bx-}{(ad-bc)\left(-i\pi\,\mathrm{csgn}\left(i\right.\right.}$$

3 Test file number 70

Test folder name:

`test_cases/4_Trig_functions/4.1_Sine/70_4.1.1.2-g_cos-^p-a+b_sin-^m`

3.1 Problem number 604

$$\int \frac{1}{(e\cos(c+dx))^{7/2}(a+b\sin(c+dx))^3}\,dx$$

Optimal antiderivative

$$\frac{9b^{\frac{7}{2}}\left(11a^2+2b^2\right)\arctan\left(\frac{\sqrt{b}\ \sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{8\left(-a^2+b^2\right)^{\frac{17}{4}}\,d\,e^{\frac{7}{2}}}$$
$$-\frac{9b^{\frac{7}{2}}\left(11a^2+2b^2\right)\operatorname{arctanh}\left(\frac{\sqrt{b}\ \sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{8\left(-a^2+b^2\right)^{\frac{17}{4}}\,d\,e^{\frac{7}{2}}}$$
$$+\frac{b}{2\left(a^2-b^2\right)de\left(e\cos(dx+c)\right)^{\frac{5}{2}}\left(a+b\sin(dx+c)\right)^2}$$
$$+\frac{13ab}{4\left(a^2-b^2\right)^2de\left(e\cos(dx+c)\right)^{\frac{5}{2}}\left(a+b\sin(dx+c)\right)}$$
$$+\frac{-9b\left(11a^2+2b^2\right)+a\left(8a^2+109b^2\right)\sin(dx+c)}{20\left(a^2-b^2\right)^3de\left(e\cos(dx+c)\right)^{\frac{5}{2}}}+\frac{\frac{9b^3\left(11a^2+2b^2\right)}{4}+\frac{3a\left(8a^4-64a^2b^2-139b^4\right)\sin(dx+c)}{20}}{\left(a^2-b^2\right)^4d\,e^3\sqrt{e\cos(dx+c)}}$$
$$+\frac{9a\,b^3\left(11a^2+2b^2\right)\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b-\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{8\cos\left(\frac{dx}{2}+\frac{c}{2}\right)\left(a^2-b^2\right)^4d\,e^3\left(b-\sqrt{-a^2+b^2}\right)\sqrt{e\cos(dx+c)}}$$
$$+\frac{9a\,b^3\left(11a^2+2b^2\right)\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b+\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{8\cos\left(\frac{dx}{2}+\frac{c}{2}\right)\left(a^2-b^2\right)^4d\,e^3\left(b+\sqrt{-a^2+b^2}\right)\sqrt{e\cos(dx+c)}}$$
$$-\frac{3a\left(8a^4-64a^2b^2-139b^4\right)\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticE}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\sqrt{2}\right)\sqrt{e\cos(dx+c)}}{20\cos\left(\frac{dx}{2}+\frac{c}{2}\right)\left(a^2-b^2\right)^4d\,e^4\sqrt{\cos(dx+c)}}$$

command

```
int(1/(e*cos(d*x+c))^(7/2)/(a+b*sin(d*x+c))^3,x)
```

Maple 2022.1 output

$$\int \frac{1}{\left(e\cos\left(dx+c\right)\right)^{\frac{7}{2}}\left(a+b\sin\left(dx+c\right)\right)^3}\,dx$$

Maple 2021.1 output

output too large to display

3.2 Problem number 605

$$\int \frac{(e\cos(c+dx))^{15/2}}{(a+b\sin(c+dx))^4}\,dx$$

Optimal antiderivative

$$\frac{39a\left(11a^4-17a^2b^2+6b^4\right)e^{\frac{15}{2}}\arctan\left(\frac{\sqrt{b}\ \sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16b^{\frac{15}{2}}\left(-a^2+b^2\right)^{\frac{3}{4}}d}$$
$$+\frac{39a\left(11a^4-17a^2b^2+6b^4\right)e^{\frac{15}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\ \sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16b^{\frac{15}{2}}\left(-a^2+b^2\right)^{\frac{3}{4}}d}$$
$$-\frac{e(e\cos(dx+c))^{\frac{13}{2}}}{3bd\left(a+b\sin(dx+c)\right)^3}-\frac{13e^3(e\cos(dx+c))^{\frac{9}{2}}\left(11a+4b\sin(dx+c)\right)}{84b^3d\left(a+b\sin(dx+c)\right)^2}$$
$$-\frac{39e^5(e\cos(dx+c))^{\frac{5}{2}}\left(77a^2-20b^2+22ab\sin(dx+c)\right)}{280b^5d\left(a+b\sin(dx+c)\right)}$$
$$+\frac{13\left(231a^4-203a^2b^2+20b^4\right)e^8\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticF}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{56\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^8d\sqrt{e\cos(dx+c)}}$$
$$-\frac{39a^2\left(11a^4-17a^2b^2+6b^4\right)e^8\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b-\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^8d\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)\sqrt{e\cos(dx+c)}}$$
$$-\frac{39a^2\left(11a^4-17a^2b^2+6b^4\right)e^8\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b+\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^8d\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)\sqrt{e\cos(dx+c)}}$$
$$+\frac{13e^7\left(21a\left(11a^2-6b^2\right)-b\left(77a^2-20b^2\right)\sin(dx+c)\right)\sqrt{e\cos(dx+c)}}{56b^7d}$$

command

```
int((e*cos(d*x+c))^(15/2)/(a+b*sin(d*x+c))^4,x)
```

Maple 2022.1 output

$$\int \frac{(e\cos\left(dx+c\right))^{\frac{15}{2}}}{\left(a+b\sin\left(dx+c\right)\right)^4}\,dx$$

Maple 2021.1 output

output too large to display

3.3 Problem number 607

$$\int \frac{(e\cos(c+dx))^{11/2}}{(a+b\sin(c+dx))^4}\,dx$$

Optimal antiderivative

$$-\frac{15a\left(7a^2-6b^2\right)e^{\frac{11}{2}}\arctan\left(\frac{\sqrt{b}\ \sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16b^{\frac{11}{2}}\left(-a^2+b^2\right)^{\frac{3}{4}}d}$$
$$-\frac{15a\left(7a^2-6b^2\right)e^{\frac{11}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\ \sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16b^{\frac{11}{2}}\left(-a^2+b^2\right)^{\frac{3}{4}}d}$$
$$-\frac{e(e\cos(dx+c))^{\frac{9}{2}}}{3bd\left(a+b\sin(dx+c)\right)^3}-\frac{e^3(e\cos(dx+c))^{\frac{5}{2}}\left(7a+4b\sin(dx+c)\right)}{4b^3d\left(a+b\sin(dx+c)\right)^2}$$
$$-\frac{5\left(21a^2-4b^2\right)e^6\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticF}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{8\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^6d\sqrt{e\cos(dx+c)}}$$
$$+\frac{15a^2\left(7a^2-6b^2\right)e^6\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b-\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^6d\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)\sqrt{e\cos(dx+c)}}$$
$$+\frac{15a^2\left(7a^2-6b^2\right)e^6\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b+\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^6d\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)\sqrt{e\cos(dx+c)}}$$
$$-\frac{5e^5\left(21a^2-4b^2+14ab\sin(dx+c)\right)\sqrt{e\cos(dx+c)}}{8b^5d\left(a+b\sin(dx+c)\right)}$$

command

```
int((e*cos(d*x+c))^(11/2)/(a+b*sin(d*x+c))^4,x)
```

Maple 2022.1 output

$$\int \frac{(e\cos\left(dx+c\right))^{\frac{11}{2}}}{\left(a+b\sin\left(dx+c\right)\right)^4}\,dx$$

Maple 2021.1 output

output too large to display

3.4 Problem number 609

$$\int \frac{(e\cos(c+dx))^{7/2}}{(a+b\sin(c+dx))^4}\,dx$$

Optimal antiderivative

$$-\frac{5a\left(a^2-2b^2\right)e^{\frac{7}{2}}\arctan\left(\frac{\sqrt{b}\ \sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16b^{\frac{7}{2}}\left(-a^2+b^2\right)^{\frac{7}{4}}d}$$
$$-\frac{5a\left(a^2-2b^2\right)e^{\frac{7}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\ \sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16b^{\frac{7}{2}}\left(-a^2+b^2\right)^{\frac{7}{4}}d}-\frac{e(e\cos(dx+c))^{\frac{5}{2}}}{3bd\left(a+b\sin(dx+c)\right)^3}$$
$$+\frac{5\left(3a^2-4b^2\right)e^4\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticF}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{24\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^4\left(a^2-b^2\right)d\sqrt{e\cos(dx+c)}}$$
$$-\frac{5a^2\left(a^2-2b^2\right)e^4\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b-\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^4\left(a^2-b^2\right)d\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)\sqrt{e\cos(dx+c)}}$$
$$-\frac{5a^2\left(a^2-2b^2\right)e^4\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b+\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^4\left(a^2-b^2\right)d\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)\sqrt{e\cos(dx+c)}}$$
$$-\frac{5\left(3a^2-4b^2\right)e^3\sqrt{e\cos(dx+c)}}{24b^3\left(a^2-b^2\right)d\left(a+b\sin(dx+c)\right)}+\frac{5e^3(3a+4b\sin(dx+c))\sqrt{e\cos(dx+c)}}{12b^3d\left(a+b\sin(dx+c)\right)^2}$$

command

```
int((e*cos(d*x+c))^(7/2)/(a+b*sin(d*x+c))^4,x)
```

Maple 2022.1 output

$$\int \frac{(e\cos\left(dx+c\right))^{\frac{7}{2}}}{\left(a+b\sin\left(dx+c\right)\right)^4}\,dx$$

Maple 2021.1 output

output too large to display

3.5 Problem number 610

$$\int \frac{(e\cos(c+dx))^{5/2}}{(a+b\sin(c+dx))^4}\,dx$$

Optimal antiderivative

$$-\frac{a\left(a^2-6b^2\right)e^{\frac{5}{2}}\arctan\left(\frac{\sqrt{b}\,\sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16b^{\frac{5}{2}}\left(-a^2+b^2\right)^{\frac{9}{4}}d}+\frac{a\left(a^2-6b^2\right)e^{\frac{5}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16b^{\frac{5}{2}}\left(-a^2+b^2\right)^{\frac{9}{4}}d}$$
$$-\frac{e(e\cos(dx+c))^{\frac{3}{2}}}{3bd\left(a+b\sin(dx+c)\right)^3}+\frac{ae(e\cos(dx+c))^{\frac{3}{2}}}{4b\left(a^2-b^2\right)d\left(a+b\sin(dx+c)\right)^2}+\frac{\left(a^2+4b^2\right)e(e\cos(dx+c))^{\frac{3}{2}}}{8b\left(a^2-b^2\right)^2d\left(a+b\sin(dx+c)\right)}$$
$$-\frac{a^2\left(a^2-6b^2\right)e^3\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b-\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^3\left(a^2-b^2\right)^2d\left(b-\sqrt{-a^2+b^2}\right)\sqrt{e\cos(dx+c)}}$$
$$-\frac{a^2\left(a^2-6b^2\right)e^3\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b+\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^3\left(a^2-b^2\right)^2d\left(b+\sqrt{-a^2+b^2}\right)\sqrt{e\cos(dx+c)}}$$
$$+\frac{\left(a^2+4b^2\right)e^2\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticE}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\sqrt{2}\right)\sqrt{e\cos(dx+c)}}{8\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^2\left(a^2-b^2\right)^2d\sqrt{\cos(dx+c)}}$$

command

```
int((e*cos(d*x+c))^(5/2)/(a+b*sin(d*x+c))^4,x)
```

Maple 2022.1 output

$$\int \frac{(e\cos\left(dx+c\right))^{\frac{5}{2}}}{\left(a+b\sin\left(dx+c\right)\right)^4}\,dx$$

Maple 2021.1 output

output too large to display

3.6 Problem number 611

$$\int \frac{(e\cos(c+dx))^{3/2}}{(a+b\sin(c+dx))^4}\,dx$$

Optimal antiderivative

$$-\frac{a\left(a^2+6b^2\right)e^{\frac{3}{2}}\arctan\left(\frac{\sqrt{b}\,\sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16b^{\frac{3}{2}}\left(-a^2+b^2\right)^{\frac{11}{4}}d}-\frac{a\left(a^2+6b^2\right)e^{\frac{3}{2}}\operatorname{arctanh}\left(\frac{\sqrt{b}\,\sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16b^{\frac{3}{2}}\left(-a^2+b^2\right)^{\frac{11}{4}}d}$$
$$-\frac{\left(3a^2+4b^2\right)e^2\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticF}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{24\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^2\left(a^2-b^2\right)^2d\sqrt{e\cos(dx+c)}}$$
$$+\frac{a^2\left(a^2+6b^2\right)e^2\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b-\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^2\left(a^2-b^2\right)^2d\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)\sqrt{e\cos(dx+c)}}$$
$$+\frac{a^2\left(a^2+6b^2\right)e^2\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b+\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)b^2\left(a^2-b^2\right)^2d\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)\sqrt{e\cos(dx+c)}}$$
$$-\frac{e\sqrt{e\cos(dx+c)}}{3bd\left(a+b\sin(dx+c)\right)^3}+\frac{ae\sqrt{e\cos(dx+c)}}{12b\left(a^2-b^2\right)d\left(a+b\sin(dx+c)\right)^2}$$
$$+\frac{\left(3a^2+4b^2\right)e\sqrt{e\cos(dx+c)}}{24b\left(a^2-b^2\right)^2d\left(a+b\sin(dx+c)\right)}$$

command

```
int((e*cos(d*x+c))^(3/2)/(a+b*sin(d*x+c))^4,x)
```

Maple 2022.1 output

$$\int \frac{(e\cos\left(dx+c\right))^{\frac{3}{2}}}{\left(a+b\sin\left(dx+c\right)\right)^4}\,dx$$

Maple 2021.1 output

output too large to display

3.7 Problem number 614

$$\int \frac{1}{(e\cos(c+dx))^{3/2}(a+b\sin(c+dx))^4}\,dx$$

Optimal antiderivative

$$\begin{aligned}
&-\frac{15a\,b^{\frac{3}{2}}\left(7a^2+6b^2\right)\arctan\left(\frac{\sqrt{b}\ \sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16\left(-a^2+b^2\right)^{\frac{17}{4}}\,d\,e^{\frac{3}{2}}}\\
&+\frac{15a\,b^{\frac{3}{2}}\left(7a^2+6b^2\right)\operatorname{arctanh}\left(\frac{\sqrt{b}\ \sqrt{e\cos\left(dx+c\right)}}{\left(-a^2+b^2\right)^{\frac{1}{4}}\sqrt{e}}\right)}{16\left(-a^2+b^2\right)^{\frac{17}{4}}\,d\,e^{\frac{3}{2}}}\\
&+\frac{b}{3\left(a^2-b^2\right)de\left(a+b\sin(dx+c)\right)^3\sqrt{e\cos(dx+c)}}\\
&+\frac{13ab}{12\left(a^2-b^2\right)^2de\left(a+b\sin(dx+c)\right)^2\sqrt{e\cos(dx+c)}}\\
&+\frac{b\left(89a^2+28b^2\right)}{24\left(a^2-b^2\right)^3de\left(a+b\sin(dx+c)\right)\sqrt{e\cos(dx+c)}}\\
&+\frac{-15ab\left(7a^2+6b^2\right)+\left(16a^4+151a^2b^2+28b^4\right)\sin(dx+c)}{8\left(a^2-b^2\right)^4de\sqrt{e\cos(dx+c)}}\\
&-\frac{15a^2b\left(7a^2+6b^2\right)\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b-\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)\left(a^2-b^2\right)^4de\left(b-\sqrt{-a^2+b^2}\right)\sqrt{e\cos(dx+c)}}\\
&-\frac{15a^2b\left(7a^2+6b^2\right)\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticPi}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\frac{2b}{b+\sqrt{-a^2+b^2}},\sqrt{2}\right)\left(\sqrt{\cos}\left(dx+c\right)\right)}{16\cos\left(\frac{dx}{2}+\frac{c}{2}\right)\left(a^2-b^2\right)^4de\left(b+\sqrt{-a^2+b^2}\right)\sqrt{e\cos(dx+c)}}\\
&-\frac{\left(16a^4+151a^2b^2+28b^4\right)\sqrt{\frac{\cos\left(dx+c\right)}{2}+\frac{1}{2}}\ \operatorname{EllipticE}\left(\sin\left(\frac{dx}{2}+\frac{c}{2}\right),\sqrt{2}\right)\sqrt{e\cos(dx+c)}}{8\cos\left(\frac{dx}{2}+\frac{c}{2}\right)\left(a^2-b^2\right)^4d\,e^2\sqrt{\cos(dx+c)}}
\end{aligned}$$

command

```
int(1/(e*cos(d*x+c))^(3/2)/(a+b*sin(d*x+c))^4,x)
```

Maple 2022.1 output

$$\int \frac{1}{(e\cos\left(dx+c\right))^{\frac{3}{2}}\left(a+b\sin\left(dx+c\right)\right)^4}\,dx$$

Maple 2021.1 output

output too large to display

4 Test file number 107

Test folder name:

`test_cases/4_Trig_functions/4.3_Tangent/107_4.3.9_trig^m-a+b_tan^n+c_tan^-2_n-^p`

4.1 Problem number 19

$$\int \frac{\tan^7(d+ex)}{\left(a+b\tan(d+ex)+c\tan^2(d+ex)\right)^{3/2}}\,dx$$

Optimal antiderivative

$$\frac{3b\operatorname{arctanh}\left(\frac{b+2c\tan(ex+d)}{2\sqrt{c}\ \sqrt{a+b\tan(ex+d)+c\left(\tan^2(ex+d)\right)}}\right)}{2c^{\frac{5}{2}}e}$$
$$-\frac{5b\left(-12ac+7b^2\right)\operatorname{arctanh}\left(\frac{b+2c\tan(ex+d)}{2\sqrt{c}\ \sqrt{a+b\tan(ex+d)+c\left(\tan^2(ex+d)\right)}}\right)}{16c^{\frac{9}{2}}e}$$
$$+\frac{\operatorname{arctanh}\left(\frac{\left(b^2-(a-c)\left(a-c-\sqrt{a^2-2ac+b^2+c^2}\right)\right)-b\left(2a-2c+\sqrt{a^2-2ac+b^2+c^2}\right)\tan(ex+d)}{2\sqrt{2a-2c+\sqrt{a^2-2ac+b^2+c^2}}\ \sqrt{a^2-b^2-2ac+c^2-(a-c)\sqrt{a^2-2ac+b^2+c^2}}\ \sqrt{a+b\tan(}\right.}{2\left(a^2-\right.}$$
$$-\frac{\operatorname{arctanh}\left(\frac{\left(b^2-(a-c)\left(a-c+\sqrt{a^2-2ac+b^2+c^2}\right)\right)-b\left(2a-2c-\sqrt{a^2-2ac+b^2+c^2}\right)\tan(ex+d)}{2\sqrt{2a-2c-\sqrt{a^2-2ac+b^2+c^2}}\ \sqrt{a^2-b^2-2ac+c^2+(a-c)\sqrt{a^2-2ac+b^2+c^2}}\ \sqrt{a+b\tan}\right.}{2\left(a^2-\right.}$$
$$+\frac{\left(-16ac+7b^2\right)\sqrt{a+b\tan(ex+d)+c\left(\tan^2(ex+d)\right)}\left(\tan^2(ex+d)\right)}{3c^2\left(-4ac+b^2\right)e}$$
$$-\frac{2b\sqrt{a+b\tan(ex+d)+c\left(\tan^2(ex+d)\right)}\left(\tan^3(ex+d)\right)}{c\left(-4ac+b^2\right)e}$$
$$+\frac{4a+2b\tan(ex+d)}{\left(-4ac+b^2\right)e\sqrt{a+b\tan(ex+d)+c\left(\tan^2(ex+d)\right)}}$$
$$-\frac{2\left(\tan^2(ex+d)\right)\left(2a+b\tan(ex+d)\right)}{\left(-4ac+b^2\right)e\sqrt{a+b\tan(ex+d)+c\left(\tan^2(ex+d)\right)}}$$
$$+\frac{2\left(\tan^4(ex+d)\right)\left(2a+b\tan(ex+d)\right)}{\left(-4ac+b^2\right)e\sqrt{a+b\tan(ex+d)+c\left(\tan^2(ex+d)\right)}}$$
$$-\frac{\sqrt{a+b\tan(ex+d)+c\left(\tan^2(ex+d)\right)}\left(3b^2-8ac-2bc\tan(ex+d)\right)}{c^2\left(-4ac+b^2\right)e}$$
$$-\frac{2\left(a\left(b^2-2(a-c)c\right)+bc(a+c)\tan(ex+d)\right)}{\left(\left(b^2+(a-c)^2\right)\left(-4ac+b^2\right)e\sqrt{a+b\tan(ex+d)+c\left(\tan^2(ex+d)\right)}\right.}$$
$$+\frac{\sqrt{a+b\tan(ex+d)+c\left(\tan^2(ex+d)\right)}\left(105b^4-460ab^2c+256a^2c^2-2bc\left(-116ac+35b^2\right)\tan(ex+d)\right)}{24c^4\left(-4ac+b^2\right)e}$$

command

```
int(tan(e*x+d)^7/(a+b*tan(e*x+d)+c*tan(e*x+d)^2)^(3/2),x)
```

Maple 2022.1 output

hanged

Maple 2021.1 output

output too large to display

5 Test file number 135

Test folder name:

`test_cases/4_Trig_functions/4.7_Miscellaneous/135_4.7.1-c_trig-^m-d_trig-^n`

5.1 Problem number 176

$$\int \frac{\cos^2(a+bx)}{\sin^{\frac{7}{2}}(2a+2bx)}\,dx$$

Optimal antiderivative

$$\frac{3\sqrt{\frac{1}{2}+\frac{\sin(2bx+2a)}{2}}\ \text{EllipticE}\left(\cos\left(a+\frac{\pi}{4}+bx\right),\sqrt{2}\right)}{10\sin\left(a+\frac{\pi}{4}+bx\right)b}-\frac{\cos^2(bx+a)}{5b\sin(2bx+2a)^{\frac{5}{2}}}-\frac{3\cos(2bx+2a)}{10b\sqrt{\sin(2bx+2a)}}$$

command

```
int(cos(b*x+a)^2/sin(2*b*x+2*a)^(7/2),x)
```

Maple 2022.1 output

$$\int \frac{\cos^2(xb+a)}{\sin(2xb+2a)^{\frac{7}{2}}}\,dx$$

Maple 2021.1 output

$$\sqrt{2}\left(-\frac{8\sqrt{2}}{5\sin(2bx+2a)^{\frac{5}{2}}}+\frac{4\sqrt{2}\left(6\sqrt{1+\sin(2bx+2a)}\ \sqrt{-2\sin(2bx+2a)+2}\ \sqrt{-\sin(2bx+2a)}\ (\sin^2(2bx+2a))\ \text{Ellip}\right.}{}\right.$$

5.2 Problem number 178

$$\int \cos^3(a+bx)\sqrt{\sin(2a+2bx)}\,dx$$

Optimal antiderivative

$$-\frac{5\arcsin(\cos(bx+a)-\sin(bx+a))}{32b}-\frac{5\ln\left(\cos(bx+a)+\sin(bx+a)+\sqrt{\sin}\,(2bx+2a)\right)}{32b}$$
$$+\frac{\cos(bx+a)\left(\sin^{\frac{3}{2}}(2bx+2a)\right)}{8b}+\frac{5\sin(bx+a)\left(\sqrt{\sin}\,(2bx+2a)\right)}{16b}$$

command

```
int(cos(b*x+a)^3*sin(2*b*x+2*a)^(1/2),x)
```

Maple 2022.1 output

hanged

Maple 2021.1 output

output too large to display

5.3 Problem number 179

$$\int \frac{\cos^3(a+bx)}{\sqrt{\sin(2a+2bx)}}\,dx$$

Optimal antiderivative

$$-\frac{3\arcsin(\cos(bx+a)-\sin(bx+a))}{8b}$$
$$+\frac{3\ln\left(\cos(bx+a)+\sin(bx+a)+\sqrt{\sin}\,(2bx+2a)\right)}{8b}+\frac{\cos(bx+a)\left(\sqrt{\sin}\,(2bx+2a)\right)}{4b}$$

command

```
int(cos(b*x+a)^3/sin(2*b*x+2*a)^(1/2),x)
```

Maple 2022.1 output

hanged

Maple 2021.1 output

output too large to display

6 Test file number 158

Test folder name:

`test_cases/5_Inverse_trig_functions/5.6_Inverse_cosecant/158_5.6.1_u-a+b_arccsc-c_x-^n`

