Maple 2018.2 Integration Test Results
on the problems in "6 Hyperbolic functions/6.2 Hyperbolic cosine"

Test results for the 48 problems in "6.2.1 (c+d x)^m (a+b cosh)^n.txt"

Problem 1: Result more than twice size of optimal antiderivative.

$$\int (dx+c)^4 \cosh(bx+a)\, dx$$

Optimal(type 3, 91 leaves, 5 steps):

$$-\frac{24 d^3 (dx+c)\cosh(bx+a)}{b^4} - \frac{4 d (dx+c)^3 \cosh(bx+a)}{b^2} + \frac{24 d^4 \sinh(bx+a)}{b^5} + \frac{12 d^2 (dx+c)^2 \sinh(bx+a)}{b^3} + \frac{(dx+c)^4 \sinh(bx+a)}{b}$$

Result(type 3, 546 leaves):

$$\frac{1}{b}\Bigg(c^4 \sinh(bx+a) - \frac{12 d^3 a c \left((bx+a)^2 \sinh(bx+a) - 2(bx+a)\cosh(bx+a) + 2\sinh(bx+a)\right)}{b^3}$$
$$+ \frac{12 d^3 a^2 c \left((bx+a)\sinh(bx+a) - \cosh(bx+a)\right)}{b^3} - \frac{12 d^2 a c^2 \left((bx+a)\sinh(bx+a) - \cosh(bx+a)\right)}{b^2}$$
$$+ \frac{d^4 \left((bx+a)^4 \sinh(bx+a) - 4(bx+a)^3 \cosh(bx+a) + 12(bx+a)^2 \sinh(bx+a) - 24(bx+a)\cosh(bx+a) + 24\sinh(bx+a)\right)}{b^4}$$
$$+ \frac{d^4 a^4 \sinh(bx+a)}{b^4} - \frac{4 d^3 a^3 c \sinh(bx+a)}{b^3} + \frac{6 d^2 a^2 c^2 \sinh(bx+a)}{b^2} - \frac{4 d a c^3 \sinh(bx+a)}{b}$$
$$- \frac{4 d^4 a \left((bx+a)^3 \sinh(bx+a) - 3(bx+a)^2 \cosh(bx+a) + 6(bx+a)\sinh(bx+a) - 6\cosh(bx+a)\right)}{b^4}$$
$$+ \frac{4 d^3 c \left((bx+a)^3 \sinh(bx+a) - 3(bx+a)^2 \cosh(bx+a) + 6(bx+a)\sinh(bx+a) - 6\cosh(bx+a)\right)}{b^3}$$
$$+ \frac{6 d^4 a^2 \left((bx+a)^2 \sinh(bx+a) - 2(bx+a)\cosh(bx+a) + 2\sinh(bx+a)\right)}{b^4}$$
$$+ \frac{6 d^2 c^2 \left((bx+a)^2 \sinh(bx+a) - 2(bx+a)\cosh(bx+a) + 2\sinh(bx+a)\right)}{b^2} - \frac{4 d^4 a^3 \left((bx+a)\sinh(bx+a) - \cosh(bx+a)\right)}{b^4}$$
$$+ \frac{4 d c^3 \left((bx+a)\sinh(bx+a) - \cosh(bx+a)\right)}{b}\Bigg)$$

Problem 2: Result more than twice size of optimal antiderivative.

$$\int (dx+c)^2 \cosh(bx+a)\, dx$$

Optimal(type 3, 49 leaves, 3 steps):

$$-\frac{2 d (dx+c)\cosh(bx+a)}{b^2} + \frac{2 d^2 \sinh(bx+a)}{b^3} + \frac{(dx+c)^2 \sinh(bx+a)}{b}$$

Result(type 3, 146 leaves):

$$\frac{1}{b}\left(\frac{d^2\left((bx+a)^2\sinh(bx+a)-2(bx+a)\cosh(bx+a)+2\sinh(bx+a)\right)}{b^2}-\frac{2d^2a\left((bx+a)\sinh(bx+a)-\cosh(bx+a)\right)}{b^2}+\frac{2dc\left((bx+a)\sinh(bx+a)-\cosh(bx+a)\right)}{b}+\frac{d^2a^2\sinh(bx+a)}{b^2}-\frac{2dac\sinh(bx+a)}{b}+c^2\sinh(bx+a)\right)$$

Problem 3: Result more than twice size of optimal antiderivative.

$$\int\frac{\cosh(bx+a)}{(dx+c)^3}\,dx$$

Optimal(type 4, 96 leaves, 5 steps):

$$\frac{b^2\operatorname{Chi}\left(\frac{bc}{d}+bx\right)\cosh\left(a-\frac{bc}{d}\right)}{2d^3}-\frac{\cosh(bx+a)}{2d(dx+c)^2}+\frac{b^2\operatorname{Shi}\left(\frac{bc}{d}+bx\right)\sinh\left(a-\frac{bc}{d}\right)}{2d^3}-\frac{b\sinh(bx+a)}{2d^2(dx+c)}$$

Result(type 4, 276 leaves):

$$\frac{b^3e^{-bx-a}x}{4d\left(b^2d^2x^2+2b^2cdx+c^2b^2\right)}+\frac{b^3e^{-bx-a}c}{4d^2\left(b^2d^2x^2+2b^2cdx+c^2b^2\right)}-\frac{b^2e^{-bx-a}}{4d\left(b^2d^2x^2+2b^2cdx+c^2b^2\right)}-\frac{b^2e^{-\frac{da-cb}{d}}\operatorname{Ei}_1\left(bx+a-\frac{da-cb}{d}\right)}{4d^3}-\frac{b^2e^{bx+a}}{4d^3\left(\frac{bc}{d}+bx\right)^2}-\frac{b^2e^{bx+a}}{4d^3\left(\frac{bc}{d}+bx\right)}-\frac{b^2e^{\frac{da-cb}{d}}\operatorname{Ei}_1\left(-bx-a-\frac{-da+cb}{d}\right)}{4d^3}$$

Problem 4: Result more than twice size of optimal antiderivative.

$$\int(dx+c)^2\cosh(bx+a)^2\,dx$$

Optimal(type 3, 85 leaves, 4 steps):

$$\frac{d^2x}{4b^2}+\frac{(dx+c)^3}{6d}-\frac{d(dx+c)\cosh(bx+a)^2}{2b^2}+\frac{d^2\cosh(bx+a)\sinh(bx+a)}{4b^3}+\frac{(dx+c)^2\cosh(bx+a)\sinh(bx+a)}{2b}$$

Result(type 3, 261 leaves):

$$\frac{1}{b}\left(\frac{d^2\left(\frac{(bx+a)^2\cosh(bx+a)\sinh(bx+a)}{2}+\frac{(bx+a)^3}{6}-\frac{(bx+a)\cosh(bx+a)^2}{2}+\frac{\cosh(bx+a)\sinh(bx+a)}{4}+\frac{bx}{4}+\frac{a}{4}\right)}{b^2}-\frac{2d^2a\left(\frac{(bx+a)\cosh(bx+a)\sinh(bx+a)}{2}+\frac{(bx+a)^2}{4}-\frac{\cosh(bx+a)^2}{4}\right)}{b^2}\right.$$

$$+\frac{2 d c \left(\frac{(b x+a) \cosh(b x+a) \sinh(b x+a)}{2}+\frac{(b x+a)^2}{4}-\frac{\cosh(b x+a)^2}{4}\right)}{b}+\frac{d^2 a^2 \left(\frac{\cosh(b x+a) \sinh(b x+a)}{2}+\frac{b x}{2}+\frac{a}{2}\right)}{b^2}$$

$$-\frac{2 d a c \left(\frac{\cosh(b x+a) \sinh(b x+a)}{2}+\frac{b x}{2}+\frac{a}{2}\right)}{b}+c^2 \left(\frac{\cosh(b x+a) \sinh(b x+a)}{2}+\frac{b x}{2}+\frac{a}{2}\right)\Bigg)$$

Problem 5: Result more than twice size of optimal antiderivative.

$$\int \frac{\cosh(b x+a)^2}{(d x+c)^4}\, dx$$

Optimal(type 4, 150 leaves, 7 steps):

$$\frac{b^2}{3 d^3 (d x+c)}-\frac{\cosh(b x+a)^2}{3 d (d x+c)^3}-\frac{2 b^2 \cosh(b x+a)^2}{3 d^3 (d x+c)}+\frac{2 b^3 \cosh\left(2 a-\frac{2 b c}{d}\right) \operatorname{Shi}\left(\frac{2 b c}{d}+2 b x\right)}{3 d^4}+\frac{2 b^3 \operatorname{Chi}\left(\frac{2 b c}{d}+2 b x\right) \sinh\left(2 a-\frac{2 b c}{d}\right)}{3 d^4}$$

$$-\frac{b \cosh(b x+a) \sinh(b x+a)}{3 d^2 (d x+c)^2}$$

Result(type 4, 554 leaves):

$$-\frac{1}{6 d (d x+c)^3}-\frac{b^5 e^{-2 b x-2 a} x^2}{6 d \left(b^3 d^3 x^3+3 b^3 c d^2 x^2+3 b^3 c^2 d x+b^3 c^3\right)}-\frac{b^5 e^{-2 b x-2 a} c x}{3 d^2 \left(b^3 d^3 x^3+3 b^3 c d^2 x^2+3 b^3 c^2 d x+b^3 c^3\right)}$$

$$-\frac{b^5 e^{-2 b x-2 a} c^2}{6 d^3 \left(b^3 d^3 x^3+3 b^3 c d^2 x^2+3 b^3 c^2 d x+b^3 c^3\right)}+\frac{b^4 e^{-2 b x-2 a} x}{12 d \left(b^3 d^3 x^3+3 b^3 c d^2 x^2+3 b^3 c^2 d x+b^3 c^3\right)}$$

$$+\frac{b^4 e^{-2 b x-2 a} c}{12 d^2 \left(b^3 d^3 x^3+3 b^3 c d^2 x^2+3 b^3 c^2 d x+b^3 c^3\right)}-\frac{b^3 e^{-2 b x-2 a}}{12 d \left(b^3 d^3 x^3+3 b^3 c d^2 x^2+3 b^3 c^2 d x+b^3 c^3\right)}$$

$$+\frac{b^3 e^{-\frac{2 (d a-c b)}{d}} \operatorname{Ei}_1\left(2 b x+2 a-\frac{2 (d a-c b)}{d}\right)}{3 d^4}-\frac{b^3 e^{2 b x+2 a}}{12 d^4 \left(\frac{b c}{d}+b x\right)^3}-\frac{b^3 e^{2 b x+2 a}}{12 d^4 \left(\frac{b c}{d}+b x\right)^2}-\frac{b^3 e^{2 b x+2 a}}{6 d^4 \left(\frac{b c}{d}+b x\right)}$$

$$-\frac{b^3 e^{\frac{2 (d a-c b)}{d}} \operatorname{Ei}_1\left(-2 b x-2 a-\frac{2 (-d a+c b)}{d}\right)}{3 d^4}$$

Problem 6: Result more than twice size of optimal antiderivative.

$$\int (d x+c)^4 \cosh(b x+a)^3\, dx$$

Optimal(type 3, 205 leaves, 12 steps):

$$-\frac{160 d^3 (d x+c) \cosh(b x+a)}{9 b^4}-\frac{8 d (d x+c)^3 \cosh(b x+a)}{3 b^2}-\frac{8 d^3 (d x+c) \cosh(b x+a)^3}{27 b^4}-\frac{4 d (d x+c)^3 \cosh(b x+a)^3}{9 b^2}+\frac{488 d^4 \sinh(b x+a)}{27 b^5}$$
$$+\frac{80 d^2 (d x+c)^2 \sinh(b x+a)}{9 b^3}+\frac{2 (d x+c)^4 \sinh(b x+a)}{3 b}+\frac{4 d^2 (d x+c)^2 \cosh(b x+a)^2 \sinh(b x+a)}{9 b^3}$$
$$+\frac{(d x+c)^4 \cosh(b x+a)^2 \sinh(b x+a)}{3 b}+\frac{8 d^4 \sinh(b x+a)^3}{81 b^5}$$

Result(type 3, 1216 leaves):

$$\frac{1}{b}\Bigg(\frac{1}{b^4}\bigg(d^4\bigg(\frac{2 (b x+a)^4 \sinh(b x+a)}{3}+\frac{(b x+a)^4 \sinh(b x+a) \cosh(b x+a)^2}{3}-\frac{28 (b x+a)^3 \cosh(b x+a)}{9}+\frac{80 (b x+a)^2 \sinh(b x+a)}{9}$$
$$-\frac{488 (b x+a) \cosh(b x+a)}{27}+\frac{1456 \sinh(b x+a)}{81}-\frac{4 (b x+a)^3 \sinh(b x+a)^2 \cosh(b x+a)}{9}+\frac{4 (b x+a)^2 \sinh(b x+a) \cosh(b x+a)^2}{9}$$
$$-\frac{8 (b x+a) \sinh(b x+a)^2 \cosh(b x+a)}{27}+\frac{8 \cosh(b x+a)^2 \sinh(b x+a)}{81}\bigg)\bigg)-\frac{1}{b^4}\bigg(4 d^4 a\bigg(\frac{2 (b x+a)^3 \sinh(b x+a)}{3}$$
$$+\frac{(b x+a)^3 \sinh(b x+a) \cosh(b x+a)^2}{3}-\frac{7 (b x+a)^2 \cosh(b x+a)}{3}+\frac{40 (b x+a) \sinh(b x+a)}{9}-\frac{122 \cosh(b x+a)}{27}$$
$$-\frac{(b x+a)^2 \sinh(b x+a)^2 \cosh(b x+a)}{3}+\frac{2 (b x+a) \sinh(b x+a) \cosh(b x+a)^2}{9}-\frac{2 \sinh(b x+a)^2 \cosh(b x+a)}{27}\bigg)\bigg)$$
$$+\frac{1}{b^4}\bigg(6 d^4 a^2\bigg(\frac{(b x+a)^2 \sinh(b x+a) \cosh(b x+a)^2}{3}+\frac{2 (b x+a)^2 \sinh(b x+a)}{3}-\frac{2 (b x+a) \sinh(b x+a)^2 \cosh(b x+a)}{9}$$
$$-\frac{14 (b x+a) \cosh(b x+a)}{9}+\frac{2 \cosh(b x+a)^2 \sinh(b x+a)}{27}+\frac{40 \sinh(b x+a)}{27}\bigg)\bigg)$$
$$-\frac{4 d^4 a^3\left(\frac{2 (b x+a) \sinh(b x+a)}{3}+\frac{(b x+a) \sinh(b x+a) \cosh(b x+a)^2}{3}-\frac{7 \cosh(b x+a)}{9}-\frac{\sinh(b x+a)^2 \cosh(b x+a)}{9}\right)}{b^4}$$
$$+\frac{d^4 a^4\left(\frac{2}{3}+\frac{\cosh(b x+a)^2}{3}\right) \sinh(b x+a)}{b^4}+\frac{1}{b^3}\bigg(4 c d^3\bigg(\frac{2 (b x+a)^3 \sinh(b x+a)}{3}+\frac{(b x+a)^3 \sinh(b x+a) \cosh(b x+a)^2}{3}$$
$$-\frac{7 (b x+a)^2 \cosh(b x+a)}{3}+\frac{40 (b x+a) \sinh(b x+a)}{9}-\frac{122 \cosh(b x+a)}{27}-\frac{(b x+a)^2 \sinh(b x+a)^2 \cosh(b x+a)}{3}$$

$$+\frac{2(bx+a)\sinh(bx+a)\cosh(bx+a)^2}{9}-\frac{2\sinh(bx+a)^2\cosh(bx+a)}{27}\Bigg)\Bigg)-\frac{1}{b^3}\Bigg(12cd^3a\Bigg(\frac{(bx+a)^2\sinh(bx+a)\cosh(bx+a)^2}{3}$$

$$+\frac{2(bx+a)^2\sinh(bx+a)}{3}-\frac{2(bx+a)\sinh(bx+a)^2\cosh(bx+a)}{9}-\frac{14(bx+a)\cosh(bx+a)}{9}+\frac{2\cosh(bx+a)^2\sinh(bx+a)}{27}$$

$$+\frac{40\sinh(bx+a)}{27}\Bigg)\Bigg)$$

$$+\frac{12cd^3a^2\left(\frac{2(bx+a)\sinh(bx+a)}{3}+\frac{(bx+a)\sinh(bx+a)\cosh(bx+a)^2}{3}-\frac{7\cosh(bx+a)}{9}-\frac{\sinh(bx+a)^2\cosh(bx+a)}{9}\right)}{b^3}$$

$$-\frac{4cd^3a^3\left(\frac{2}{3}+\frac{\cosh(bx+a)^2}{3}\right)\sinh(bx+a)}{b^3}+\frac{1}{b^2}\Bigg(6c^2d^2\Bigg(\frac{(bx+a)^2\sinh(bx+a)\cosh(bx+a)^2}{3}+\frac{2(bx+a)^2\sinh(bx+a)}{3}$$

$$-\frac{2(bx+a)\sinh(bx+a)^2\cosh(bx+a)}{9}-\frac{14(bx+a)\cosh(bx+a)}{9}+\frac{2\cosh(bx+a)^2\sinh(bx+a)}{27}+\frac{40\sinh(bx+a)}{27}\Bigg)\Bigg)$$

$$-\frac{12c^2d^2a\left(\frac{2(bx+a)\sinh(bx+a)}{3}+\frac{(bx+a)\sinh(bx+a)\cosh(bx+a)^2}{3}-\frac{7\cosh(bx+a)}{9}-\frac{\sinh(bx+a)^2\cosh(bx+a)}{9}\right)}{b^2}$$

$$+\frac{6c^2d^2a^2\left(\frac{2}{3}+\frac{\cosh(bx+a)^2}{3}\right)\sinh(bx+a)}{b^2}$$

$$+\frac{4c^3d\left(\frac{2(bx+a)\sinh(bx+a)}{3}+\frac{(bx+a)\sinh(bx+a)\cosh(bx+a)^2}{3}-\frac{7\cosh(bx+a)}{9}-\frac{\sinh(bx+a)^2\cosh(bx+a)}{9}\right)}{b}$$

$$-\frac{4c^3da\left(\frac{2}{3}+\frac{\cosh(bx+a)^2}{3}\right)\sinh(bx+a)}{b}+c^4\left(\frac{2}{3}+\frac{\cosh(bx+a)^2}{3}\right)\sinh(bx+a)\Bigg)$$

Problem 7: Result more than twice size of optimal antiderivative.

$$\int (dx+c)^3\cosh(bx+a)^3\,dx$$

Optimal(type 3, 161 leaves, 8 steps):

$$-\frac{40d^3\cosh(bx+a)}{9b^4}-\frac{2d(dx+c)^2\cosh(bx+a)}{b^2}-\frac{2d^3\cosh(bx+a)^3}{27b^4}-\frac{d(dx+c)^2\cosh(bx+a)^3}{3b^2}+\frac{40d^2(dx+c)\sinh(bx+a)}{9b^3}$$

$$+\frac{2\,(dx+c)^3\sinh(bx+a)}{3\,b}+\frac{2\,d^2\,(dx+c)\cosh(bx+a)^2\sinh(bx+a)}{9\,b^3}+\frac{(dx+c)^3\cosh(bx+a)^2\sinh(bx+a)}{3\,b}$$

Result(type 3, 675 leaves):

$$\frac{1}{b}\Bigg(\frac{1}{b^3}\Bigg(d^3\Bigg(\frac{2\,(bx+a)^3\sinh(bx+a)}{3}+\frac{(bx+a)^3\sinh(bx+a)\cosh(bx+a)^2}{3}-\frac{7\,(bx+a)^2\cosh(bx+a)}{3}+\frac{40\,(bx+a)\sinh(bx+a)}{9}$$

$$-\frac{122\cosh(bx+a)}{27}-\frac{(bx+a)^2\sinh(bx+a)^2\cosh(bx+a)}{3}+\frac{2\,(bx+a)\sinh(bx+a)\cosh(bx+a)^2}{9}-\frac{2\sinh(bx+a)^2\cosh(bx+a)}{27}\Bigg)\Bigg)$$

$$-\frac{1}{b^3}\Bigg(3\,d^3\,a\Bigg(\frac{(bx+a)^2\sinh(bx+a)\cosh(bx+a)^2}{3}+\frac{2\,(bx+a)^2\sinh(bx+a)}{3}-\frac{2\,(bx+a)\sinh(bx+a)^2\cosh(bx+a)}{9}$$

$$-\frac{14\,(bx+a)\cosh(bx+a)}{9}+\frac{2\cosh(bx+a)^2\sinh(bx+a)}{27}+\frac{40\sinh(bx+a)}{27}\Bigg)\Bigg)+\frac{1}{b^2}\Bigg(3\,d^2\,c\Bigg(\frac{(bx+a)^2\sinh(bx+a)\cosh(bx+a)^2}{3}$$

$$+\frac{2\,(bx+a)^2\sinh(bx+a)}{3}-\frac{2\,(bx+a)\sinh(bx+a)^2\cosh(bx+a)}{9}-\frac{14\,(bx+a)\cosh(bx+a)}{9}+\frac{2\cosh(bx+a)^2\sinh(bx+a)}{27}$$

$$+\frac{40\sinh(bx+a)}{27}\Bigg)\Bigg)$$

$$+\frac{3\,d^3\,a^2\left(\frac{2\,(bx+a)\sinh(bx+a)}{3}+\frac{(bx+a)\sinh(bx+a)\cosh(bx+a)^2}{3}-\frac{7\cosh(bx+a)}{9}-\frac{\sinh(bx+a)^2\cosh(bx+a)}{9}\right)}{b^3}$$

$$-\frac{6\,d^2\,a\,c\left(\frac{2\,(bx+a)\sinh(bx+a)}{3}+\frac{(bx+a)\sinh(bx+a)\cosh(bx+a)^2}{3}-\frac{7\cosh(bx+a)}{9}-\frac{\sinh(bx+a)^2\cosh(bx+a)}{9}\right)}{b^2}$$

$$+\frac{3\,c^2\,d\left(\frac{2\,(bx+a)\sinh(bx+a)}{3}+\frac{(bx+a)\sinh(bx+a)\cosh(bx+a)^2}{3}-\frac{7\cosh(bx+a)}{9}-\frac{\sinh(bx+a)^2\cosh(bx+a)}{9}\right)}{b}$$

$$-\frac{d^3\,a^3\left(\frac{2}{3}+\frac{\cosh(bx+a)^2}{3}\right)\sinh(bx+a)}{b^3}+\frac{3\,d^2\,a^2\,c\left(\frac{2}{3}+\frac{\cosh(bx+a)^2}{3}\right)\sinh(bx+a)}{b^2}-\frac{3\,d\,a\,c^2\left(\frac{2}{3}+\frac{\cosh(bx+a)^2}{3}\right)\sinh(bx+a)}{b}$$

$$+c^3\left(\frac{2}{3}+\frac{\cosh(bx+a)^2}{3}\right)\sinh(bx+a)\Bigg)$$

Problem 8: Result more than twice size of optimal antiderivative.

$$\int (d x+c)^2 \cosh(b x+a)^3 \, dx$$

Optimal(type 3, 111 leaves, 6 steps):

$$-\frac{4 d (d x+c) \cosh(b x+a)}{3 b^2}-\frac{2 d (d x+c) \cosh(b x+a)^3}{9 b^2}+\frac{14 d^2 \sinh(b x+a)}{9 b^3}+\frac{2 (d x+c)^2 \sinh(b x+a)}{3 b}+\frac{(d x+c)^2 \cosh(b x+a)^2 \sinh(b x+a)}{3 b}+\frac{2 d^2 \sinh(b x+a)^3}{27 b^3}$$

Result(type 3, 319 leaves):

$$\frac{1}{b}\left(\frac{1}{b^2}\left(d^2\left(\frac{(b x+a)^2 \sinh(b x+a) \cosh(b x+a)^2}{3}+\frac{2 (b x+a)^2 \sinh(b x+a)}{3}-\frac{2 (b x+a) \sinh(b x+a)^2 \cosh(b x+a)}{9}-\frac{14 (b x+a) \cosh(b x+a)}{9}+\frac{2 \cosh(b x+a)^2 \sinh(b x+a)}{27}+\frac{40 \sinh(b x+a)}{27}\right)\right)-\frac{2 d^2 a\left(\frac{2 (b x+a) \sinh(b x+a)}{3}+\frac{(b x+a) \sinh(b x+a) \cosh(b x+a)^2}{3}-\frac{7 \cosh(b x+a)}{9}-\frac{\sinh(b x+a)^2 \cosh(b x+a)}{9}\right)}{b^2}+\frac{2 d c\left(\frac{2 (b x+a) \sinh(b x+a)}{3}+\frac{(b x+a) \sinh(b x+a) \cosh(b x+a)^2}{3}-\frac{7 \cosh(b x+a)}{9}-\frac{\sinh(b x+a)^2 \cosh(b x+a)}{9}\right)}{b}+\frac{d^2 a^2\left(\frac{2}{3}+\frac{\cosh(b x+a)^2}{3}\right) \sinh(b x+a)}{b^2}-\frac{2 d a c\left(\frac{2}{3}+\frac{\cosh(b x+a)^2}{3}\right) \sinh(b x+a)}{b}+c^2\left(\frac{2}{3}+\frac{\cosh(b x+a)^2}{3}\right) \sinh(b x+a)\right)$$

Problem 10: Result more than twice size of optimal antiderivative.

$$\int x^3 \cosh(b x+a)^4 \, dx$$

Optimal(type 3, 152 leaves, 8 steps):

$$\frac{45 x^2}{128 b^2}+\frac{3 x^4}{32}-\frac{45 \cosh(b x+a)^2}{128 b^4}-\frac{9 x^2 \cosh(b x+a)^2}{16 b^2}-\frac{3 \cosh(b x+a)^4}{128 b^4}-\frac{3 x^2 \cosh(b x+a)^4}{16 b^2}+\frac{45 x \cosh(b x+a) \sinh(b x+a)}{64 b^3}+\frac{3 x^3 \cosh(b x+a) \sinh(b x+a)}{8 b}+\frac{3 x \cosh(b x+a)^3 \sinh(b x+a)}{32 b^3}+\frac{x^3 \cosh(b x+a)^3 \sinh(b x+a)}{4 b}$$

Result(type 3, 431 leaves):

$$\frac{1}{b^4}\left(\frac{(b x+a)^3 \sinh(b x+a) \cosh(b x+a)^3}{4}+\frac{3 (b x+a)^3 \cosh(b x+a) \sinh(b x+a)}{8}+\frac{3 (b x+a)^4}{32}-\frac{3 (b x+a)^2 \sinh(b x+a)^2 \cosh(b x+a)^2}{16}\right.$$

$$- \frac{3 (b x+a)^2 \cosh(b x+a)^2}{4} + \frac{3 (b x+a) \sinh(b x+a) \cosh(b x+a)^3}{32} + \frac{45 (b x+a) \cosh(b x+a) \sinh(b x+a)}{64} + \frac{45 (b x+a)^2}{128}$$
$$- \frac{3 \sinh(b x+a)^2 \cosh(b x+a)^2}{128} - \frac{3 \cosh(b x+a)^2}{8} - 3 a \left(\frac{(b x+a)^2 \sinh(b x+a) \cosh(b x+a)^3}{4} + \frac{3 (b x+a)^2 \cosh(b x+a) \sinh(b x+a)}{8} \right.$$
$$+ \frac{(b x+a)^3}{8} - \frac{(b x+a) \sinh(b x+a)^2 \cosh(b x+a)^2}{8} - \frac{(b x+a) \cosh(b x+a)^2}{2} + \frac{\cosh(b x+a)^3 \sinh(b x+a)}{32}$$
$$\left. + \frac{15 \cosh(b x+a) \sinh(b x+a)}{64} + \frac{15 b x}{64} + \frac{15 a}{64} \right) + 3 a^2 \left(\frac{(b x+a) \sinh(b x+a) \cosh(b x+a)^3}{4} + \frac{3 (b x+a) \cosh(b x+a) \sinh(b x+a)}{8} \right.$$
$$\left. + \frac{3 (b x+a)^2}{16} - \frac{\sinh(b x+a)^2 \cosh(b x+a)^2}{16} - \frac{\cosh(b x+a)^2}{4} \right) - a^3 \left(\left(\frac{\cosh(b x+a)^3}{4} + \frac{3 \cosh(b x+a)}{8} \right) \sinh(b x+a) + \frac{3 b x}{8} + \frac{3 a}{8} \right) \Big)$$

Problem 14: Unable to integrate problem.

$$\int (d x+c)^{5/2} \cosh(b x+a) \, dx$$

Optimal(type 4, 131 leaves, 8 steps):

$$- \frac{5 d (d x+c)^{3/2} \cosh(b x+a)}{2 b^2} + \frac{(d x+c)^{5/2} \sinh(b x+a)}{b} + \frac{15 d^{5/2} e^{-a+\frac{b c}{d}} \operatorname{erf}\left(\frac{\sqrt{b} \sqrt{d x+c}}{\sqrt{d}} \right) \sqrt{\pi}}{16 b^{7/2}} - \frac{15 d^{5/2} e^{a-\frac{b c}{d}} \operatorname{erfi}\left(\frac{\sqrt{b} \sqrt{d x+c}}{\sqrt{d}} \right) \sqrt{\pi}}{16 b^{7/2}}$$
$$+ \frac{15 d^2 \sinh(b x+a) \sqrt{d x+c}}{4 b^3}$$

Result(type 8, 16 leaves):

$$\int (d x+c)^{5/2} \cosh(b x+a) \, dx$$

Problem 15: Unable to integrate problem.

$$\int \frac{\cosh(b x+a)}{(d x+c)^{3/2}} \, dx$$

Optimal(type 4, 91 leaves, 6 steps):

$$- \frac{e^{-a+\frac{b c}{d}} \operatorname{erf}\left(\frac{\sqrt{b} \sqrt{d x+c}}{\sqrt{d}} \right) \sqrt{b} \sqrt{\pi}}{d^{3/2}} + \frac{e^{a-\frac{b c}{d}} \operatorname{erfi}\left(\frac{\sqrt{b} \sqrt{d x+c}}{\sqrt{d}} \right) \sqrt{b} \sqrt{\pi}}{d^{3/2}} - \frac{2 \cosh(b x+a)}{d \sqrt{d x+c}}$$

Result(type 8, 16 leaves):

$$\int \frac{\cosh(b x+a)}{(d x+c)^{3/2}} \, dx$$

Problem 16: Unable to integrate problem.

$$\int \frac{\cosh(bx+a)}{(dx+c)^{7/2}}\, dx$$

Optimal(type 4, 132 leaves, 8 steps):

$$-\frac{2\cosh(bx+a)}{5d(dx+c)^{5/2}}-\frac{4b\sinh(bx+a)}{15d^2(dx+c)^{3/2}}-\frac{4b^{5/2}e^{-a+\frac{bc}{d}}\operatorname{erf}\left(\frac{\sqrt{b}\sqrt{dx+c}}{\sqrt{d}}\right)\sqrt{\pi}}{15d^{7/2}}+\frac{4b^{5/2}e^{a-\frac{bc}{d}}\operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{dx+c}}{\sqrt{d}}\right)\sqrt{\pi}}{15d^{7/2}}-\frac{8b^2\cosh(bx+a)}{15d^3\sqrt{dx+c}}$$

Result(type 8, 16 leaves):

$$\int \frac{\cosh(bx+a)}{(dx+c)^{7/2}}\, dx$$

Problem 17: Unable to integrate problem.

$$\int (dx+c)^{3/2}\cosh(bx+a)^2\, dx$$

Optimal(type 4, 159 leaves, 9 steps):

$$\frac{(dx+c)^{5/2}}{5d}+\frac{(dx+c)^{3/2}\cosh(bx+a)\sinh(bx+a)}{2b}+\frac{3d^{3/2}e^{-2a+\frac{2bc}{d}}\operatorname{erf}\left(\frac{\sqrt{2}\sqrt{b}\sqrt{dx+c}}{\sqrt{d}}\right)\sqrt{2}\sqrt{\pi}}{128b^{5/2}}$$
$$+\frac{3d^{3/2}e^{2a-\frac{2bc}{d}}\operatorname{erfi}\left(\frac{\sqrt{2}\sqrt{b}\sqrt{dx+c}}{\sqrt{d}}\right)\sqrt{2}\sqrt{\pi}}{128b^{5/2}}+\frac{3d\sqrt{dx+c}}{16b^2}-\frac{3d\cosh(bx+a)^2\sqrt{dx+c}}{8b^2}$$

Result(type 8, 18 leaves):

$$\int (dx+c)^{3/2}\cosh(bx+a)^2\, dx$$

Problem 18: Unable to integrate problem.

$$\int (dx+c)^{5/2}\cosh(bx+a)^3\, dx$$

Optimal(type 4, 291 leaves, 23 steps):

$$-\frac{5d(dx+c)^{3/2}\cosh(bx+a)}{3b^2}-\frac{5d(dx+c)^{3/2}\cosh(bx+a)^3}{18b^2}+\frac{2(dx+c)^{5/2}\sinh(bx+a)}{3b}+\frac{(dx+c)^{5/2}\cosh(bx+a)^2\sinh(bx+a)}{3b}$$
$$+\frac{5d^{5/2}e^{-3a+\frac{3bc}{d}}\operatorname{erf}\left(\frac{\sqrt{3}\sqrt{b}\sqrt{dx+c}}{\sqrt{d}}\right)\sqrt{3}\sqrt{\pi}}{1728b^{7/2}}-\frac{5d^{5/2}e^{3a-\frac{3bc}{d}}\operatorname{erfi}\left(\frac{\sqrt{3}\sqrt{b}\sqrt{dx+c}}{\sqrt{d}}\right)\sqrt{3}\sqrt{\pi}}{1728b^{7/2}}$$

$$+\frac{45 d^{5/2} e^{-a+\frac{b c}{d}} \operatorname{erf}\left(\frac{\sqrt{b}\sqrt{d x+c}}{\sqrt{d}}\right)\sqrt{\pi}}{64 b^{7/2}} - \frac{45 d^{5/2} e^{a-\frac{b c}{d}} \operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{d x+c}}{\sqrt{d}}\right)\sqrt{\pi}}{64 b^{7/2}} + \frac{45 d^2 \sinh(b x+a)\sqrt{d x+c}}{16 b^3}$$

$$+\frac{5 d^2 \sinh(3 b x+3 a)\sqrt{d x+c}}{144 b^3}$$

Result(type 8, 18 leaves):

$$\int (d x+c)^{5/2}\cosh(b x+a)^3\,dx$$

Problem 19: Unable to integrate problem.

$$\int \frac{\cosh(b x+a)^3}{\sqrt{d x+c}}\,dx$$

Optimal(type 4, 162 leaves, 12 steps):

$$\frac{e^{-3 a+\frac{3 b c}{d}} \operatorname{erf}\left(\frac{\sqrt{3}\sqrt{b}\sqrt{d x+c}}{\sqrt{d}}\right)\sqrt{3}\sqrt{\pi}}{24\sqrt{b}\sqrt{d}} + \frac{e^{3 a-\frac{3 b c}{d}} \operatorname{erfi}\left(\frac{\sqrt{3}\sqrt{b}\sqrt{d x+c}}{\sqrt{d}}\right)\sqrt{3}\sqrt{\pi}}{24\sqrt{b}\sqrt{d}} + \frac{3 e^{-a+\frac{b c}{d}} \operatorname{erf}\left(\frac{\sqrt{b}\sqrt{d x+c}}{\sqrt{d}}\right)\sqrt{\pi}}{8\sqrt{b}\sqrt{d}}$$

$$+\frac{3 e^{a-\frac{b c}{d}} \operatorname{erfi}\left(\frac{\sqrt{b}\sqrt{d x+c}}{\sqrt{d}}\right)\sqrt{\pi}}{8\sqrt{b}\sqrt{d}}$$

Result(type 8, 18 leaves):

$$\int \frac{\cosh(b x+a)^3}{\sqrt{d x+c}}\,dx$$

Problem 25: Result unnecessarily involves higher level functions.

$$\int x^{3+m}\cosh(b x+a)\,dx$$

Optimal(type 4, 53 leaves, 3 steps):

$$-\frac{e^a x^m \Gamma(4+m, -b x)}{2 b^4 (-b x)^m} - \frac{x^m \Gamma(4+m, b x)}{2 b^4 e^a (b x)^m}$$

Result(type 5, 72 leaves):

$$\frac{x^{4+m}\operatorname{hypergeom}\left(\left[2+\frac{m}{2}\right], \left[\frac{1}{2}, 3+\frac{m}{2}\right], \frac{x^2 b^2}{4}\right)\cosh(a)}{4+m} + \frac{b x^{5+m}\operatorname{hypergeom}\left(\left[\frac{5}{2}+\frac{m}{2}\right], \left[\frac{3}{2}, \frac{7}{2}+\frac{m}{2}\right], \frac{x^2 b^2}{4}\right)\sinh(a)}{5+m}$$

Problem 26: Unable to integrate problem.

$$\int x^m \cosh(bx+a)^2\, dx$$

Optimal(type 4, 83 leaves, 5 steps):

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

Result(type 8, 14 leaves):

$$\int x^m \cosh(bx+a)^2\, dx$$

Problem 27: Unable to integrate problem.