6.1 Problem number 109

$$\int \frac{a + b \csc^{-1}(cx)}{\left(d + ex^2\right)^2} \, dx$$

Optimal antiderivative

$$\frac{(a+b\operatorname{arccsc}(cx))\ln\left(1-\frac{\mathrm{I}c\left(\frac{\mathrm{I}}{cx}+\sqrt{1-\frac{1}{c^2x^2}}\right)\sqrt{-d}}{\sqrt{e}-\sqrt{c^2d+e}}\right)}{4(-d)^{\frac{3}{2}}\sqrt{e}}$$
$$-\frac{(a+b\operatorname{arccsc}(cx))\ln\left(1+\frac{\mathrm{I}c\left(\frac{\mathrm{I}}{cx}+\sqrt{1-\frac{1}{c^2x^2}}\right)\sqrt{-d}}{\sqrt{e}-\sqrt{c^2d+e}}\right)}{4(-d)^{\frac{3}{2}}\sqrt{e}}$$
$$+\frac{(a+b\operatorname{arccsc}(cx))\ln\left(1-\frac{\mathrm{I}c\left(\frac{\mathrm{I}}{cx}+\sqrt{1-\frac{1}{c^2x^2}}\right)\sqrt{-d}}{\sqrt{e}+\sqrt{c^2d+e}}\right)}{4(-d)^{\frac{3}{2}}\sqrt{e}}$$
$$-\frac{(a+b\operatorname{arccsc}(cx))\ln\left(1+\frac{\mathrm{I}c\left(\frac{\mathrm{I}}{cx}+\sqrt{1-\frac{1}{c^2x^2}}\right)\sqrt{-d}}{\sqrt{e}+\sqrt{c^2d+e}}\right)}{4(-d)^{\frac{3}{2}}\sqrt{e}}$$
$$+\frac{\mathrm{I}b\operatorname{polylog}\left(2,\frac{-\mathrm{I}c\left(\frac{\mathrm{I}}{cx}+\sqrt{1-\frac{1}{c^2x^2}}\right)\sqrt{-d}}{\sqrt{e}-\sqrt{c^2d+e}}\right)}{4(-d)^{\frac{3}{2}}\sqrt{e}}$$
$$-\frac{\mathrm{I}b\operatorname{polylog}\left(2,\frac{\mathrm{I}c\left(\frac{\mathrm{I}}{cx}+\sqrt{1-\frac{1}{c^2x^2}}\right)\sqrt{-d}}{\sqrt{e}-\sqrt{c^2d+e}}\right)}{4(-d)^{\frac{3}{2}}\sqrt{e}}$$
$$+\frac{\mathrm{I}b\operatorname{polylog}\left(2,\frac{-\mathrm{I}c\left(\frac{\mathrm{I}}{cx}+\sqrt{1-\frac{1}{c^2x^2}}\right)\sqrt{-d}}{\sqrt{e}+\sqrt{c^2d+e}}\right)}{4(-d)^{\frac{3}{2}}\sqrt{e}}$$
$$-\frac{\mathrm{I}b\operatorname{polylog}\left(2,\frac{\mathrm{I}c\left(\frac{\mathrm{I}}{cx}+\sqrt{1-\frac{1}{c^2x^2}}\right)\sqrt{-d}}{\sqrt{e}+\sqrt{c^2d+e}}\right)}{4(-d)^{\frac{3}{2}}\sqrt{e}}+\frac{-a-b\operatorname{arccsc}(cx)}{4d\left(\frac{d}{x}+\sqrt{-d}\sqrt{e}\right)}$$

command

```
int((a+b*arccsc(c*x))/(e*x^2+d)^2,x)
```

Maple 2022.1 output

hanged

Maple 2021.1 output

output too large to display

7 Test file number 163

Test folder name:

`test_cases/6_Hyperbolic_functions/6.1_Hyperbolic_sine/163_6.1.5_Hyperbolic_sine_functions`

7.1 Problem number 276

$$\int \frac{\sinh^3(a+b\log(cx^n))}{x}\,dx$$

Optimal antiderivative

$$-\frac{\cosh(a+b\ln(c\,x^n))}{bn}+\frac{\cosh^3(a+b\ln(c\,x^n))}{3bn}$$

command

```
int(sinh(a+b*ln(c*x^n))^3/x,x)
```

Maple 2022.1 output

$$\int \frac{\sinh^3(a+b\ln(c\,x^n))}{x}\,dx$$

Maple 2021.1 output

$$\frac{\left(-\frac{2}{3}+\frac{(\sinh^2(a+b\ln(c\,x^n)))}{3}\right)\cosh(a+b\ln(c\,x^n))}{nb}$$

7.2 Problem number 277

$$\int \frac{\sinh^4\left(a+b\log\left(cx^n\right)\right)}{x}\,dx$$

Optimal antiderivative

$$\frac{3\ln(x)}{8}-\frac{3\cosh(a+b\ln(c\,x^n))\sinh(a+b\ln(c\,x^n))}{8bn}+\frac{\cosh(a+b\ln(c\,x^n))\left(\sinh^3\left(a+b\ln(c\,x^n)\right)\right)}{4bn}$$

command

```
int(sinh(a+b*ln(c*x^n))^4/x,x)
```

Maple 2022.1 output

$$\int \frac{\sinh^4\left(a+b\ln\left(c\,x^n\right)\right)}{x}\,dx$$

Maple 2021.1 output

$$\frac{\cosh\left(a+b\ln\left(c\,x^n\right)\right)\left(\sinh^3\left(a+b\ln\left(c\,x^n\right)\right)\right)}{4bn}-\frac{3\cosh\left(a+b\ln\left(c\,x^n\right)\right)\sinh\left(a+b\ln\left(c\,x^n\right)\right)}{8bn}+\frac{3\ln\left(c\,x^n\right)}{8n}+\frac{3a}{8bn}$$

7.3 Problem number 278

$$\int \frac{\sinh^5\left(a+b\log\left(cx^n\right)\right)}{x}\,dx$$

Optimal antiderivative

$$\frac{\cosh(a+b\ln(c\,x^n))}{bn}-\frac{2\left(\cosh^3\left(a+b\ln(c\,x^n)\right)\right)}{3bn}+\frac{\cosh^5\left(a+b\ln(c\,x^n)\right)}{5bn}$$

command

```
int(sinh(a+b*ln(c*x^n))^5/x,x)
```

Maple 2022.1 output

$$\int \frac{\sinh^5\left(a+b\ln\left(c\,x^n\right)\right)}{x}\,dx$$

Maple 2021.1 output

$$\frac{\left(\frac{8}{15}+\frac{\left(\sinh^4\left(a+b\ln\left(c\,x^n\right)\right)\right)}{5}-\frac{4\left(\sinh^2\left(a+b\ln\left(c\,x^n\right)\right)\right)}{15}\right)\cosh\left(a+b\ln\left(c\,x^n\right)\right)}{nb}$$

8 Test file number 169

Test folder name:

`test_cases/6_Hyperbolic_functions/6.2_Hyperbolic_cosine/169_6.2.5_Hyperbolic_cosine_functions`

8.1 Problem number 249

$$\int \frac{\cosh^3(a+b\log(cx^n))}{x}\,dx$$

Optimal antiderivative

$$\frac{\sinh(a+b\ln(cx^n))}{bn}+\frac{\sinh^3(a+b\ln(cx^n))}{3bn}$$

command

```
int(cosh(a+b*ln(c*x^n))^3/x,x)
```

Maple 2022.1 output

$$\int \frac{\cosh^3(a+b\ln(cx^n))}{x}\,dx$$

Maple 2021.1 output

$$\frac{\left(\frac{2}{3}+\frac{(\cosh^2(a+b\ln(cx^n)))}{3}\right)\sinh(a+b\ln(cx^n))}{nb}$$

8.2 Problem number 250

$$\int \frac{\cosh^4(a+b\log(cx^n))}{x}\,dx$$

Optimal antiderivative

$$\frac{3\ln(x)}{8}+\frac{3\cosh(a+b\ln(cx^n))\sinh(a+b\ln(cx^n))}{8bn}+\frac{(\cosh^3(a+b\ln(cx^n)))\sinh(a+b\ln(cx^n))}{4bn}$$

command

```
int(cosh(a+b*ln(c*x^n))^4/x,x)
```

Maple 2022.1 output

$$\int \frac{\cosh^4(a+b\ln(cx^n))}{x}\,dx$$

Maple 2021.1 output

$$\frac{(\cosh^3(a+b\ln(cx^n)))\sinh(a+b\ln(cx^n))}{4bn}+\frac{3\cosh(a+b\ln(cx^n))\sinh(a+b\ln(cx^n))}{8bn}+\frac{3\ln(cx^n)}{8n}+\frac{3a}{8bn}$$

8.3 Problem number 251

$$\int \frac{\cosh^5\left(a+b\log\left(cx^n\right)\right)}{x}\,dx$$

Optimal antiderivative

$$\frac{\sinh(a+b\ln(c\,x^n))}{bn}+\frac{2\left(\sinh^3\left(a+b\ln(c\,x^n)\right)\right)}{3bn}+\frac{\sinh^5\left(a+b\ln(c\,x^n)\right)}{5bn}$$

command

```
int(cosh(a+b*ln(c*x^n))^5/x,x)
```

Maple 2022.1 output

$$\int \frac{\cosh^5\left(a+b\ln\left(c\,x^n\right)\right)}{x}\,dx$$

Maple 2021.1 output

$$\frac{\left(\frac{8}{15}+\frac{\left(\cosh^4(a+b\ln(c\,x^n))\right)}{5}+\frac{4\left(\cosh^2(a+b\ln(c\,x^n))\right)}{15}\right)\sinh\left(a+b\ln\left(c\,x^n\right)\right)}{nb}$$

9 Test file number 178

Test folder name:

```
test_cases/6_Hyperbolic_functions/6.5_Hyperbolic_secant/178_6.5.2-e_x-^m-a+b_sech-c+d_x^n-^p
```

9.1 Problem number 59

$$\int \frac{\left(a+b\operatorname{sech}\left(c+d\sqrt{x}\right)\right)^2}{\sqrt{x}}\,dx$$

Optimal antiderivative

$$\frac{4ab\arctan\left(\sinh\left(c+d\sqrt{x}\right)\right)}{d}+2a^2\sqrt{x}+\frac{2b^2\tanh\left(c+d\sqrt{x}\right)}{d}$$

command

```
int((a+b*sech(c+d*x^(1/2)))^2/x^(1/2),x)
```

Maple 2022.1 output

$$\int \frac{\left(a+b\operatorname{sech}\left(c+d\sqrt{x}\right)\right)^2}{\sqrt{x}}\,dx$$

Maple 2021.1 output

$$2a^2\sqrt{x}+\frac{2b^2\tanh\left(c+d\sqrt{x}\right)}{d}+\frac{8ab\arctan\left(\mathrm{e}^{c+d\sqrt{x}}\right)}{d}+\frac{2a^2c}{d}$$

10 Test file number 182

Test folder name:

`test_cases/6_Hyperbolic_functions/6.6_Hyperbolic_cosecant/182_6.6.2-e_x-^m-a+b_csch-c+d_x^n-^p`

10.1 Problem number 58

$$\int \frac{\left(a+b\operatorname{csch}\left(c+d\sqrt{x}\right)\right)^2}{\sqrt{x}}\,dx$$

Optimal antiderivative

$$-\frac{4ab\operatorname{arctanh}\left(\cosh\left(c+d\sqrt{x}\right)\right)}{d}-\frac{2b^2\coth\left(c+d\sqrt{x}\right)}{d}+2a^2\sqrt{x}$$

command

```
int((a+b*csch(c+d*x^(1/2)))^2/x^(1/2),x)
```

Maple 2022.1 output

$$\int \frac{\left(a+b\,\operatorname{csch}\left(c+d\sqrt{x}\right)\right)^2}{\sqrt{x}}\,dx$$

Maple 2021.1 output

$$\frac{2a^2\left(c+d\sqrt{x}\right)-8ab\operatorname{arctanh}\left(\mathrm{e}^{c+d\sqrt{x}}\right)-2b^2\coth\left(c+d\sqrt{x}\right)}{d}$$

11 Test file number 186

Test folder name:

`test_cases/7_Inverse_hyperbolic_functions/7.1_Inverse_hyperbolic_sine/186_7.1.2-d_x-^m-a+b_arcsinh-c_x-^n`

11.1 Problem number 12

$$\int x^4\sinh^{-1}(ax)^2\,dx$$

Optimal antiderivative

$$\frac{16x}{75a^4}-\frac{8x^3}{225a^2}+\frac{2x^5}{125}+\frac{x^5\operatorname{arcsinh}(ax)^2}{5}-\frac{16\operatorname{arcsinh}(ax)\sqrt{a^2x^2+1}}{75a^5}+\frac{8x^2\operatorname{arcsinh}(ax)\sqrt{a^2x^2+1}}{75a^3}-\frac{2x^4\operatorname{arcsinh}(ax)\sqrt{a^2x^2+1}}{25a}$$

command

```
int(x^4*arcsinh(a*x)^2,x)
```

Maple 2022.1 output

$$\int x^4 \operatorname{arcsinh}(ax)^2 \, dx$$

Maple 2021.1 output

$$\frac{\frac{a^5x^5 \operatorname{arcsinh}(ax)^2}{5} - \frac{16\sqrt{a^2x^2+1}\,\operatorname{arcsinh}(ax)}{75} - \frac{2a^4x^4 \operatorname{arcsinh}(ax)\sqrt{a^2x^2+1}}{25} + \frac{8\operatorname{arcsinh}(ax)\sqrt{a^2x^2+1}\,a^2x^2}{75} + \frac{16ax}{75} + \frac{2a^5x}{125}}{a^5}$$

11.2 Problem number 13

$$\int x^3 \sinh^{-1}(ax)^2 \, dx$$

Optimal antiderivative

$$-\frac{3x^2}{32a^2} + \frac{x^4}{32} - \frac{3\operatorname{arcsinh}(ax)^2}{32a^4} + \frac{x^4 \operatorname{arcsinh}(ax)^2}{4} + \frac{3x \operatorname{arcsinh}(ax)\sqrt{a^2x^2+1}}{16a^3} - \frac{x^3 \operatorname{arcsinh}(ax)\sqrt{a^2x^2+1}}{8a}$$

command

```
int(x^3*arcsinh(a*x)^2,x)
```

Maple 2022.1 output

$$\int x^3 \operatorname{arcsinh}(ax)^2 \, dx$$

Maple 2021.1 output

$$\frac{\frac{a^4x^4 \operatorname{arcsinh}(ax)^2}{4} - \frac{a^3x^3 \operatorname{arcsinh}(ax)\sqrt{a^2x^2+1}}{8} + \frac{3\operatorname{arcsinh}(ax)\sqrt{a^2x^2+1}\,ax}{16} - \frac{3\operatorname{arcsinh}(ax)^2}{32} + \frac{a^4x^4}{32} - \frac{3a^2x^2}{32} - \frac{3}{32}}{a^4}$$

11.3 Problem number 14

$$\int x^2 \sinh^{-1}(ax)^2 \, dx$$

Optimal antiderivative

$$-\frac{4x}{9a^2}+\frac{2x^3}{27}+\frac{x^3 \operatorname{arcsinh}(ax)^2}{3}+\frac{4 \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{9a^3}-\frac{2x^2 \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{9a}$$

command

```
int(x^2*arcsinh(a*x)^2,x)
```

Maple 2022.1 output

$$\int x^2 \operatorname{arcsinh}\left(ax\right)^2 \, dx$$

Maple 2021.1 output

$$\frac{\frac{a^3x^3 \operatorname{arcsinh}(ax)^2}{3}+\frac{4\sqrt{a^2x^2+1}\ \operatorname{arcsinh}(ax)}{9}-\frac{2 \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}\ a^2x^2}{9}-\frac{4ax}{9}+\frac{2a^3x^3}{27}}{a^3}$$

11.4 Problem number 22

$$\int x^4 \sinh^{-1}(ax)^3 \, dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{76\left(a^2x^2+1\right)^{\frac{3}{2}}}{1125a^5}-\frac{6\left(a^2x^2+1\right)^{\frac{5}{2}}}{625a^5}+\frac{16x \operatorname{arcsinh}(ax)}{25a^4}-\frac{8x^3 \operatorname{arcsinh}(ax)}{75a^2}\\&+\frac{6x^5 \operatorname{arcsinh}(ax)}{125}+\frac{x^5 \operatorname{arcsinh}(ax)^3}{5}-\frac{298\sqrt{a^2x^2+1}}{375a^5}-\frac{8 \operatorname{arcsinh}(ax)^2 \sqrt{a^2x^2+1}}{25a^5}\\&+\frac{4x^2 \operatorname{arcsinh}(ax)^2 \sqrt{a^2x^2+1}}{25a^3}-\frac{3x^4 \operatorname{arcsinh}(ax)^2 \sqrt{a^2x^2+1}}{25a}\end{aligned}$$

command

```
int(x^4*arcsinh(a*x)^3,x)
```

Maple 2022.1 output

$$\int x^4 \operatorname{arcsinh}\left(ax\right)^3 \, dx$$

Maple 2021.1 output

$$\frac{\frac{a^5x^5 \operatorname{arcsinh}(ax)^3}{5}-\frac{8 \operatorname{arcsinh}(ax)^2 \sqrt{a^2x^2+1}}{25}-\frac{3a^4x^4 \operatorname{arcsinh}(ax)^2 \sqrt{a^2x^2+1}}{25}+\frac{4 \operatorname{arcsinh}(ax)^2 \sqrt{a^2x^2+1}\ a^2x^2}{25}+\frac{16ax \operatorname{arcsinh}}{25}}{a^5}$$

11.5 Problem number 23

$$\int x^3 \sinh^{-1}(ax)^3 \, dx$$

Optimal antiderivative

$$-\frac{45 \operatorname{arcsinh}(ax)}{256a^4} - \frac{9x^2 \operatorname{arcsinh}(ax)}{32a^2} + \frac{3x^4 \operatorname{arcsinh}(ax)}{32} - \frac{3 \operatorname{arcsinh}(ax)^3}{32a^4} + \frac{x^4 \operatorname{arcsinh}(ax)^3}{4} + \frac{45x\sqrt{a^2x^2+1}}{256a^3} - \frac{3x^3\sqrt{a^2x^2+1}}{128a} + \frac{9x \operatorname{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{32a^3} - \frac{3x^3 \operatorname{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{16a}$$

command

```
int(x^3*arcsinh(a*x)^3,x)
```

Maple 2022.1 output

$$\int x^3 \operatorname{arcsinh}(ax)^3 \, dx$$

Maple 2021.1 output

$$\frac{\frac{a^4x^4 \operatorname{arcsinh}(ax)^3}{4} - \frac{3a^3x^3 \operatorname{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{16} + \frac{9ax \operatorname{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{32} - \frac{3 \operatorname{arcsinh}(ax)^3}{32} + \frac{3 \operatorname{arcsinh}(ax)a^4x^4}{32} - \frac{3a^3x^3\sqrt{}}{}}{a^4}$$

11.6 Problem number 24

$$\int x^2 \sinh^{-1}(ax)^3 \, dx$$

Optimal antiderivative

$$-\frac{2(a^2x^2+1)^{\frac{3}{2}}}{27a^3} - \frac{4x \operatorname{arcsinh}(ax)}{3a^2} + \frac{2x^3 \operatorname{arcsinh}(ax)}{9} + \frac{x^3 \operatorname{arcsinh}(ax)^3}{3} + \frac{14\sqrt{a^2x^2+1}}{9a^3} + \frac{2 \operatorname{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{3a^3} - \frac{x^2 \operatorname{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{3a}$$

command

```
int(x^2*arcsinh(a*x)^3,x)
```

Maple 2022.1 output

$$\int x^2 \operatorname{arcsinh}(ax)^3 \, dx$$

Maple 2021.1 output

$$\frac{\frac{a^3x^3 \operatorname{arcsinh}(ax)^3}{3} + \frac{2 \operatorname{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{3} - \frac{\operatorname{arcsinh}(ax)^2\sqrt{a^2x^2+1}\,a^2x^2}{3} - \frac{4ax \operatorname{arcsinh}(ax)}{3} + \frac{40\sqrt{a^2x^2+1}}{27} + \frac{2a^3x^3 \operatorname{arcs}}{9}}{a^3}$$

11.7 Problem number 32

$$\int x^5 \sinh^{-1}(ax)^4 \, dx$$

Optimal antiderivative

$$\frac{245x^2}{1152a^4} - \frac{65x^4}{3456a^2} + \frac{x^6}{324} + \frac{245 \operatorname{arcsinh}(ax)^2}{1152a^6} + \frac{5x^2 \operatorname{arcsinh}(ax)^2}{16a^4} - \frac{5x^4 \operatorname{arcsinh}(ax)^2}{48a^2} + \frac{x^6 \operatorname{arcsinh}(ax)^2}{18} + \frac{5 \operatorname{arcsinh}(ax)^4}{96a^6} + \frac{x^6 \operatorname{arcsinh}(ax)^4}{6} - \frac{245x \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{576a^5} + \frac{65x^3 \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{864a^3} - \frac{x^5 \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{54a} - \frac{5x \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{24a^5} + \frac{5x^3 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{36a^3} - \frac{x^5 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{9a}$$

command

```
int(x^5*arcsinh(a*x)^4,x)
```

Maple 2022.1 output

$$\int x^5 \operatorname{arcsinh}(ax)^4 \, dx$$

Maple 2021.1 output

$$\frac{a^6x^6 \operatorname{arcsinh}(ax)^4}{6} - \frac{a^5x^5 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{9} + \frac{5a^3x^3 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{36} - \frac{5ax \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{24} + \frac{5 \operatorname{arcsinh}(a$$

11.8 Problem number 33

$$\int x^4 \sinh^{-1}(ax)^4 \, dx$$

Optimal antiderivative

$$\frac{16576x}{5625a^4} - \frac{1088x^3}{16875a^2} + \frac{24x^5}{3125} + \frac{32x \operatorname{arcsinh}(ax)^2}{25a^4} - \frac{16x^3 \operatorname{arcsinh}(ax)^2}{75a^2} + \frac{12x^5 \operatorname{arcsinh}(ax)^2}{125} + \frac{x^5 \operatorname{arcsinh}(ax)^4}{5} - \frac{16576 \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{5625a^5} + \frac{1088x^2 \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{5625a^3} - \frac{24x^4 \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{625a} - \frac{32 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{75a^5} + \frac{16x^2 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{75a^3} - \frac{4x^4 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{25a}$$

command

```
int(x^4*arcsinh(a*x)^4,x)
```

Maple 2022.1 output

$$\int x^4 \operatorname{arcsinh}(ax)^4 \, dx$$

Maple 2021.1 output

$$\frac{a^5x^5 \operatorname{arcsinh}(ax)^4}{5} - \frac{32 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{75} - \frac{4a^4x^4 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{25} + \frac{16a^2x^2 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{75} + \frac{32ax \operatorname{arcsi}}{25}$$

11.9 Problem number 34

$$\int x^3 \sinh^{-1}(ax)^4 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&-\frac{45x^2}{128a^2} + \frac{3x^4}{128} - \frac{45 \operatorname{arcsinh}(ax)^2}{128a^4} - \frac{9x^2 \operatorname{arcsinh}(ax)^2}{16a^2} + \frac{3x^4 \operatorname{arcsinh}(ax)^2}{16} - \frac{3 \operatorname{arcsinh}(ax)^4}{32a^4} \\
&+ \frac{x^4 \operatorname{arcsinh}(ax)^4}{4} + \frac{45x \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{64a^3} - \frac{3x^3 \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{32a} \\
&+ \frac{3x \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{8a^3} - \frac{x^3 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{4a}
\end{aligned}$$

command

```
int(x^3*arcsinh(a*x)^4,x)
```

Maple 2022.1 output

$$\int x^3 \operatorname{arcsinh}(ax)^4 \, dx$$

Maple 2021.1 output

$$\frac{a^4x^4 \operatorname{arcsinh}(ax)^4}{4} - \frac{a^3x^3 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{4} + \frac{3ax \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{8} - \frac{3 \operatorname{arcsinh}(ax)^4}{32} + \frac{3a^4x^4 \operatorname{arcsinh}(ax)^2}{16} - \frac{3a^3x^3 a}{a^4}$$

11.10 Problem number 35

$$\int x^2 \sinh^{-1}(ax)^4 \, dx$$

Optimal antiderivative

$$-\frac{160x}{27a^2} + \frac{8x^3}{81} - \frac{8x \operatorname{arcsinh}(ax)^2}{3a^2} + \frac{4x^3 \operatorname{arcsinh}(ax)^2}{9} + \frac{x^3 \operatorname{arcsinh}(ax)^4}{3} + \frac{160 \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{27a^3} - \frac{8x^2 \operatorname{arcsinh}(ax) \sqrt{a^2x^2+1}}{27a} + \frac{8 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{9a^3} - \frac{4x^2 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{9a}$$

command

```
int(x^2*arcsinh(a*x)^4,x)
```

Maple 2022.1 output

$$\int x^2 \operatorname{arcsinh}(ax)^4 \, dx$$

Maple 2021.1 output

$$\frac{\frac{a^3x^3 \operatorname{arcsinh}(ax)^4}{3} + \frac{8 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{9} - \frac{4a^2x^2 \operatorname{arcsinh}(ax)^3 \sqrt{a^2x^2+1}}{9} - \frac{8ax \operatorname{arcsinh}(ax)^2}{3} + \frac{160\sqrt{a^2x^2+1}\ \operatorname{arcsinh}(ax}{27}}{a^3}$$

12 Test file number 187

Test folder name:

```
test_cases/7_Inverse_hyperbolic_functions/7.1_Inverse_hyperbolic_sine/187_7.1.4-f_x-
^m-d+e_x^2-^p-a+b_arcsinh-c_x-^n
```

12.1 Problem number 55

$$\int x^3 \sqrt{\pi + c^2\pi x^2} \left(a + b \sinh^{-1}(cx)\right) \, dx$$

Optimal antiderivative

$$-\frac{\left(c^2\pi x^2 + \pi\right)^{\frac{3}{2}} \left(a + b \operatorname{arcsinh}(cx)\right)}{3c^4\pi} + \frac{\left(c^2\pi x^2 + \pi\right)^{\frac{5}{2}} \left(a + b \operatorname{arcsinh}(cx)\right)}{5c^4\pi^2} + \frac{2bx\sqrt{\pi}}{15c^3} - \frac{b x^3 \sqrt{\pi}}{45c} - \frac{bc x^5 \sqrt{\pi}}{25}$$

command

```
int(x^3*(a+b*arcsinh(c*x))*(Pi*c^2*x^2+Pi)^(1/2),x)
```

Maple 2022.1 output

$$\int x^3(a+b\,\mathrm{arcsinh}\,(cx))\,\sqrt{\pi\,c^2x^2+\pi}\,dx$$

Maple 2021.1 output

$$a\left(\frac{x^2\left(\pi\,c^2x^2+\pi\right)^{\frac{3}{2}}}{5\pi\,c^2}-\frac{2\left(\pi\,c^2x^2+\pi\right)^{\frac{3}{2}}}{15\pi\,c^4}\right)$$
$$+\frac{b\sqrt{\pi}\,\left(45\,\mathrm{arcsinh}\,(cx)\,c^6x^6+60\,\mathrm{arcsinh}\,(cx)\,c^4x^4-9c^5x^5\sqrt{c^2x^2+1}\,-15\,\mathrm{arcsinh}\,(cx)\,c^2x^2-5c^3x^3\sqrt{c^2x^2+1}\,-\right.}{225c^4\sqrt{c^2x^2+1}}$$

12.2 Problem number 57

$$\int x\sqrt{\pi+c^2\pi x^2}\,\left(a+b\sinh^{-1}(cx)\right)\,dx$$

Optimal antiderivative

$$\frac{\left(c^2\pi\,x^2+\pi\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{3c^2\pi}-\frac{bx\sqrt{\pi}}{3c}-\frac{bc\,x^3\sqrt{\pi}}{9}$$

command

```
int(x*(a+b*arcsinh(c*x))*(Pi*c^2*x^2+Pi)^(1/2),x)
```

Maple 2022.1 output

$$\int x(a+b\,\mathrm{arcsinh}\,(cx))\,\sqrt{\pi\,c^2x^2+\pi}\,dx$$

Maple 2021.1 output

$$\frac{a\left(\pi\,c^2x^2+\pi\right)^{\frac{3}{2}}}{3\pi\,c^2}$$
$$+\frac{b\sqrt{\pi}\,\left(3\,\mathrm{arcsinh}\,(cx)\,c^4x^4+6\,\mathrm{arcsinh}\,(cx)\,c^2x^2-c^3x^3\sqrt{c^2x^2+1}\,+3\,\mathrm{arcsinh}\,(cx)-3cx\sqrt{c^2x^2+1}\,\right)}{9c^2\sqrt{c^2x^2+1}}$$

12.3 Problem number 63

$$\int x^3 \left(\pi + c^2 \pi x^2\right)^{3/2} \left(a + b \sinh^{-1}(cx)\right) \, dx$$

Optimal antiderivative

$$\frac{2b\,\pi^{\frac{3}{2}} x}{35c^3} - \frac{b\,\pi^{\frac{3}{2}} x^3}{105c} - \frac{8bc\,\pi^{\frac{3}{2}} x^5}{175} - \frac{b\,c^3 \pi^{\frac{3}{2}} x^7}{49} - \frac{\left(c^2 \pi\, x^2 + \pi\right)^{\frac{5}{2}} \left(a + b \operatorname{arcsinh}(cx)\right)}{5c^4 \pi} + \frac{\left(c^2 \pi\, x^2 + \pi\right)^{\frac{7}{2}} \left(a + b \operatorname{arcsinh}(cx)\right)}{7c^4 \pi^2}$$

command

```
int(x^3*(Pi*c^2*x^2+Pi)^(3/2)*(a+b*arcsinh(c*x)),x)
```

Maple 2022.1 output

$$\int x^3 \left(\pi\, c^2 x^2 + \pi\right)^{\frac{3}{2}} \left(a + b \operatorname{arcsinh}\left(cx\right)\right) \, dx$$

Maple 2021.1 output

$$a\left(\frac{x^2 \left(\pi\, c^2 x^2 + \pi\right)^{\frac{5}{2}}}{7\pi\, c^2} - \frac{2\left(\pi\, c^2 x^2 + \pi\right)^{\frac{5}{2}}}{35\pi\, c^4}\right) + \frac{b\,\pi^{\frac{3}{2}} \left(525 \operatorname{arcsinh}\left(cx\right) c^8 x^8 + 1365 \operatorname{arcsinh}\left(cx\right) c^6 x^6 - 75 c^7 x^7 \sqrt{c^2 x^2 + 1} + 945 \operatorname{arcsinh}\left(cx\right) c^4 x^4 - 168 c^5 x^5 \sqrt{c^2 x^2}\right.}{3675 c^4 \sqrt{c^2 x^2 + 1}}$$

12.4 Problem number 64

$$\int x^2 \left(\pi + c^2 \pi x^2\right)^{3/2} \left(a + b \sinh^{-1}(cx)\right) \, dx$$

Optimal antiderivative

$$-\frac{b\,\pi^{\frac{3}{2}} x^2}{32c} - \frac{7bc\,\pi^{\frac{3}{2}} x^4}{96} - \frac{b\,c^3 \pi^{\frac{3}{2}} x^6}{36} + \frac{x^3 \left(c^2 \pi\, x^2 + \pi\right)^{\frac{3}{2}} \left(a + b \operatorname{arcsinh}(cx)\right)}{6} - \frac{\pi^{\frac{3}{2}} (a + b \operatorname{arcsinh}(cx))^2}{32b\,c^3} + \frac{\pi^{\frac{3}{2}} x (a + b \operatorname{arcsinh}(cx)) \sqrt{c^2 x^2 + 1}}{16c^2} + \frac{\pi\, x^3 (a + b \operatorname{arcsinh}(cx)) \sqrt{c^2 \pi\, x^2 + \pi}}{8}$$

command

```
int(x^2*(Pi*c^2*x^2+Pi)^(3/2)*(a+b*arcsinh(c*x)),x)
```

Maple 2022.1 output

$$\int x^2\left(\pi\, c^2x^2+\pi\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)\,dx$$

Maple 2021.1 output

$$\begin{aligned}&\frac{ax\left(\pi\, c^2x^2+\pi\right)^{\frac{5}{2}}}{6\pi\, c^2}-\frac{ax\left(\pi\, c^2x^2+\pi\right)^{\frac{3}{2}}}{24c^2}-\frac{a\pi x\sqrt{\pi\, c^2x^2+\pi}}{16c^2}\\&-\frac{a\,\pi^2\ln\left(\frac{\pi x\,c^2}{\sqrt{\pi\, c^2}}+\sqrt{\pi\, c^2x^2+\pi}\right)}{16c^2\sqrt{\pi\, c^2}}+\frac{b\,\pi^{\frac{3}{2}}c^2\,\mathrm{arcsinh}\left(cx\right)\sqrt{c^2x^2+1}\,x^5}{6}\\&-\frac{b\,c^3\pi^{\frac{3}{2}}x^6}{36}+\frac{7b\,\pi^{\frac{3}{2}}\,\mathrm{arcsinh}\left(cx\right)\sqrt{c^2x^2+1}\,x^3}{24}-\frac{7bc\,\pi^{\frac{3}{2}}x^4}{96}\\&+\frac{b\,\pi^{\frac{3}{2}}\,\mathrm{arcsinh}\left(cx\right)\sqrt{c^2x^2+1}\,x}{16c^2}-\frac{b\,\pi^{\frac{3}{2}}x^2}{32c}-\frac{b\,\pi^{\frac{3}{2}}\,\mathrm{arcsinh}\left(cx\right)^2}{32c^3}+\frac{b\,\pi^{\frac{3}{2}}}{72c^3}\end{aligned}$$

12.5 Problem number 65

$$\int x\left(\pi+c^2\pi x^2\right)^{3/2}\left(a+b\,\mathrm{sinh}^{-1}(cx)\right)\,dx$$

Optimal antiderivative

$$-\frac{b\,\pi^{\frac{3}{2}}x}{5c}-\frac{2bc\,\pi^{\frac{3}{2}}x^3}{15}-\frac{b\,c^3\pi^{\frac{3}{2}}x^5}{25}+\frac{\left(c^2\pi\,x^2+\pi\right)^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{5c^2\pi}$$

command

```
int(x*(Pi*c^2*x^2+Pi)^(3/2)*(a+b*arcsinh(c*x)),x)
```

Maple 2022.1 output

$$\int x\left(\pi\, c^2x^2+\pi\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)\,dx$$

Maple 2021.1 output

$$\begin{aligned}&\frac{a\left(\pi\, c^2x^2+\pi\right)^{\frac{5}{2}}}{5\pi\, c^2}\\&+\frac{b\,\pi^{\frac{3}{2}}\left(15\,\mathrm{arcsinh}\left(cx\right)c^6x^6+45\,\mathrm{arcsinh}\left(cx\right)c^4x^4-3c^5x^5\sqrt{c^2x^2+1}+45\,\mathrm{arcsinh}\left(cx\right)c^2x^2-10c^3x^3\sqrt{c^2x^2+1}+\right.}{75c^2\sqrt{c^2x^2+1}}\end{aligned}$$

12.6 Problem number 66

$$\int \left(\pi + c^2\pi x^2\right)^{3/2} \left(a + b\sinh^{-1}(cx)\right)\, dx$$

Optimal antiderivative

$$-\frac{5bc\,\pi^{\frac{3}{2}}x^2}{16} - \frac{b\,c^3\pi^{\frac{3}{2}}x^4}{16} + \frac{x\left(c^2\pi\,x^2+\pi\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{4} + \frac{3\pi^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)^2}{16bc} + \frac{3\pi x\left(a+b\,\mathrm{arcsinh}(cx)\right)\sqrt{c^2\pi\,x^2+\pi}}{8}$$

command

```
int((Pi*c^2*x^2+Pi)^(3/2)*(a+b*arcsinh(c*x)),x)
```

Maple 2022.1 output

$$\int \left(\pi\,c^2x^2+\pi\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)\, dx$$

Maple 2021.1 output

$$\frac{x\left(\pi\,c^2x^2+\pi\right)^{\frac{3}{2}}a}{4} + \frac{3a\pi x\sqrt{\pi\,c^2x^2+\pi}}{8} + \frac{3a\,\pi^2\ln\left(\frac{\pi x\,c^2}{\sqrt{\pi\,c^2}}+\sqrt{\pi\,c^2x^2+\pi}\right)}{8\sqrt{\pi\,c^2}} + \frac{b\,\pi^{\frac{3}{2}}c^2\sqrt{c^2x^2+1}\,\mathrm{arcsinh}\left(cx\right)x^3}{4} - \frac{b\,c^3\pi^{\frac{3}{2}}x^4}{16} + \frac{5b\,\pi^{\frac{3}{2}}\,\mathrm{arcsinh}\left(cx\right)\sqrt{c^2x^2+1}\,x}{8} - \frac{5bc\,\pi^{\frac{3}{2}}x^2}{16} + \frac{3b\,\pi^{\frac{3}{2}}\,\mathrm{arcsinh}\left(cx\right)^2}{16c} - \frac{b\,\pi^{\frac{3}{2}}}{4c}$$

12.7 Problem number 71

$$\int x^3\left(\pi + c^2\pi x^2\right)^{5/2}\left(a + b\sinh^{-1}(cx)\right)\, dx$$

Optimal antiderivative

$$\frac{2b\,\pi^{\frac{5}{2}}x}{63c^3} - \frac{b\,\pi^{\frac{5}{2}}x^3}{189c} - \frac{bc\,\pi^{\frac{5}{2}}x^5}{21} - \frac{19b\,c^3\pi^{\frac{5}{2}}x^7}{441} - \frac{b\,c^5\pi^{\frac{5}{2}}x^9}{81} - \frac{\left(c^2\pi\,x^2+\pi\right)^{\frac{7}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{7c^4\pi} + \frac{\left(c^2\pi\,x^2+\pi\right)^{\frac{9}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{9c^4\pi^2}$$

command

```
int(x^3*(Pi*c^2*x^2+Pi)^(5/2)*(a+b*arcsinh(c*x)),x)
```

Maple 2022.1 output

$$\int x^3 \left(\pi\, c^2 x^2+\pi\right)^{\frac{5}{2}} \left(a+b \operatorname{arcsinh}\left(c x\right)\right)\, dx$$

Maple 2021.1 output

$$a\left(\frac{x^2 \left(\pi\, c^2 x^2+\pi\right)^{\frac{7}{2}}}{9\pi\, c^2}-\frac{2\left(\pi\, c^2 x^2+\pi\right)^{\frac{7}{2}}}{63\pi\, c^4}\right)$$
$$+\frac{b\,\pi^{\frac{5}{2}}\left(441 \operatorname{arcsinh}\left(c x\right) c^{10} x^{10}+1638 \operatorname{arcsinh}\left(c x\right) c^8 x^8-49 c^9 x^9 \sqrt{c^2 x^2+1}+2142 \operatorname{arcsinh}\left(c x\right) c^6 x^6-171 c^7 x^7 \sqrt{c\right.}$$

12.8 Problem number 72

$$\int x^2 \left(\pi+c^2 \pi x^2\right)^{5/2} \left(a+b \sinh^{-1}(c x)\right)\, dx$$

Optimal antiderivative

$$-\frac{5b\,\pi^{\frac{5}{2}} x^2}{256c}-\frac{59bc\,\pi^{\frac{5}{2}} x^4}{768}-\frac{17b\,c^3\pi^{\frac{5}{2}} x^6}{288}-\frac{b\,c^5\pi^{\frac{5}{2}} x^8}{64}+\frac{5\pi\, x^3\left(c^2\pi\, x^2+\pi\right)^{\frac{3}{2}}\left(a+b \operatorname{arcsinh}(c x)\right)}{48}$$
$$+\frac{x^3\left(c^2\pi\, x^2+\pi\right)^{\frac{5}{2}}\left(a+b \operatorname{arcsinh}(c x)\right)}{8}-\frac{5\pi^{\frac{5}{2}}\left(a+b \operatorname{arcsinh}(c x)\right)^2}{256b\,c^3}$$
$$+\frac{5\pi^{\frac{5}{2}} x\left(a+b \operatorname{arcsinh}(c x)\right)\sqrt{c^2x^2+1}}{128c^2}+\frac{5\pi^2 x^3\left(a+b \operatorname{arcsinh}(c x)\right)\sqrt{c^2\pi\, x^2+\pi}}{64}$$

command

```
int(x^2*(Pi*c^2*x^2+Pi)^(5/2)*(a+b*arcsinh(c*x)),x)
```

Maple 2022.1 output

$$\int x^2 \left(\pi\, c^2 x^2+\pi\right)^{\frac{5}{2}} \left(a+b \operatorname{arcsinh}\left(c x\right)\right)\, dx$$

Maple 2021.1 output

$$\frac{ax\left(\pi\, c^2 x^2+\pi\right)^{\frac{7}{2}}}{8\pi\, c^2}-\frac{ax\left(\pi\, c^2 x^2+\pi\right)^{\frac{5}{2}}}{48c^2}-\frac{5a\pi x\left(\pi\, c^2 x^2+\pi\right)^{\frac{3}{2}}}{192c^2}-\frac{5a\,\pi^2 x\sqrt{\pi\, c^2 x^2+\pi}}{128c^2}$$
$$-\frac{5a\,\pi^3 \ln\left(\frac{\pi x\, c^2}{\sqrt{\pi\, c^2}}+\sqrt{\pi\, c^2 x^2+\pi}\right)}{128c^2\sqrt{\pi\, c^2}}+\frac{b\,\pi^{\frac{5}{2}} c^4 \operatorname{arcsinh}\left(c x\right)\sqrt{c^2x^2+1}\, x^7}{8}-\frac{b\,c^5\pi^{\frac{5}{2}} x^8}{64}$$
$$+\frac{17b\,\pi^{\frac{5}{2}} c^2 \operatorname{arcsinh}\left(c x\right)\sqrt{c^2x^2+1}\, x^5}{48}-\frac{17b\,c^3\pi^{\frac{5}{2}} x^6}{288}+\frac{59b\,\pi^{\frac{5}{2}} \operatorname{arcsinh}\left(c x\right)\sqrt{c^2x^2+1}\, x^3}{192}$$
$$-\frac{59bc\,\pi^{\frac{5}{2}} x^4}{768}+\frac{5b\,\pi^{\frac{5}{2}} \operatorname{arcsinh}\left(c x\right)\sqrt{c^2x^2+1}\, x}{128c^2}-\frac{5b\,\pi^{\frac{5}{2}} x^2}{256c}-\frac{5b\,\pi^{\frac{5}{2}} \operatorname{arcsinh}\left(c x\right)^2}{256c^3}+\frac{b\,\pi^{\frac{5}{2}}}{72c^3}$$

12.9 Problem number 73

$$\int x\left(\pi + c^2\pi x^2\right)^{5/2}\left(a + b\sinh^{-1}(cx)\right)\,dx$$

Optimal antiderivative

$$-\frac{b\,\pi^{\frac{5}{2}}x}{7c} - \frac{bc\,\pi^{\frac{5}{2}}x^3}{7} - \frac{3b\,c^3\pi^{\frac{5}{2}}x^5}{35} - \frac{b\,c^5\pi^{\frac{5}{2}}x^7}{49} + \frac{\left(c^2\pi\,x^2+\pi\right)^{\frac{7}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{7c^2\pi}$$

command

```
int(x*(Pi*c^2*x^2+Pi)^(5/2)*(a+b*arcsinh(c*x)),x)
```

Maple 2022.1 output

$$\int x\left(\pi\,c^2x^2+\pi\right)^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)\,dx$$

Maple 2021.1 output

$$\frac{a\left(\pi\,c^2x^2+\pi\right)^{\frac{7}{2}}}{7\pi\,c^2}$$
$$+\frac{b\,\pi^{\frac{5}{2}}\Big(35\,\mathrm{arcsinh}\left(cx\right)c^8x^8+140\,\mathrm{arcsinh}\left(cx\right)c^6x^6-5c^7x^7\sqrt{c^2x^2+1}+210\,\mathrm{arcsinh}\left(cx\right)c^4x^4-21c^5x^5\sqrt{c^2x^2+1}}{245c^2\sqrt{c^2x^2+1}}$$

12.10 Problem number 74

$$\int \left(\pi + c^2\pi x^2\right)^{5/2}\left(a + b\sinh^{-1}(cx)\right)\,dx$$

Optimal antiderivative

$$-\frac{25bc\,\pi^{\frac{5}{2}}x^2}{96} - \frac{5b\,c^3\pi^{\frac{5}{2}}x^4}{96} - \frac{b\,\pi^{\frac{5}{2}}\left(c^2x^2+1\right)^3}{36c} + \frac{5\pi x\left(c^2\pi\,x^2+\pi\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{24}$$
$$+\frac{x\left(c^2\pi\,x^2+\pi\right)^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{6} + \frac{5\pi^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)^2}{32bc}$$
$$+\frac{5\pi^2x\left(a+b\,\mathrm{arcsinh}(cx)\right)\sqrt{c^2\pi\,x^2+\pi}}{16}$$

command

```
int((Pi*c^2*x^2+Pi)^(5/2)*(a+b*arcsinh(c*x)),x)
```

Maple 2022.1 output

$$\int \left(\pi\, c^2 x^2+\pi\right)^{\frac{5}{2}} \left(a+b \operatorname{arcsinh}\left(c x\right)\right)\, dx$$

Maple 2021.1 output

$$\frac{x\left(\pi\, c^2 x^2+\pi\right)^{\frac{5}{2}} a}{6}+\frac{5 a \pi x\left(\pi\, c^2 x^2+\pi\right)^{\frac{3}{2}}}{24}+\frac{5 a\, \pi^2 x \sqrt{\pi\, c^2 x^2+\pi}}{16}$$
$$+\frac{5 a\, \pi^3 \ln\left(\frac{\pi x\, c^2}{\sqrt{\pi\, c^2}}+\sqrt{\pi\, c^2 x^2+\pi}\right)}{16 \sqrt{\pi\, c^2}}+\frac{b\, \pi^{\frac{5}{2}} c^4 \operatorname{arcsinh}\left(c x\right) \sqrt{c^2 x^2+1}\, x^5}{6}$$
$$-\frac{b\, \pi^{\frac{5}{2}} c^5 x^6}{36}+\frac{13 b\, \pi^{\frac{5}{2}} c^2 \operatorname{arcsinh}\left(c x\right) \sqrt{c^2 x^2+1}\, x^3}{24}-\frac{13 b\, c^3 \pi^{\frac{5}{2}} x^4}{96}$$
$$+\frac{11 b\, \pi^{\frac{5}{2}} \operatorname{arcsinh}\left(c x\right) \sqrt{c^2 x^2+1}\, x}{16}-\frac{11 b c\, \pi^{\frac{5}{2}} x^2}{32}+\frac{5 b\, \pi^{\frac{5}{2}} \operatorname{arcsinh}\left(c x\right)^2}{32 c}-\frac{17 b\, \pi^{\frac{5}{2}}}{72 c}$$

12.11 Problem number 80

$$\int \frac{x^5 \left(a+b \sinh^{-1}(c x)\right)}{\sqrt{\pi+c^2 \pi x^2}}\, dx$$

Optimal antiderivative

$$-\frac{8 b x}{15 c^5 \sqrt{\pi}}+\frac{4 b\, x^3}{45 c^3 \sqrt{\pi}}-\frac{b\, x^5}{25 c \sqrt{\pi}}+\frac{8 (a+b \operatorname{arcsinh}(c x)) \sqrt{c^2 \pi\, x^2+\pi}}{15 c^6 \pi}$$
$$-\frac{4 x^2 (a+b \operatorname{arcsinh}(c x)) \sqrt{c^2 \pi\, x^2+\pi}}{15 c^4 \pi}+\frac{x^4 (a+b \operatorname{arcsinh}(c x)) \sqrt{c^2 \pi\, x^2+\pi}}{5 c^2 \pi}$$

command

```
int(x^5*(a+b*arcsinh(c*x))/(Pi*c^2*x^2+Pi)^(1/2),x)
```

Maple 2022.1 output

$$\int \frac{x^5 (a+b \operatorname{arcsinh}\left(c x\right))}{\sqrt{\pi\, c^2 x^2+\pi}}\, dx$$

Maple 2021.1 output

$$a\left(\frac{x^4 \sqrt{\pi\, c^2 x^2+\pi}}{5 \pi\, c^2}-\frac{4\left(\frac{x^2 \sqrt{\pi\, c^2 x^2+\pi}}{3 \pi\, c^2}-\frac{2 \sqrt{\pi\, c^2 x^2+\pi}}{3 \pi\, c^4}\right)}{5 c^2}\right)$$
$$+\frac{b\left(45 \operatorname{arcsinh}\left(c x\right) c^6 x^6-15 \operatorname{arcsinh}\left(c x\right) c^4 x^4-9 c^5 x^5 \sqrt{c^2 x^2+1}+60 \operatorname{arcsinh}\left(c x\right) c^2 x^2+20 c^3 x^3 \sqrt{c^2 x^2+1}+12\right.}{225 c^6 \sqrt{\pi}\ \sqrt{c^2 x^2+1}}$$