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

Optimal(type 4, 70 leaves, 5 steps):

$$\frac{x^m}{2m}-\frac{2^{-2-m}e^{2a}x^m\Gamma(m,-2bx)}{(-bx)^m}-\frac{2^{-2-m}x^m\Gamma(m,2bx)}{e^{2a}(bx)^m}$$

Result(type 8, 16 leaves):

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

Problem 28: Result more than twice size of optimal antiderivative.

$$\int (dx+c)^2\,(a+a\cosh(fx+e))\, dx$$

Optimal(type 3, 65 leaves, 5 steps):

$$\frac{a(dx+c)^3}{3d}-\frac{2ad(dx+c)\cosh(fx+e)}{f^2}+\frac{2ad^2\sinh(fx+e)}{f^3}+\frac{a(dx+c)^2\sinh(fx+e)}{f}$$

Result(type 3, 239 leaves):

$$\frac{1}{f}\Bigg(\frac{d^2a(fx+e)^3}{3f^2}+\frac{d^2a\left((fx+e)^2\sinh(fx+e)-2(fx+e)\cosh(fx+e)+2\sinh(fx+e)\right)}{f^2}-\frac{d^2ea(fx+e)^2}{f^2}$$
$$-\frac{2d^2ea\left((fx+e)\sinh(fx+e)-\cosh(fx+e)\right)}{f^2}+\frac{dca(fx+e)^2}{f}+\frac{2dca\left((fx+e)\sinh(fx+e)-\cosh(fx+e)\right)}{f}+\frac{d^2e^2a(fx+e)}{f^2}$$
$$+\frac{d^2e^2a\sinh(fx+e)}{f^2}-\frac{2deca(fx+e)}{f}-\frac{2deca\sinh(fx+e)}{f}+c^2a(fx+e)+c^2a\sinh(fx+e)\Bigg)$$

Problem 29: Result more than twice size of optimal antiderivative.

$$\int (dx+c)\,(a+a\cosh(fx+e))\, dx$$

Optimal(type 3, 43 leaves, 4 steps):

$$\frac{a\,(d x+c)^2}{2\,d}-\frac{a\,d\cosh(fx+e)}{f^2}+\frac{a\,(d x+c)\,\sinh(fx+e)}{f}$$

Result(type 3, 90 leaves):

$$\frac{\frac{d\,a\,(fx+e)^2}{2f}+\frac{d\,a\,(\,(fx+e)\,\sinh(fx+e)\,-\cosh(fx+e)\,)}{f}-\frac{d\,e\,a\,(fx+e)}{f}-\frac{d\,e\,a\sinh(fx+e)}{f}+c\,a\,(fx+e)\,+c\,a\sinh(fx+e)}{f}$$

Problem 37: Unable to integrate problem.

$$\int\frac{\sqrt{a+a\cosh(d x+c)}}{x}\,\mathrm{d}x$$

Optimal(type 4, 63 leaves, 4 steps):

$$\operatorname{Chi}\left(\frac{d x}{2}\right)\cosh\left(\frac{c}{2}\right)\operatorname{sech}\left(\frac{c}{2}+\frac{d x}{2}\right)\sqrt{a+a\cosh(d x+c)}\,+\operatorname{sech}\left(\frac{c}{2}+\frac{d x}{2}\right)\operatorname{Shi}\left(\frac{d x}{2}\right)\sinh\left(\frac{c}{2}\right)\sqrt{a+a\cosh(d x+c)}$$

Result(type 8, 18 leaves):

$$\int\frac{\sqrt{a+a\cosh(d x+c)}}{x}\,\mathrm{d}x$$

Problem 38: Unable to integrate problem.

$$\int\frac{\sqrt{a+a\cosh(d x+c)}}{x^3}\,\mathrm{d}x$$

Optimal(type 4, 115 leaves, 6 steps):

$$-\frac{\sqrt{a+a\cosh(d x+c)}}{2\,x^2}+\frac{d^2\operatorname{Chi}\left(\frac{d x}{2}\right)\cosh\left(\frac{c}{2}\right)\operatorname{sech}\left(\frac{c}{2}+\frac{d x}{2}\right)\sqrt{a+a\cosh(d x+c)}}{8}$$
$$+\frac{d^2\operatorname{sech}\left(\frac{c}{2}+\frac{d x}{2}\right)\operatorname{Shi}\left(\frac{d x}{2}\right)\sinh\left(\frac{c}{2}\right)\sqrt{a+a\cosh(d x+c)}}{8}-\frac{d\sqrt{a+a\cosh(d x+c)}\,\tanh\left(\frac{c}{2}+\frac{d x}{2}\right)}{4\,x}$$

Result(type 8, 18 leaves):

$$\int\frac{\sqrt{a+a\cosh(d x+c)}}{x^3}\,\mathrm{d}x$$

Problem 39: Unable to integrate problem.

$$\int\frac{\sqrt{a+a\cosh(x)}}{x^2}\,\mathrm{d}x$$

Optimal(type 4, 32 leaves, 3 steps):

$$-\frac{\sqrt{a+a\cosh(x)}}{x}+\frac{\operatorname{sech}\left(\frac{x}{2}\right)\operatorname{Shi}\left(\frac{x}{2}\right)\sqrt{a+a\cosh(x)}}{2}$$

Result(type 8, 14 leaves):

$$\int \frac{\sqrt{a+a\cosh(x)}}{x^2}\, dx$$

Problem 40: Unable to integrate problem.

$$\int x^3 (a+a\cosh(x))^{3/2}\, dx$$

Optimal(type 3, 139 leaves, 9 steps):

$$-\frac{1280 a\sqrt{a+a\cosh(x)}}{9}-16 a x^2\sqrt{a+a\cosh(x)}-\frac{64 a\cosh\left(\frac{x}{2}\right)^2\sqrt{a+a\cosh(x)}}{27}-\frac{8 a x^2\cosh\left(\frac{x}{2}\right)^2\sqrt{a+a\cosh(x)}}{3}$$
$$+\frac{32 a x\cosh\left(\frac{x}{2}\right)\sinh\left(\frac{x}{2}\right)\sqrt{a+a\cosh(x)}}{9}+\frac{4 a x^3\cosh\left(\frac{x}{2}\right)\sinh\left(\frac{x}{2}\right)\sqrt{a+a\cosh(x)}}{3}+\frac{640 a x\sqrt{a+a\cosh(x)}\tanh\left(\frac{x}{2}\right)}{9}$$
$$+\frac{8 a x^3\sqrt{a+a\cosh(x)}\tanh\left(\frac{x}{2}\right)}{3}$$

Result(type 8, 14 leaves):

$$\int x^3 (a+a\cosh(x))^{3/2}\, dx$$

Problem 44: Unable to integrate problem.

$$\int (dx+c)^m (a+a\cosh(fx+e))^2\, dx$$

Optimal(type 4, 257 leaves, 9 steps):

$$\frac{3a^2(dx+c)^{1+m}}{2d(1+m)}+\frac{2^{-3-m}a^2 e^{2e-\frac{2cf}{d}}(dx+c)^m\Gamma\left(1+m,-\frac{2f(dx+c)}{d}\right)}{f\left(-\frac{f(dx+c)}{d}\right)^m}+\frac{a^2 e^{e-\frac{cf}{d}}(dx+c)^m\Gamma\left(1+m,-\frac{f(dx+c)}{d}\right)}{f\left(-\frac{f(dx+c)}{d}\right)^m}$$
$$-\frac{a^2 e^{-e+\frac{cf}{d}}(dx+c)^m\Gamma\left(1+m,\frac{f(dx+c)}{d}\right)}{f\left(\frac{f(dx+c)}{d}\right)^m}-\frac{2^{-3-m}a^2 e^{-2e+\frac{2cf}{d}}(dx+c)^m\Gamma\left(1+m,\frac{2f(dx+c)}{d}\right)}{f\left(\frac{f(dx+c)}{d}\right)^m}$$

Result(type 8, 22 leaves):

$$\int (d x+c)^m (a+a\cosh(fx+e))^2\, dx$$

Problem 46: Result more than twice size of optimal antiderivative.

$$\int (d x+c)^3 (a+b\cosh(fx+e))\, dx$$

Optimal(type 3, 87 leaves, 6 steps):

$$\frac{a (d x+c)^4}{4 d}-\frac{6 b d^3 \cosh(fx+e)}{f^4}-\frac{3 b d (d x+c)^2 \cosh(fx+e)}{f^2}+\frac{6 b d^2 (d x+c) \sinh(fx+e)}{f^3}+\frac{b (d x+c)^3 \sinh(fx+e)}{f}$$

Result(type 3, 481 leaves):

$$\frac{1}{f}\left(\frac{d^3 a (fx+e)^4}{4 f^3}+\frac{d^3 b \left((fx+e)^3 \sinh(fx+e)-3 (fx+e)^2 \cosh(fx+e)+6 (fx+e) \sinh(fx+e)-6\cosh(fx+e)\right)}{f^3}-\frac{d^3 e a (fx+e)^3}{f^3}\right.$$
$$-\frac{3 d^3 e b \left((fx+e)^2 \sinh(fx+e)-2 (fx+e) \cosh(fx+e)+2\sinh(fx+e)\right)}{f^3}+\frac{d^2 c a (fx+e)^3}{f^2}$$
$$+\frac{3 d^2 c b \left((fx+e)^2 \sinh(fx+e)-2 (fx+e) \cosh(fx+e)+2\sinh(fx+e)\right)}{f^2}+\frac{3 d^3 e^2 a (fx+e)^2}{2 f^3}$$
$$+\frac{3 d^3 e^2 b \left((fx+e) \sinh(fx+e)-\cosh(fx+e)\right)}{f^3}-\frac{3 d^2 e c a (fx+e)^2}{f^2}-\frac{6 d^2 e c b \left((fx+e) \sinh(fx+e)-\cosh(fx+e)\right)}{f^2}+\frac{3 d c^2 a (fx+e)^2}{2 f}$$
$$+\frac{3 d c^2 b \left((fx+e) \sinh(fx+e)-\cosh(fx+e)\right)}{f}-\frac{d^3 e^3 a (fx+e)}{f^3}-\frac{d^3 e^3 b \sinh(fx+e)}{f^3}+\frac{3 d^2 e^2 c a (fx+e)}{f^2}+\frac{3 d^2 e^2 c b \sinh(fx+e)}{f^2}$$
$$\left.-\frac{3 d e c^2 a (fx+e)}{f}-\frac{3 d e c^2 b \sinh(fx+e)}{f}+a c^3 (fx+e)+c^3 b \sinh(fx+e)\right)$$

Problem 48: Result more than twice size of optimal antiderivative.

$$\int \frac{(a+b\cosh(fx+e))^2}{(d x+c)^3}\, dx$$

Optimal(type 4, 242 leaves, 14 steps):

$$-\frac{a^2}{2 d (d x+c)^2}+\frac{b^2 f^2 \operatorname{Chi}\left(\frac{2 c f}{d}+2 f x\right) \cosh\left(-2 e+\frac{2 c f}{d}\right)}{d^3}+\frac{a b f^2 \operatorname{Chi}\left(\frac{c f}{d}+f x\right) \cosh\left(-e+\frac{c f}{d}\right)}{d^3}-\frac{a b \cosh(fx+e)}{d (d x+c)^2}-\frac{b^2 \cosh(fx+e)^2}{2 d (d x+c)^2}$$
$$-\frac{b^2 f^2 \operatorname{Shi}\left(\frac{2 c f}{d}+2 f x\right) \sinh\left(-2 e+\frac{2 c f}{d}\right)}{d^3}-\frac{a b f^2 \operatorname{Shi}\left(\frac{c f}{d}+f x\right) \sinh\left(-e+\frac{c f}{d}\right)}{d^3}-\frac{a b f \sinh(fx+e)}{d^2 (d x+c)}-\frac{b^2 f \cosh(fx+e) \sinh(fx+e)}{d^2 (d x+c)}$$

Result(type 4, 625 leaves):

$$\frac{a\,b\,f^3\,\mathrm{e}^{-fx-e}\,x}{2\,d\,(d^2 f^2 x^2+2\,c\,d\,f^2 x+c^2 f^2)}+\frac{a\,b\,f^3\,\mathrm{e}^{-fx-e}\,c}{2\,d^2\,(d^2 f^2 x^2+2\,c\,d\,f^2 x+c^2 f^2)}-\frac{a\,b\,f^2\,\mathrm{e}^{-fx-e}}{2\,d\,(d^2 f^2 x^2+2\,c\,d\,f^2 x+c^2 f^2)}-\frac{a\,b\,f^2\,\mathrm{e}^{\frac{cf-de}{d}}\,\mathrm{Ei}_1\left(fx+e+\frac{cf-de}{d}\right)}{2\,d^3}$$

$$-\frac{a\,b\,f^2\,\mathrm{e}^{fx+e}}{2\,d^3\left(\frac{cf}{d}+fx\right)^2}-\frac{a\,b\,f^2\,\mathrm{e}^{fx+e}}{2\,d^3\left(\frac{cf}{d}+fx\right)}-\frac{a\,b\,f^2\,\mathrm{e}^{-\frac{cf-de}{d}}\,\mathrm{Ei}_1\left(-fx-e-\frac{cf-de}{d}\right)}{2\,d^3}-\frac{a^2}{2\,d\,(d\,x+c)^2}-\frac{b^2}{4\,d\,(d\,x+c)^2}$$

$$+\frac{b^2 f^3\,\mathrm{e}^{-2fx-2e}\,x}{4\,d\,(d^2 f^2 x^2+2\,c\,d\,f^2 x+c^2 f^2)}+\frac{b^2 f^3\,\mathrm{e}^{-2fx-2e}\,c}{4\,d^2\,(d^2 f^2 x^2+2\,c\,d\,f^2 x+c^2 f^2)}-\frac{b^2 f^2\,\mathrm{e}^{-2fx-2e}}{8\,d\,(d^2 f^2 x^2+2\,c\,d\,f^2 x+c^2 f^2)}$$

$$-\frac{b^2 f^2\,\mathrm{e}^{\frac{2(cf-de)}{d}}\,\mathrm{Ei}_1\left(2fx+2e+\frac{2(cf-de)}{d}\right)}{2\,d^3}-\frac{f^2 b^2\,\mathrm{e}^{2fx+2e}}{8\,d^3\left(\frac{cf}{d}+fx\right)^2}-\frac{f^2 b^2\,\mathrm{e}^{2fx+2e}}{4\,d^3\left(\frac{cf}{d}+fx\right)}-\frac{f^2 b^2\,\mathrm{e}^{-\frac{2(cf-de)}{d}}\,\mathrm{Ei}_1\left(-2fx-2e-\frac{2(cf-de)}{d}\right)}{2\,d^3}$$

Test results for the 30 problems in "6.2.2 (e x)^m (a+b x^n)^p cosh.txt"

Problem 1: Result more than twice size of optimal antiderivative.

$$\int x^3\,(b\,x+a)\cosh(d\,x+c)\,\mathrm{d}x$$

Optimal(type 3, 124 leaves, 11 steps):

$$-\frac{6\,a\cosh(d\,x+c)}{d^4}-\frac{24\,b\,x\cosh(d\,x+c)}{d^4}-\frac{3\,a\,x^2\cosh(d\,x+c)}{d^2}-\frac{4\,b\,x^3\cosh(d\,x+c)}{d^2}+\frac{24\,b\sinh(d\,x+c)}{d^5}+\frac{6\,a\,x\sinh(d\,x+c)}{d^3}+\frac{12\,b\,x^2\sinh(d\,x+c)}{d^3}+\frac{a\,x^3\sinh(d\,x+c)}{d}+\frac{b\,x^4\sinh(d\,x+c)}{d}$$

Result(type 3, 355 leaves):

$$\frac{1}{d^4}\Bigg(\frac{b\left((d\,x+c)^4\sinh(d\,x+c)-4\,(d\,x+c)^3\cosh(d\,x+c)+12\,(d\,x+c)^2\sinh(d\,x+c)-24\,(d\,x+c)\cosh(d\,x+c)+24\sinh(d\,x+c)\right)}{d}$$
$$-\frac{4\,b\,c\left((d\,x+c)^3\sinh(d\,x+c)-3\,(d\,x+c)^2\cosh(d\,x+c)+6\,(d\,x+c)\sinh(d\,x+c)-6\cosh(d\,x+c)\right)}{d}$$
$$+\frac{6\,b\,c^2\left((d\,x+c)^2\sinh(d\,x+c)-2\,(d\,x+c)\cosh(d\,x+c)+2\sinh(d\,x+c)\right)}{d}-\frac{4\,b\,c^3\left((d\,x+c)\sinh(d\,x+c)-\cosh(d\,x+c)\right)}{d}$$
$$+\frac{b\,c^4\sinh(d\,x+c)}{d}+a\left((d\,x+c)^3\sinh(d\,x+c)-3\,(d\,x+c)^2\cosh(d\,x+c)+6\,(d\,x+c)\sinh(d\,x+c)-6\cosh(d\,x+c)\right)-3\,a\,c\left((d\,x$$
$$+c)^2\sinh(d\,x+c)-2\,(d\,x+c)\cosh(d\,x+c)+2\sinh(d\,x+c)\right)+3\,a\,c^2\left((d\,x+c)\sinh(d\,x+c)-\cosh(d\,x+c)\right)-a\,c^3\sinh(d\,x+c)\Bigg)$$

Problem 4: Result more than twice size of optimal antiderivative.

$$\int x^2 (bx+a)^2 \cosh(dx+c)\,dx$$

Optimal(type 3, 184 leaves, 14 steps):

$$-\frac{12 a b \cosh(dx+c)}{d^4}-\frac{24 b^2 x \cosh(dx+c)}{d^4}-\frac{2 a^2 x \cosh(dx+c)}{d^2}-\frac{6 a b x^2 \cosh(dx+c)}{d^2}-\frac{4 b^2 x^3 \cosh(dx+c)}{d^2}+\frac{24 b^2 \sinh(dx+c)}{d^5}+\frac{2 a^2 \sinh(dx+c)}{d^3}+\frac{12 a b x \sinh(dx+c)}{d^3}+\frac{12 b^2 x^2 \sinh(dx+c)}{d^3}+\frac{a^2 x^2 \sinh(dx+c)}{d}+\frac{2 a b x^3 \sinh(dx+c)}{d}+\frac{b^2 x^4 \sinh(dx+c)}{d}$$

Result(type 3, 462 leaves):

$$\frac{1}{d^3}\Bigg(\frac{b^2\left((dx+c)^4\sinh(dx+c)-4(dx+c)^3\cosh(dx+c)+12(dx+c)^2\sinh(dx+c)-24(dx+c)\cosh(dx+c)+24\sinh(dx+c)\right)}{d^2}-\frac{4b^2c\left((dx+c)^3\sinh(dx+c)-3(dx+c)^2\cosh(dx+c)+6(dx+c)\sinh(dx+c)-6\cosh(dx+c)\right)}{d^2}+\frac{6b^2c^2\left((dx+c)^2\sinh(dx+c)-2(dx+c)\cosh(dx+c)+2\sinh(dx+c)\right)}{d^2}-\frac{4b^2c^3\left((dx+c)\sinh(dx+c)-\cosh(dx+c)\right)}{d^2}+\frac{2ab\left((dx+c)^3\sinh(dx+c)-3(dx+c)^2\cosh(dx+c)+6(dx+c)\sinh(dx+c)-6\cosh(dx+c)\right)}{d}-\frac{6bca\left((dx+c)^2\sinh(dx+c)-2(dx+c)\cosh(dx+c)+2\sinh(dx+c)\right)}{d}+\frac{6bac^2\left((dx+c)\sinh(dx+c)-\cosh(dx+c)\right)}{d}+\frac{b^2c^4\sinh(dx+c)}{d^2}-\frac{2bc^3a\sinh(dx+c)}{d}+a^2\left((dx+c)^2\sinh(dx+c)-2(dx+c)\cosh(dx+c)+2\sinh(dx+c)\right)-2a^2c\left((dx+c)\sinh(dx+c)-\cosh(dx+c)\right)+a^2c^2\sinh(dx+c)\Bigg)$$