12.12 Problem number 81

$$\int \frac{x^4\left(a+b\sinh^{-1}(cx)\right)}{\sqrt{\pi+c^2\pi x^2}}\,dx$$

Optimal antiderivative

$$\frac{3b\,x^2}{16c^3\sqrt{\pi}}-\frac{b\,x^4}{16c\sqrt{\pi}}+\frac{3(a+b\,\mathrm{arcsinh}(cx))^2}{16b\,c^5\sqrt{\pi}}$$
$$-\frac{3x(a+b\,\mathrm{arcsinh}(cx))\,\sqrt{c^2\pi\,x^2+\pi}}{8c^4\pi}+\frac{x^3(a+b\,\mathrm{arcsinh}(cx))\,\sqrt{c^2\pi\,x^2+\pi}}{4c^2\pi}$$

command

```
int(x^4*(a+b*arcsinh(c*x))/(Pi*c^2*x^2+Pi)^(1/2),x)
```

Maple 2022.1 output

$$\int \frac{x^4(a+b\,\mathrm{arcsinh}\,(cx))}{\sqrt{\pi\,c^2x^2+\pi}}\,dx$$

Maple 2021.1 output

$$\frac{a\,x^3\sqrt{\pi\,c^2x^2+\pi}}{4\pi\,c^2}-\frac{3ax\sqrt{\pi\,c^2x^2+\pi}}{8c^4\pi}+\frac{3a\ln\left(\frac{\pi x\,c^2}{\sqrt{\pi\,c^2}}+\sqrt{\pi\,c^2x^2+\pi}\right)}{8c^4\sqrt{\pi\,c^2}}$$
$$+\frac{b\,\mathrm{arcsinh}\,(cx)\,\sqrt{c^2x^2+1}\,x^3}{4c^2\sqrt{\pi}}-\frac{b\,x^4}{16c\sqrt{\pi}}-\frac{3b\,\mathrm{arcsinh}\,(cx)\,\sqrt{c^2x^2+1}\,x}{8c^4\sqrt{\pi}}$$
$$+\frac{3b\,x^2}{16c^3\sqrt{\pi}}+\frac{3b\,\mathrm{arcsinh}\,(cx)^2}{16c^5\sqrt{\pi}}+\frac{3b}{16c^5\sqrt{\pi}}$$

12.13 Problem number 82

$$\int \frac{x^3\left(a+b\sinh^{-1}(cx)\right)}{\sqrt{\pi+c^2\pi x^2}}\,dx$$

Optimal antiderivative

$$\frac{2bx}{3c^3\sqrt{\pi}}-\frac{b\,x^3}{9c\sqrt{\pi}}-\frac{2(a+b\,\mathrm{arcsinh}(cx))\,\sqrt{c^2\pi\,x^2+\pi}}{3c^4\pi}+\frac{x^2(a+b\,\mathrm{arcsinh}(cx))\,\sqrt{c^2\pi\,x^2+\pi}}{3c^2\pi}$$

command

```
int(x^3*(a+b*arcsinh(c*x))/(Pi*c^2*x^2+Pi)^(1/2),x)
```

Maple 2022.1 output

$$\int \frac{x^3(a+b\operatorname{arcsinh}(cx))}{\sqrt{\pi\,c^2x^2+\pi}}\,dx$$

Maple 2021.1 output

$$a\left(\frac{x^2\sqrt{\pi\,c^2x^2+\pi}}{3\pi\,c^2}-\frac{2\sqrt{\pi\,c^2x^2+\pi}}{3\pi\,c^4}\right)$$
$$+\frac{b\left(3\operatorname{arcsinh}(cx)\,c^4x^4-3\operatorname{arcsinh}(cx)\,c^2x^2-c^3x^3\sqrt{c^2x^2+1}-6\operatorname{arcsinh}(cx)+6cx\sqrt{c^2x^2+1}\right)}{9c^4\sqrt{\pi}\,\sqrt{c^2x^2+1}}$$

12.14 Problem number 198

$$\int x^4\left(d+c^2dx^2\right)\left(a+b\sinh^{-1}(cx)\right)^2\,dx$$

Optimal antiderivative

$$\frac{304b^2dx}{3675c^4}-\frac{152b^2d\,x^3}{11025c^2}+\frac{38b^2d\,x^5}{6125}+\frac{2b^2c^2d\,x^7}{343}$$
$$-\frac{2bd\left(c^2x^2+1\right)^{\frac{3}{2}}\left(a+b\operatorname{arcsinh}(cx)\right)}{21c^5}+\frac{4bd\left(c^2x^2+1\right)^{\frac{5}{2}}\left(a+b\operatorname{arcsinh}(cx)\right)}{35c^5}$$
$$-\frac{2bd\left(c^2x^2+1\right)^{\frac{7}{2}}\left(a+b\operatorname{arcsinh}(cx)\right)}{49c^5}+\frac{2d\,x^5(a+b\operatorname{arcsinh}(cx))^2}{35}$$
$$+\frac{d\,x^5\left(c^2x^2+1\right)\left(a+b\operatorname{arcsinh}(cx)\right)^2}{7}-\frac{32bd(a+b\operatorname{arcsinh}(cx))\,\sqrt{c^2x^2+1}}{525c^5}$$
$$+\frac{16bd\,x^2(a+b\operatorname{arcsinh}(cx))\,\sqrt{c^2x^2+1}}{525c^3}-\frac{4bd\,x^4(a+b\operatorname{arcsinh}(cx))\,\sqrt{c^2x^2+1}}{175c}$$

command

```
int(x^4*(c^2*d*x^2+d)*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x^4\left(c^2d\,x^2+d\right)\left(a+b\operatorname{arcsinh}(cx)\right)^2\,dx$$

Maple 2021.1 output

$$d\,a^2\left(\tfrac{1}{7}c^7x^7+\tfrac{1}{5}c^5x^5\right)+d\,b^2\left(\frac{\operatorname{arcsinh}(cx)^2c^3x^3\left(c^2x^2+1\right)^2}{7}-\frac{3\operatorname{arcsinh}(cx)^2cx\left(c^2x^2+1\right)^2}{35}+\frac{2\operatorname{arcsinh}(cx)^2cx}{35}+\frac{\operatorname{arcsinh}(cx)^2cx\left(c^2x^2+1\right)}{35}\right.$$

12.15 Problem number 199

$$\int x^3 \left(d+c^2 d x^2\right) \left(a+b \sinh ^{-1}(c x)\right)^2 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&-\frac{b^2 d x^2}{24 c^2}+\frac{b^2 d x^4}{72}+\frac{b^2 c^2 d x^6}{108}-\frac{d (a+b \operatorname{arcsinh}(c x))^2}{24 c^4}+\frac{d x^4 (a+b \operatorname{arcsinh}(c x))^2}{12} \\
&+\frac{d x^4 \left(c^2 x^2+1\right) (a+b \operatorname{arcsinh}(c x))^2}{6}+\frac{b d x (a+b \operatorname{arcsinh}(c x)) \sqrt{c^2 x^2+1}}{12 c^3} \\
&-\frac{b d x^3 (a+b \operatorname{arcsinh}(c x)) \sqrt{c^2 x^2+1}}{18 c}-\frac{b c d x^5 (a+b \operatorname{arcsinh}(c x)) \sqrt{c^2 x^2+1}}{18}
\end{aligned}$$

command

```
int(x^3*(c^2*d*x^2+d)*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x^3 \left(c^2 d x^2+d\right) \left(a+b \operatorname{arcsinh}\left(c x\right)\right)^2 \, dx$$

Maple 2021.1 output

$$d a^2 \left(\frac{1}{6} c^6 x^6+\frac{1}{4} c^4 x^4\right)+d b^2 \left(\frac{\operatorname{arcsinh}(c x)^2 c^2 x^2 \left(c^2 x^2+1\right)^2}{6}-\frac{\operatorname{arcsinh}(c x)^2 \left(c^2 x^2+1\right)^2}{12}-\frac{\operatorname{arcsinh}(c x) c x \left(c^2 x^2+1\right)^{\frac{5}{2}}}{18}+\frac{\operatorname{arcsinh}(c x) c x \left(c^2 x^2\right.}{18}\right.$$

12.16 Problem number 200

$$\int x^2 \left(d+c^2 d x^2\right) \left(a+b \sinh ^{-1}(c x)\right)^2 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&-\frac{52 b^2 d x}{225 c^2}+\frac{26 b^2 d x^3}{675}+\frac{2 b^2 c^2 d x^5}{125}+\frac{2 b d \left(c^2 x^2+1\right)^{\frac{3}{2}} (a+b \operatorname{arcsinh}(c x))}{15 c^3} \\
&-\frac{2 b d \left(c^2 x^2+1\right)^{\frac{5}{2}} (a+b \operatorname{arcsinh}(c x))}{25 c^3}+\frac{2 d x^3 (a+b \operatorname{arcsinh}(c x))^2}{15} \\
&+\frac{d x^3 \left(c^2 x^2+1\right) (a+b \operatorname{arcsinh}(c x))^2}{5}+\frac{8 b d (a+b \operatorname{arcsinh}(c x)) \sqrt{c^2 x^2+1}}{45 c^3} \\
&-\frac{4 b d x^2 (a+b \operatorname{arcsinh}(c x)) \sqrt{c^2 x^2+1}}{45 c}
\end{aligned}$$

command

```
int(x^2*(c^2*d*x^2+d)*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x^2\left(c^2 d\, x^2+d\right)\left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)^2\,dx$$

Maple 2021.1 output

$$d\,a^2\left(\tfrac{1}{5}c^5x^5+\tfrac{1}{3}c^3x^3\right)+d\,b^2\left(\frac{\mathrm{arcsinh}(cx)^2cx\left(c^2x^2+1\right)^2}{5}-\frac{2\,\mathrm{arcsinh}(cx)^2cx}{15}-\frac{\mathrm{arcsinh}(cx)^2cx\left(c^2x^2+1\right)}{15}-\frac{2\,\mathrm{arcsinh}(cx)\left(c^2x^2+1\right)^{\frac{5}{2}}}{25}-\frac{8}{}\right.$$

12.17 Problem number 201

$$\int x\left(d+c^2dx^2\right)\left(a+b\sinh^{-1}(cx)\right)^2\,dx$$

Optimal antiderivative

$$\frac{5b^2d\,x^2}{32}+\frac{b^2c^2d\,x^4}{32}-\frac{bdx\left(c^2x^2+1\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{8c}-\frac{3d(a+b\,\mathrm{arcsinh}(cx))^2}{32c^2}$$
$$+\frac{d\left(c^2x^2+1\right)^2\left(a+b\,\mathrm{arcsinh}(cx)\right)^2}{4c^2}-\frac{3bdx(a+b\,\mathrm{arcsinh}(cx))\sqrt{c^2x^2+1}}{16c}$$

command

```
int(x*(c^2*d*x^2+d)*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x\left(c^2d\,x^2+d\right)\left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)^2\,dx$$

Maple 2021.1 output

$$d\,a^2\left(\tfrac{1}{4}c^4x^4+\tfrac{1}{2}c^2x^2\right)+d\,b^2\left(\frac{\mathrm{arcsinh}(cx)^2\left(c^2x^2+1\right)^2}{4}-\frac{\mathrm{arcsinh}(cx)cx\left(c^2x^2+1\right)^{\frac{3}{2}}}{8}-\frac{3\,\mathrm{arcsinh}(cx)\sqrt{c^2x^2+1}\,cx}{16}-\frac{3\,\mathrm{arcsinh}(cx)^2}{32}+\right.$$
$$c$$

12.18 Problem number 202

$$\int \left(d+c^2dx^2\right)\left(a+b\sinh^{-1}(cx)\right)^2\,dx$$

Optimal antiderivative

$$\frac{14b^2dx}{9}+\frac{2b^2c^2dx^3}{27}-\frac{2bd\left(c^2x^2+1\right)^{\frac{3}{2}}\left(a+b\operatorname{arcsinh}(cx)\right)}{9c}+\frac{2dx(a+b\operatorname{arcsinh}(cx))^2}{3}$$
$$+\frac{dx\left(c^2x^2+1\right)\left(a+b\operatorname{arcsinh}(cx)\right)^2}{3}-\frac{4bd(a+b\operatorname{arcsinh}(cx))\sqrt{c^2x^2+1}}{3c}$$

command

```
int((c^2*d*x^2+d)*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int \left(c^2dx^2+d\right)\left(a+b\operatorname{arcsinh}\left(cx\right)\right)^2\,dx$$

Maple 2021.1 output

$$\frac{da^2\left(\frac{1}{3}c^3x^3+cx\right)+db^2\left(\frac{2\operatorname{arcsinh}(cx)^2cx}{3}+\frac{\operatorname{arcsinh}(cx)^2cx\left(c^2x^2+1\right)}{3}-\frac{4\operatorname{arcsinh}(cx)\sqrt{c^2x^2+1}}{3}+\frac{40cx}{27}-\frac{2\operatorname{arcsinh}(cx)\left(c^2x^2+1\right)}{9}\right.}{c}$$

12.19 Problem number 207

$$\int x^4\left(d+c^2dx^2\right)^2\left(a+b\sinh^{-1}(cx)\right)^2\,dx$$

Optimal antiderivative

$$\frac{4208b^2d^2x}{99225c^4}-\frac{2104b^2d^2x^3}{297675c^2}+\frac{526b^2d^2x^5}{165375}+\frac{212b^2c^2d^2x^7}{27783}+\frac{2b^2c^4d^2x^9}{729}$$
$$-\frac{8bd^2\left(c^2x^2+1\right)^{\frac{3}{2}}\left(a+b\operatorname{arcsinh}(cx)\right)}{189c^5}+\frac{2bd^2\left(c^2x^2+1\right)^{\frac{5}{2}}\left(a+b\operatorname{arcsinh}(cx)\right)}{315c^5}$$
$$+\frac{20bd^2\left(c^2x^2+1\right)^{\frac{7}{2}}\left(a+b\operatorname{arcsinh}(cx)\right)}{441c^5}-\frac{2bd^2\left(c^2x^2+1\right)^{\frac{9}{2}}\left(a+b\operatorname{arcsinh}(cx)\right)}{81c^5}$$
$$+\frac{8d^2x^5(a+b\operatorname{arcsinh}(cx))^2}{315}+\frac{4d^2x^5\left(c^2x^2+1\right)\left(a+b\operatorname{arcsinh}(cx)\right)^2}{63}$$
$$+\frac{d^2x^5\left(c^2x^2+1\right)^2\left(a+b\operatorname{arcsinh}(cx)\right)^2}{9}-\frac{128bd^2(a+b\operatorname{arcsinh}(cx))\sqrt{c^2x^2+1}}{4725c^5}$$
$$+\frac{64bd^2x^2(a+b\operatorname{arcsinh}(cx))\sqrt{c^2x^2+1}}{4725c^3}-\frac{16bd^2x^4(a+b\operatorname{arcsinh}(cx))\sqrt{c^2x^2+1}}{1575c}$$

command

```
int(x^4*(c^2*d*x^2+d)^2*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x^4 \left(c^2 d\, x^2 + d\right)^2 \left(a + b \operatorname{arcsinh}\left(cx\right)\right)^2 \, dx$$

Maple 2021.1 output

$$d^2 a^2 \left(\tfrac{1}{9} c^9 x^9 + \tfrac{2}{7} c^7 x^7 + \tfrac{1}{5} c^5 x^5\right) + d^2 b^2 \left(\frac{\operatorname{arcsinh}(cx)^2 c^3 x^3 \left(c^2 x^2+1\right)^3}{9} - \frac{\operatorname{arcsinh}(cx)^2 cx \left(c^2 x^2+1\right)^3}{21} + \frac{8 \operatorname{arcsinh}(cx)^2 cx}{315} + \frac{\operatorname{arcsinh}(cx)^2 c}{10}\right.$$

12.20 Problem number 208

$$\int x^3 \left(d + c^2 d x^2\right)^2 \left(a + b \sinh^{-1}(cx)\right)^2 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&-\frac{73 b^2 d^2 x^2}{3072 c^2} + \frac{73 b^2 d^2 x^4}{9216} + \frac{43 b^2 c^2 d^2 x^6}{3456} + \frac{b^2 c^4 d^2 x^8}{256} \\
&- \frac{bc\, d^2 x^5 \left(c^2 x^2 + 1\right)^{\frac{3}{2}} \left(a + b \operatorname{arcsinh}(cx)\right)}{32} - \frac{73 d^2 \left(a + b \operatorname{arcsinh}(cx)\right)^2}{3072 c^4} \\
&+ \frac{d^2 x^4 \left(a + b \operatorname{arcsinh}(cx)\right)^2}{24} + \frac{d^2 x^4 \left(c^2 x^2 + 1\right) \left(a + b \operatorname{arcsinh}(cx)\right)^2}{12} \\
&+ \frac{d^2 x^4 \left(c^2 x^2 + 1\right)^2 \left(a + b \operatorname{arcsinh}(cx)\right)^2}{8} + \frac{73 b\, d^2 x \left(a + b \operatorname{arcsinh}(cx)\right) \sqrt{c^2 x^2 + 1}}{1536 c^3} \\
&- \frac{73 b\, d^2 x^3 \left(a + b \operatorname{arcsinh}(cx)\right) \sqrt{c^2 x^2 + 1}}{2304 c} - \frac{25 bc\, d^2 x^5 \left(a + b \operatorname{arcsinh}(cx)\right) \sqrt{c^2 x^2 + 1}}{576}
\end{aligned}$$

command

```
int(x^3*(c^2*d*x^2+d)^2*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x^3 \left(c^2 d\, x^2 + d\right)^2 \left(a + b \operatorname{arcsinh}\left(cx\right)\right)^2 \, dx$$

Maple 2021.1 output

$$d^2 a^2 \left(\tfrac{1}{8} c^8 x^8 + \tfrac{1}{3} c^6 x^6 + \tfrac{1}{4} c^4 x^4\right) + d^2 b^2 \left(\frac{\operatorname{arcsinh}(cx)^2 c^2 x^2 \left(c^2 x^2+1\right)^3}{8} - \frac{\operatorname{arcsinh}(cx)^2 \left(c^2 x^2+1\right)^3}{24} - \frac{\operatorname{arcsinh}(cx) cx \left(c^2 x^2+1\right)^{\frac{7}{2}}}{32} + \frac{11 \operatorname{arcs}\right.$$

12.21 Problem number 209

$$\int x^2 \left(d+c^2 d x^2\right)^2 \left(a+b \sinh ^{-1}(c x)\right)^2 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&-\frac{1636 b^2 d^2 x}{11025 c^2}+\frac{818 b^2 d^2 x^3}{33075}+\frac{136 b^2 c^2 d^2 x^5}{6125}+\frac{2 b^2 c^4 d^2 x^7}{343} \\
&+\frac{8 b\, d^2 \left(c^2 x^2+1\right)^{\frac{3}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{105 c^3}+\frac{2 b\, d^2 \left(c^2 x^2+1\right)^{\frac{5}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{175 c^3} \\
&-\frac{2 b\, d^2 \left(c^2 x^2+1\right)^{\frac{7}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{49 c^3}+\frac{8 d^2 x^3 \left(a+b \operatorname{arcsinh}(c x)\right)^2}{105} \\
&+\frac{4 d^2 x^3 \left(c^2 x^2+1\right) \left(a+b \operatorname{arcsinh}(c x)\right)^2}{35}+\frac{d^2 x^3 \left(c^2 x^2+1\right)^2 \left(a+b \operatorname{arcsinh}(c x)\right)^2}{7} \\
&+\frac{32 b\, d^2 \left(a+b \operatorname{arcsinh}(c x)\right) \sqrt{c^2 x^2+1}}{315 c^3}-\frac{16 b\, d^2 x^2 \left(a+b \operatorname{arcsinh}(c x)\right) \sqrt{c^2 x^2+1}}{315 c}
\end{aligned}$$

command

```
int(x^2*(c^2*d*x^2+d)^2*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x^2 \left(c^2 d\, x^2+d\right)^2 \left(a+b \operatorname{arcsinh}\left(c x\right)\right)^2 \, dx$$

Maple 2021.1 output

$$d^2 a^2 \left(\tfrac{1}{7} c^7 x^7+\tfrac{2}{5} c^5 x^5+\tfrac{1}{3} c^3 x^3\right)+d^2 b^2 \left(\frac{\operatorname{arcsinh}(c x)^2 c x \left(c^2 x^2+1\right)^3}{7}-\frac{8 \operatorname{arcsinh}(c x)^2 c x}{105}-\frac{\operatorname{arcsinh}(c x)^2 c x \left(c^2 x^2+1\right)^2}{35}-\frac{4 \operatorname{arcsinh}(c x)^2 c x}{105}\right.$$

12.22 Problem number 210

$$\int x \left(d+c^2 d x^2\right)^2 \left(a+b \sinh ^{-1}(c x)\right)^2 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{25 b^2 d^2 x^2}{288}+\frac{5 b^2 c^2 d^2 x^4}{288}+\frac{b^2 d^2 \left(c^2 x^2+1\right)^3}{108 c^2}-\frac{5 b\, d^2 x \left(c^2 x^2+1\right)^{\frac{3}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{72 c} \\
&-\frac{b\, d^2 x \left(c^2 x^2+1\right)^{\frac{5}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{18 c}-\frac{5 d^2 \left(a+b \operatorname{arcsinh}(c x)\right)^2}{96 c^2} \\
&+\frac{d^2 \left(c^2 x^2+1\right)^3 \left(a+b \operatorname{arcsinh}(c x)\right)^2}{6 c^2}-\frac{5 b\, d^2 x \left(a+b \operatorname{arcsinh}(c x)\right) \sqrt{c^2 x^2+1}}{48 c}
\end{aligned}$$

command

```
int(x*(c^2*d*x^2+d)^2*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x\left(c^2 d\, x^2+d\right)^2 \left(a+b\,\operatorname{arcsinh}\left(cx\right)\right)^2\, dx$$

Maple 2021.1 output

$$d^2a^2\left(\tfrac{1}{6}c^6x^6+\tfrac{1}{2}c^4x^4+\tfrac{1}{2}c^2x^2\right)+d^2b^2\left(\frac{\operatorname{arcsinh}(cx)^2\left(c^2x^2+1\right)^3}{6}-\frac{\operatorname{arcsinh}(cx)cx\left(c^2x^2+1\right)^{\frac{5}{2}}}{18}-\frac{5\operatorname{arcsinh}(cx)cx\left(c^2x^2+1\right)^{\frac{3}{2}}}{72}-\frac{5\operatorname{arcsinh}\right.$$

12.23 Problem number 211

$$\int \left(d+c^2dx^2\right)^2 \left(a+b\sinh^{-1}(cx)\right)^2\, dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{298b^2d^2x}{225}+\frac{76b^2c^2d^2x^3}{675}+\frac{2b^2c^4d^2x^5}{125}-\frac{8b\,d^2\left(c^2x^2+1\right)^{\frac{3}{2}}\left(a+b\operatorname{arcsinh}(cx)\right)}{45c}\\&-\frac{2b\,d^2\left(c^2x^2+1\right)^{\frac{5}{2}}\left(a+b\operatorname{arcsinh}(cx)\right)}{25c}+\frac{8d^2x(a+b\operatorname{arcsinh}(cx))^2}{15}\\&+\frac{4d^2x\left(c^2x^2+1\right)\left(a+b\operatorname{arcsinh}(cx)\right)^2}{15}+\frac{d^2x\left(c^2x^2+1\right)^2\left(a+b\operatorname{arcsinh}(cx)\right)^2}{5}\\&-\frac{16b\,d^2(a+b\operatorname{arcsinh}(cx))\sqrt{c^2x^2+1}}{15c}\end{aligned}$$

command

```
int((c^2*d*x^2+d)^2*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int \left(c^2 d\, x^2+d\right)^2 \left(a+b\,\operatorname{arcsinh}\left(cx\right)\right)^2\, dx$$

Maple 2021.1 output

$$d^2a^2\left(\tfrac{1}{5}c^5x^5+\tfrac{2}{3}c^3x^3+cx\right)+d^2b^2\left(\frac{8\operatorname{arcsinh}(cx)^2cx}{15}+\frac{\operatorname{arcsinh}(cx)^2cx\left(c^2x^2+1\right)^2}{5}+\frac{4\operatorname{arcsinh}(cx)^2cx\left(c^2x^2+1\right)}{15}-\frac{16\operatorname{arcsinh}(cx)\sqrt{c^2}\right.$$

12.24 Problem number 216

$$\int x^4 \left(d+c^2 d x^2\right)^3 \left(a+b \sinh^{-1}(c x)\right)^2 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{100976 b^2 d^3 x}{4002075 c^4} - \frac{50488 b^2 d^3 x^3}{12006225 c^2} + \frac{12622 b^2 d^3 x^5}{6670125} + \frac{9410 b^2 c^2 d^3 x^7}{1120581} \\
&+ \frac{182 b^2 c^4 d^3 x^9}{29403} + \frac{2 b^2 c^6 d^3 x^{11}}{1331} - \frac{16 b\, d^3 \left(c^2 x^2+1\right)^{\frac{3}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{693 c^5} \\
&+ \frac{4 b\, d^3 \left(c^2 x^2+1\right)^{\frac{5}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{1155 c^5} - \frac{2 b\, d^3 \left(c^2 x^2+1\right)^{\frac{7}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{1617 c^5} \\
&+ \frac{8 b\, d^3 \left(c^2 x^2+1\right)^{\frac{9}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{297 c^5} - \frac{2 b\, d^3 \left(c^2 x^2+1\right)^{\frac{11}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{121 c^5} \\
&+ \frac{16 d^3 x^5 (a+b \operatorname{arcsinh}(c x))^2}{1155} + \frac{8 d^3 x^5 \left(c^2 x^2+1\right) (a+b \operatorname{arcsinh}(c x))^2}{231} \\
&+ \frac{2 d^3 x^5 \left(c^2 x^2+1\right)^2 (a+b \operatorname{arcsinh}(c x))^2}{33} + \frac{d^3 x^5 \left(c^2 x^2+1\right)^3 (a+b \operatorname{arcsinh}(c x))^2}{11} \\
&- \frac{256 b\, d^3 (a+b \operatorname{arcsinh}(c x)) \sqrt{c^2 x^2+1}}{17325 c^5} + \frac{128 b\, d^3 x^2 (a+b \operatorname{arcsinh}(c x)) \sqrt{c^2 x^2+1}}{17325 c^3} \\
&- \frac{32 b\, d^3 x^4 (a+b \operatorname{arcsinh}(c x)) \sqrt{c^2 x^2+1}}{5775 c}
\end{aligned}$$

command

```
int(x^4*(c^2*d*x^2+d)^3*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x^4 \left(c^2 d\, x^2+d\right)^3 \left(a+b \operatorname{arcsinh}\left(c x\right)\right)^2 \, dx$$

Maple 2021.1 output

$$d^3 a^2 \left(\tfrac{1}{11} c^{11} x^{11} + \tfrac{1}{3} c^9 x^9 + \tfrac{3}{7} c^7 x^7 + \tfrac{1}{5} c^5 x^5\right) + d^3 b^2 \left(\frac{\operatorname{arcsinh}(c x)^2 c^3 x^3 \left(c^2 x^2+1\right)^4}{11} - \frac{\operatorname{arcsinh}(c x)^2 c x \left(c^2 x^2+1\right)^4}{33} + \frac{16 \operatorname{arcsinh}(c x)^2 c x}{1155} - \right.$$

12.25 Problem number 217

$$\int x^3 \left(d+c^2 d x^2\right)^3 \left(a+b \sinh^{-1}(c x)\right)^2 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&-\frac{79 b^2 d^3 x^2}{5120 c^2}+\frac{79 b^2 d^3 x^4}{15360}+\frac{401 b^2 c^2 d^3 x^6}{28800}+\frac{57 b^2 c^4 d^3 x^8}{6400}+\frac{b^2 c^6 d^3 x^{10}}{500} \\
&-\frac{b c\, d^3 x^5 \left(c^2 x^2+1\right)^{\frac{3}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{32}-\frac{b c\, d^3 x^5 \left(c^2 x^2+1\right)^{\frac{5}{2}} \left(a+b \operatorname{arcsinh}(c x)\right)}{50} \\
&-\frac{79 d^3 \left(a+b \operatorname{arcsinh}(c x)\right)^2}{5120 c^4}+\frac{d^3 x^4 \left(a+b \operatorname{arcsinh}(c x)\right)^2}{40} \\
&+\frac{d^3 x^4 \left(c^2 x^2+1\right) \left(a+b \operatorname{arcsinh}(c x)\right)^2}{20}+\frac{3 d^3 x^4 \left(c^2 x^2+1\right)^2 \left(a+b \operatorname{arcsinh}(c x)\right)^2}{40} \\
&+\frac{d^3 x^4 \left(c^2 x^2+1\right)^3 \left(a+b \operatorname{arcsinh}(c x)\right)^2}{10}+\frac{79 b\, d^3 x \left(a+b \operatorname{arcsinh}(c x)\right) \sqrt{c^2 x^2+1}}{2560 c^3} \\
&-\frac{79 b\, d^3 x^3 \left(a+b \operatorname{arcsinh}(c x)\right) \sqrt{c^2 x^2+1}}{3840 c}-\frac{31 b c\, d^3 x^5 \left(a+b \operatorname{arcsinh}(c x)\right) \sqrt{c^2 x^2+1}}{960}
\end{aligned}$$

command

```
int(x^3*(c^2*d*x^2+d)^3*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x^3 \left(c^2 d\, x^2+d\right)^3 \left(a+b \operatorname{arcsinh}\left(c x\right)\right)^2 \, dx$$

Maple 2021.1 output

$$d^3 a^2 \left(\tfrac{1}{10} c^{10} x^{10}+\tfrac{3}{8} c^8 x^8+\tfrac{1}{2} c^6 x^6+\tfrac{1}{4} c^4 x^4\right)+d^3 b^2 \left(\frac{\operatorname{arcsinh}(c x)^2 c^2 x^2 \left(c^2 x^2+1\right)^4}{10}-\frac{\operatorname{arcsinh}(c x)^2 \left(c^2 x^2+1\right)^4}{40}-\frac{\operatorname{arcsinh}(c x) c x \left(c^2 x^2+1\right.}{50}\right.$$

12.26 Problem number 218

$$\int x^2 \left(d+c^2 d x^2\right)^3 \left(a+b \sinh^{-1}(c x)\right)^2 \, dx$$

Optimal antiderivative

$$
\begin{aligned}
&-\frac{10516b^2d^3x}{99225c^2}+\frac{5258b^2d^3x^3}{297675}+\frac{4198b^2c^2d^3x^5}{165375}+\frac{374b^2c^4d^3x^7}{27783}+\frac{2b^2c^6d^3x^9}{729}\\
&+\frac{16b\,d^3\left(c^2x^2+1\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{315c^3}+\frac{4b\,d^3\left(c^2x^2+1\right)^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{525c^3}\\
&+\frac{2b\,d^3\left(c^2x^2+1\right)^{\frac{7}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{441c^3}-\frac{2b\,d^3\left(c^2x^2+1\right)^{\frac{9}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{81c^3}\\
&+\frac{16d^3x^3(a+b\,\mathrm{arcsinh}(cx))^2}{315}+\frac{8d^3x^3\left(c^2x^2+1\right)\left(a+b\,\mathrm{arcsinh}(cx)\right)^2}{105}\\
&+\frac{2d^3x^3\left(c^2x^2+1\right)^2\left(a+b\,\mathrm{arcsinh}(cx)\right)^2}{21}+\frac{d^3x^3\left(c^2x^2+1\right)^3\left(a+b\,\mathrm{arcsinh}(cx)\right)^2}{9}\\
&+\frac{64b\,d^3(a+b\,\mathrm{arcsinh}(cx))\sqrt{c^2x^2+1}}{945c^3}-\frac{32b\,d^3x^2(a+b\,\mathrm{arcsinh}(cx))\sqrt{c^2x^2+1}}{945c}
\end{aligned}
$$

command

```
int(x^2*(c^2*d*x^2+d)^3*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x^2\left(c^2d\,x^2+d\right)^3\left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)^2\,dx$$

Maple 2021.1 output

$$d^3a^2\left(\tfrac{1}{9}c^9x^9+\tfrac{3}{7}c^7x^7+\tfrac{3}{5}c^5x^5+\tfrac{1}{3}c^3x^3\right)+d^3b^2\left(\frac{\mathrm{arcsinh}(cx)^2cx\left(c^2x^2+1\right)^4}{9}-\frac{16\,\mathrm{arcsinh}(cx)^2cx}{315}-\frac{\mathrm{arcsinh}(cx)^2cx\left(c^2x^2+1\right)^3}{63}-\frac{2\,\mathrm{ar}}{}\right.$$

12.27 Problem number 219

$$\int x\left(d+c^2dx^2\right)^3\left(a+b\sinh^{-1}(cx)\right)^2\,dx$$

Optimal antiderivative

$$
\begin{aligned}
&\frac{175b^2d^3x^2}{3072}+\frac{35b^2c^2d^3x^4}{3072}+\frac{7b^2d^3\left(c^2x^2+1\right)^3}{1152c^2}+\frac{b^2d^3\left(c^2x^2+1\right)^4}{256c^2}\\
&-\frac{35b\,d^3x\left(c^2x^2+1\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{768c}-\frac{7b\,d^3x\left(c^2x^2+1\right)^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{192c}\\
&-\frac{b\,d^3x\left(c^2x^2+1\right)^{\frac{7}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{32c}-\frac{35d^3(a+b\,\mathrm{arcsinh}(cx))^2}{1024c^2}\\
&+\frac{d^3\left(c^2x^2+1\right)^4\left(a+b\,\mathrm{arcsinh}(cx)\right)^2}{8c^2}-\frac{35b\,d^3x(a+b\,\mathrm{arcsinh}(cx))\sqrt{c^2x^2+1}}{512c}
\end{aligned}
$$

command

```
int(x*(c^2*d*x^2+d)^3*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int x\left(c^2 d\, x^2+d\right)^3 \left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)^2\, dx$$

Maple 2021.1 output

$$d^3a^2\left(\tfrac{1}{8}c^8x^8+\tfrac{1}{2}c^6x^6+\tfrac{3}{4}c^4x^4+\tfrac{1}{2}c^2x^2\right)+d^3b^2\left(\frac{\mathrm{arcsinh}(cx)^2\left(c^2x^2+1\right)^4}{8}-\frac{\mathrm{arcsinh}(cx)cx\left(c^2x^2+1\right)^{\frac{7}{2}}}{32}-\frac{7\,\mathrm{arcsinh}(cx)cx\left(c^2x^2+1\right)^{\frac{5}{2}}}{192}\right.$$

12.28 Problem number 220

$$\int \left(d+c^2dx^2\right)^3 \left(a+b\sinh^{-1}(cx)\right)^2\, dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{4322b^2d^3x}{3675}+\frac{1514b^2c^2d^3x^3}{11025}+\frac{234b^2c^4d^3x^5}{6125}+\frac{2b^2c^6d^3x^7}{343}\\
&-\frac{16b\,d^3\left(c^2x^2+1\right)^{\frac{3}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{105c}-\frac{12b\,d^3\left(c^2x^2+1\right)^{\frac{5}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{175c}\\
&-\frac{2b\,d^3\left(c^2x^2+1\right)^{\frac{7}{2}}\left(a+b\,\mathrm{arcsinh}(cx)\right)}{49c}+\frac{16d^3x(a+b\,\mathrm{arcsinh}(cx))^2}{35}\\
&+\frac{8d^3x\left(c^2x^2+1\right)\left(a+b\,\mathrm{arcsinh}(cx)\right)^2}{35}+\frac{6d^3x\left(c^2x^2+1\right)^2\left(a+b\,\mathrm{arcsinh}(cx)\right)^2}{35}\\
&+\frac{d^3x\left(c^2x^2+1\right)^3\left(a+b\,\mathrm{arcsinh}(cx)\right)^2}{7}-\frac{32b\,d^3(a+b\,\mathrm{arcsinh}(cx))\,\sqrt{c^2x^2+1}}{35c}
\end{aligned}$$

command

```
int((c^2*d*x^2+d)^3*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int \left(c^2 d\, x^2+d\right)^3 \left(a+b\,\mathrm{arcsinh}\left(cx\right)\right)^2\, dx$$

Maple 2021.1 output

$$d^3a^2\left(\tfrac{1}{7}c^7x^7+\tfrac{3}{5}c^5x^5+c^3x^3+cx\right)+d^3b^2\left(\frac{16\,\mathrm{arcsinh}(cx)^2cx}{35}+\frac{\mathrm{arcsinh}(cx)^2cx\left(c^2x^2+1\right)^3}{7}+\frac{6\,\mathrm{arcsinh}(cx)^2cx\left(c^2x^2+1\right)^2}{35}+\frac{8\,\mathrm{arcsinh}\right.$$

12.29 Problem number 252

$$\int \left(\pi + c^2\pi x^2\right)^{5/2} \left(a + b\sinh^{-1}(cx)\right)^2 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{65b^2\pi^{\frac{5}{2}}x\left(c^2x^2+1\right)^{\frac{3}{2}}}{1728} + \frac{b^2\pi^{\frac{5}{2}}x\left(c^2x^2+1\right)^{\frac{5}{2}}}{108} - \frac{115b^2\pi^{\frac{5}{2}}\operatorname{arcsinh}(cx)}{1152c} \\
&- \frac{5bc\,\pi^{\frac{5}{2}}x^2(a+b\operatorname{arcsinh}(cx))}{16} - \frac{5b\,\pi^{\frac{5}{2}}\left(c^2x^2+1\right)^2(a+b\operatorname{arcsinh}(cx))}{48c} \\
&- \frac{b\,\pi^{\frac{5}{2}}\left(c^2x^2+1\right)^3(a+b\operatorname{arcsinh}(cx))}{18c} + \frac{5\pi x\left(c^2\pi\,x^2+\pi\right)^{\frac{3}{2}}(a+b\operatorname{arcsinh}(cx))^2}{24} \\
&+ \frac{x\left(c^2\pi\,x^2+\pi\right)^{\frac{5}{2}}(a+b\operatorname{arcsinh}(cx))^2}{6} + \frac{5\pi^{\frac{5}{2}}(a+b\operatorname{arcsinh}(cx))^3}{48bc} \\
&+ \frac{245b^2\pi^{\frac{5}{2}}x\sqrt{c^2x^2+1}}{1152} + \frac{5\pi^2x(a+b\operatorname{arcsinh}(cx))^2\sqrt{c^2\pi\,x^2+\pi}}{16}
\end{aligned}$$

command

```
int((Pi*c^2*x^2+Pi)^(5/2)*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int \left(\pi\,c^2x^2+\pi\right)^{\frac{5}{2}}\left(a+b\operatorname{arcsinh}\left(cx\right)\right)^2 \, dx$$

Maple 2021.1 output

$$\begin{aligned}
&\frac{a^2x\left(\pi\,c^2x^2+\pi\right)^{\frac{5}{2}}}{6} + \frac{5a^2\pi x\left(\pi\,c^2x^2+\pi\right)^{\frac{3}{2}}}{24} + \frac{5a^2\pi^2x\sqrt{\pi\,c^2x^2+\pi}}{16} \\
&+ \frac{5a^2\pi^3\ln\left(\frac{\pi x\,c^2}{\sqrt{\pi\,c^2}} + \sqrt{\pi\,c^2x^2+\pi}\right)}{16\sqrt{\pi\,c^2}} + \frac{b^2\pi^{\frac{5}{2}}c^4\sqrt{c^2x^2+1}\,\operatorname{arcsinh}\left(cx\right)^2x^5}{6} \\
&- \frac{b^2\pi^{\frac{5}{2}}c^5\operatorname{arcsinh}\left(cx\right)x^6}{18} + \frac{b^2\pi^{\frac{5}{2}}c^4x^5\sqrt{c^2x^2+1}}{108} \\
&+ \frac{13b^2\pi^{\frac{5}{2}}c^2\sqrt{c^2x^2+1}\,\operatorname{arcsinh}\left(cx\right)^2x^3}{24} - \frac{13b^2\pi^{\frac{5}{2}}c^3\operatorname{arcsinh}\left(cx\right)x^4}{48} \\
&+ \frac{97b^2\pi^{\frac{5}{2}}c^2x^3\sqrt{c^2x^2+1}}{1728} + \frac{11b^2\pi^{\frac{5}{2}}\operatorname{arcsinh}\left(cx\right)^2\sqrt{c^2x^2+1}\,x}{16} \\
&- \frac{11b^2\pi^{\frac{5}{2}}c\operatorname{arcsinh}\left(cx\right)x^2}{16} + \frac{299b^2\pi^{\frac{5}{2}}x\sqrt{c^2x^2+1}}{1152} + \frac{5b^2\pi^{\frac{5}{2}}\operatorname{arcsinh}\left(cx\right)^3}{48c} \\
&- \frac{299b^2\pi^{\frac{5}{2}}\operatorname{arcsinh}\left(cx\right)}{1152c} + \frac{ab\,\pi^{\frac{5}{2}}c^4\sqrt{c^2x^2+1}\,\operatorname{arcsinh}\left(cx\right)x^5}{3} \\
&- \frac{ab\,\pi^{\frac{5}{2}}c^5x^6}{18} + \frac{13ab\,\pi^{\frac{5}{2}}c^2\sqrt{c^2x^2+1}\,\operatorname{arcsinh}\left(cx\right)x^3}{12} - \frac{13ab\,\pi^{\frac{5}{2}}c^3x^4}{48} \\
&+ \frac{11ab\,\pi^{\frac{5}{2}}\operatorname{arcsinh}\left(cx\right)\sqrt{c^2x^2+1}\,x}{8} - \frac{11ab\,\pi^{\frac{5}{2}}c\,x^2}{16} + \frac{5ab\,\pi^{\frac{5}{2}}\operatorname{arcsinh}\left(cx\right)^2}{16c} - \frac{17ab\,\pi^{\frac{5}{2}}}{36c}
\end{aligned}$$

12.30 Problem number 253

$$\int \left(\pi + c^2\pi x^2\right)^{3/2} \left(a + b\sinh^{-1}(cx)\right)^2 \, dx$$

Optimal antiderivative

$$\frac{b^2\pi^{\frac{3}{2}}x\left(c^2x^2+1\right)^{\frac{3}{2}}}{32} - \frac{9b^2\pi^{\frac{3}{2}}\operatorname{arcsinh}(cx)}{64c} - \frac{3bc\,\pi^{\frac{3}{2}}x^2(a+b\operatorname{arcsinh}(cx))}{8}$$
$$- \frac{b\,\pi^{\frac{3}{2}}\left(c^2x^2+1\right)^2(a+b\operatorname{arcsinh}(cx))}{8c} + \frac{x\left(c^2\pi\,x^2+\pi\right)^{\frac{3}{2}}(a+b\operatorname{arcsinh}(cx))^2}{4}$$
$$+ \frac{\pi^{\frac{3}{2}}(a+b\operatorname{arcsinh}(cx))^3}{8bc} + \frac{15b^2\pi^{\frac{3}{2}}x\sqrt{c^2x^2+1}}{64} + \frac{3\pi x(a+b\operatorname{arcsinh}(cx))^2\sqrt{c^2\pi\,x^2+\pi}}{8}$$

command

```
int((Pi*c^2*x^2+Pi)^(3/2)*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int \left(\pi\,c^2x^2+\pi\right)^{\frac{3}{2}}(a+b\operatorname{arcsinh}(cx))^2 \, dx$$

Maple 2021.1 output

$$\frac{a^2x\left(\pi\,c^2x^2+\pi\right)^{\frac{3}{2}}}{4} + \frac{3a^2\pi x\sqrt{\pi\,c^2x^2+\pi}}{8} + \frac{3a^2\pi^2\ln\left(\frac{\pi x\,c^2}{\sqrt{\pi\,c^2}}+\sqrt{\pi\,c^2x^2+\pi}\right)}{8\sqrt{\pi\,c^2}}$$
$$+ \frac{b^2\pi^{\frac{3}{2}}c^2\operatorname{arcsinh}(cx)^2\sqrt{c^2x^2+1}\,x^3}{4} - \frac{b^2\pi^{\frac{3}{2}}c^3\operatorname{arcsinh}(cx)\,x^4}{8}$$
$$+ \frac{b^2\pi^{\frac{3}{2}}c^2x^3\sqrt{c^2x^2+1}}{32} + \frac{5b^2\pi^{\frac{3}{2}}\operatorname{arcsinh}(cx)^2\sqrt{c^2x^2+1}\,x}{8}$$
$$- \frac{5b^2\pi^{\frac{3}{2}}c\operatorname{arcsinh}(cx)\,x^2}{8} + \frac{17b^2\pi^{\frac{3}{2}}x\sqrt{c^2x^2+1}}{64} + \frac{b^2\pi^{\frac{3}{2}}\operatorname{arcsinh}(cx)^3}{8c}$$
$$- \frac{17b^2\pi^{\frac{3}{2}}\operatorname{arcsinh}(cx)}{64c} + \frac{ab\,\pi^{\frac{3}{2}}c^2\operatorname{arcsinh}(cx)\sqrt{c^2x^2+1}\,x^3}{2} - \frac{ab\,\pi^{\frac{3}{2}}c^3x^4}{8}$$
$$+ \frac{5ab\,\pi^{\frac{3}{2}}\operatorname{arcsinh}(cx)\sqrt{c^2x^2+1}\,x}{4} - \frac{5ab\,\pi^{\frac{3}{2}}c\,x^2}{8} + \frac{3ab\,\pi^{\frac{3}{2}}\operatorname{arcsinh}(cx)^2}{8c} - \frac{ab\,\pi^{\frac{3}{2}}}{2c}$$

12.31 Problem number 282

$$\int \frac{x^4 \sinh^{-1}(ax)^2}{\sqrt{1+a^2x^2}}\,dx$$

Optimal antiderivative

$$\frac{15\,\mathrm{arcsinh}(ax)}{64a^5}+\frac{3x^2\,\mathrm{arcsinh}(ax)}{8a^3}-\frac{x^4\,\mathrm{arcsinh}(ax)}{8a}+\frac{\mathrm{arcsinh}(ax)^3}{8a^5}-\frac{15x\sqrt{a^2x^2+1}}{64a^4}$$
$$+\frac{x^3\sqrt{a^2x^2+1}}{32a^2}-\frac{3x\,\mathrm{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{8a^4}+\frac{x^3\,\mathrm{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{4a^2}$$

command

```
int(x^4*arcsinh(a*x)^2/(a^2*x^2+1)^(1/2),x)
```

Maple 2022.1 output

$$\int \frac{x^4\,\mathrm{arcsinh}\left(ax\right)^2}{\sqrt{a^2x^2+1}}\,dx$$

Maple 2021.1 output

$$\frac{16\,\mathrm{arcsinh}\left(ax\right)^2\sqrt{a^2x^2+1}\,a^3x^3-8\,\mathrm{arcsinh}\left(ax\right)x^4a^4+2\sqrt{a^2x^2+1}\,x^3a^3-24\,\mathrm{arcsinh}\left(ax\right)^2\sqrt{a^2x^2+1}\,ax+2}{64a^5}$$

12.32 Problem number 283

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

Optimal antiderivative

$$\frac{2\left(a^2x^2+1\right)^{\frac{3}{2}}}{27a^4}+\frac{4x\,\mathrm{arcsinh}(ax)}{3a^3}-\frac{2x^3\,\mathrm{arcsinh}(ax)}{9a}-\frac{14\sqrt{a^2x^2+1}}{9a^4}$$
$$-\frac{2\,\mathrm{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{3a^4}+\frac{x^2\,\mathrm{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{3a^2}$$

command

```
int(x^3*arcsinh(a*x)^2/(a^2*x^2+1)^(1/2),x)
```

Maple 2022.1 output

$$\int \frac{x^3\,\mathrm{arcsinh}\left(ax\right)^2}{\sqrt{a^2x^2+1}}\,dx$$

Maple 2021.1 output

$$\frac{9\,\mathrm{arcsinh}\left(ax\right)^2x^4a^4-9\,\mathrm{arcsinh}\left(ax\right)^2a^2x^2-6\,\mathrm{arcsinh}\left(ax\right)\sqrt{a^2x^2+1}\,a^3x^3+2x^4a^4-38a^2x^2-18\,\mathrm{arcsinh}\left(ax\right)^2}{27a^4\sqrt{a^2x^2+1}}$$

12.33 Problem number 328

$$\int \left(c+a^2cx^2\right)^3 \sinh^{-1}(ax)^3\,dx$$

Optimal antiderivative

$$-\frac{30256c^3\left(a^2x^2+1\right)^{\frac{3}{2}}}{385875a}-\frac{2664c^3\left(a^2x^2+1\right)^{\frac{5}{2}}}{214375a}-\frac{6c^3\left(a^2x^2+1\right)^{\frac{7}{2}}}{2401a}+\frac{4322c^3x\,\mathrm{arcsinh}(ax)}{1225}$$
$$+\frac{1514a^2c^3x^3\,\mathrm{arcsinh}(ax)}{3675}+\frac{702a^4c^3x^5\,\mathrm{arcsinh}(ax)}{6125}+\frac{6a^6c^3x^7\,\mathrm{arcsinh}(ax)}{343}$$
$$-\frac{8c^3\left(a^2x^2+1\right)^{\frac{3}{2}}\mathrm{arcsinh}(ax)^2}{35a}-\frac{18c^3\left(a^2x^2+1\right)^{\frac{5}{2}}\mathrm{arcsinh}(ax)^2}{175a}$$
$$-\frac{3c^3\left(a^2x^2+1\right)^{\frac{7}{2}}\mathrm{arcsinh}(ax)^2}{49a}+\frac{16c^3x\,\mathrm{arcsinh}(ax)^3}{35}+\frac{8c^3x\left(a^2x^2+1\right)\mathrm{arcsinh}(ax)^3}{35}$$
$$+\frac{6c^3x\left(a^2x^2+1\right)^2\mathrm{arcsinh}(ax)^3}{35}+\frac{c^3x\left(a^2x^2+1\right)^3\mathrm{arcsinh}(ax)^3}{7}$$
$$-\frac{413312c^3\sqrt{a^2x^2+1}}{128625a}-\frac{48c^3\,\mathrm{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{35a}$$

command