Problem 12: Result more than twice size of optimal antiderivative.

$$\int \frac{x\cosh(dx+c)}{(bx+a)^3}\,dx$$

Optimal(type 4, 175 leaves, 11 steps):

$$-\frac{a d^2 \operatorname{Chi}\left(\frac{da}{b}+dx\right)\cosh\left(-c+\frac{da}{b}\right)}{2b^4}+\frac{a\cosh(dx+c)}{2b^2(bx+a)^2}-\frac{\cosh(dx+c)}{b^2(bx+a)}+\frac{d\cosh\left(-c+\frac{da}{b}\right)\operatorname{Shi}\left(\frac{da}{b}+dx\right)}{b^3}-\frac{d\operatorname{Chi}\left(\frac{da}{b}+dx\right)\sinh\left(-c+\frac{da}{b}\right)}{b^3}+\frac{a d^2\operatorname{Shi}\left(\frac{da}{b}+dx\right)\sinh\left(-c+\frac{da}{b}\right)}{2b^4}+\frac{a d\sinh(dx+c)}{2b^3(bx+a)}$$

Result(type 4, 434 leaves):

$$-\frac{d^3 e^{-dx-c} a x}{4b^2\left(b^2d^2x^2+2abd^2x+a^2d^2\right)}-\frac{d^3 e^{-dx-c} a^2}{4b^3\left(b^2d^2x^2+2abd^2x+a^2d^2\right)}-\frac{d^2 e^{-dx-c} x}{2b\left(b^2d^2x^2+2abd^2x+a^2d^2\right)}-\frac{d^2 e^{-dx-c} a}{4b^2\left(b^2d^2x^2+2abd^2x+a^2d^2\right)}$$

$$+\frac{d^2 e^{\frac{da-cb}{b}} \mathrm{Ei}_1\left(dx+c+\frac{da-cb}{b}\right) a}{4 b^4}+\frac{d e^{\frac{da-cb}{b}} \mathrm{Ei}_1\left(dx+c+\frac{da-cb}{b}\right)}{2 b^3}+\frac{d^2 e^{dx+c} a}{4 b^4 \left(\frac{da}{b}+dx\right)^2}+\frac{d^2 e^{dx+c} a}{4 b^4 \left(\frac{da}{b}+dx\right)}$$

$$+\frac{d^2 e^{-\frac{da-cb}{b}} \mathrm{Ei}_1\left(-dx-c-\frac{da-cb}{b}\right) a}{4 b^4}-\frac{d e^{dx+c}}{2 b^3 \left(\frac{da}{b}+dx\right)}-\frac{d e^{-\frac{da-cb}{b}} \mathrm{Ei}_1\left(-dx-c-\frac{da-cb}{b}\right)}{2 b^3}$$

Problem 13: Result more than twice size of optimal antiderivative.

$$\int \frac{\cosh(dx+c)}{x^3 (bx+a)^3}\, dx$$

Optimal(type 4, 367 leaves, 26 steps):

$$\frac{6 b^2 \mathrm{Chi}(dx) \cosh(c)}{a^5}+\frac{d^2 \mathrm{Chi}(dx) \cosh(c)}{2 a^3}-\frac{6 b^2 \mathrm{Chi}\left(\frac{da}{b}+dx\right) \cosh\left(-c+\frac{da}{b}\right)}{a^5}-\frac{d^2 \mathrm{Chi}\left(\frac{da}{b}+dx\right) \cosh\left(-c+\frac{da}{b}\right)}{2 a^3}-\frac{\cosh(dx+c)}{2 a^3 x^2}$$

$$+\frac{3 b \cosh(dx+c)}{a^4 x}+\frac{b^2 \cosh(dx+c)}{2 a^3 (bx+a)^2}+\frac{3 b^2 \cosh(dx+c)}{a^4 (bx+a)}-\frac{3 b d \cosh(c) \mathrm{Shi}(dx)}{a^4}-\frac{3 b d \cosh\left(-c+\frac{da}{b}\right) \mathrm{Shi}\left(\frac{da}{b}+dx\right)}{a^4}$$

$$-\frac{3 b d \mathrm{Chi}(dx) \sinh(c)}{a^4}+\frac{6 b^2 \mathrm{Shi}(dx) \sinh(c)}{a^5}+\frac{d^2 \mathrm{Shi}(dx) \sinh(c)}{2 a^3}+\frac{3 b d \mathrm{Chi}\left(\frac{da}{b}+dx\right) \sinh\left(-c+\frac{da}{b}\right)}{a^4}$$

$$+\frac{6 b^2 \mathrm{Shi}\left(\frac{da}{b}+dx\right) \sinh\left(-c+\frac{da}{b}\right)}{a^5}+\frac{d^2 \mathrm{Shi}\left(\frac{da}{b}+dx\right) \sinh\left(-c+\frac{da}{b}\right)}{2 a^3}-\frac{d \sinh(dx+c)}{2 a^3 x}+\frac{b d \sinh(dx+c)}{2 a^3 (bx+a)}$$

Result(type 4, 759 leaves):

$$\frac{d^3 e^{-dx-c} b}{4 a^2 (b^2 d^2 x^2+2 a b d^2 x+a^2 d^2)}+\frac{3 d^2 e^{-dx-c} x b^3}{a^4 (b^2 d^2 x^2+2 a b d^2 x+a^2 d^2)}+\frac{d^3 e^{-dx-c}}{4 a x (b^2 d^2 x^2+2 a b d^2 x+a^2 d^2)}+\frac{9 d^2 e^{-dx-c} b^2}{2 a^3 (b^2 d^2 x^2+2 a b d^2 x+a^2 d^2)}$$

$$+\frac{d^2 e^{-dx-c} b}{a^2 x (b^2 d^2 x^2+2 a b d^2 x+a^2 d^2)}-\frac{d^2 e^{-dx-c}}{4 a x^2 (b^2 d^2 x^2+2 a b d^2 x+a^2 d^2)}+\frac{d^2 e^{\frac{da-cb}{b}} \mathrm{Ei}_1\left(dx+c+\frac{da-cb}{b}\right)}{4 a^3}$$

$$-\frac{3 d e^{\frac{da-cb}{b}} \mathrm{Ei}_1\left(dx+c+\frac{da-cb}{b}\right) b}{2 a^4}+\frac{3 e^{\frac{da-cb}{b}} \mathrm{Ei}_1\left(dx+c+\frac{da-cb}{b}\right) b^2}{a^5}-\frac{d^2 e^{-c} \mathrm{Ei}_1(dx)}{4 a^3}-\frac{3 d e^{-c} \mathrm{Ei}_1(dx) b}{2 a^4}-\frac{3 e^{-c} \mathrm{Ei}_1(dx) b^2}{a^5}$$

$$+\frac{d^2 e^{dx+c}}{4a^3\left(\frac{da}{b}+dx\right)^2}+\frac{d^2 e^{dx+c}}{4a^3\left(\frac{da}{b}+dx\right)}+\frac{d^2 e^{-\frac{da-cb}{b}}\operatorname{Ei}_1\left(-dx-c-\frac{da-cb}{b}\right)}{4a^3}+\frac{3db\,e^{dx+c}}{2a^4\left(\frac{da}{b}+dx\right)}$$
$$+\frac{3db\,e^{-\frac{da-cb}{b}}\operatorname{Ei}_1\left(-dx-c-\frac{da-cb}{b}\right)}{2a^4}+\frac{3b\,e^{dx+c}}{2a^4x}+\frac{3db\,e^c\operatorname{Ei}_1(-dx)}{2a^4}+\frac{3b^2 e^{-\frac{da-cb}{b}}\operatorname{Ei}_1\left(-dx-c-\frac{da-cb}{b}\right)}{a^5}-\frac{3b^2 e^c\operatorname{Ei}_1(-dx)}{a^5}$$
$$-\frac{e^{dx+c}}{4a^3x^2}-\frac{d\,e^{dx+c}}{4a^3x}-\frac{d^2 e^c\operatorname{Ei}_1(-dx)}{4a^3}$$

Problem 14: Result more than twice size of optimal antiderivative.

$$\int x^2\left(bx^2+a\right)\cosh(dx+c)\,dx$$

Optimal(type 3, 109 leaves, 10 steps):

$$-\frac{24bx\cosh(dx+c)}{d^4}-\frac{2ax\cosh(dx+c)}{d^2}-\frac{4bx^3\cosh(dx+c)}{d^2}+\frac{24b\sinh(dx+c)}{d^5}+\frac{2a\sinh(dx+c)}{d^3}+\frac{12bx^2\sinh(dx+c)}{d^3}+\frac{ax^2\sinh(dx+c)}{d}$$
$$+\frac{bx^4\sinh(dx+c)}{d}$$

Result(type 3, 297 leaves):

$$\frac{1}{d^3}\left(\frac{b\left((dx+c)^4\sinh(dx+c)-4(dx+c)^3\cosh(dx+c)+12(dx+c)^2\sinh(dx+c)-24(dx+c)\cosh(dx+c)+24\sinh(dx+c)\right)}{d^2}\right.$$
$$-\frac{4bc\left((dx+c)^3\sinh(dx+c)-3(dx+c)^2\cosh(dx+c)+6(dx+c)\sinh(dx+c)-6\cosh(dx+c)\right)}{d^2}$$
$$+\frac{6bc^2\left((dx+c)^2\sinh(dx+c)-2(dx+c)\cosh(dx+c)+2\sinh(dx+c)\right)}{d^2}-\frac{4bc^3\left((dx+c)\sinh(dx+c)-\cosh(dx+c)\right)}{d^2}$$
$$+\frac{bc^4\sinh(dx+c)}{d^2}+a\left((dx+c)^2\sinh(dx+c)-2(dx+c)\cosh(dx+c)+2\sinh(dx+c)\right)-2ac\left((dx+c)\sinh(dx+c)-\cosh(dx+c)\right)$$
$$\left.+c^2a\sinh(dx+c)\right)$$

Problem 17: Result more than twice size of optimal antiderivative.

$$\int x^2\left(bx^2+a\right)^2\cosh(dx+c)\,dx$$

Optimal(type 3, 234 leaves, 17 steps):

$$-\frac{720b^2x\cosh(dx+c)}{d^6}-\frac{48abx\cosh(dx+c)}{d^4}-\frac{2a^2x\cosh(dx+c)}{d^2}-\frac{120b^2x^3\cosh(dx+c)}{d^4}-\frac{8abx^3\cosh(dx+c)}{d^2}-\frac{6b^2x^5\cosh(dx+c)}{d^2}$$

$$+\frac{720 b^2 \sinh(d x+c)}{d^7}+\frac{48 a b \sinh(d x+c)}{d^5}+\frac{2 a^2 \sinh(d x+c)}{d^3}+\frac{360 b^2 x^2 \sinh(d x+c)}{d^5}+\frac{24 a b x^2 \sinh(d x+c)}{d^3}+\frac{a^2 x^2 \sinh(d x+c)}{d}$$
$$+\frac{30 b^2 x^4 \sinh(d x+c)}{d^3}+\frac{2 a b x^4 \sinh(d x+c)}{d}+\frac{b^2 x^6 \sinh(d x+c)}{d}$$

Result(type 3, 737 leaves):

$$\frac{1}{d^3}\Bigg(a^2 c^2 \sinh(d x+c)-\frac{8 b a c \left((d x+c)^3 \sinh(d x+c)-3 (d x+c)^2 \cosh(d x+c)+6 (d x+c) \sinh(d x+c)-6 \cosh(d x+c)\right)}{d^2}$$
$$+\frac{12 b c^2 a \left((d x+c)^2 \sinh(d x+c)-2 (d x+c) \cosh(d x+c)+2 \sinh(d x+c)\right)}{d^2}-\frac{8 b c^3 a \left((d x+c) \sinh(d x+c)-\cosh(d x+c)\right)}{d^2}$$
$$-\frac{1}{d^4}\big(6 b^2 c \left((d x+c)^5 \sinh(d x+c)-5 (d x+c)^4 \cosh(d x+c)+20 (d x+c)^3 \sinh(d x+c)-60 (d x+c)^2 \cosh(d x+c)+120 (d x+c) \sinh(d x$$
$$+c)-120 \cosh(d x+c)\right)\big)$$
$$+\frac{15 b^2 c^2 \left((d x+c)^4 \sinh(d x+c)-4 (d x+c)^3 \cosh(d x+c)+12 (d x+c)^2 \sinh(d x+c)-24 (d x+c) \cosh(d x+c)+24 \sinh(d x+c)\right)}{d^4}$$
$$-\frac{20 b^2 c^3 \left((d x+c)^3 \sinh(d x+c)-3 (d x+c)^2 \cosh(d x+c)+6 (d x+c) \sinh(d x+c)-6 \cosh(d x+c)\right)}{d^4}$$
$$+\frac{15 b^2 c^4 \left((d x+c)^2 \sinh(d x+c)-2 (d x+c) \cosh(d x+c)+2 \sinh(d x+c)\right)}{d^4}$$
$$+\frac{2 b a \left((d x+c)^4 \sinh(d x+c)-4 (d x+c)^3 \cosh(d x+c)+12 (d x+c)^2 \sinh(d x+c)-24 (d x+c) \cosh(d x+c)+24 \sinh(d x+c)\right)}{d^2}$$
$$-\frac{6 b^2 c^5 \left((d x+c) \sinh(d x+c)-\cosh(d x+c)\right)}{d^4}+\frac{2 b c^4 a \sinh(d x+c)}{d^2}+a^2 \left((d x+c)^2 \sinh(d x+c)-2 (d x+c) \cosh(d x+c)+2 \sinh(d x$$
$$+c)\right)+\frac{1}{d^4}\big(b^2 \left((d x+c)^6 \sinh(d x+c)-6 (d x+c)^5 \cosh(d x+c)+30 (d x+c)^4 \sinh(d x+c)-120 (d x+c)^3 \cosh(d x+c)+360 (d x$$
$$+c)^2 \sinh(d x+c)-720 (d x+c) \cosh(d x+c)+720 \sinh(d x+c)\right)\big)+\frac{b^2 c^6 \sinh(d x+c)}{d^4}-2 a^2 c \left((d x+c) \sinh(d x+c)-\cosh(d x+c)\right)\Bigg)$$

Problem 24: Result more than twice size of optimal antiderivative.

$$\int x^2 \left(b x^3+a\right) \cosh(d x+c)\, dx$$

Optimal(type 3, 124 leaves, 11 steps):

$$-\frac{120 b \cosh(d x+c)}{d^6}-\frac{2 a x \cosh(d x+c)}{d^2}-\frac{60 b x^2 \cosh(d x+c)}{d^4}-\frac{5 b x^4 \cosh(d x+c)}{d^2}+\frac{2 a \sinh(d x+c)}{d^3}+\frac{120 b x \sinh(d x+c)}{d^5}$$
$$+\frac{a x^2 \sinh(d x+c)}{d}+\frac{20 b x^3 \sinh(d x+c)}{d^3}+\frac{b x^5 \sinh(d x+c)}{d}$$

Result(type 3, 388 leaves):

$$\frac{1}{d^3}\left(\frac{1}{d^3}\left(b\left((dx+c)^5\sinh(dx+c)-5(dx+c)^4\cosh(dx+c)+20(dx+c)^3\sinh(dx+c)-60(dx+c)^2\cosh(dx+c)+120(dx+c)\sinh(dx+c)-120\cosh(dx+c)\right)\right)\right.$$
$$-\frac{5bc\left((dx+c)^4\sinh(dx+c)-4(dx+c)^3\cosh(dx+c)+12(dx+c)^2\sinh(dx+c)-24(dx+c)\cosh(dx+c)+24\sinh(dx+c)\right)}{d^3}$$
$$+\frac{10bc^2\left((dx+c)^3\sinh(dx+c)-3(dx+c)^2\cosh(dx+c)+6(dx+c)\sinh(dx+c)-6\cosh(dx+c)\right)}{d^3}$$
$$-\frac{10bc^3\left((dx+c)^2\sinh(dx+c)-2(dx+c)\cosh(dx+c)+2\sinh(dx+c)\right)}{d^3}+\frac{5bc^4\left((dx+c)\sinh(dx+c)-\cosh(dx+c)\right)}{d^3}$$
$$-\frac{bc^5\sinh(dx+c)}{d^3}+a\left((dx+c)^2\sinh(dx+c)-2(dx+c)\cosh(dx+c)+2\sinh(dx+c)\right)-2ac\left((dx+c)\sinh(dx+c)-\cosh(dx+c)\right)$$
$$\left.+c^2a\sinh(dx+c)\right)$$

Problem 25: Result more than twice size of optimal antiderivative.

$$\int x\left(bx^3+a\right)\cosh(dx+c)\,dx$$

Optimal(type 3, 94 leaves, 9 steps):

$$-\frac{a\cosh(dx+c)}{d^2}-\frac{24bx\cosh(dx+c)}{d^4}-\frac{4bx^3\cosh(dx+c)}{d^2}+\frac{24b\sinh(dx+c)}{d^5}+\frac{ax\sinh(dx+c)}{d}+\frac{12bx^2\sinh(dx+c)}{d^3}+\frac{bx^4\sinh(dx+c)}{d}$$

Result(type 3, 256 leaves):

$$\frac{1}{d^2}\left(\frac{b\left((dx+c)^4\sinh(dx+c)-4(dx+c)^3\cosh(dx+c)+12(dx+c)^2\sinh(dx+c)-24(dx+c)\cosh(dx+c)+24\sinh(dx+c)\right)}{d^3}\right.$$
$$-\frac{4bc\left((dx+c)^3\sinh(dx+c)-3(dx+c)^2\cosh(dx+c)+6(dx+c)\sinh(dx+c)-6\cosh(dx+c)\right)}{d^3}$$
$$+\frac{6bc^2\left((dx+c)^2\sinh(dx+c)-2(dx+c)\cosh(dx+c)+2\sinh(dx+c)\right)}{d^3}-\frac{4bc^3\left((dx+c)\sinh(dx+c)-\cosh(dx+c)\right)}{d^3}+a((dx$$
$$\left.+c)\sinh(dx+c)-\cosh(dx+c))+\frac{bc^4\sinh(dx+c)}{d^3}-ca\sinh(dx+c)\right)$$

Problem 28: Result is not expressed in closed-form.