```
int((a^2*c*x^2+c)^3*arcsinh(a*x)^3,x)
```

Maple 2022.1 output

$$\int \left(a^2c\,x^2+c\right)^3 \mathrm{arcsinh}\left(ax\right)^3\,dx$$

Maple 2021.1 output

$$c^3\Big(1929375\,\mathrm{arcsinh}\left(ax\right)^3 a^7x^7-826875\,\mathrm{arcsinh}\left(ax\right)^2\sqrt{a^2x^2+1}\;a^6x^6+8103375\,\mathrm{arcsinh}\left(ax\right)^3 a^5x^5+236250\,\mathrm{arcs}$$

12.34 Problem number 329

$$\int \left(c+a^2cx^2\right)^2 \sinh^{-1}(ax)^3\,dx$$

Optimal antiderivative

$$-\frac{272c^2\left(a^2x^2+1\right)^{\frac{3}{2}}}{3375a}-\frac{6c^2\left(a^2x^2+1\right)^{\frac{5}{2}}}{625a}+\frac{298c^2x\,\mathrm{arcsinh}(ax)}{75}$$
$$+\frac{76a^2c^2x^3\,\mathrm{arcsinh}(ax)}{225}+\frac{6a^4c^2x^5\,\mathrm{arcsinh}(ax)}{125}-\frac{4c^2\left(a^2x^2+1\right)^{\frac{3}{2}}\mathrm{arcsinh}(ax)^2}{15a}$$
$$-\frac{3c^2\left(a^2x^2+1\right)^{\frac{5}{2}}\mathrm{arcsinh}(ax)^2}{25a}+\frac{8c^2x\,\mathrm{arcsinh}(ax)^3}{15}+\frac{4c^2x\left(a^2x^2+1\right)\mathrm{arcsinh}(ax)^3}{15}$$
$$+\frac{c^2x\left(a^2x^2+1\right)^2\mathrm{arcsinh}(ax)^3}{5}-\frac{4144c^2\sqrt{a^2x^2+1}}{1125a}-\frac{8c^2\,\mathrm{arcsinh}(ax)^2\sqrt{a^2x^2+1}}{5a}$$

command

```
int((a^2*c*x^2+c)^2*arcsinh(a*x)^3,x)
```

Maple 2022.1 output

$$\int \left(a^2 c\, x^2 + c\right)^2 \operatorname{arcsinh}\left(ax\right)^3 \, dx$$

Maple 2021.1 output

$$\frac{c^2\Big(3375 \operatorname{arcsinh}\left(ax\right)^3 a^5 x^5 - 2025 \operatorname{arcsinh}\left(ax\right)^2 \sqrt{a^2x^2+1}\, a^4 x^4 + 11250 \operatorname{arcsinh}\left(ax\right)^3 a^3 x^3 + 810 \operatorname{arcsinh}\left(ax\right) a^5$$

12.35 Problem number 330

$$\int \left(c + a^2 c x^2\right) \sinh^{-1}(ax)^3 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&-\frac{2c\left(a^2x^2+1\right)^{\frac{3}{2}}}{27a} + \frac{14cx \operatorname{arcsinh}(ax)}{3} + \frac{2a^2 c\, x^3 \operatorname{arcsinh}(ax)}{9} \\
&- \frac{c\left(a^2x^2+1\right)^{\frac{3}{2}} \operatorname{arcsinh}(ax)^2}{3a} + \frac{2cx \operatorname{arcsinh}(ax)^3}{3} \\
&+ \frac{cx\left(a^2x^2+1\right) \operatorname{arcsinh}(ax)^3}{3} - \frac{40c\sqrt{a^2x^2+1}}{9a} - \frac{2c \operatorname{arcsinh}(ax)^2 \sqrt{a^2x^2+1}}{a}
\end{aligned}$$

command

```
int((a^2*c*x^2+c)*arcsinh(a*x)^3,x)
```

Maple 2022.1 output

$$\int \left(a^2 c\, x^2 + c\right) \operatorname{arcsinh}\left(ax\right)^3 \, dx$$

Maple 2021.1 output

$$\frac{c\Big(9 \operatorname{arcsinh}\left(ax\right)^3 a^3 x^3 - 9 \operatorname{arcsinh}\left(ax\right)^2 \sqrt{a^2x^2+1}\, a^2 x^2 + 27 \operatorname{arcsinh}\left(ax\right)^3 ax + 6 \operatorname{arcsinh}\left(ax\right) a^3 x^3 - 63 \operatorname{arcsinh}($$
$$27a$$

12.36 Problem number 342

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

Optimal antiderivative

$$\frac{45x^2}{128a^3} - \frac{3x^4}{128a} + \frac{45\,\mathrm{arcsinh}(ax)^2}{128a^5} + \frac{9x^2\,\mathrm{arcsinh}(ax)^2}{16a^3} - \frac{3x^4\,\mathrm{arcsinh}(ax)^2}{16a} + \frac{3\,\mathrm{arcsinh}(ax)^4}{32a^5} - \frac{45x\,\mathrm{arcsinh}(ax)\sqrt{a^2x^2+1}}{64a^4} + \frac{3x^3\,\mathrm{arcsinh}(ax)\sqrt{a^2x^2+1}}{32a^2} - \frac{3x\,\mathrm{arcsinh}(ax)^3\sqrt{a^2x^2+1}}{8a^4} + \frac{x^3\,\mathrm{arcsinh}(ax)^3\sqrt{a^2x^2+1}}{4a^2}$$

command

```
int(x^4*arcsinh(a*x)^3/(a^2*x^2+1)^(1/2),x)
```

Maple 2022.1 output

$$\int \frac{x^4 \,\mathrm{arcsinh}\,(ax)^3}{\sqrt{a^2x^2+1}}\,dx$$

Maple 2021.1 output

$$\frac{32\,\mathrm{arcsinh}\,(ax)^3\sqrt{a^2x^2+1}\,a^3x^3 - 24\,\mathrm{arcsinh}\,(ax)^2 x^4a^4 + 12\,\mathrm{arcsinh}\,(ax)\sqrt{a^2x^2+1}\,a^3x^3 - 3x^4a^4 - 48\,\mathrm{arcsinh}$$

12.37 Problem number 343

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

Optimal antiderivative

$$\frac{40x}{9a^3} - \frac{2x^3}{27a} + \frac{2x\,\mathrm{arcsinh}(ax)^2}{a^3} - \frac{x^3\,\mathrm{arcsinh}(ax)^2}{3a} - \frac{40\,\mathrm{arcsinh}(ax)\sqrt{a^2x^2+1}}{9a^4} + \frac{2x^2\,\mathrm{arcsinh}(ax)\sqrt{a^2x^2+1}}{9a^2} - \frac{2\,\mathrm{arcsinh}(ax)^3\sqrt{a^2x^2+1}}{3a^4} + \frac{x^2\,\mathrm{arcsinh}(ax)^3\sqrt{a^2x^2+1}}{3a^2}$$

command

```
int(x^3*arcsinh(a*x)^3/(a^2*x^2+1)^(1/2),x)
```

Maple 2022.1 output

$$\int \frac{x^3 \operatorname{arcsinh}(ax)^3}{\sqrt{a^2x^2+1}}\,dx$$

Maple 2021.1 output

$$\frac{9\operatorname{arcsinh}(ax)^3 x^4a^4 - 9\operatorname{arcsinh}(ax)^3 x^2a^2 - 9\operatorname{arcsinh}(ax)^2\sqrt{a^2x^2+1}\,a^3x^3 + 6\operatorname{arcsinh}(ax)x^4a^4 - 114\operatorname{arcsinh}(}{27a^4}$$

13 Test file number 188

Test folder name:

`test_cases/7_Inverse_hyperbolic_functions/7.1_Inverse_hyperbolic_sine/188_7.1.5_Inverse_hyper`

13.1 Problem number 12

$$\int (d+ex)^3\left(a+b\sinh^{-1}(cx)\right)^2\,dx$$

Optimal antiderivative

$$\begin{aligned}
&2b^2d^3x - \frac{4b^2d\,e^2x}{3c^2} + \frac{3b^2d^2e\,x^2}{4} - \frac{3b^2e^3x^2}{32c^2} + \frac{2b^2d\,e^2x^3}{9} + \frac{b^2e^3x^4}{32} - \frac{d^4(a+b\operatorname{arcsinh}(cx))^2}{4e}\\
&+\frac{3d^2e(a+b\operatorname{arcsinh}(cx))^2}{4c^2} - \frac{3e^3(a+b\operatorname{arcsinh}(cx))^2}{32c^4} + \frac{(ex+d)^4(a+b\operatorname{arcsinh}(cx))^2}{4e}\\
&-\frac{2b\,d^3(a+b\operatorname{arcsinh}(cx))\sqrt{c^2x^2+1}}{c} + \frac{4bd\,e^2(a+b\operatorname{arcsinh}(cx))\sqrt{c^2x^2+1}}{3c^3}\\
&-\frac{3b\,d^2ex(a+b\operatorname{arcsinh}(cx))\sqrt{c^2x^2+1}}{2c} + \frac{3b\,e^3x(a+b\operatorname{arcsinh}(cx))\sqrt{c^2x^2+1}}{16c^3}\\
&-\frac{2bd\,e^2x^2(a+b\operatorname{arcsinh}(cx))\sqrt{c^2x^2+1}}{3c} - \frac{b\,e^3x^3(a+b\operatorname{arcsinh}(cx))\sqrt{c^2x^2+1}}{8c}
\end{aligned}$$

command

```
int((e*x+d)^3*(a+b*arcsinh(c*x))^2,x)
```

Maple 2022.1 output

$$\int (ex+d)^3\left(a+b\operatorname{arcsinh}(cx)\right)^2\,dx$$

Maple 2021.1 output

$$\frac{(cex+cd)^4a^2}{4c^3e} + \frac{b^2\left(c^3d^3\left(\operatorname{arcsinh}(cx)^2cx - 2\operatorname{arcsinh}(cx)\sqrt{c^2x^2+1}+2cx\right) + \frac{3c^2d^2e\left(2\operatorname{arcsinh}(cx)^2c^2x^2 - 2\operatorname{arcsinh}(cx)\sqrt{c^2x^2+1}\,cx + \operatorname{arcsinh}(c}{4}\right.}$$

13.2 Problem number 67

$$\int x^3 \sinh^{-1}(a+bx)^2\,dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{4ax}{3b^3}-\frac{2a^3x}{b^3}-\frac{3(bx+a)^2}{32b^4}+\frac{3a^2(bx+a)^2}{4b^4}-\frac{2a(bx+a)^3}{9b^4}+\frac{(bx+a)^4}{32b^4}\\
&-\frac{3\operatorname{arcsinh}(bx+a)^2}{32b^4}+\frac{3a^2\operatorname{arcsinh}(bx+a)^2}{4b^4}-\frac{a^4\operatorname{arcsinh}(bx+a)^2}{4b^4}\\
&+\frac{x^4\operatorname{arcsinh}(bx+a)^2}{4}-\frac{4a\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}}{3b^4}\\
&+\frac{2a^3\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}}{b^4}+\frac{3(bx+a)\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}}{16b^4}\\
&-\frac{3a^2(bx+a)\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}}{2b^4}\\
&+\frac{2a(bx+a)^2\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}}{3b^4}\\
&-\frac{(bx+a)^3\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}}{8b^4}
\end{aligned}$$

command

```
int(x^3*arcsinh(b*x+a)^2,x)
```

Maple 2022.1 output

$$\int x^3 \operatorname{arcsinh}\left(bx+a\right)^2\,dx$$

Maple 2021.1 output

$$-a^3\left(\operatorname{arcsinh}\left(bx+a\right)^2(bx+a)-2\operatorname{arcsinh}\left(bx+a\right)\sqrt{1+(bx+a)^2}+2bx+2a\right)+\frac{3a^2\left(2\operatorname{arcsinh}(bx+a)^2(bx+a)^2-2\operatorname{arc}\right.}{}$$

13.3 Problem number 68

$$\int x^2 \sinh^{-1}(a+bx)^2\,dx$$

Optimal antiderivative

$$\begin{aligned}
&-\frac{4x}{9b^2}+\frac{2a^2x}{b^2}-\frac{a(bx+a)^2}{2b^3}+\frac{2(bx+a)^3}{27b^3}-\frac{a\operatorname{arcsinh}(bx+a)^2}{2b^3}\\
&+\frac{a^3\operatorname{arcsinh}(bx+a)^2}{3b^3}+\frac{x^3\operatorname{arcsinh}(bx+a)^2}{3}+\frac{4\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}}{9b^3}\\
&-\frac{2a^2\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}}{b^3}+\frac{a(bx+a)\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}}{b^3}\\
&-\frac{2(bx+a)^2\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}}{9b^3}
\end{aligned}$$

command

```
int(x^2*arcsinh(b*x+a)^2,x)
```

Maple 2022.1 output

$$\int x^2 \operatorname{arcsinh}\left(bx+a\right)^2\,dx$$

Maple 2021.1 output

$$-\frac{a\left(2\operatorname{arcsinh}(bx+a)^2(bx+a)^2-2\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}\,(bx+a)+\operatorname{arcsinh}(bx+a)^2+(bx+a)^2+1\right)}{2}-\frac{\operatorname{arcsinh}(bx+a)^2(bx+a)}{3}+\frac{\operatorname{arcsi}}{}$$

13.4 Problem number 75

$$\int x^2 \sinh^{-1}(a+bx)^3\,dx$$

Optimal antiderivative

$$
\begin{aligned}
&-\frac{2\left(1+(bx+a)^2\right)^{\frac{3}{2}}}{27b^3}-\frac{3a\operatorname{arcsinh}(bx+a)}{4b^3}-\frac{4(bx+a)\operatorname{arcsinh}(bx+a)}{3b^3}\\
&+\frac{6a^2(bx+a)\operatorname{arcsinh}(bx+a)}{b^3}-\frac{3a(bx+a)^2\operatorname{arcsinh}(bx+a)}{2b^3}\\
&+\frac{2(bx+a)^3\operatorname{arcsinh}(bx+a)}{9b^3}-\frac{a\operatorname{arcsinh}(bx+a)^3}{2b^3}\\
&+\frac{a^3\operatorname{arcsinh}(bx+a)^3}{3b^3}+\frac{x^3\operatorname{arcsinh}(bx+a)^3}{3}+\frac{14\sqrt{1+(bx+a)^2}}{9b^3}\\
&-\frac{6a^2\sqrt{1+(bx+a)^2}}{b^3}+\frac{3a(bx+a)\sqrt{1+(bx+a)^2}}{4b^3}\\
&+\frac{2\operatorname{arcsinh}(bx+a)^2\sqrt{1+(bx+a)^2}}{3b^3}-\frac{3a^2\operatorname{arcsinh}(bx+a)^2\sqrt{1+(bx+a)^2}}{b^3}\\
&+\frac{3a(bx+a)\operatorname{arcsinh}(bx+a)^2\sqrt{1+(bx+a)^2}}{2b^3}\\
&-\frac{(bx+a)^2\operatorname{arcsinh}(bx+a)^2\sqrt{1+(bx+a)^2}}{3b^3}
\end{aligned}
$$

command

```
int(x^2*arcsinh(b*x+a)^3,x)
```

Maple 2022.1 output

$$\int x^2\operatorname{arcsinh}\left(bx+a\right)^3\,dx$$

Maple 2021.1 output

$$-\frac{a\left(4\operatorname{arcsinh}(bx+a)^3(bx+a)^2-6\operatorname{arcsinh}(bx+a)^2\sqrt{1+(bx+a)^2}\,(bx+a)+2\operatorname{arcsinh}(bx+a)^3+6\operatorname{arcsinh}(bx+a)(bx+a)^2-3(bx+a)\sqrt{1+(bx\right.}}{4}$$

13.5 Problem number 266

$$\int \left(1+a^2+2abx+b^2x^2\right)^{3/2} \sinh^{-1}(a+bx)^3\,dx$$

Optimal antiderivative

$$\begin{aligned}
&-\frac{51(bx+a)^2}{128b}-\frac{3(bx+a)^4}{128b}+\frac{3(bx+a)\left(1+(bx+a)^2\right)^{\frac{3}{2}}\operatorname{arcsinh}(bx+a)}{32b}\\
&-\frac{27\operatorname{arcsinh}(bx+a)^2}{128b}-\frac{9(bx+a)^2\operatorname{arcsinh}(bx+a)^2}{16b}\\
&-\frac{3\left(1+(bx+a)^2\right)^2\operatorname{arcsinh}(bx+a)^2}{16b}+\frac{(bx+a)\left(1+(bx+a)^2\right)^{\frac{3}{2}}\operatorname{arcsinh}(bx+a)^3}{4b}\\
&+\frac{3\operatorname{arcsinh}(bx+a)^4}{32b}+\frac{45(bx+a)\operatorname{arcsinh}(bx+a)\sqrt{1+(bx+a)^2}}{64b}\\
&+\frac{3(bx+a)\operatorname{arcsinh}(bx+a)^3\sqrt{1+(bx+a)^2}}{8b}
\end{aligned}$$

command

```
int((b^2*x^2+2*a*b*x+a^2+1)^(3/2)*arcsinh(b*x+a)^3,x)
```

Maple 2022.1 output

$$\int \left(b^2x^2+2abx+a^2+1\right)^{\frac{3}{2}} \operatorname{arcsinh}\left(bx+a\right)^3\,dx$$

Maple 2021.1 output

$$\frac{-48-102abx+80\sqrt{b^2x^2+2abx+a^2+1}\,\operatorname{arcsinh}\left(bx+a\right)^3xb-240\operatorname{arcsinh}\left(bx+a\right)^2xab+102\sqrt{b^2x^2+2abx-}}{}$$

14 Test file number 189

Test folder name:

```
test_cases/7_Inverse_hyperbolic_functions/7.2_Inverse_hyperbolic_cosine/189_7.2.2-
d_x-^m-a+b_arccosh-c_x-^n
```

14.1 Problem number 12

$$\int x^4 \cosh^{-1}(ax)^2 \, dx$$

Optimal antiderivative

$$\frac{16x}{75a^4} + \frac{8x^3}{225a^2} + \frac{2x^5}{125} + \frac{x^5 \operatorname{arccosh}(ax)^2}{5} - \frac{16 \operatorname{arccosh}(ax) \sqrt{ax-1}\ \sqrt{ax+1}}{75a^5} - \frac{8x^2 \operatorname{arccosh}(ax) \sqrt{ax-1}\ \sqrt{ax+1}}{75a^3} - \frac{2x^4 \operatorname{arccosh}(ax) \sqrt{ax-1}\ \sqrt{ax+1}}{25a}$$

command

```
int(x^4*arccosh(a*x)^2,x)
```

Maple 2022.1 output

$$\int x^4 \operatorname{arccosh}(ax)^2 \, dx$$

Maple 2021.1 output

$$\frac{\frac{\operatorname{arccosh}(ax)^2 a^5 x^5}{5} - \frac{16\sqrt{ax-1}\ \sqrt{ax+1}\ \operatorname{arccosh}(ax)}{75} - \frac{2 \operatorname{arccosh}(ax) a^4 x^4 \sqrt{ax-1}\ \sqrt{ax+1}}{25} - \frac{8 \operatorname{arccosh}(ax) \sqrt{ax-1}\ \sqrt{ax}}{75}}{a^5}$$

14.2 Problem number 14

$$\int x^2 \cosh^{-1}(ax)^2 \, dx$$

Optimal antiderivative

$$\frac{4x}{9a^2} + \frac{2x^3}{27} + \frac{x^3 \operatorname{arccosh}(ax)^2}{3} - \frac{4 \operatorname{arccosh}(ax) \sqrt{ax-1}\ \sqrt{ax+1}}{9a^3} - \frac{2x^2 \operatorname{arccosh}(ax) \sqrt{ax-1}\ \sqrt{ax+1}}{9a}$$

command

```
int(x^2*arccosh(a*x)^2,x)
```

Maple 2022.1 output

$$\int x^2 \operatorname{arccosh}(ax)^2 \, dx$$

Maple 2021.1 output

$$\frac{\frac{a^3 x^3 \operatorname{arccosh}(ax)^2}{3} - \frac{4\sqrt{ax-1}\ \sqrt{ax+1}\ \operatorname{arccosh}(ax)}{9} - \frac{2 \operatorname{arccosh}(ax) \sqrt{ax-1}\ \sqrt{ax+1}\ a^2 x^2}{9} + \frac{4ax}{9} + \frac{2x^3 a^3}{27}}{a^3}$$

14.3 Problem number 22

$$\int x^4 \cosh^{-1}(ax)^3 \, dx$$

Optimal antiderivative

$$\frac{16x \operatorname{arccosh}(ax)}{25a^4} + \frac{8x^3 \operatorname{arccosh}(ax)}{75a^2} + \frac{6x^5 \operatorname{arccosh}(ax)}{125} + \frac{x^5 \operatorname{arccosh}(ax)^3}{5} - \frac{4144\sqrt{ax-1}\,\sqrt{ax+1}}{5625a^5} - \frac{272x^2\sqrt{ax-1}\,\sqrt{ax+1}}{5625a^3} - \frac{6x^4\sqrt{ax-1}\,\sqrt{ax+1}}{625a} - \frac{8\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}}{25a^5} - \frac{4x^2\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}}{25a^3} - \frac{3x^4\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}}{25a}$$

command

```
int(x^4*arccosh(a*x)^3,x)
```

Maple 2022.1 output

$$\int x^4 \operatorname{arccosh}(ax)^3 \, dx$$

Maple 2021.1 output

$$\frac{a^5x^5\operatorname{arccosh}(ax)^3}{5} - \frac{8\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}}{25} - \frac{3\operatorname{arccosh}(ax)^2a^4x^4\sqrt{ax-1}\,\sqrt{ax+1}}{25} - \frac{4\operatorname{arccosh}(ax)^2a^2x^2\sqrt{ax-1}\,\sqrt{}}{25}$$

14.4 Problem number 23

$$\int x^3 \cosh^{-1}(ax)^3 \, dx$$

Optimal antiderivative

$$-\frac{45 \operatorname{arccosh}(ax)}{256a^4} + \frac{9x^2 \operatorname{arccosh}(ax)}{32a^2} + \frac{3x^4 \operatorname{arccosh}(ax)}{32} - \frac{3\operatorname{arccosh}(ax)^3}{32a^4} + \frac{x^4 \operatorname{arccosh}(ax)^3}{4} - \frac{45x\sqrt{ax-1}\,\sqrt{ax+1}}{256a^3} - \frac{3x^3\sqrt{ax-1}\,\sqrt{ax+1}}{128a} - \frac{9x\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}}{32a^3} - \frac{3x^3\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}}{16a}$$

command

```
int(x^3*arccosh(a*x)^3,x)
```

Maple 2022.1 output

$$\int x^3 \operatorname{arccosh}(ax)^3 \, dx$$

Maple 2021.1 output

$$\frac{\frac{a^4x^4\operatorname{arccosh}(ax)^3}{4} - \frac{3\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}\,a^3x^3}{16} - \frac{9\operatorname{arccosh}(ax)^2 ax\sqrt{ax-1}\,\sqrt{ax+1}}{32} - \frac{3\operatorname{arccosh}(ax)^3}{32} + \frac{3a^4x^4\operatorname{arcco}}{32}}{a^4}$$

14.5 Problem number 24

$$\int x^2 \cosh^{-1}(ax)^3 \, dx$$

Optimal antiderivative

$$\begin{aligned}&\frac{4x\operatorname{arccosh}(ax)}{3a^2} + \frac{2x^3\operatorname{arccosh}(ax)}{9} + \frac{x^3\operatorname{arccosh}(ax)^3}{3} \\ &- \frac{40\sqrt{ax-1}\,\sqrt{ax+1}}{27a^3} - \frac{2x^2\sqrt{ax-1}\,\sqrt{ax+1}}{27a} \\ &- \frac{2\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}}{3a^3} - \frac{x^2\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}}{3a}\end{aligned}$$

command