$$\int\frac{\cosh(dx+c)}{x^2\left(bx^3+a\right)}\,dx$$

Optimal(type 4, 273 leaves, 17 steps):

$$\frac{b^{1/3}\operatorname{Chi}\left(\frac{a^{1/3}d}{b^{1/3}}+dx\right)\cosh\left(c-\frac{a^{1/3}d}{b^{1/3}}\right)}{3a^{4/3}}+\frac{(-1)^{2/3}b^{1/3}\operatorname{Chi}\left(\frac{(-1)^{1/3}a^{1/3}d}{b^{1/3}}-dx\right)\cosh\left(c+\frac{(-1)^{1/3}a^{1/3}d}{b^{1/3}}\right)}{3a^{4/3}}$$
$$-\frac{(-1)^{1/3}b^{1/3}\operatorname{Chi}\left(-\frac{(-1)^{2/3}a^{1/3}d}{b^{1/3}}-dx\right)\cosh\left(c-\frac{(-1)^{2/3}a^{1/3}d}{b^{1/3}}\right)}{3a^{4/3}}-\frac{\cosh(dx+c)}{ax}+\frac{d\cosh(c)\operatorname{Shi}(dx)}{a}+\frac{d\operatorname{Chi}(dx)\sinh(c)}{a}$$
$$+\frac{b^{1/3}\operatorname{Shi}\left(\frac{a^{1/3}d}{b^{1/3}}+dx\right)\sinh\left(c-\frac{a^{1/3}d}{b^{1/3}}\right)}{3a^{4/3}}+\frac{(-1)^{2/3}b^{1/3}\operatorname{Shi}\left(-\frac{(-1)^{1/3}a^{1/3}d}{b^{1/3}}+dx\right)\sinh\left(c+\frac{(-1)^{1/3}a^{1/3}d}{b^{1/3}}\right)}{3a^{4/3}}$$
$$-\frac{(-1)^{1/3}b^{1/3}\operatorname{Shi}\left(\frac{(-1)^{2/3}a^{1/3}d}{b^{1/3}}+dx\right)\sinh\left(c-\frac{(-1)^{2/3}a^{1/3}d}{b^{1/3}}\right)}{3a^{4/3}}$$

Result(type 7, 186 leaves):

$$-\frac{e^{-dx-c}}{2xa}+\frac{d\left(\sum_{\_R1=RootOf(\_Z^3b-3\_Z^2bc+3\_Zbc^2+ad^3-bc^3)}\frac{e^{-\_R1}\operatorname{Ei}_1(dx-\_R1+c)}{\_R1-c}\right)}{6a}+\frac{de^{-c}\operatorname{Ei}_1(dx)}{2a}-\frac{e^{dx+c}}{2xa}$$
$$+\frac{d\left(\sum_{\_R1=RootOf(\_Z^3b-3\_Z^2bc+3\_Zbc^2+ad^3-bc^3)}\frac{e^{\_R1}\operatorname{Ei}_1(-dx+\_R1-c)}{\_R1-c}\right)}{6a}-\frac{de^{c}\operatorname{Ei}_1(-dx)}{2a}$$

Problem 29: Result is not expressed in closed-form.

$$\int\frac{\cosh(dx+c)}{x^3(bx^3+a)}\,dx$$

Optimal(type 4, 294 leaves, 18 steps):

$$\frac{d^2\operatorname{Chi}(dx)\cosh(c)}{2a}-\frac{b^{2/3}\operatorname{Chi}\left(\frac{a^{1/3}d}{b^{1/3}}+dx\right)\cosh\left(c-\frac{a^{1/3}d}{b^{1/3}}\right)}{3a^{5/3}}+\frac{(-1)^{1/3}b^{2/3}\operatorname{Chi}\left(\frac{(-1)^{1/3}a^{1/3}d}{b^{1/3}}-dx\right)\cosh\left(c+\frac{(-1)^{1/3}a^{1/3}d}{b^{1/3}}\right)}{3a^{5/3}}$$
$$-\frac{(-1)^{2/3}b^{2/3}\operatorname{Chi}\left(-\frac{(-1)^{2/3}a^{1/3}d}{b^{1/3}}-dx\right)\cosh\left(c-\frac{(-1)^{2/3}a^{1/3}d}{b^{1/3}}\right)}{3a^{5/3}}-\frac{\cosh(dx+c)}{2ax^2}+\frac{d^2\operatorname{Shi}(dx)\sinh(c)}{2a}$$
$$-\frac{b^{2/3}\operatorname{Shi}\left(\frac{a^{1/3}d}{b^{1/3}}+dx\right)\sinh\left(c-\frac{a^{1/3}d}{b^{1/3}}\right)}{3a^{5/3}}+\frac{(-1)^{1/3}b^{2/3}\operatorname{Shi}\left(-\frac{(-1)^{1/3}a^{1/3}d}{b^{1/3}}+dx\right)\sinh\left(c+\frac{(-1)^{1/3}a^{1/3}d}{b^{1/3}}\right)}{3a^{5/3}}$$

$$-\frac{(-1)^{2/3} b^{2/3} \operatorname{Shi}\left(\frac{(-1)^{2/3} a^{1/3} d}{b^{1/3}}+d x\right) \sinh\left(c-\frac{(-1)^{2/3} a^{1/3} d}{b^{1/3}}\right)}{3 a^{5/3}}-\frac{d \sinh(d x+c)}{2 a x}$$

Result(type 7, 239 leaves):

$$\frac{d \,\mathrm{e}^{-d x-c}}{4 x a}-\frac{\mathrm{e}^{-d x-c}}{4 x^{2} a}+\frac{d^{2}\left(\sum_{\_R1=RootOf(\_Z^{3} b-3\,\_Z^{2} b c+3\,\_Z b c^{2}+a d^{3}-b c^{3})} \frac{\mathrm{e}^{-\_R1} \operatorname{Ei}_{1}(d x-\_R1+c)}{\_R1^{2}-2\,\_R1 c+c^{2}}\right)}{6 a}-\frac{d^{2} \mathrm{e}^{-c} \operatorname{Ei}_{1}(d x)}{4 a}-\frac{d \,\mathrm{e}^{d x+c}}{4 x a}-\frac{\mathrm{e}^{d x+c}}{4 x^{2} a}$$
$$+\frac{d^{2}\left(\sum_{\_R1=RootOf(\_Z^{3} b-3\,\_Z^{2} b c+3\,\_Z b c^{2}+a d^{3}-b c^{3})} \frac{\mathrm{e}^{\_R1} \operatorname{Ei}_{1}(-d x+\_R1-c)}{\_R1^{2}-2\,\_R1 c+c^{2}}\right)}{6 a}-\frac{d^{2} \mathrm{e}^{c} \operatorname{Ei}_{1}(-d x)}{4 a}$$

Problem 30: Result is not expressed in closed-form.

$$\int \frac{x^{3} \cosh(d x+c)}{(b x^{3}+a)^{2}}\, dx$$

Optimal(type 4, 500 leaves, 23 steps):

$$\frac{\operatorname{Chi}\left(\frac{a^{1/3} d}{b^{1/3}}+d x\right) \cosh\left(c-\frac{a^{1/3} d}{b^{1/3}}\right)}{9 a^{2/3} b^{4/3}}-\frac{(-1)^{1/3} \operatorname{Chi}\left(\frac{(-1)^{1/3} a^{1/3} d}{b^{1/3}}-d x\right) \cosh\left(c+\frac{(-1)^{1/3} a^{1/3} d}{b^{1/3}}\right)}{9 a^{2/3} b^{4/3}}$$
$$+\frac{(-1)^{2/3} \operatorname{Chi}\left(-\frac{(-1)^{2/3} a^{1/3} d}{b^{1/3}}-d x\right) \cosh\left(c-\frac{(-1)^{2/3} a^{1/3} d}{b^{1/3}}\right)}{9 a^{2/3} b^{4/3}}-\frac{x \cosh(d x+c)}{3 b\,(b x^{3}+a)}$$
$$-\frac{(-1)^{2/3} d \cosh\left(c+\frac{(-1)^{1/3} a^{1/3} d}{b^{1/3}}\right) \operatorname{Shi}\left(-\frac{(-1)^{1/3} a^{1/3} d}{b^{1/3}}+d x\right)}{9 a^{1/3} b^{5/3}}-\frac{d \cosh\left(c-\frac{a^{1/3} d}{b^{1/3}}\right) \operatorname{Shi}\left(\frac{a^{1/3} d}{b^{1/3}}+d x\right)}{9 a^{1/3} b^{5/3}}$$
$$+\frac{(-1)^{1/3} d \cosh\left(c-\frac{(-1)^{2/3} a^{1/3} d}{b^{1/3}}\right) \operatorname{Shi}\left(\frac{(-1)^{2/3} a^{1/3} d}{b^{1/3}}+d x\right)}{9 a^{1/3} b^{5/3}}-\frac{d \operatorname{Chi}\left(\frac{a^{1/3} d}{b^{1/3}}+d x\right) \sinh\left(c-\frac{a^{1/3} d}{b^{1/3}}\right)}{9 a^{1/3} b^{5/3}}$$
$$+\frac{\operatorname{Shi}\left(\frac{a^{1/3} d}{b^{1/3}}+d x\right) \sinh\left(c-\frac{a^{1/3} d}{b^{1/3}}\right)}{9 a^{2/3} b^{4/3}}-\frac{(-1)^{2/3} d \operatorname{Chi}\left(\frac{(-1)^{1/3} a^{1/3} d}{b^{1/3}}-d x\right) \sinh\left(c+\frac{(-1)^{1/3} a^{1/3} d}{b^{1/3}}\right)}{9 a^{1/3} b^{5/3}}$$
$$-\frac{(-1)^{1/3} \operatorname{Shi}\left(-\frac{(-1)^{1/3} a^{1/3} d}{b^{1/3}}+d x\right) \sinh\left(c+\frac{(-1)^{1/3} a^{1/3} d}{b^{1/3}}\right)}{9 a^{2/3} b^{4/3}}+\frac{(-1)^{1/3} d \operatorname{Chi}\left(-\frac{(-1)^{2/3} a^{1/3} d}{b^{1/3}}-d x\right) \sinh\left(c-\frac{(-1)^{2/3} a^{1/3} d}{b^{1/3}}\right)}{9 a^{1/3} b^{5/3}}$$

$$+\frac{(-1)^{2/3}\operatorname{Shi}\left(\frac{(-1)^{2/3}a^{1/3}d}{b^{1/3}}+dx\right)\sinh\left(c-\frac{(-1)^{2/3}a^{1/3}d}{b^{1/3}}\right)}{9a^{2/3}b^{4/3}}$$

```
Result(type 7, 876 leaves):
```

$$-\frac{d^3\,\mathrm{e}^{-dx-c}x}{6b\left(bd^3x^3+ad^3\right)}$$

$$-\frac{1}{18dab^2}\left(\sum_{\_R1=RootOf(\_Z^3b-3\_Z^2bc+3\_Zbc^2+ad^3-bc^3)}\frac{(3\_R1^2bc^2-\_R1ad^3-5\_R1bc^3-2acd^3+2bc^4+3\_R1bc^2+ad^3-bc^3)\,\mathrm{e}^{-\_R1}\operatorname{Ei}_1(dx-\_R1+c)}{\_R1^2-2\_R1c+c^2}\right)$$

$$+\frac{c^3\left(\sum_{\_R1=RootOf(\_Z^3b-3\_Z^2bc+3\_Zbc^2+ad^3-bc^3)}\frac{(\_R1-c+2)\,\mathrm{e}^{-\_R1}\operatorname{Ei}_1(dx-\_R1+c)}{\_R1^2-2\_R1c+c^2}\right)}{18dab}$$

$$-\frac{c^2\left(\sum_{\_R1=RootOf(\_Z^3b-3\_Z^2bc+3\_Zbc^2+ad^3-bc^3)}\frac{(\_R1^2-\_R1c+\_R1+c)\,\mathrm{e}^{-\_R1}\operatorname{Ei}_1(dx-\_R1+c)}{\_R1^2-2\_R1c+c^2}\right)}{6dab}$$

$$+\frac{c\left(\sum_{\_R1=RootOf(\_Z^3b-3\_Z^2bc+3\_Zbc^2+ad^3-bc^3)}\frac{(2\_R1^2bc-3\_R1bc^2-ad^3+bc^3+2\_R1bc)\,\mathrm{e}^{-\_R1}\operatorname{Ei}_1(dx-\_R1+c)}{\_R1^2-2\_R1c+c^2}\right)}{6dab^2}-\frac{d^3\,\mathrm{e}^{dx+c}x}{6b\left(bd^3x^3+ad^3\right)}$$

$$+\frac{1}{18dab^2}\left(\sum_{\_R1=RootOf(\_Z^3b-3\_Z^2bc+3\_Zbc^2+ad^3-bc^3)}\frac{(3\_R1^2bc^2-\_R1ad^3-5\_R1bc^3-2acd^3+2bc^4-3\_R1bc^2-ad^3+bc^3)\,\mathrm{e}^{\_R1}\operatorname{Ei}_1(-dx+\_R1-c)}{\_R1^2-2\_R1c+c^2}\right)$$

$$-\frac{c^3\left(\sum_{\_R1=RootOf(\_Z^3b-3\_Z^2bc+3\_Zbc^2+ad^3-bc^3)}\frac{(\_R1-c-2)\,\mathrm{e}^{\_R1}\operatorname{Ei}_1(-dx+\_R1-c)}{\_R1^2-2\_R1c+c^2}\right)}{18dab}$$

$$+\frac{c^2\left(\sum_{\_R1=RootOf(\_Z^3b-3\_Z^2bc+3\_Zbc^2+ad^3-bc^3)}\frac{(\_R1^2-\_R1c-\_R1-c)\,\mathrm{e}^{\_R1}\operatorname{Ei}_1(-dx+\_R1-c)}{\_R1^2-2\_R1c+c^2}\right)}{6dab}$$

$$-\frac{c\left(\sum_{\_R1=RootOf(\_Z^3b-3\_Z^2bc+3\_Zbc^2+ad^3-bc^3)}\frac{(2\_R1^2bc-3\_R1bc^2-ad^3+bc^3-2\_R1bc)\,\mathrm{e}^{\_R1}\operatorname{Ei}_1(-dx+\_R1-c)}{\_R1^2-2\_R1c+c^2}\right)}{6dab^2}$$

Test results for the 22 problems in "6.2.3 (e x)^m (a+b cosh(c+d x^n))^p.txt"

Problem 11: Result more than twice size of optimal antiderivative.

$$\int \frac{\cosh\left(a+\frac{b}{x}\right)}{x^4}\,dx$$

Optimal(type 3, 46 leaves, 4 steps):

$$\frac{2\cosh\left(a+\frac{b}{x}\right)}{b^2 x}-\frac{2\sinh\left(a+\frac{b}{x}\right)}{b^3}-\frac{\sinh\left(a+\frac{b}{x}\right)}{b x^2}$$

Result(type 3, 93 leaves):

$$-\frac{\left(a+\frac{b}{x}\right)^2\sinh\left(a+\frac{b}{x}\right)-2\left(a+\frac{b}{x}\right)\cosh\left(a+\frac{b}{x}\right)+2\sinh\left(a+\frac{b}{x}\right)-2a\left(\left(a+\frac{b}{x}\right)\sinh\left(a+\frac{b}{x}\right)-\cosh\left(a+\frac{b}{x}\right)\right)+a^2\sinh\left(a+\frac{b}{x}\right)}{b^3}$$

Problem 12: Result unnecessarily involves higher level functions.

$$\int \cosh(a+b x^n)\,dx$$

Optimal(type 4, 61 leaves, 3 steps):

$$-\frac{e^a x\,\Gamma\left(\frac{1}{n},-b x^n\right)}{2n\left(-b x^n\right)^{\frac{1}{n}}}-\frac{x\,\Gamma\left(\frac{1}{n},b x^n\right)}{2e^a n\left(b x^n\right)^{\frac{1}{n}}}$$

Result(type 5, 73 leaves):

$$x\,\mathrm{hypergeom}\left(\left[\frac{1}{2n}\right],\left[\frac{1}{2},1+\frac{1}{2n}\right],\frac{x^{2n}b^2}{4}\right)\cosh(a)+\frac{x^{n+1}b\,\mathrm{hypergeom}\left(\left[\frac{1}{2}+\frac{1}{2n}\right],\left[\frac{3}{2},\frac{3}{2}+\frac{1}{2n}\right],\frac{x^{2n}b^2}{4}\right)\sinh(a)}{n+1}$$

Problem 13: Unable to integrate problem.

$$\int \cosh(a+b x^n)^3\,dx$$

Optimal(type 4, 140 leaves, 8 steps):

$$-\frac{e^{3a}x\,\Gamma\left(\frac{1}{n},-3b x^n\right)}{8\,3^{\frac{1}{n}}\,n\left(-b x^n\right)^{\frac{1}{n}}}-\frac{3e^a x\,\Gamma\left(\frac{1}{n},-b x^n\right)}{8n\left(-b x^n\right)^{\frac{1}{n}}}-\frac{3x\,\Gamma\left(\frac{1}{n},b x^n\right)}{8e^a n\left(b x^n\right)^{\frac{1}{n}}}-\frac{x\,\Gamma\left(\frac{1}{n},3b x^n\right)}{8\,3^{\frac{1}{n}}\,e^{3a}n\left(b x^n\right)^{\frac{1}{n}}}$$

Result(type 8, 12 leaves):

$$\int \cosh(a+b x^n)^3\,dx$$

Problem 15: Unable to integrate problem.

$$\int (e x)^{-1+n} \left(a+b \cosh\left(c+d x^{n}\right)\right)^{p} dx$$

Optimal(type 6, 117 leaves, 5 steps):

$$\frac{(e x)^{n} \mathit{AppellF1}\left(\frac{1}{2}, -p, \frac{1}{2}, \frac{3}{2}, \frac{b\left(1-\cosh\left(c+d x^{n}\right)\right)}{a+b}, \frac{1}{2}-\frac{\cosh\left(c+d x^{n}\right)}{2}\right)\left(a+b \cosh\left(c+d x^{n}\right)\right)^{p} \sinh\left(c+d x^{n}\right) \sqrt{2}}{d e n x^{n}\left(\frac{a+b \cosh\left(c+d x^{n}\right)}{a+b}\right)^{p} \sqrt{1+\cosh\left(c+d x^{n}\right)}}$$

Result(type 8, 24 leaves):

$$\int (e x)^{-1+n} \left(a+b \cosh\left(c+d x^{n}\right)\right)^{p} dx$$

Problem 16: Result unnecessarily involves higher level functions.

$$\int x^{m} \cosh\left(a+b x^{n}\right) dx$$

Optimal(type 4, 85 leaves, 3 steps):

$$-\frac{e^{a} x^{1+m} \Gamma\left(\frac{1+m}{n}, -b x^{n}\right)}{2 n \left(-b x^{n}\right)^{\frac{1+m}{n}}}-\frac{x^{1+m} \Gamma\left(\frac{1+m}{n}, b x^{n}\right)}{2 e^{a} n \left(b x^{n}\right)^{\frac{1+m}{n}}}$$