```
int(x^2*arccosh(a*x)^3,x)
```

Maple 2022.1 output

$$\int x^2 \operatorname{arccosh}(ax)^3 \, dx$$

Maple 2021.1 output

$$\frac{\frac{a^3x^3\operatorname{arccosh}(ax)^3}{3} - \frac{2\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}}{3} - \frac{\operatorname{arccosh}(ax)^2a^2x^2\sqrt{ax-1}\,\sqrt{ax+1}}{3} + \frac{4ax\operatorname{arccosh}(ax)}{3} - \frac{40\sqrt{ax-1}}{2}}{a^3}$$

14.6 Problem number 32

$$\int x^5 \cosh^{-1}(ax)^4 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{245x^2}{1152a^4} + \frac{65x^4}{3456a^2} + \frac{x^6}{324} - \frac{245\operatorname{arccosh}(ax)^2}{1152a^6} + \frac{5x^2\operatorname{arccosh}(ax)^2}{16a^4} \\
&+ \frac{5x^4\operatorname{arccosh}(ax)^2}{48a^2} + \frac{x^6\operatorname{arccosh}(ax)^2}{18} - \frac{5\operatorname{arccosh}(ax)^4}{96a^6} + \frac{x^6\operatorname{arccosh}(ax)^4}{6} \\
&- \frac{245x\operatorname{arccosh}(ax)\sqrt{ax-1}\,\sqrt{ax+1}}{576a^5} - \frac{65x^3\operatorname{arccosh}(ax)\sqrt{ax-1}\,\sqrt{ax+1}}{864a^3} \\
&- \frac{x^5\operatorname{arccosh}(ax)\sqrt{ax-1}\,\sqrt{ax+1}}{54a} - \frac{5x\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{24a^5} \\
&- \frac{5x^3\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{36a^3} - \frac{x^5\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{9a}
\end{aligned}$$

command

```
int(x^5*arccosh(a*x)^4,x)
```

Maple 2022.1 output

$$\int x^5 \operatorname{arccosh}(ax)^4 \, dx$$

Maple 2021.1 output

$$\frac{a^6x^6\operatorname{arccosh}(ax)^4}{6} - \frac{a^5x^5\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{9} - \frac{5\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}\,a^3x^3}{36} - \frac{5\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{}}{24}$$

14.7 Problem number 33

$$\int x^4 \cosh^{-1}(ax)^4 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{16576x}{5625a^4} + \frac{1088x^3}{16875a^2} + \frac{24x^5}{3125} + \frac{32x\operatorname{arccosh}(ax)^2}{25a^4} \\
&+ \frac{16x^3\operatorname{arccosh}(ax)^2}{75a^2} + \frac{12x^5\operatorname{arccosh}(ax)^2}{125} + \frac{x^5\operatorname{arccosh}(ax)^4}{5} \\
&- \frac{16576\operatorname{arccosh}(ax)\sqrt{ax-1}\,\sqrt{ax+1}}{5625a^5} - \frac{1088x^2\operatorname{arccosh}(ax)\sqrt{ax-1}\,\sqrt{ax+1}}{5625a^3} \\
&- \frac{24x^4\operatorname{arccosh}(ax)\sqrt{ax-1}\,\sqrt{ax+1}}{625a} - \frac{32\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{75a^5} \\
&- \frac{16x^2\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{75a^3} - \frac{4x^4\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{25a}
\end{aligned}$$

command

```
int(x^4*arccosh(a*x)^4,x)
```

Maple 2022.1 output

$$\int x^4 \operatorname{arccosh}(ax)^4 \, dx$$

Maple 2021.1 output

$$\frac{a^5x^5\operatorname{arccosh}(ax)^4}{5} - \frac{32\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{75} - \frac{4a^4x^4\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{25} - \frac{16\operatorname{arccosh}(ax)^3a^2x^2\sqrt{ax-1}}{75}$$

14.8 Problem number 34

$$\int x^3 \cosh^{-1}(ax)^4 \, dx$$

Optimal antiderivative

$$\frac{45x^2}{128a^2} + \frac{3x^4}{128} - \frac{45\operatorname{arccosh}(ax)^2}{128a^4} + \frac{9x^2\operatorname{arccosh}(ax)^2}{16a^2} + \frac{3x^4\operatorname{arccosh}(ax)^2}{16} - \frac{3\operatorname{arccosh}(ax)^4}{32a^4} + \frac{x^4\operatorname{arccosh}(ax)^4}{4} - \frac{45x\operatorname{arccosh}(ax)\sqrt{ax-1}\,\sqrt{ax+1}}{64a^3} - \frac{3x^3\operatorname{arccosh}(ax)\sqrt{ax-1}\,\sqrt{ax+1}}{32a} - \frac{3x\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{8a^3} - \frac{x^3\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{4a}$$

command

```
int(x^3*arccosh(a*x)^4,x)
```

Maple 2022.1 output

$$\int x^3 \operatorname{arccosh}(ax)^4 \, dx$$

Maple 2021.1 output

$$\frac{a^4x^4\operatorname{arccosh}(ax)^4}{4} - \frac{\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}\,a^3x^3}{4} - \frac{3\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}\,ax}{8} - \frac{3\operatorname{arccosh}(ax)^4}{32} + \frac{3a^4x^4\operatorname{arccos}}{16}$$

14.9 Problem number 35

$$\int x^2 \cosh^{-1}(ax)^4 \, dx$$

Optimal antiderivative

$$\frac{160x}{27a^2} + \frac{8x^3}{81} + \frac{8x\operatorname{arccosh}(ax)^2}{3a^2} + \frac{4x^3\operatorname{arccosh}(ax)^2}{9} + \frac{x^3\operatorname{arccosh}(ax)^4}{3} - \frac{160\operatorname{arccosh}(ax)\sqrt{ax-1}\,\sqrt{ax+1}}{27a^3} - \frac{8x^2\operatorname{arccosh}(ax)\sqrt{ax-1}\,\sqrt{ax+1}}{27a} - \frac{8\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{9a^3} - \frac{4x^2\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{9a}$$

command

```
int(x^2*arccosh(a*x)^4,x)
```

Maple 2022.1 output

$$\int x^2 \operatorname{arccosh}(ax)^4 \, dx$$

Maple 2021.1 output

$$\frac{a^3x^3\operatorname{arccosh}(ax)^4}{3} - \frac{8\operatorname{arccosh}(ax)^3\sqrt{ax-1}\,\sqrt{ax+1}}{9} - \frac{4\operatorname{arccosh}(ax)^3a^2x^2\sqrt{ax-1}\,\sqrt{ax+1}}{9} + \frac{8ax\operatorname{arccosh}(ax)^2}{3} - \frac{160\sqrt{ax-}}{a^3}$$

15 Test file number 190

Test folder name:

```
test_cases/7_Inverse_hyperbolic_functions/7.2_Inverse_hyperbolic_cosine/190_7.2.4-f_x-^m-d+e_x^2-^p-a+b_arccosh-c_x-^n
```

15.1 Problem number 164

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

Optimal antiderivative

$$\frac{4322c^3x}{3675} - \frac{1514a^2c^3x^3}{11025} + \frac{234a^4c^3x^5}{6125} - \frac{2a^6c^3x^7}{343} + \frac{16c^3(ax-1)^{\frac{3}{2}}(ax+1)^{\frac{3}{2}}\operatorname{arccosh}(ax)}{105a} - \frac{12c^3(ax-1)^{\frac{5}{2}}(ax+1)^{\frac{5}{2}}\operatorname{arccosh}(ax)}{175a} + \frac{2c^3(ax-1)^{\frac{7}{2}}(ax+1)^{\frac{7}{2}}\operatorname{arccosh}(ax)}{49a} + \frac{16c^3x\operatorname{arccosh}(ax)^2}{35} + \frac{8c^3x\left(-a^2x^2+1\right)\operatorname{arccosh}(ax)^2}{35} + \frac{6c^3x\left(-a^2x^2+1\right)^2\operatorname{arccosh}(ax)^2}{35} + \frac{c^3x\left(-a^2x^2+1\right)^3\operatorname{arccosh}(ax)^2}{7} - \frac{32c^3\operatorname{arccosh}(ax)\sqrt{ax-1}\,\sqrt{ax+1}}{35a}$$

command

```
int((-a^2*c*x^2+c)^3*arccosh(a*x)^2,x)
```

Maple 2022.1 output

$$\int \left(-a^2 c\, x^2 + c\right)^3 \operatorname{arccosh}(ax)^2 \, dx$$

Maple 2021.1 output

$$-\frac{c^3\Big(55125\operatorname{arccosh}(ax)^2 a^7 x^7 - 15750 \operatorname{arccosh}(ax) \sqrt{ax-1}\ \sqrt{ax+1}\ a^6 x^6 - 231525\operatorname{arccosh}(ax)^2 a^5 x^5 + 73710\,\mathrm{ar}$$

15.2 Problem number 165

$$\int \left(c - a^2 c x^2\right)^2 \cosh^{-1}(ax)^2 \, dx$$

Optimal antiderivative

$$\frac{298c^2 x}{225} - \frac{76a^2 c^2 x^3}{675} + \frac{2a^4 c^2 x^5}{125} + \frac{8c^2 (ax-1)^{\frac{3}{2}} (ax+1)^{\frac{3}{2}} \operatorname{arccosh}(ax)}{45a} - \frac{2c^2 (ax-1)^{\frac{5}{2}} (ax+1)^{\frac{5}{2}} \operatorname{arccosh}(ax)}{25a} + \frac{8c^2 x \operatorname{arccosh}(ax)^2}{15} + \frac{4c^2 x\left(-a^2 x^2+1\right) \operatorname{arccosh}(ax)^2}{15} + \frac{c^2 x \left(-a^2 x^2+1\right)^2 \operatorname{arccosh}(ax)^2}{5} - \frac{16c^2 \operatorname{arccosh}(ax) \sqrt{ax-1}\ \sqrt{ax+1}}{15a}$$

command

```
int((-a^2*c*x^2+c)^2*arccosh(a*x)^2,x)
```

Maple 2022.1 output

$$\int \left(-a^2 c\, x^2 + c\right)^2 \operatorname{arccosh}(ax)^2 \, dx$$

Maple 2021.1 output

$$\frac{c^2\Big(675\operatorname{arccosh}(ax)^2 a^5 x^5 - 270 \operatorname{arccosh}(ax) a^4 x^4 \sqrt{ax-1}\ \sqrt{ax+1}\ - 2250 a^3 x^3 \operatorname{arccosh}(ax)^2 + 1140 \operatorname{arccosh}(ax)$$

15.3 Problem number 240

$$\int \left(c - a^2 c x^2\right)^3 \cosh^{-1}(ax)^3 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{4322c^3 x \operatorname{arccosh}(ax)}{1225} - \frac{1514a^2c^3x^3\operatorname{arccosh}(ax)}{3675} + \frac{702a^4c^3x^5\operatorname{arccosh}(ax)}{6125} \\
&- \frac{6a^6c^3x^7\operatorname{arccosh}(ax)}{343} + \frac{8c^3(ax-1)^{\frac{3}{2}}(ax+1)^{\frac{3}{2}}\operatorname{arccosh}(ax)^2}{35a} \\
&- \frac{18c^3(ax-1)^{\frac{5}{2}}(ax+1)^{\frac{5}{2}}\operatorname{arccosh}(ax)^2}{175a} + \frac{3c^3(ax-1)^{\frac{7}{2}}(ax+1)^{\frac{7}{2}}\operatorname{arccosh}(ax)^2}{49a} \\
&+ \frac{16c^3 x\operatorname{arccosh}(ax)^3}{35} + \frac{8c^3x\left(-a^2x^2+1\right)\operatorname{arccosh}(ax)^3}{35} \\
&+ \frac{6c^3x\left(-a^2x^2+1\right)^2\operatorname{arccosh}(ax)^3}{35} + \frac{c^3x\left(-a^2x^2+1\right)^3\operatorname{arccosh}(ax)^3}{7} \\
&+ \frac{7104c^3\left(-a^2x^2+1\right)}{42875a\sqrt{ax-1}\,\sqrt{ax+1}} + \frac{1184c^3\left(-a^2x^2+1\right)^2}{42875a\sqrt{ax-1}\,\sqrt{ax+1}} \\
&+ \frac{2664c^3\left(-a^2x^2+1\right)^3}{214375a\sqrt{ax-1}\,\sqrt{ax+1}} + \frac{6c^3\left(-a^2x^2+1\right)^4}{2401a\sqrt{ax-1}\,\sqrt{ax+1}} - \frac{976c^3\sqrt{ax-1}\,\sqrt{ax+1}}{315a} \\
&+ \frac{16a\,c^3x^2\sqrt{ax-1}\,\sqrt{ax+1}}{315} - \frac{48c^3\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}}{35a}
\end{aligned}$$

command

```
int((-a^2*c*x^2+c)^3*arccosh(a*x)^3,x)
```

Maple 2022.1 output

$$\int \left(-a^2 c\, x^2 + c\right)^3 \operatorname{arccosh}(ax)^3 \, dx$$

Maple 2021.1 output

$$-\frac{c^3\Big(1929375\operatorname{arccosh}(ax)^3\, a^7x^7 - 826875\operatorname{arccosh}(ax)^2\,\sqrt{ax-1}\,\sqrt{ax+1}\, a^6x^6 - 8103375\operatorname{arccosh}(ax)^3\, a^5x^5 + 386$$

15.4 Problem number 241

$$\int \left(c - a^2 c x^2\right)^2 \cosh^{-1}(ax)^3 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&\frac{298c^2 x \operatorname{arccosh}(ax)}{75} - \frac{76a^2c^2x^3\operatorname{arccosh}(ax)}{225} + \frac{6a^4c^2x^5\operatorname{arccosh}(ax)}{125} \\
&+ \frac{4c^2(ax-1)^{\frac{3}{2}}(ax+1)^{\frac{3}{2}}\operatorname{arccosh}(ax)^2}{15a} - \frac{3c^2(ax-1)^{\frac{5}{2}}(ax+1)^{\frac{5}{2}}\operatorname{arccosh}(ax)^2}{25a} \\
&+ \frac{8c^2x\operatorname{arccosh}(ax)^3}{15} + \frac{4c^2x\left(-a^2x^2+1\right)\operatorname{arccosh}(ax)^3}{15} \\
&+ \frac{c^2x\left(-a^2x^2+1\right)^2\operatorname{arccosh}(ax)^3}{5} + \frac{16c^2\left(-a^2x^2+1\right)}{125a\sqrt{ax-1}\,\sqrt{ax+1}} \\
&+ \frac{8c^2\left(-a^2x^2+1\right)^2}{375a\sqrt{ax-1}\,\sqrt{ax+1}} + \frac{6c^2\left(-a^2x^2+1\right)^3}{625a\sqrt{ax-1}\,\sqrt{ax+1}} - \frac{488c^2\sqrt{ax-1}\,\sqrt{ax+1}}{135a} \\
&+ \frac{8a\,c^2x^2\sqrt{ax-1}\,\sqrt{ax+1}}{135} - \frac{8c^2\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}}{5a}
\end{aligned}$$

command

```
int((-a^2*c*x^2+c)^2*arccosh(a*x)^3,x)
```

Maple 2022.1 output

$$\int \left(-a^2 c\, x^2 + c\right)^2 \operatorname{arccosh}(ax)^3 \, dx$$

Maple 2021.1 output

$$\frac{c^2\Big(3375\operatorname{arccosh}(ax)^3 a^5x^5 - 2025\operatorname{arccosh}(ax)^2\sqrt{ax-1}\,\sqrt{ax+1}\,a^4x^4 - 11250a^3x^3\operatorname{arccosh}(ax)^3 + 8550\operatorname{arccosh}($$

15.5 Problem number 527

$$\int \left(d + ex^2\right)\left(a + b\cosh^{-1}(cx)\right)^2 \, dx$$

Optimal antiderivative

$$\begin{aligned}
&2b^2dx + \frac{4b^2ex}{9c^2} + \frac{2b^2e\,x^3}{27} + dx(a + b\operatorname{arccosh}(cx))^2 \\
&+ \frac{e\,x^3(a + b\operatorname{arccosh}(cx))^2}{3} - \frac{2bd(a + b\operatorname{arccosh}(cx))\sqrt{cx-1}\,\sqrt{cx+1}}{c} \\
&- \frac{4be(a + b\operatorname{arccosh}(cx))\sqrt{cx-1}\,\sqrt{cx+1}}{9c^3} - \frac{2be\,x^2(a + b\operatorname{arccosh}(cx))\sqrt{cx-1}\,\sqrt{cx+1}}{9c}
\end{aligned}$$

command

```
int((e*x^2+d)*(a+b*arccosh(c*x))^2,x)
```

Maple 2022.1 output

$$\int \left(e\,x^2+d\right)\left(a+b\,\mathrm{arccosh}(cx)\right)^2\,dx$$

Maple 2021.1 output

$$\frac{a^2\left(\frac{1}{3}c^3x^3e+c^3dx\right)}{c^2}+\frac{b^2\left(\frac{e\left(9\mathrm{arccosh}(cx)^2c^3x^3-6\,\mathrm{arccosh}(cx)\sqrt{cx-1}\,\sqrt{cx+1}\,c^2x^2-12\,\mathrm{arccosh}(cx)\sqrt{cx-1}\,\sqrt{cx+1}+2c^3x^3+12cx\right)}{27}+c^2d\right.}{c^2}$$

16 Test file number 191

Test folder name:

```
test_cases/7_Inverse_hyperbolic_functions/7.2_Inverse_hyperbolic_cosine/191_7.2.5_Inverse_hyp
```

16.1 Problem number 8

$$\int (d+ex)^3\cosh^{-1}(cx)^2\,dx$$

Optimal antiderivative

$$\begin{aligned}
&2d^3x+\frac{4d\,e^2x}{3c^2}+\frac{3d^2e\,x^2}{4}+\frac{3e^3x^2}{32c^2}+\frac{2d\,e^2x^3}{9}+\frac{e^3x^4}{32}-\frac{d^4\mathrm{arccosh}(cx)^2}{4e}\\
&-\frac{3d^2e\mathrm{arccosh}(cx)^2}{4c^2}-\frac{3e^3\mathrm{arccosh}(cx)^2}{32c^4}+\frac{(ex+d)^4\,\mathrm{arccosh}(cx)^2}{4e}\\
&-\frac{2d^3\mathrm{arccosh}(cx)\,\sqrt{cx-1}\,\sqrt{cx+1}}{c}-\frac{4d\,e^2\mathrm{arccosh}(cx)\,\sqrt{cx-1}\,\sqrt{cx+1}}{3c^3}\\
&-\frac{3d^2ex\,\mathrm{arccosh}(cx)\,\sqrt{cx-1}\,\sqrt{cx+1}}{2c}-\frac{3e^3x\,\mathrm{arccosh}(cx)\,\sqrt{cx-1}\,\sqrt{cx+1}}{16c^3}\\
&-\frac{2d\,e^2x^2\mathrm{arccosh}(cx)\,\sqrt{cx-1}\,\sqrt{cx+1}}{3c}-\frac{e^3x^3\mathrm{arccosh}(cx)\,\sqrt{cx-1}\,\sqrt{cx+1}}{8c}
\end{aligned}$$

command

```
int((e*x+d)^3*arccosh(c*x)^2,x)
```

Maple 2022.1 output

$$\int (ex+d)^3\,\mathrm{arccosh}(cx)^2\,dx$$

Maple 2021.1 output

$$72\mathrm{arccosh}(cx)^2c^4x^4e^3+288\mathrm{arccosh}(cx)^2c^4x^3d\,e^2+432\mathrm{arccosh}(cx)^2c^4x^2d^2e+288\mathrm{arccosh}(cx)^2c^4x\,d^3-36\,\mathrm{arccos}$$

16.2 Problem number 9

$$\int (d+ex)^2 \cosh^{-1}(cx)^2 \, dx$$

Optimal antiderivative

$$2d^2x + \frac{4e^2x}{9c^2} + \frac{de\,x^2}{2} + \frac{2e^2x^3}{27} - \frac{d^3\text{arccosh}(cx)^2}{3e} - \frac{de\text{arccosh}(cx)^2}{2c^2} + \frac{(ex+d)^3\,\text{arccosh}(cx)^2}{3e} - \frac{2d^2\text{arccosh}(cx)\,\sqrt{cx-1}\,\sqrt{cx+1}}{c} - \frac{4e^2\text{arccosh}(cx)\,\sqrt{cx-1}\,\sqrt{cx+1}}{9c^3} - \frac{dex\,\text{arccosh}(cx)\,\sqrt{cx-1}\,\sqrt{cx+1}}{c} - \frac{2e^2x^2\text{arccosh}(cx)\,\sqrt{cx-1}\,\sqrt{cx+1}}{9c}$$

command

```
int((e*x+d)^2*arccosh(c*x)^2,x)
```

Maple 2022.1 output

$$\int (ex+d)^2 \,\text{arccosh}(cx)^2 \, dx$$

Maple 2021.1 output

$$\frac{18\text{arccosh}(cx)^2 c^3x^3e^2 + 54\text{arccosh}(cx)^2 c^3x^2de + 54\text{arccosh}(cx)^2 c^3x\,d^2 - 12\,\text{arccosh}(cx)\,\sqrt{cx-1}\,\sqrt{cx+1}\,c^2x^2e$$

17 Test file number 196

Test folder name:

```
test_cases/7_Inverse_hyperbolic_functions/7.3_Inverse_hyperbolic_tangent/196_7.3.6_Exponentia
```

17.1 Problem number 394

$$\int e^{2\tanh^{-1}(ax)} x^2 \sqrt{c-acx} \, dx$$

Optimal antiderivative

$$\frac{10(-acx+c)^{\frac{3}{2}}}{3a^3c} - \frac{8(-acx+c)^{\frac{5}{2}}}{5a^3c^2} + \frac{2(-acx+c)^{\frac{7}{2}}}{7a^3c^3} - \frac{4\sqrt{-acx+c}}{a^3}$$

command

```
int((a*x+1)^2/(-a^2*x^2+1)*x^2*(-a*c*x+c)^(1/2),x)
```

Maple 2022.1 output

hanged

Maple 2021.1 output

$$-\frac{2\sqrt{-acx+c}\,\left(15x^3a^3+39a^2x^2+52ax+104\right)}{105a^3}$$

18 Test file number 198

Test folder name:

`test_cases/7_Inverse_hyperbolic_functions/7.4_Inverse_hyperbolic_cotangent/198_7.4.1_Inverse_`

18.1 Problem number 147

$$\int x^4 \coth^{-1}(\tanh(a+bx))^3\,dx$$

Optimal antiderivative

$$-\frac{b^3x^8}{280}+\frac{b^2x^7\text{arccoth}(\tanh(bx+a))}{35}-\frac{b\,x^6\text{arccoth}(\tanh(bx+a))^2}{10}+\frac{x^5\text{arccoth}(\tanh(bx+a))^3}{5}$$

command

```
int(x^4*arccoth(tanh(b*x+a))^3,x)
```

Maple 2022.1 output

$$\int x^4\text{arccoth}(\tanh(bx+a))^3\,dx$$

Maple 2021.1 output

output too large to display

18.2 Problem number 148

$$\int x^3 \coth^{-1}(\tanh(a+bx))^3\,dx$$

Optimal antiderivative

$$-\frac{b^3x^7}{140}+\frac{b^2x^6\text{arccoth}(\tanh(bx+a))}{20}-\frac{3b\,x^5\text{arccoth}(\tanh(bx+a))^2}{20}+\frac{x^4\text{arccoth}(\tanh(bx+a))^3}{4}$$

command

```
int(x^3*arccoth(tanh(b*x+a))^3,x)
```

Maple 2022.1 output

$$\int x^3\text{arccoth}(\tanh(bx+a))^3\,dx$$

Maple 2021.1 output

output too large to display

18.3 Problem number 149

$$\int x^2 \coth^{-1}(\tanh(a+bx))^3\,dx$$

Optimal antiderivative

$$\frac{x^2\text{arccoth}(\tanh(bx+a))^4}{4b} - \frac{x\text{arccoth}(\tanh(bx+a))^5}{10b^2} + \frac{\text{arccoth}(\tanh(bx+a))^6}{60b^3}$$

command

```
int(x^2*arccoth(tanh(b*x+a))^3,x)
```

Maple 2022.1 output

$$\int x^2\text{arccoth}(\tanh(bx+a))^3\,dx$$

Maple 2021.1 output

output too large to display

19 Test file number 209

Test folder name:

```
test_cases/209_Blake_problems
```

19.1 Problem number 209

$$\int x^5 \sqrt[3]{1+x^3}\,dx$$

Optimal antiderivative

$$\frac{(x^3+1)^{\frac{1}{3}}\left(4x^6+x^3-3\right)}{28}$$

command

```
int(x^5*(x^3+1)^(1/3),x)
```

Maple 2022.1 output

hanged

Maple 2021.1 output

method	result	size
meijerg	$\frac{\text{hypergeom}\left(\left[-\frac{1}{3},2\right],[3],-x^3\right)x^6}{6}$	17
risch	$\frac{\left(x^3+1\right)^{\frac{1}{3}}\left(4x^6+x^3-3\right)}{28}$	20
trager	$\left(\frac{1}{7}x^6+\frac{1}{28}x^3-\frac{3}{28}\right)\left(x^3+1\right)^{\frac{1}{3}}$	21
gosper	$\frac{(1+x)\left(x^2-x+1\right)\left(4x^3-3\right)\left(x^3+1\right)^{\frac{1}{3}}}{28}$	28

19.2 Problem number 759

$$\int x^2 \sqrt[4]{x^2+x^4}\, dx$$

Optimal antiderivative

$$\frac{\left(4x^3+x\right)\left(x^4+x^2\right)^{\frac{1}{4}}}{16}+\frac{3\arctan\left(\frac{x}{\left(x^4+x^2\right)^{\frac{1}{4}}}\right)}{32}-\frac{3\operatorname{arctanh}\left(\frac{x}{\left(x^4+x^2\right)^{\frac{1}{4}}}\right)}{32}$$

command

```
int(x^2*(x^4+x^2)^(1/4),x)
```

Maple 2022.1 output

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

Maple 2021.1 output

method	result
meijerg	$\frac{2x^{\frac{7}{2}}\,\text{hypergeom}\left(\left[-\frac{1}{4},\frac{7}{4}\right],\left[\frac{11}{4}\right],-x^2\right)}{7}$
trager	$\frac{x\left(4x^2+1\right)\left(x^4+x^2\right)^{\frac{1}{4}}}{16}-\frac{3\ln\left(\frac{2\left(x^4+x^2\right)^{\frac{3}{4}}+2\sqrt{x^4+x^2}\ x+2x^2\left(x^4+x^2\right)^{\frac{1}{4}}+2x^3+x}{x}\right)}{64}-\frac{3\,\text{RootOf}\left(\_Z^2+1\right)\ln\left(\frac{2\sqrt{x^4+x^2}\ \text{Ro}}{}\right.}{}$
risch	$\frac{x\left(4x^2+1\right)\left(x^2\left(x^2+1\right)\right)^{\frac{1}{4}}}{16}+\left(-\frac{3\ln\left(\frac{2x^6+2\left(x^8+3x^6+3x^4+x^2\right)^{\frac{1}{4}}x^4+2\sqrt{x^8+3x^6+3x^4+x^2}\ x^2+5x^4+2\left(x^8+3x^6+3x^4+x^2\right)^{\frac{3}{4}}+4\left(\right.}{\left(x^2+1\right)^2}\right.}{64}\right.$

19.3 Problem number 1554

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

Optimal antiderivative

Unintegrable

command

```
int((x^2-2)*(x^3+x)^(1/3)/x^2/(x^4-2*x^2+4),x)
```

Maple 2022.1 output

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

Maple 2021.1 output

method	result	size
trager	Expression too large to display	2048
risch	Expression too large to display	7003

19.4 Problem number 1669

$$\int \frac{\left(1+x^3\right)^{2/3}\left(2+x^3\right)\left(4+3x^3\right)}{x^6\left(4+2x^3+x^6\right)}\,dx$$

Optimal antiderivative

Unintegrable

command

```
int((x^3+1)^(2/3)*(x^3+2)*(3*x^3+4)/x^6/(x^6+2*x^3+4),x)
```

Maple 2022.1 output

$$\int \frac{\left(x^3+1\right)^{\frac{2}{3}}\left(x^3+2\right)\left(3x^3+4\right)}{x^6\left(x^6+2x^3+4\right)}\,dx$$

Maple 2021.1 output

Expression too large to display

19.5 Problem number 1778

$$\int \frac{\sqrt[3]{-x+x^3}\left(8-10x^2+x^4\right)}{x^4\left(4-2x^2+x^4\right)}\,dx$$

Optimal antiderivative

Unintegrable

command

```
int((x^3-x)^(1/3)*(x^4-10*x^2+8)/x^4/(x^4-2*x^2+4),x)
```

Maple 2022.1 output

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

Maple 2021.1 output

output too large to display

19.6 Problem number 1779

$$\int \frac{\sqrt[3]{-x+x^3}\left(8-10x^2+x^4\right)}{x^4\left(4-2x^2+x^4\right)}\,dx$$

Optimal antiderivative

Unintegrable

command

```
int((x^3-x)^(1/3)*(x^4-10*x^2+8)/x^4/(x^4-2*x^2+4),x)
```

Maple 2022.1 output

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

Maple 2021.1 output

output too large to display

19.7 Problem number 2194

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

Optimal antiderivative

$$\frac{\arctan\left(\frac{2^{\frac{1}{8}}x}{\left(x^6+x^2\right)^{\frac{1}{4}}}\right)2^{\frac{5}{8}}}{4}+\frac{\arctan\left(\frac{2^{\frac{5}{8}}x\left(x^6+x^2\right)^{\frac{1}{4}}}{x^2 2^{\frac{1}{4}}-\sqrt{x^6+x^2}}\right)2^{\frac{1}{8}}}{4}$$
$$-\frac{\operatorname{arctanh}\left(\frac{2^{\frac{1}{8}}x}{\left(x^6+x^2\right)^{\frac{1}{4}}}\right)2^{\frac{5}{8}}}{4}+\frac{\operatorname{arctanh}\left(\frac{\frac{x^2 2^{\frac{5}{8}}}{2}+\frac{\sqrt{x^6+x^2}\,2^{\frac{3}{8}}}{2}}{x\left(x^6+x^2\right)^{\frac{1}{4}}}\right)2^{\frac{1}{8}}}{4}$$

command

```
int((x^4-1)*(x^6+x^2)^(1/4)/(x^8+1),x)
```

Maple 2022.1 output

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

Maple 2021.1 output

output too large to display

19.8 Problem number 2274

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

Optimal antiderivative

Unintegrable

command

```
int(x^2*(x^4+x^3)^(1/4)/(x^4-1),x)
```

Maple 2022.1 output

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

Maple 2021.1 output

method	result	size
trager	Expression too large to display	1932

19.9 Problem number 2276

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

Optimal antiderivative

Unintegrable

command

```
int(1/(x^3-x)^(1/3)/(x^6+1),x)
```

Maple 2022.1 output

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

Maple 2021.1 output

method	result	size
trager	Expression too large to display	4395

19.10 Problem number 2277

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

Optimal antiderivative

Unintegrable

command

```
int(1/(x^3-x)^(1/3)/(x^6+1),x)
```

Maple 2022.1 output

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

Maple 2021.1 output

method	result	size
trager	Expression too large to display	3898

19.11 Problem number 2531

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

Optimal antiderivative

Unintegrable

command

```
int((x^3-x^2+1)/(x^3-x^2-1)/(x^3+x^2)^(1/3),x)
```

Maple 2022.1 output

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

Maple 2021.1 output

method	result	size
trager	Expression too large to display	253926

19.12 Problem number 2622

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

Optimal antiderivative

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

command

```
int(x^3*(x^2+3)/(x^2+1)/(-x^3+x^2+1)^(1/3)/(x^3+x^2+1),x)
```

Maple 2022.1 output

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

Maple 2021.1 output

method	result	size
trager	Expression too large to display	1845

19.13 Problem number 2728

$$\int \frac{x\left(x^2c_3-c_4\right)}{\sqrt{\frac{xc_0+x^2c_3+c_4}{xc_1+x^2c_3+c_4}}\left(x+3x^2c_3+3c_4\right)\left(-x^2+x^4{c_3}^2+2x^2c_3c_4+{c_4}^2\right)}\,dx$$

Optimal antiderivative

$$-\frac{\arctan\left(\frac{\sqrt{1-\_C0}\ \sqrt{-1+\_C1}\ \sqrt{\frac{\_C3x^2+\_C0x+\_C4}{\_C3x^2+\_C1x+\_C4}}}{-1+\_C0}\right)\sqrt{-1+\_C1}}{2\sqrt{1-\_C0}}$$
$$-\frac{\arctan\left(\frac{\sqrt{-1-\_C0}\ \sqrt{1+\_C1}\ \sqrt{\frac{\_C3x^2+\_C0x+\_C4}{\_C3x^2+\_C1x+\_C4}}}{1+\_C0}\right)\sqrt{1+\_C1}}{4\sqrt{-1-\_C0}}$$
$$+\frac{3\arctan\left(\frac{\sqrt{1-3\_C0}\ \sqrt{-1+3\_C1}\ \sqrt{\frac{\_C3x^2+\_C0x+\_C4}{\_C3x^2+\_C1x+\_C4}}}{-1+3\_C0}\right)\sqrt{-1+3\_C1}}{4\sqrt{1-3\_C0}}$$

command

```
int(x*(_C3*x^2-_C4)/((_C3*x^2+_C0*x+_C4)/(_C3*x^2+_C1*x+_C4))^(1/2)/(3*_C3*x^2+3*_C4+x)/(_C3^
x^2),x)
```

Maple 2022.1 output

hanged

Maple 2021.1 output

method	result	size
default	Expression too large to display	186113818

19.14 Problem number 2737

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

Optimal antiderivative

$$\begin{aligned}
&-\frac{3\sqrt{3}\ \arctan\left(\frac{\sqrt{3}\ x}{-x+2^{\frac{2}{3}}\left(x^4+x^2\right)^{\frac{1}{3}}}\right)2^{\frac{2}{3}}}{8}-\frac{\sqrt{3}\ \arctan\left(\frac{\sqrt{3}\ x}{x+2^{\frac{2}{3}}\left(x^4+x^2\right)^{\frac{1}{3}}}\right)2^{\frac{2}{3}}}{8}\\
&+\frac{\ln\left(-2x+2^{\frac{2}{3}}\left(x^4+x^2\right)^{\frac{1}{3}}\right)2^{\frac{2}{3}}}{8}-\frac{3\ln\left(2x+2^{\frac{2}{3}}\left(x^4+x^2\right)^{\frac{1}{3}}\right)2^{\frac{2}{3}}}{8}\\
&+\frac{3\ln\left(-2x^2+2^{\frac{2}{3}}x\left(x^4+x^2\right)^{\frac{1}{3}}-2^{\frac{1}{3}}\left(x^4+x^2\right)^{\frac{2}{3}}\right)2^{\frac{2}{3}}}{16}\\
&-\frac{\ln\left(2x^2+2^{\frac{2}{3}}x\left(x^4+x^2\right)^{\frac{1}{3}}+2^{\frac{1}{3}}\left(x^4+x^2\right)^{\frac{2}{3}}\right)2^{\frac{2}{3}}}{16}
\end{aligned}$$

command

```
int((x^2-x+1)/(x^2-1)/(x^4+x^2)^(1/3),x)
```

Maple 2022.1 output

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

Maple 2021.1 output

method	result	size
trager	Expression too large to display	8780

20 Test file number 210

Test folder name:

`test_cases/210_Hebisch`

20.1 Problem number 3909

$$\int \frac{200x^2+80x^3+\left(-50x^3-20x^4\right)\log(x)+\left(-400x-160x^2+\left(100x^2+40x^3\right)\log(x)\right)\log\left(x^2\right)+\left(200+80x+\left(-\right.\right.}{}$$

Optimal antiderivative

$$\left(\mathrm{e}^{\frac{x\ln\left(\frac{4}{x}-\ln(x)\right)}{2\ln\left(x^2\right)-2x}}-x\right)(25+5x)$$

command

```
int(((((5*x^2+25*x)*ln(x)-20*x-100)*ln(x^2)+(-10*x^2-50*x)*ln(x)+40*x+200)*ln((-x*ln(x)+4)/x
40)*ln(x^2)^2+(-20*x^2*ln(x)+5*x^2+125*x+100)*ln(x^2)+10*x^3*ln(x)-5*x^3-85*x^2-100*x)*exp(x*
x*ln(x)+4)/x)/(2*ln(x^2)-2*x))+((-20*x^2-50*x)*ln(x)+80*x+200)*ln(x^2)^2+((40*x^3+100*x^2)*ln
160*x^2-400*x)*ln(x^2)+(-20*x^4-50*x^3)*ln(x)+80*x^3+200*x^2)/((2*x*ln(x)-8)*ln(x^2)^2+(-
4*x^2*ln(x)+16*x)*ln(x^2)+2*x^3*ln(x)-8*x^2),x)
```

Maple 2022.1 output

$$\int \frac{\left(\left(\left(\left(5x^2+25x\right)\ln(x)-20x-100\right)\ln\left(x^2\right)+\left(-10x^2-50x\right)\ln(x)+40x+200\right)\ln\left(\frac{-x\ln(x)+4}{x}\right)+(10x\ln(x)-\right.}{}$$

Maple 2021.1 output

method	result
risch	$-5x^2-25x+(25+5x)\,\mathrm{e}^{-\frac{x\left(-i\pi\operatorname{csgn}\left(\frac{i(x\ln(x)-4)}{x}\right)^3-i\pi\operatorname{csgn}\left(\frac{i(x\ln(x)-4)}{x}\right)^2\operatorname{csgn}\left(\frac{i}{x}\right)-i\pi\operatorname{csgn}\left(\frac{i(x\ln(x)-4)}{x}\right)^2\operatorname{csgn}(i(x\ln(x)-4))+\right.}{2\left(-i\pi\operatorname{csgn}\left(ix^2\right)^3+2i\pi\,\operatorname{csgn}(ix)\operatorname{csgn}\left(ix^2\right.\right.}}$

20.2 Problem number 5812

$$\int \frac{\left(-12x^7+4x^9+\left(12x^6-8x^8\right)\log(4)\right)\log^3\left(\frac{5x-5\log(4)}{x^2}\right)+\left(-8x^9+8x^8\log(4)\right)\log^4\left(\frac{5x-5\log(4)}{x^2}\right)+\log^3(x)\left(-32\right.}{}$$

Optimal antiderivative

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

command

```
int((((432*x^2*ln(2)-216*x^3)*ln((-10*ln(2)+5*x)/x^2)+2*(-216*x^2+324)*ln(2)+108*x^3-
324*x)*ln(x)^3+((432*x^4*ln(2)-216*x^5)*ln((-10*ln(2)+5*x)/x^2)^2+(2*(-216*x^4+324*x^2)*ln(2)
324*x^3)*ln((-10*ln(2)+5*x)/x^2))*ln(x)^2+((144*x^6*ln(2)-72*x^7)*ln((-10*ln(2)+5*x)/x^2)^3+(
72*x^6+108*x^4)*ln(2)+36*x^7-108*x^5)*ln((-10*ln(2)+5*x)/x^2)^2)*ln(x)+(16*x^8*ln(2)-
8*x^9)*ln((-10*ln(2)+5*x)/x^2)^4+(2*(-8*x^8+12*x^6)*ln(2)+4*x^9-12*x^7)*ln((-10*ln(2)+5*x)/x^
81*x^2),x)
```

Maple 2022.1 output

$$\int \frac{\left(\left(432x^2\ln(2)-216x^3\right)\ln\left(\frac{-10\ln(2)+5x}{x^2}\right)+2\left(-216x^2+324\right)\ln(2)+108x^3-324x\right)\ln(x)^3+\left(\left(432x^4\ln(2)-\right.\right.}{}$$

Maple 2021.1 output

method	result	size
risch	Expression too large to display	77075

20.3 Problem number 7306

$$\int \frac{4-12x-15x^2-4x^3+e^3\left(-4-4x-x^2\right)+\left(-20x-18x^2-4x^3\right)\log\left(\frac{2}{x}\right)+\left(-4x-2x^2-\right.}{4x-28x^2+33x^3+56x^4+16x^5+e^6\left(4x+4x^2+x^3\right)+e^3\left(-8x+24x^2+30x^3+8x^4\right)+\left(-8x^2+28x^3+16x^4\right.}$$

Optimal antiderivative

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

command

```
int(((-4*x*ln(2/x)-2*x^2-4*x)*ln(x)+(-4*x^3-18*x^2-20*x)*ln(2/x)+(-x^2-4*x-4)*exp(3)-
4*x^3-15*x^2-12*x+4)/(4*x^3*ln(x)^2+((4*x^3+8*x^2)*exp(3)+16*x^4+28*x^3-8*x^2)*ln(x)+(x^3+4*x
8*x)*exp(3)+16*x^5+56*x^4+33*x^3-28*x^2+4*x),x)
```

Maple 2022.1 output

$$\int \frac{\left(-4x\ln\left(\frac{2}{x}\right)-2x^2-4x\right)\ln(x)+\left(-4x^3-18x^2-20x\right)\ln\left(\frac{2}{x}\right)+\left(-x^2-4x-4\right)\mathrm{e}^3-4x^3-1}{4x^3\ln(x)^2+\left(\left(4x^3+8x^2\right)\mathrm{e}^3+16x^4+28x^3-8x^2\right)\ln(x)+\left(x^3+4x^2+4x\right)\mathrm{e}^6+\left(8x^4+30x^3+24x^2-8x\right)\mathrm{e}^3+}$$

Maple 2021.1 output

method	result	size
risch	$-\frac{1}{x}+\frac{-4+2x^2\ln(2)+x^2\mathrm{e}^3+4x^3+4x\ln(2)+4x\,\mathrm{e}^3+15x^2+4\,\mathrm{e}^3+12x}{2x(2x\ln(x)+x\,\mathrm{e}^3+4x^2+2\,\mathrm{e}^3+7x-2)}$	79

20.4 Problem number 7352

$$\int \frac{-16x^2-68x^3-32x^4-4x^5+e^2\left(64x^3+32x^4+4x^5\right)+\left(4x^3+e^2\left(16x^2+4x^3\right)\right)\log(x)+\left(64x^3+32x^4+4x^5+\right.}{}$$

Optimal antiderivative

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

command

```
int(((((4*x^2+8*x-32)*ln(x)+4*x^4+24*x^3-128*x)*ln((ln(x)+x^2+4*x)/(4+x))+(4*x^2+8*x-
32)*exp(2)*ln(x)+(4*x^4+24*x^3-128*x)*exp(2))*ln((ln((ln(x)+x^2+4*x)/(4+x))^2+2*exp(2)*ln((ln
4*x^2-16*x)*ln(x)-4*x^4-32*x^3-64*x^2)*ln((ln(x)+x^2+4*x)/(4+x))+(-4*x^2-16*x)*exp(2)*ln(x)+(
4*x^4-32*x^3-64*x^2)*exp(2))*ln((ln((ln(x)+x^2+4*x)/(4+x))^2+2*exp(2)*ln((ln(x)+x^2+4*x)/(4+x
4*x^3-8*x^2+32*x)*ln(x)-4*x^5-24*x^4+128*x^2)*ln((ln(x)+x^2+4*x)/(4+x))+((-4*x^3-8*x^2+32*x)*
4*x^3+8*x^2)*ln(x)+(-4*x^5-24*x^4+128*x^2)*exp(2)+4*x^5+24*x^4+4*x^3-120*x^2-32*x)*ln((ln((ln
4*x^5-32*x^4-68*x^3-16*x^2)/(((x^4+4*x^3)*ln(x)+x^6+8*x^5+16*x^4)*ln((ln(x)+x^2+4*x)/(4+x))+(
```

Maple 2022.1 output

$$\int \frac{\left(\left(\left(4x^2+8x-32\right)\ln(x)+4x^4+24x^3-128x\right)\ln\left(\frac{\ln(x)+x^2+4x}{4+x}\right)+\left(4x^2+8x-32\right)\mathrm{e}^2\ln(x)+\left(4x^4+24x^3-12\right.}{}$$

Maple 2021.1 output

method	result	size
risch	Expression too large to display	6785

20.5 Problem number 7552

$$\int \frac{-1-x+e^{5x}(1+x)+\left(2-2e^{5x}\right)\log(x)+\left(-x+e^{5x}x+\left(1-e^{5x}\right)\log(x)\right)\log(-x+\log(x))+\left(2x+e^{5x}\left(-2x-\right.\right.}{(-2x+2\log(x)+(-x+\mathrm{lo}}$$

Optimal antiderivative

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

command

```
int(((((1+5*x)*exp(5*x)-1)*ln(x)+(-5*x^2-x)*exp(5*x)+x)*ln(ln(x)-x)+((10*x+2)*exp(5*x)-
2)*ln(x)+(-10*x^2-2*x)*exp(5*x)+2*x)*ln(-x/(ln(ln(x)-x)+2))+((-exp(5*x)+1)*ln(x)+x*exp(5*x)-
x)*ln(ln(x)-x)+(-2*exp(5*x)+2)*ln(x)+(x+1)*exp(5*x)-x-1)/((ln(x)-x)*ln(ln(x)-x)+2*ln(x)-
2*x)/ln(-x/(ln(ln(x)-x)+2))^2,x)
```

Maple 2022.1 output

$$\int \frac{\left(\left(\left((1+5x)\,\mathrm{e}^{5x}-1\right)\ln(x)+\left(-5x^2-x\right)\mathrm{e}^{5x}+x\right)\ln(\ln(x)-x)+\left((10x+2)\,\mathrm{e}^{5x}-2\right)\ln(x)+\left(-10x^2-2x\right)\mathrm{e}^{5x}\right.}{((\ln(x)-x)\ln(\ln(x)-x)+}$$

Maple 2021.1 output

method	result
risch	$-\frac{2ix\left(\mathrm{e}^{5x}-1\right)}{\pi\,\mathrm{csgn}\left(\frac{i}{\ln(\ln(x)-x)+2}\right)\mathrm{csgn}\left(\frac{ix}{\ln(\ln(x)-x)+2}\right)^2-\pi\,\mathrm{csgn}\left(\frac{i}{\ln(\ln(x)-x)+2}\right)\mathrm{csgn}\left(\frac{ix}{\ln(\ln(x)-x)+2}\right)\mathrm{csgn}(ix)+\pi\mathrm{csgn}\left(\frac{ix}{\ln(\ln(x)-x)+2}\right)^3-2\pi\mathrm{c}}$

20.6 Problem number 9256

$$\int \frac{e^{2e^{-x}-x}\left(2e^x-2x\log\left(\frac{60}{x+4e^2x}\right)\right)}{x\log^3\left(\frac{60}{x+4e^2x}\right)}\,dx$$

Optimal antiderivative

$$\frac{\mathrm{e}^{2\,\mathrm{e}^{-x}}}{\ln\left(\frac{3}{\frac{\mathrm{e}^2x}{5}+\frac{x}{20}}\right)^2}$$

command

```
int((-2*x*ln(60/(4*x*exp(1)^2+x))+2*exp(x))*exp(1/exp(x))^2/x/exp(x)/ln(60/(4*x*exp(1)^2+x))^
```

Maple 2022.1 output

$$\int \frac{\left(-2x\ln\left(\frac{60}{4\,\mathrm{e}^2x+x}\right)+2\,\mathrm{e}^x\right)\mathrm{e}^{2\,\mathrm{e}^{-x}}\mathrm{e}^{-x}}{x\ln\left(\frac{60}{4\,\mathrm{e}^2x+x}\right)^3}\,dx$$

Maple 2021.1 output

method	result	size
risch	$-\frac{4\,\mathrm{e}^{2\,\mathrm{e}^{-x}}}{(2i\ln(5)+2i\ln(3)+4i\ln(2)-2i\ln(4\,\mathrm{e}^2+1)-2i\ln(x))^2}$	43

20.7 Problem number 9321

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

Optimal antiderivative

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

command

```
int(((((1-x)*exp(1)-x^2+x)*ln(3*x-3)^2+((1-x)*exp(1)-x^2+x)*ln(x)+(x-1)*exp(1)+x^2-
x)*ln(x*ln(3*x-3)^2+x*ln(x)-x)+(ln(x)*(x^2-x)+(1-x)*exp(1))*ln(3*x-3)^2+(2*x^2*ln(x)-
2*x*exp(1))*ln(3*x-3)+(x^2-x)*ln(x)^2+(1-x)*exp(1)*ln(x))/((x^3-x^2)*ln(3*x-3)^2+(x^3-
x^2)*ln(x)-x^3+x^2)/ln(x*ln(3*x-3)^2+x*ln(x)-x)^2,x)
```

Maple 2022.1 output

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

Maple 2021.1 output

method	result
risch	$\frac{-2x}{x\left(2\ln(x)+2\ln\left(\ln(3x-3)^2+\ln(x)-1\right)-i\pi\,\mathrm{csgn}(ix)\mathrm{csgn}\left(i\left(\ln(3x-3)^2+\ln(x)-1\right)\right)\mathrm{csgn}\left(ix\left(\ln(3x-3)^2+\ln(x)-1\right)\right)+i\pi\,\mathrm{csgn}(ix)\mathrm{csgn}\right.}$