Result(type 5, 109 leaves):

$$\frac{x^{1+m} \mathrm{hypergeom}\left(\left[\frac{m}{2 n}+\frac{1}{2 n}\right],\left[\frac{1}{2}, 1+\frac{m}{2 n}+\frac{1}{2 n}\right], \frac{x^{2 n} b^{2}}{4}\right) \cosh(a)}{1+m}$$
$$+\frac{x^{m+n+1} b \, \mathrm{hypergeom}\left(\left[\frac{1}{2}+\frac{m}{2 n}+\frac{1}{2 n}\right],\left[\frac{3}{2}, \frac{3}{2}+\frac{m}{2 n}+\frac{1}{2 n}\right], \frac{x^{2 n} b^{2}}{4}\right) \sinh(a)}{m+n+1}$$

Problem 17: Unable to integrate problem.

$$\int x^{m} \cosh\left(a+b x^{n}\right)^{3} dx$$

Optimal(type 4, 196 leaves, 8 steps):

$$-\frac{e^{3 a} x^{1+m} \Gamma\left(\frac{1+m}{n}, -3 b x^{n}\right)}{8\, 3^{\frac{1+m}{n}} n \left(-b x^{n}\right)^{\frac{1+m}{n}}}-\frac{3 e^{a} x^{1+m} \Gamma\left(\frac{1+m}{n}, -b x^{n}\right)}{8 n \left(-b x^{n}\right)^{\frac{1+m}{n}}}-\frac{3 x^{1+m} \Gamma\left(\frac{1+m}{n}, b x^{n}\right)}{8 e^{a} n \left(b x^{n}\right)^{\frac{1+m}{n}}}-\frac{x^{1+m} \Gamma\left(\frac{1+m}{n}, 3 b x^{n}\right)}{8\, 3^{\frac{1+m}{n}} e^{3 a} n \left(b x^{n}\right)^{\frac{1+m}{n}}}$$

Result(type 8, 16 leaves):

$$\int x^{m} \cosh\left(a+b x^{n}\right)^{3} dx$$

Problem 19: Result more than twice size of optimal antiderivative.

$$\int x^2 \cosh\left(a+b\sqrt{dx+c}\right)\,dx$$

Optimal(type 3, 310 leaves, 16 steps):

$$-\frac{240\cosh\left(a+b\sqrt{dx+c}\right)}{b^6 d^3}+\frac{24\,c\cosh\left(a+b\sqrt{dx+c}\right)}{b^4 d^3}-\frac{2\,c^2\cosh\left(a+b\sqrt{dx+c}\right)}{b^2 d^3}-\frac{120\,(dx+c)\cosh\left(a+b\sqrt{dx+c}\right)}{b^4 d^3}+\frac{12\,c\,(dx+c)\cosh\left(a+b\sqrt{dx+c}\right)}{b^2 d^3}-\frac{10\,(dx+c)^2\cosh\left(a+b\sqrt{dx+c}\right)}{b^2 d^3}+\frac{40\,(dx+c)^{3/2}\sinh\left(a+b\sqrt{dx+c}\right)}{b^3 d^3}-\frac{4\,c\,(dx+c)^{3/2}\sinh\left(a+b\sqrt{dx+c}\right)}{b\,d^3}+\frac{2\,(dx+c)^{5/2}\sinh\left(a+b\sqrt{dx+c}\right)}{b\,d^3}+\frac{240\sinh\left(a+b\sqrt{dx+c}\right)\sqrt{dx+c}}{b^5 d^3}-\frac{24\,c\sinh\left(a+b\sqrt{dx+c}\right)\sqrt{dx+c}}{b^3 d^3}+\frac{2\,c^2\sinh\left(a+b\sqrt{dx+c}\right)\sqrt{dx+c}}{b\,d^3}$$

Result(type 3, 830 leaves):

$$\frac{1}{d^3 b^2}\left(2\left(\frac{1}{b^4}\left(\left(a+b\sqrt{dx+c}\right)^5\sinh\left(a+b\sqrt{dx+c}\right)-5\left(a+b\sqrt{dx+c}\right)^4\cosh\left(a+b\sqrt{dx+c}\right)+20\left(a+b\sqrt{dx+c}\right)^3\sinh\left(a+b\sqrt{dx+c}\right)-60\left(a+b\sqrt{dx+c}\right)^2\cosh\left(a+b\sqrt{dx+c}\right)+120\left(a+b\sqrt{dx+c}\right)\sinh\left(a+b\sqrt{dx+c}\right)-120\cosh\left(a+b\sqrt{dx+c}\right)\right)-\frac{1}{b^4}\left(5\,a\left(\left(a+b\sqrt{dx+c}\right)^4\sinh\left(a+b\sqrt{dx+c}\right)-4\left(a+b\sqrt{dx+c}\right)^3\cosh\left(a+b\sqrt{dx+c}\right)+12\left(a+b\sqrt{dx+c}\right)^2\sinh\left(a+b\sqrt{dx+c}\right)-24\left(a+b\sqrt{dx+c}\right)\cosh\left(a+b\sqrt{dx+c}\right)+24\sinh\left(a+b\sqrt{dx+c}\right)\right)\right)+\frac{1}{b^4}\left(10\,a^2\left(\left(a+b\sqrt{dx+c}\right)^3\sinh\left(a+b\sqrt{dx+c}\right)-3\left(a+b\sqrt{dx+c}\right)^2\cosh\left(a+b\sqrt{dx+c}\right)+6\left(a+b\sqrt{dx+c}\right)\sinh\left(a+b\sqrt{dx+c}\right)-6\cosh\left(a+b\sqrt{dx+c}\right)\right)\right)-\frac{10\,a^3\left(\left(a+b\sqrt{dx+c}\right)^2\sinh\left(a+b\sqrt{dx+c}\right)-2\left(a+b\sqrt{dx+c}\right)\cosh\left(a+b\sqrt{dx+c}\right)+2\sinh\left(a+b\sqrt{dx+c}\right)\right)}{b^4}-\frac{1}{b^2}\left(2\,c\left(\left(a+b\sqrt{dx+c}\right)^3\sinh\left(a+b\sqrt{dx+c}\right)-3\left(a+b\sqrt{dx+c}\right)^2\cosh\left(a+b\sqrt{dx+c}\right)+6\left(a+b\sqrt{dx+c}\right)\sinh\left(a+b\sqrt{dx+c}\right)-6\cosh\left(a+b\sqrt{dx+c}\right)\right)\right)+\frac{6\,c\,a\left(\left(a+b\sqrt{dx+c}\right)^2\sinh\left(a+b\sqrt{dx+c}\right)-2\left(a+b\sqrt{dx+c}\right)\cosh\left(a+b\sqrt{dx+c}\right)+2\sinh\left(a+b\sqrt{dx+c}\right)\right)}{b^2}+\frac{5\,a^4\left(\left(a+b\sqrt{dx+c}\right)\sinh\left(a+b\sqrt{dx+c}\right)-\cosh\left(a+b\sqrt{dx+c}\right)\right)}{b^4}-\frac{6\,a^2\,c\left(\left(a+b\sqrt{dx+c}\right)\sinh\left(a+b\sqrt{dx+c}\right)-\cosh\left(a+b\sqrt{dx+c}\right)\right)}{b^2}-\frac{a^5\sinh\left(a+b\sqrt{dx+c}\right)}{b^4}+\frac{2\,a^3\,c\sinh\left(a+b\sqrt{dx+c}\right)}{b^2}+c^2\left(\left(a\right.\right.$$

$+ b\sqrt{dx+c}\,)\sinh\left(a+b\sqrt{dx+c}\right) - \cosh\left(a+b\sqrt{dx+c}\right)\Big) - c^2 a \sinh\left(a+b\sqrt{dx+c}\right)\Big)\Big)$

Problem 20: Result more than twice size of optimal antiderivative.

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

Optimal(type 3, 477 leaves, 23 steps):

$$\frac{720\,c\cosh\left(a+b\,(dx+c)^{1/3}\right)}{b^6 d^3} - \frac{120960\,(dx+c)^{1/3}\cosh\left(a+b\,(dx+c)^{1/3}\right)}{b^8 d^3} - \frac{6\,c^2\,(dx+c)^{1/3}\cosh\left(a+b\,(dx+c)^{1/3}\right)}{b^2 d^3}$$
$$+ \frac{360\,c\,(dx+c)^{2/3}\cosh\left(a+b\,(dx+c)^{1/3}\right)}{b^4 d^3} - \frac{20160\,(dx+c)\cosh\left(a+b\,(dx+c)^{1/3}\right)}{b^6 d^3} + \frac{30\,c\,(dx+c)^{4/3}\cosh\left(a+b\,(dx+c)^{1/3}\right)}{b^2 d^3}$$
$$- \frac{1008\,(dx+c)^{5/3}\cosh\left(a+b\,(dx+c)^{1/3}\right)}{b^4 d^3} - \frac{24\,(dx+c)^{7/3}\cosh\left(a+b\,(dx+c)^{1/3}\right)}{b^2 d^3} + \frac{120960\sinh\left(a+b\,(dx+c)^{1/3}\right)}{b^9 d^3}$$
$$+ \frac{6\,c^2\sinh\left(a+b\,(dx+c)^{1/3}\right)}{b^3 d^3} - \frac{720\,c\,(dx+c)^{1/3}\sinh\left(a+b\,(dx+c)^{1/3}\right)}{b^5 d^3} + \frac{60480\,(dx+c)^{2/3}\sinh\left(a+b\,(dx+c)^{1/3}\right)}{b^7 d^3}$$
$$+ \frac{3\,c^2\,(dx+c)^{2/3}\sinh\left(a+b\,(dx+c)^{1/3}\right)}{b\,d^3} - \frac{120\,c\,(dx+c)\sinh\left(a+b\,(dx+c)^{1/3}\right)}{b^3 d^3} + \frac{5040\,(dx+c)^{4/3}\sinh\left(a+b\,(dx+c)^{1/3}\right)}{b^5 d^3}$$
$$- \frac{6\,c\,(dx+c)^{5/3}\sinh\left(a+b\,(dx+c)^{1/3}\right)}{b\,d^3} + \frac{168\,(dx+c)^2\sinh\left(a+b\,(dx+c)^{1/3}\right)}{b^3 d^3} + \frac{3\,(dx+c)^{8/3}\sinh\left(a+b\,(dx+c)^{1/3}\right)}{b\,d^3}$$

Result(type 3, 1814 leaves):

$$\frac{1}{d^3 b^3}\Bigg(3\Bigg(a^2 c^2 \sinh\left(a+b\,(dx+c)^{1/3}\right) - \frac{1}{b^6}\Big(8\,a\,\Big(\left(a+b\,(dx+c)^{1/3}\right)^7\sinh\left(a+b\,(dx+c)^{1/3}\right) - 7\left(a+b\,(dx+c)^{1/3}\right)^6\cosh\left(a+b\,(dx+c)^{1/3}\right)$$
$$+ 42\left(a+b\,(dx+c)^{1/3}\right)^5\sinh\left(a+b\,(dx+c)^{1/3}\right) - 210\left(a+b\,(dx+c)^{1/3}\right)^4\cosh\left(a+b\,(dx+c)^{1/3}\right) + 840\left(a+b\,(dx+c)^{1/3}\right)^3\sinh\big(a$$
$$+ b\,(dx+c)^{1/3}\big) - 2520\left(a+b\,(dx+c)^{1/3}\right)^2\cosh\left(a+b\,(dx+c)^{1/3}\right) + 5040\left(a+b\,(dx+c)^{1/3}\right)\sinh\left(a+b\,(dx+c)^{1/3}\right) - 5040\cosh\big(a$$
$$+ b\,(dx+c)^{1/3}\big)\Big)\Big) + \frac{1}{b^6}\Big(28\,a^2\Big(\left(a+b\,(dx+c)^{1/3}\right)^6\sinh\left(a+b\,(dx+c)^{1/3}\right) - 6\left(a+b\,(dx+c)^{1/3}\right)^5\cosh\left(a+b\,(dx+c)^{1/3}\right)$$
$$+ 30\left(a+b\,(dx+c)^{1/3}\right)^4\sinh\left(a+b\,(dx+c)^{1/3}\right) - 120\left(a+b\,(dx+c)^{1/3}\right)^3\cosh\left(a+b\,(dx+c)^{1/3}\right) + 360\left(a+b\,(dx+c)^{1/3}\right)^2\sinh\big(a$$
$$+ b\,(dx+c)^{1/3}\big) - 720\left(a+b\,(dx+c)^{1/3}\right)\cosh\left(a+b\,(dx+c)^{1/3}\right) + 720\sinh\left(a+b\,(dx+c)^{1/3}\right)\Big)\Big) - \frac{1}{b^6}\Big(56\,a^3\Big(\big(a+b\,(dx$$
$$+ c)^{1/3}\big)^5\sinh\left(a+b\,(dx+c)^{1/3}\right) - 5\left(a+b\,(dx+c)^{1/3}\right)^4\cosh\left(a+b\,(dx+c)^{1/3}\right) + 20\left(a+b\,(dx+c)^{1/3}\right)^3\sinh\left(a+b\,(dx+c)^{1/3}\right)$$

$$-60\,(a+b\,(d\,x+c)^{1/3})^2\cosh(a+b\,(d\,x+c)^{1/3})+120\,(a+b\,(d\,x+c)^{1/3})\sinh(a+b\,(d\,x+c)^{1/3})-120\cosh(a+b\,(d\,x+c)^{1/3})))$$

$$+\frac{1}{b^6}(70\,a^4\,((a+b\,(d\,x+c)^{1/3})^4\sinh(a+b\,(d\,x+c)^{1/3})-4\,(a+b\,(d\,x+c)^{1/3})^3\cosh(a+b\,(d\,x+c)^{1/3})+12\,(a+b\,(d\,x+c)^{1/3})^2\sinh(a$$

$$+b\,(d\,x+c)^{1/3})-24\,(a+b\,(d\,x+c)^{1/3})\cosh(a+b\,(d\,x+c)^{1/3})+24\sinh(a+b\,(d\,x+c)^{1/3})))-2\,a\,c^2\,((a+b\,(d\,x+c)^{1/3})\sinh(a$$

$$+b\,(d\,x+c)^{1/3})-\cosh(a+b\,(d\,x+c)^{1/3}))-\frac{1}{b^6}(56\,a^5\,((a+b\,(d\,x+c)^{1/3})^3\sinh(a+b\,(d\,x+c)^{1/3})-3\,(a+b\,(d\,x+c)^{1/3})^2\cosh(a$$

$$+b\,(d\,x+c)^{1/3})+6\,(a+b\,(d\,x+c)^{1/3})\sinh(a+b\,(d\,x+c)^{1/3})-6\cosh(a+b\,(d\,x+c)^{1/3})))-\frac{1}{b^3}(2\,c\,((a+b\,(d\,x+c)^{1/3})^5\sinh(a$$

$$+b\,(d\,x+c)^{1/3})-5\,(a+b\,(d\,x+c)^{1/3})^4\cosh(a+b\,(d\,x+c)^{1/3})+20\,(a+b\,(d\,x+c)^{1/3})^3\sinh(a+b\,(d\,x+c)^{1/3})-60\,(a+b\,(d\,x$$

$$+c)^{1/3})^2\cosh(a+b\,(d\,x+c)^{1/3})+120\,(a+b\,(d\,x+c)^{1/3})\sinh(a+b\,(d\,x+c)^{1/3})-120\cosh(a+b\,(d\,x+c)^{1/3})))$$

$$+\frac{28\,a^6\,((a+b\,(d\,x+c)^{1/3})^2\sinh(a+b\,(d\,x+c)^{1/3})-2\,(a+b\,(d\,x+c)^{1/3})\cosh(a+b\,(d\,x+c)^{1/3})+2\sinh(a+b\,(d\,x+c)^{1/3}))}{b^6}$$

$$-\frac{8\,a^7\,((a+b\,(d\,x+c)^{1/3})\sinh(a+b\,(d\,x+c)^{1/3})-\cosh(a+b\,(d\,x+c)^{1/3}))}{b^6}+\frac{2\,a^5\,c\sinh(a+b\,(d\,x+c)^{1/3})}{b^3}+c^2\,((a+b\,(d\,x$$

$$+c)^{1/3})^2\sinh(a+b\,(d\,x+c)^{1/3})-2\,(a+b\,(d\,x+c)^{1/3})\cosh(a+b\,(d\,x+c)^{1/3})+2\sinh(a+b\,(d\,x+c)^{1/3}))+\frac{1}{b^6}((a$$

$$+b\,(d\,x+c)^{1/3})^8\sinh(a+b\,(d\,x+c)^{1/3})-8\,(a+b\,(d\,x+c)^{1/3})^7\cosh(a+b\,(d\,x+c)^{1/3})+56\,(a+b\,(d\,x+c)^{1/3})^6\sinh(a+b\,(d\,x+c)^{1/3})$$

$$-336\,(a+b\,(d\,x+c)^{1/3})^5\cosh(a+b\,(d\,x+c)^{1/3})+1680\,(a+b\,(d\,x+c)^{1/3})^4\sinh(a+b\,(d\,x+c)^{1/3})-6720\,(a+b\,(d\,x+c)^{1/3})^3\cosh(a$$

$$+b\,(d\,x+c)^{1/3})+20160\,(a+b\,(d\,x+c)^{1/3})^2\sinh(a+b\,(d\,x+c)^{1/3})-40320\,(a+b\,(d\,x+c)^{1/3})\cosh(a+b\,(d\,x+c)^{1/3})+40320\sinh(a$$

$$+b\,(d\,x+c)^{1/3}))+\frac{a^8\sinh(a+b\,(d\,x+c)^{1/3})}{b^6}+\frac{1}{b^3}(10\,c\,a\,((a+b\,(d\,x+c)^{1/3})^4\sinh(a+b\,(d\,x+c)^{1/3})-4\,(a+b\,(d\,x$$

$$+c)^{1/3})^3\cosh(a+b\,(d\,x+c)^{1/3})+12\,(a+b\,(d\,x+c)^{1/3})^2\sinh(a+b\,(d\,x+c)^{1/3})-24\,(a+b\,(d\,x+c)^{1/3})\cosh(a+b\,(d\,x+c)^{1/3})$$

$$+24\sinh(a+b\,(d\,x+c)^{1/3})))-\frac{1}{b^3}(20\,c\,a^2\,((a+b\,(d\,x+c)^{1/3})^3\sinh(a+b\,(d\,x+c)^{1/3})-3\,(a+b\,(d\,x+c)^{1/3})^2\cosh(a+b\,(d\,x$$

$+c)^{1/3}) + 6\,(a+b\,(dx+c)^{1/3})\,\sinh(a+b\,(dx+c)^{1/3}) - 6\cosh(a+b\,(dx+c)^{1/3})\,)\,)$

$$+\frac{20\,a^3 c\left((a+b\,(dx+c)^{1/3})^2\sinh(a+b\,(dx+c)^{1/3}) - 2\,(a+b\,(dx+c)^{1/3})\cosh(a+b\,(dx+c)^{1/3}) + 2\sinh(a+b\,(dx+c)^{1/3})\right)}{b^3}$$

$$-\frac{10\,a^4 c\left((a+b\,(dx+c)^{1/3})\sinh(a+b\,(dx+c)^{1/3}) - \cosh(a+b\,(dx+c)^{1/3})\right)}{b^3}\Bigg)\Bigg)$$

```
Problem 21: Result more than twice size of optimal antiderivative.
```

$$\int x\cosh(a+b\,(dx+c)^{1/3})\,dx$$

```
Optimal(type 3, 231 leaves, 13 steps):
```

$$-\frac{360\cosh(a+b\,(dx+c)^{1/3})}{b^6 d^2} + \frac{6\,c\,(dx+c)^{1/3}\cosh(a+b\,(dx+c)^{1/3})}{b^2 d^2} - \frac{180\,(dx+c)^{2/3}\cosh(a+b\,(dx+c)^{1/3})}{b^4 d^2}$$

$$-\frac{15\,(dx+c)^{4/3}\cosh(a+b\,(dx+c)^{1/3})}{b^2 d^2} - \frac{6\,c\sinh(a+b\,(dx+c)^{1/3})}{b^3 d^2} + \frac{360\,(dx+c)^{1/3}\sinh(a+b\,(dx+c)^{1/3})}{b^5 d^2}$$

$$-\frac{3\,c\,(dx+c)^{2/3}\sinh(a+b\,(dx+c)^{1/3})}{b\,d^2} + \frac{60\,(dx+c)\sinh(a+b\,(dx+c)^{1/3})}{b^3 d^2} + \frac{3\,(dx+c)^{5/3}\sinh(a+b\,(dx+c)^{1/3})}{b\,d^2}$$

```
Result(type 3, 658 leaves):
```

$\frac{1}{d^2 b^3}\Bigg(3\Bigg(\frac{1}{b^3}\Big((a+b\,(dx+c)^{1/3})^5\sinh(a+b\,(dx+c)^{1/3}) - 5\,(a+b\,(dx+c)^{1/3})^4\cosh(a+b\,(dx+c)^{1/3}) + 20\,(a+b\,(dx+c)^{1/3})^3\sinh(a$

$+b\,(dx+c)^{1/3}) - 60\,(a+b\,(dx+c)^{1/3})^2\cosh(a+b\,(dx+c)^{1/3}) + 120\,(a+b\,(dx+c)^{1/3})\sinh(a+b\,(dx+c)^{1/3}) - 120\cosh(a$

$+b\,(dx+c)^{1/3})\Big) - \frac{1}{b^3}\Big(5\,a\,\big((a+b\,(dx+c)^{1/3})^4\sinh(a+b\,(dx+c)^{1/3}) - 4\,(a+b\,(dx+c)^{1/3})^3\cosh(a+b\,(dx+c)^{1/3})$

$+12\,(a+b\,(dx+c)^{1/3})^2\sinh(a+b\,(dx+c)^{1/3}) - 24\,(a+b\,(dx+c)^{1/3})\cosh(a+b\,(dx+c)^{1/3}) + 24\sinh(a+b\,(dx+c)^{1/3})\big)\Big)$

$+\frac{1}{b^3}\Big(10\,a^2\,\big((a+b\,(dx+c)^{1/3})^3\sinh(a+b\,(dx+c)^{1/3}) - 3\,(a+b\,(dx+c)^{1/3})^2\cosh(a+b\,(dx+c)^{1/3}) + 6\,(a+b\,(dx+c)^{1/3})\sinh(a$

$+b\,(dx+c)^{1/3}) - 6\cosh(a+b\,(dx+c)^{1/3})\big)\Big)$

$$-\frac{10\,a^3\left((a+b\,(dx+c)^{1/3})^2\sinh(a+b\,(dx+c)^{1/3}) - 2\,(a+b\,(dx+c)^{1/3})\cosh(a+b\,(dx+c)^{1/3}) + 2\sinh(a+b\,(dx+c)^{1/3})\right)}{b^3}$$

$$+\frac{5\,a^4\left((a+b\,(dx+c)^{1/3})\sinh(a+b\,(dx+c)^{1/3}) - \cosh(a+b\,(dx+c)^{1/3})\right)}{b^3} - \frac{a^5\sinh(a+b\,(dx+c)^{1/3})}{b^3} - c\,\big((a+b\,(dx$$

$+c)^{1/3})^2\sinh(a+b(dx+c)^{1/3})-2(a+b(dx+c)^{1/3})\cosh(a+b(dx+c)^{1/3})+2\sinh(a+b(dx+c)^{1/3}))+2ac((a+b(dx+c)^{1/3})\sinh(a+b(dx+c)^{1/3})-\cosh(a+b(dx+c)^{1/3}))-a^2c\sinh(a+b(dx+c)^{1/3})))$

Test results for the 11 problems in "6.2.4 (d+e x)^m cosh(a+b x+c x^2)^n.txt"

Problem 4: Unable to integrate problem.

$$\int\left(\frac{\cosh(-cx^2+bx+a)}{x^2}-\frac{b\sinh(-cx^2+bx+a)}{x}\right)dx$$

Optimal(type 4, 82 leaves, 7 steps):

$$-\frac{\cosh(-cx^2+bx+a)}{x}+\frac{e^{a+\frac{b^2}{4c}}\operatorname{erf}\left(\frac{-2cx+b}{2\sqrt{c}}\right)\sqrt{c}\sqrt{\pi}}{2}-\frac{e^{-a-\frac{b^2}{4c}}\operatorname{erfi}\left(\frac{-2cx+b}{2\sqrt{c}}\right)\sqrt{c}\sqrt{\pi}}{2}$$

Result(type 8, 37 leaves):

$$\int\left(\frac{\cosh(-cx^2+bx+a)}{x^2}-\frac{b\sinh(-cx^2+bx+a)}{x}\right)dx$$

Problem 11: Result more than twice size of optimal antiderivative.

$$\int(ex+d)\cosh(cx^2+bx+a)\,dx$$

Optimal(type 4, 100 leaves, 6 steps):

$$\frac{e\sinh(cx^2+bx+a)}{2c}+\frac{(-be+2cd)\,e^{-a+\frac{b^2}{4c}}\operatorname{erf}\left(\frac{2cx+b}{2\sqrt{c}}\right)\sqrt{\pi}}{8c^{3/2}}+\frac{(-be+2cd)\,e^{a-\frac{b^2}{4c}}\operatorname{erfi}\left(\frac{2cx+b}{2\sqrt{c}}\right)\sqrt{\pi}}{8c^{3/2}}$$

Result(type 4, 210 leaves):

$$\frac{d\sqrt{\pi}\,e^{-\frac{4ca-b^2}{4c}}\operatorname{erf}\left(\sqrt{c}\,x+\frac{b}{2\sqrt{c}}\right)}{4\sqrt{c}}-\frac{e\,e^{-cx^2-bx-a}}{4c}-\frac{eb\sqrt{\pi}\,e^{-\frac{4ca-b^2}{4c}}\operatorname{erf}\left(\sqrt{c}\,x+\frac{b}{2\sqrt{c}}\right)}{8c^{3/2}}-\frac{d\sqrt{\pi}\,e^{\frac{4ca-b^2}{4c}}\operatorname{erf}\left(-\sqrt{-c}\,x+\frac{b}{2\sqrt{-c}}\right)}{4\sqrt{-c}}$$
$$+\frac{e\,e^{cx^2+bx+a}}{4c}+\frac{eb\sqrt{\pi}\,e^{\frac{4ca-b^2}{4c}}\operatorname{erf}\left(-\sqrt{-c}\,x+\frac{b}{2\sqrt{-c}}\right)}{8c\sqrt{-c}}$$

Test results for the 89 problems in "6.2.5 Hyperbolic cosine functions.txt"

Problem 3: Result more than twice size of optimal antiderivative.

$$\int \cosh(bx+a)^{7/2}\, dx$$

Optimal(type 4, 85 leaves, 3 steps):

$$-\frac{10\, I \sqrt{\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^2}\, \mathrm{EllipticF}\left(I \sinh\left(\frac{bx}{2}+\frac{a}{2}\right), \sqrt{2}\right)}{21 \cosh\left(\frac{bx}{2}+\frac{a}{2}\right) b} + \frac{2\cosh(bx+a)^{5/2}\sinh(bx+a)}{7\, b} + \frac{10 \sinh(bx+a)\sqrt{\cosh(bx+a)}}{21\, b}$$

Result(type 4, 200 leaves):

$$\left(2\sqrt{\left(2\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^2-1\right)\sinh\left(\frac{bx}{2}+\frac{a}{2}\right)^2}\,\left(48\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^9-120\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^7+128\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^5-72\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^3\right.\right.$$
$$\left.\left.+5\sqrt{-\sinh\left(\frac{bx}{2}+\frac{a}{2}\right)^2}\sqrt{-2\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^2+1}\,\mathrm{EllipticF}\left(\cosh\left(\frac{bx}{2}+\frac{a}{2}\right),\sqrt{2}\right)+16\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)\right)\right)\Big/$$
$$\left(21\sqrt{2\sinh\left(\frac{bx}{2}+\frac{a}{2}\right)^4+\sinh\left(\frac{bx}{2}+\frac{a}{2}\right)^2}\,\sinh\left(\frac{bx}{2}+\frac{a}{2}\right)\sqrt{2\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^2-1}\; b\right)$$

Problem 4: Result more than twice size of optimal antiderivative.

$$\int \sqrt{\cosh(bx+a)}\, dx$$

Optimal(type 4, 46 leaves, 1 step):

$$\frac{-2\, I\sqrt{\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^2}\,\mathrm{EllipticE}\left(I\sinh\left(\frac{bx}{2}+\frac{a}{2}\right),\sqrt{2}\right)}{\cosh\left(\frac{bx}{2}+\frac{a}{2}\right) b}$$

Result(type 4, 134 leaves):

$$-\frac{2\sqrt{\left(2\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^2-1\right)\sinh\left(\frac{bx}{2}+\frac{a}{2}\right)^2}\sqrt{-\sinh\left(\frac{bx}{2}+\frac{a}{2}\right)^2}\sqrt{-2\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^2+1}\,\mathrm{EllipticE}\left(\cosh\left(\frac{bx}{2}+\frac{a}{2}\right),\sqrt{2}\right)}{\sqrt{2\sinh\left(\frac{bx}{2}+\frac{a}{2}\right)^4+\sinh\left(\frac{bx}{2}+\frac{a}{2}\right)^2}\,\sinh\left(\frac{bx}{2}+\frac{a}{2}\right)\sqrt{2\cosh\left(\frac{bx}{2}+\frac{a}{2}\right)^2-1}\; b}$$

Problem 5: Result more than twice size of optimal antiderivative.

$$\int (a\cosh(x))^{7/2}\, dx$$

Optimal(type 4, 66 leaves, 4 steps):

$$\frac{2 a (a \cosh(x))^{5/2} \sinh(x)}{7} - \frac{10 I a^4 \sqrt{\cosh\left(\frac{x}{2}\right)^2} \operatorname{EllipticF}\left(I \sinh\left(\frac{x}{2}\right), \sqrt{2}\right) \sqrt{\cosh(x)}}{21 \cosh\left(\frac{x}{2}\right) \sqrt{a \cosh(x)}} + \frac{10 a^3 \sinh(x) \sqrt{a \cosh(x)}}{21}$$

Result(type 4, 144 leaves):

$$\frac{1}{21 \sqrt{a \left(2 \sinh\left(\frac{x}{2}\right)^4 + \sinh\left(\frac{x}{2}\right)^2\right)} \sinh\left(\frac{x}{2}\right) \sqrt{a \left(2 \cosh\left(\frac{x}{2}\right)^2 - 1\right)}} \left(\sqrt{a \left(2 \cosh\left(\frac{x}{2}\right)^2 - 1\right) \sinh\left(\frac{x}{2}\right)^2} a^4 \left(96 \cosh\left(\frac{x}{2}\right)^9 - 240 \cosh\left(\frac{x}{2}\right)^7 + 256 \cosh\left(\frac{x}{2}\right)^5 + 5 \sqrt{2} \sqrt{-2 \cosh\left(\frac{x}{2}\right)^2 + 1} \sqrt{-\sinh\left(\frac{x}{2}\right)^2} \operatorname{EllipticF}\left(\cosh\left(\frac{x}{2}\right) \sqrt{2}, \frac{\sqrt{2}}{2}\right) - 144 \cosh\left(\frac{x}{2}\right)^3 + 32 \cosh\left(\frac{x}{2}\right)\right)\right)$$

Problem 6: Result more than twice size of optimal antiderivative.

$$\int (a \cosh(x))^{5/2} dx$$

Optimal(type 4, 53 leaves, 3 steps):

$$\frac{2 a (a \cosh(x))^{3/2} \sinh(x)}{5} - \frac{6 I a^2 \sqrt{\cosh\left(\frac{x}{2}\right)^2} \operatorname{EllipticE}\left(I \sinh\left(\frac{x}{2}\right), \sqrt{2}\right) \sqrt{a \cosh(x)}}{5 \cosh\left(\frac{x}{2}\right) \sqrt{\cosh(x)}}$$

Result(type 4, 183 leaves):

$$\frac{1}{5 \sqrt{a \left(2 \sinh\left(\frac{x}{2}\right)^4 + \sinh\left(\frac{x}{2}\right)^2\right)} \sinh\left(\frac{x}{2}\right) \sqrt{a \left(2 \cosh\left(\frac{x}{2}\right)^2 - 1\right)}} \left(\sqrt{a \left(2 \cosh\left(\frac{x}{2}\right)^2 - 1\right) \sinh\left(\frac{x}{2}\right)^2} a^3 \left(16 \cosh\left(\frac{x}{2}\right) \sinh\left(\frac{x}{2}\right)^6 + 16 \sinh\left(\frac{x}{2}\right)^4 \cosh\left(\frac{x}{2}\right) + 3 \sqrt{2} \sqrt{-2 \sinh\left(\frac{x}{2}\right)^2 - 1} \sqrt{-\sinh\left(\frac{x}{2}\right)^2} \operatorname{EllipticF}\left(\cosh\left(\frac{x}{2}\right) \sqrt{2}, \frac{\sqrt{2}}{2}\right) - 6 \sqrt{2} \sqrt{-2 \sinh\left(\frac{x}{2}\right)^2 - 1} \sqrt{-\sinh\left(\frac{x}{2}\right)^2} \operatorname{EllipticE}\left(\cosh\left(\frac{x}{2}\right) \sqrt{2}, \frac{\sqrt{2}}{2}\right) + 4 \sinh\left(\frac{x}{2}\right)^2 \cosh\left(\frac{x}{2}\right)\right)\right)$$

Problem 7: Result more than twice size of optimal antiderivative.

$$\int (a \cosh(x))^{3/2} dx$$

Optimal(type 4, 53 leaves, 3 steps):

$$-\frac{2\,I\,a^2\sqrt{\cosh\left(\frac{x}{2}\right)^2}\;\text{EllipticF}\left(I\sinh\left(\frac{x}{2}\right),\sqrt{2}\right)\sqrt{\cosh(x)}}{3\cosh\left(\frac{x}{2}\right)\sqrt{a\cosh(x)}}+\frac{2\,a\sinh(x)\sqrt{a\cosh(x)}}{3}$$

Result(type 4, 129 leaves):

$$\frac{1}{3\sqrt{a\left(2\sinh\left(\frac{x}{2}\right)^4+\sinh\left(\frac{x}{2}\right)^2\right)}\;\sinh\left(\frac{x}{2}\right)\sqrt{a\left(2\cosh\left(\frac{x}{2}\right)^2-1\right)}}\left(\sqrt{a\left(2\cosh\left(\frac{x}{2}\right)^2-1\right)\sinh\left(\frac{x}{2}\right)^2}\;a^2\left(8\sinh\left(\frac{x}{2}\right)^4\cosh\left(\frac{x}{2}\right)\right.\right.$$
$$\left.\left.+\sqrt{2}\sqrt{-2\sinh\left(\frac{x}{2}\right)^2-1}\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\;\text{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{2},\frac{\sqrt{2}}{2}\right)+4\sinh\left(\frac{x}{2}\right)^2\cosh\left(\frac{x}{2}\right)\right)\right)$$

Problem 8: Result more than twice size of optimal antiderivative.

$$\int\sqrt{a\cosh(x)}\;dx$$

Optimal(type 4, 38 leaves, 2 steps):

$$\frac{-2\,I\sqrt{\cosh\left(\frac{x}{2}\right)^2}\;\text{EllipticE}\left(I\sinh\left(\frac{x}{2}\right),\sqrt{2}\right)\sqrt{a\cosh(x)}}{\cosh\left(\frac{x}{2}\right)\sqrt{\cosh(x)}}$$

Result(type 4, 117 leaves):

$$\frac{\sqrt{a\left(2\cosh\left(\frac{x}{2}\right)^2-1\right)\sinh\left(\frac{x}{2}\right)^2}\;a\sqrt{2}\sqrt{-2\cosh\left(\frac{x}{2}\right)^2+1}\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\left(\text{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{2},\frac{\sqrt{2}}{2}\right)-2\,\text{EllipticE}\left(\cosh\left(\frac{x}{2}\right)\sqrt{2},\frac{\sqrt{2}}{2}\right)\right)}{\sqrt{a\left(2\sinh\left(\frac{x}{2}\right)^4+\sinh\left(\frac{x}{2}\right)^2\right)}\;\sinh\left(\frac{x}{2}\right)\sqrt{a\left(2\cosh\left(\frac{x}{2}\right)^2-1\right)}}$$

Problem 9: Result more than twice size of optimal antiderivative.

$$\int\frac{1}{\sqrt{a\cosh(x)}}\;dx$$

Optimal(type 4, 38 leaves, 2 steps):

$$\frac{-2\,I\sqrt{\cosh\left(\frac{x}{2}\right)^2}\;\text{EllipticF}\left(I\sinh\left(\frac{x}{2}\right),\sqrt{2}\right)\sqrt{\cosh(x)}}{\cosh\left(\frac{x}{2}\right)\sqrt{a\cosh(x)}}$$

Result(type 4, 99 leaves):

$$\frac{\sqrt{a\left(2\cosh\left(\frac{x}{2}\right)^2-1\right)\sinh\left(\frac{x}{2}\right)^2}\,\sqrt{2}\,\sqrt{-2\cosh\left(\frac{x}{2}\right)^2+1}\,\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{2},\frac{\sqrt{2}}{2}\right)}{\sqrt{a\left(2\sinh\left(\frac{x}{2}\right)^4+\sinh\left(\frac{x}{2}\right)^2\right)}\,\sinh\left(\frac{x}{2}\right)\sqrt{a\left(2\cosh\left(\frac{x}{2}\right)^2-1\right)}}$$

Problem 10: Unable to integrate problem.

$$\int (b\cosh(dx+c))^n\, dx$$

Optimal(type 5, 65 leaves, 1 step):

$$-\frac{(b\cosh(dx+c))^{n+1}\,\mathrm{hypergeom}\left(\left[\frac{1}{2},\frac{n}{2}+\frac{1}{2}\right],\left[\frac{3}{2}+\frac{n}{2}\right],\cosh(dx+c)^2\right)\sinh(dx+c)}{b\,d\,(n+1)\sqrt{-\sinh(dx+c)^2}}$$

Result(type 8, 12 leaves):

$$\int (b\cosh(dx+c))^n\, dx$$

Problem 15: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{\sqrt{a+a\cosh(dx+c)}}\, dx$$

Optimal(type 3, 37 leaves, 2 steps):

$$\frac{\arctan\left(\frac{\sinh(dx+c)\sqrt{a}\,\sqrt{2}}{2\sqrt{a+a\cosh(dx+c)}}\right)\sqrt{2}}{d\sqrt{a}}$$

Result(type 3, 102 leaves):

$$-\frac{\cosh\left(\frac{c}{2}+\frac{dx}{2}\right)\sqrt{a\sinh\left(\frac{c}{2}+\frac{dx}{2}\right)^2}\,\ln\left(\frac{2\left(\sqrt{-a}\,\sqrt{a\sinh\left(\frac{c}{2}+\frac{dx}{2}\right)^2}-a\right)}{\cosh\left(\frac{c}{2}+\frac{dx}{2}\right)}\right)\sqrt{2}}{\sqrt{-a}\,\sinh\left(\frac{c}{2}+\frac{dx}{2}\right)\sqrt{a\cosh\left(\frac{c}{2}+\frac{dx}{2}\right)^2}\,d}$$

Problem 16: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{(a+a\cosh(dx+c))^{5/2}}\, dx$$

Optimal(type 3, 88 leaves, 4 steps):

$$\frac{\sinh(dx+c)}{4d\,(a+a\cosh(dx+c))^{5/2}}+\frac{3\sinh(dx+c)}{16ad\,(a+a\cosh(dx+c))^{3/2}}+\frac{3\arctan\left(\frac{\sinh(dx+c)\sqrt{a}\sqrt{2}}{2\sqrt{a+a\cosh(dx+c)}}\right)\sqrt{2}}{32a^{5/2}d}$$

```
Result(type 3, 177 leaves):
```

$$-\frac{1}{32a^3\cosh\left(\frac{c}{2}+\frac{dx}{2}\right)^3\sqrt{-a}\,\sinh\left(\frac{c}{2}+\frac{dx}{2}\right)\sqrt{a\cosh\left(\frac{c}{2}+\frac{dx}{2}\right)^2}\,d}\left(\sqrt{a\sinh\left(\frac{c}{2}+\frac{dx}{2}\right)^2}\left(3\ln\left(\frac{2\left(\sqrt{-a}\sqrt{a\sinh\left(\frac{c}{2}+\frac{dx}{2}\right)^2}-a\right)}{\cosh\left(\frac{c}{2}+\frac{dx}{2}\right)}\right)a\cosh\left(c\right.\right.\right.$$

$$\left.\left.\left.\left/2+\frac{dx}{2}\right)^4-3\sqrt{a\sinh\left(\frac{c}{2}+\frac{dx}{2}\right)^2}\cosh\left(\frac{c}{2}+\frac{dx}{2}\right)^2\sqrt{-a}-2\sqrt{-a}\sqrt{a\sinh\left(\frac{c}{2}+\frac{dx}{2}\right)^2}\right)\sqrt{2}\right)$$

```
Problem 24: Result more than twice size of optimal antiderivative.
```

$$\int(a+b\cosh(x))^{3/2}\,dx$$

```
Optimal(type 4, 144 leaves, 6 steps):
```

$$\frac{2b\sinh(x)\sqrt{a+b\cosh(x)}}{3}-\frac{8\,\mathrm{I}\,a\sqrt{\cosh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticE}\left(\mathrm{I}\sinh\left(\frac{x}{2}\right),\sqrt{2}\sqrt{\frac{b}{a+b}}\right)\sqrt{a+b\cosh(x)}}{3\cosh\left(\frac{x}{2}\right)\sqrt{\frac{a+b\cosh(x)}{a+b}}}$$

$$+\frac{2\,\mathrm{I}\left(a^2-b^2\right)\sqrt{\cosh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticF}\left(\mathrm{I}\sinh\left(\frac{x}{2}\right),\sqrt{2}\sqrt{\frac{b}{a+b}}\right)\sqrt{\frac{a+b\cosh(x)}{a+b}}}{3\cosh\left(\frac{x}{2}\right)\sqrt{a+b\cosh(x)}}$$

```
Result(type 4, 457 leaves):
```

$$\left(2\left(4\sqrt{-\frac{2b}{a-b}}\,b^2\cosh\left(\frac{x}{2}\right)\sinh\left(\frac{x}{2}\right)^4+\left(2\sqrt{-\frac{2b}{a-b}}\,ab+2\sqrt{-\frac{2b}{a-b}}\,b^2\right)\sinh\left(\frac{x}{2}\right)^2\cosh\left(\frac{x}{2}\right)\right.\right.$$

$$+3a^2\sqrt{\frac{2b\sinh\left(\frac{x}{2}\right)^2}{a-b}+\frac{a+b}{a-b}}\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2b}{a-b}},\frac{\sqrt{-\frac{2(a-b)}{b}}}{2}\right)$$

$$+4ab\sqrt{\frac{2b\sinh\left(\frac{x}{2}\right)^2}{a-b}+\frac{a+b}{a-b}}\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2b}{a-b}},\frac{\sqrt{-\frac{2(a-b)}{b}}}{2}\right)$$

$$+ b^2 \sqrt{\frac{2\, b \sinh\left(\frac{x}{2}\right)^2}{a-b} + \frac{a+b}{a-b}}\, \sqrt{-\sinh\left(\frac{x}{2}\right)^2}\, \mathrm{EllipticF}\left(\cosh\left(\frac{x}{2}\right) \sqrt{-\frac{2\, b}{a-b}}, \frac{\sqrt{-\frac{2\,(a-b)}{b}}}{2}\right)$$

$$- 8 \sqrt{\frac{2\, b \sinh\left(\frac{x}{2}\right)^2}{a-b} + \frac{a+b}{a-b}}\, \sqrt{-\sinh\left(\frac{x}{2}\right)^2}\, \mathrm{EllipticE}\left(\cosh\left(\frac{x}{2}\right) \sqrt{-\frac{2\, b}{a-b}}, \frac{\sqrt{-\frac{2\,(a-b)}{b}}}{2}\right) a\, b \Bigg) \sqrt{\left(2 \cosh\left(\frac{x}{2}\right)^2 b + a - b\right) \sinh\left(\frac{x}{2}\right)^2}\Bigg)$$

$$\Bigg/ \left(3 \sqrt{-\frac{2\, b}{a-b}}\, \sqrt{2\, b \sinh\left(\frac{x}{2}\right)^4 + (a+b) \sinh\left(\frac{x}{2}\right)^2}\, \sinh\left(\frac{x}{2}\right) \sqrt{2 \sinh\left(\frac{x}{2}\right)^2 b + a + b}\right)$$

```
Problem 25: Result more than twice size of optimal antiderivative.
```

$$\int \sqrt{a + b \cosh(d\, x + c)}\, dx$$

```
Optimal(type 4, 86 leaves, 2 steps):
```

$$\frac{-2\, \mathrm{I} \sqrt{\cosh\left(\frac{c}{2} + \frac{d\, x}{2}\right)^2}\, \mathrm{EllipticE}\left(\mathrm{I} \sinh\left(\frac{c}{2} + \frac{d\, x}{2}\right), \sqrt{2} \sqrt{\frac{b}{a+b}}\right) \sqrt{a + b \cosh(d\, x + c)}}{\cosh\left(\frac{c}{2} + \frac{d\, x}{2}\right) d \sqrt{\frac{a + b \cosh(d\, x + c)}{a+b}}}$$

```
Result(type 4, 275 leaves):
```

$$\Bigg(2 \Bigg(a\, \mathrm{EllipticF}\left(\cosh\left(\frac{c}{2} + \frac{d\, x}{2}\right) \sqrt{-\frac{2\, b}{a-b}}, \frac{\sqrt{-\frac{2\,(a-b)}{b}}}{2}\right) + b\, \mathrm{EllipticF}\left(\cosh\left(\frac{c}{2} + \frac{d\, x}{2}\right) \sqrt{-\frac{2\, b}{a-b}}, \frac{\sqrt{-\frac{2\,(a-b)}{b}}}{2}\right) - 2\, b\, \mathrm{EllipticE}\left(\cosh\left(\frac{c}{2} + \frac{d\, x}{2}\right) \sqrt{-\frac{2\, b}{a-b}}, \frac{\sqrt{-\frac{2\,(a-b)}{b}}}{2}\right)\Bigg)$$

$$\sqrt{-\sinh\left(\frac{c}{2} + \frac{d\, x}{2}\right)^2}\, \sqrt{\frac{2 \cosh\left(\frac{c}{2} + \frac{d\, x}{2}\right)^2 b + a - b}{a-b}}\, \sqrt{\left(2 \cosh\left(\frac{c}{2} + \frac{d\, x}{2}\right)^2 b + a - b\right) \sinh\left(\frac{c}{2} + \frac{d\, x}{2}\right)^2}\Bigg) \Bigg/$$

$$\left(\sqrt{-\frac{2\, b}{a-b}}\, \sqrt{2\, b \sinh\left(\frac{c}{2} + \frac{d\, x}{2}\right)^4 + (a+b) \sinh\left(\frac{c}{2} + \frac{d\, x}{2}\right)^2}\, \sinh\left(\frac{c}{2} + \frac{d\, x}{2}\right) \sqrt{2 \sinh\left(\frac{c}{2} + \frac{d\, x}{2}\right)^2 b + a + b}\; d\right)$$

```
Problem 29: Result more than twice size of optimal antiderivative.
```

$$\int \frac{A + B \cosh(x)}{\sqrt{a + a \cosh(x)}}\, dx$$

```
Optimal(type 3, 45 leaves, 3 steps):
```

$$\frac{(A-B)\arctan\left(\frac{\sinh(x)\sqrt{a}\sqrt{2}}{2\sqrt{a+a\cosh(x)}}\right)\sqrt{2}}{\sqrt{a}}+\frac{2B\sinh(x)}{\sqrt{a+a\cosh(x)}}$$

Result(type 3, 127 leaves):

$$-\frac{\cosh\left(\frac{x}{2}\right)\sqrt{a\sinh\left(\frac{x}{2}\right)^2}\left(\ln\left(\frac{2\left(\sqrt{-a}\sqrt{a\sinh\left(\frac{x}{2}\right)^2}-a\right)}{\cosh\left(\frac{x}{2}\right)}\right)Aa-2B\sqrt{a\sinh\left(\frac{x}{2}\right)^2}\sqrt{-a}-\ln\left(\frac{2\left(\sqrt{-a}\sqrt{a\sinh\left(\frac{x}{2}\right)^2}-a\right)}{\cosh\left(\frac{x}{2}\right)}\right)Ba\right)\sqrt{2}}{\sqrt{-a}\,a\sinh\left(\frac{x}{2}\right)\sqrt{a\cosh\left(\frac{x}{2}\right)^2}}$$

Problem 30: Result more than twice size of optimal antiderivative.

$$\int\frac{A+B\cosh(x)}{(a+a\cosh(x))^{3/2}}\,dx$$

Optimal(type 3, 50 leaves, 3 steps):

$$\frac{(A-B)\sinh(x)}{2(a+a\cosh(x))^{3/2}}+\frac{(A+3B)\arctan\left(\frac{\sinh(x)\sqrt{a}\sqrt{2}}{2\sqrt{a+a\cosh(x)}}\right)\sqrt{2}}{4a^{3/2}}$$

Result(type 3, 158 leaves):

$$-\frac{1}{4\cosh\left(\frac{x}{2}\right)a^2\sqrt{-a}\sinh\left(\frac{x}{2}\right)\sqrt{a\cosh\left(\frac{x}{2}\right)^2}}\left(\sqrt{a\sinh\left(\frac{x}{2}\right)^2}\left(\ln\left(\frac{2\left(\sqrt{-a}\sqrt{a\sinh\left(\frac{x}{2}\right)^2}-a\right)}{\cosh\left(\frac{x}{2}\right)}\right)Aa\cosh\left(\frac{x}{2}\right)^2\right.\right.$$
$$\left.\left.+3\ln\left(\frac{2\left(\sqrt{-a}\sqrt{a\sinh\left(\frac{x}{2}\right)^2}-a\right)}{\cosh\left(\frac{x}{2}\right)}\right)Ba\cosh\left(\frac{x}{2}\right)^2-A\sqrt{a\sinh\left(\frac{x}{2}\right)^2}\sqrt{-a}+B\sqrt{a\sinh\left(\frac{x}{2}\right)^2}\sqrt{-a}\right)\sqrt{2}\right)$$

Problem 34: Result more than twice size of optimal antiderivative.

$$\int\frac{A+B\cosh(x)}{(a+b\cosh(x))^{3/2}}\,dx$$

Optimal(type 4, 178 leaves, 6 steps):

$$-\frac{2\,(A\,b-a\,B)\,\sinh(x)}{(a^2-b^2)\,\sqrt{a+b\cosh(x)}}-\frac{2\,\mathrm{I}\,(A\,b-a\,B)\,\sqrt{\cosh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticE}\left(\mathrm{I}\sinh\left(\frac{x}{2}\right),\sqrt{2}\,\sqrt{\frac{b}{a+b}}\right)\sqrt{a+b\cosh(x)}}{\cosh\left(\frac{x}{2}\right)b\,(a^2-b^2)\,\sqrt{\frac{a+b\cosh(x)}{a+b}}}$$

$$-\frac{2\,\mathrm{I}\,B\,\sqrt{\cosh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticF}\left(\mathrm{I}\sinh\left(\frac{x}{2}\right),\sqrt{2}\,\sqrt{\frac{b}{a+b}}\right)\sqrt{\frac{a+b\cosh(x)}{a+b}}}{\cosh\left(\frac{x}{2}\right)b\,\sqrt{a+b\cosh(x)}}$$

```
Result(type 4, 482 leaves):
```

$$\frac{1}{\sinh\left(\frac{x}{2}\right)\sqrt{2\sinh\left(\frac{x}{2}\right)^2 b+a+b}}\left(\sqrt{\left(2\cosh\left(\frac{x}{2}\right)^2 b+a-b\right)\sinh\left(\frac{x}{2}\right)^2}\left(\frac{1}{b\sqrt{-\frac{2b}{a-b}}\sqrt{2b\sinh\left(\frac{x}{2}\right)^4+(a+b)\sinh\left(\frac{x}{2}\right)^2}}\left(2B\right.\right.\right.$$

$$\left.\left.\sqrt{\frac{2\cosh\left(\frac{x}{2}\right)^2 b+a-b}{a-b}}\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2b}{a-b}},\frac{\sqrt{\frac{-2a+2b}{b}}}{2}\right)\right)$$

$$+\frac{1}{b\sqrt{-\frac{2b}{a-b}}\sinh\left(\frac{x}{2}\right)^2\left(2\sinh\left(\frac{x}{2}\right)^2 b+a+b\right)(a^2-b^2)}\left(2\,(A\,b-a\,B)\sqrt{2b\sinh\left(\frac{x}{2}\right)^4+(a+b)\sinh\left(\frac{x}{2}\right)^2}\right.\left(\right.$$

$$-2\sqrt{-\frac{2b}{a-b}}\,b\cosh\left(\frac{x}{2}\right)\sinh\left(\frac{x}{2}\right)^2+\mathrm{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2b}{a-b}},\frac{\sqrt{\frac{-2a+2b}{b}}}{2}\right)\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\sqrt{\frac{2b\sinh\left(\frac{x}{2}\right)^2}{a-b}+\frac{a+b}{a-b}}\,a$$

$$+\mathrm{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2b}{a-b}},\frac{\sqrt{\frac{-2a+2b}{b}}}{2}\right)\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\sqrt{\frac{2b\sinh\left(\frac{x}{2}\right)^2}{a-b}+\frac{a+b}{a-b}}\,b-2\,\mathrm{EllipticE}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2b}{a-b}},\right.$$

$$\left.\left.\left.\left.\left.\frac{\sqrt{\frac{-2a+2b}{b}}}{2}\right)\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\sqrt{\frac{2b\sinh\left(\frac{x}{2}\right)^2}{a-b}+\frac{a+b}{a-b}}\,b\right)\right)\right)\right)$$

```
Problem 35: Result more than twice size of optimal antiderivative.
```

$$\int\frac{A+B\cosh(x)}{(a+b\cosh(x))^{5/2}}\,dx$$

Optimal(type 4, 247 leaves, 7 steps):

$$-\frac{2\,(A\,b-a\,B)\sinh(x)}{3\,(a^2-b^2)\,(a+b\cosh(x))^{3/2}}-\frac{2\,(4\,A\,a\,b-a^2\,B-3\,B\,b^2)\sinh(x)}{3\,(a^2-b^2)^2\sqrt{a+b\cosh(x)}}$$

$$-\frac{2\,\mathrm{I}\,(4\,A\,a\,b-a^2\,B-3\,B\,b^2)\sqrt{\cosh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticE}\left(\mathrm{I}\sinh\left(\frac{x}{2}\right),\sqrt{2}\sqrt{\frac{b}{a+b}}\right)\sqrt{a+b\cosh(x)}}{3\cosh\left(\frac{x}{2}\right)b\,(a^2-b^2)^2\sqrt{\frac{a+b\cosh(x)}{a+b}}}$$

$$+\frac{2\,\mathrm{I}\,(A\,b-a\,B)\sqrt{\cosh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticF}\left(\mathrm{I}\sinh\left(\frac{x}{2}\right),\sqrt{2}\sqrt{\frac{b}{a+b}}\right)\sqrt{\frac{a+b\cosh(x)}{a+b}}}{3\cosh\left(\frac{x}{2}\right)b\,(a^2-b^2)\sqrt{a+b\cosh(x)}}$$

Result(type 4, 794 leaves):

$$\frac{1}{\sinh\left(\frac{x}{2}\right)\sqrt{2\sinh\left(\frac{x}{2}\right)^2 b+a+b}}\left(\sqrt{\left(2\cosh\left(\frac{x}{2}\right)^2 b+a-b\right)\sinh\left(\frac{x}{2}\right)^2}\left(\frac{1}{b\sqrt{-\frac{2\,b}{a-b}}\sinh\left(\frac{x}{2}\right)^2\left(2\sinh\left(\frac{x}{2}\right)^2 b+a+b\right)(a^2-b^2)}\left(2\,B\right.\right.\right.$$

$$\sqrt{2\,b\sinh\left(\frac{x}{2}\right)^4+(a+b)\sinh\left(\frac{x}{2}\right)^2}\left(-2\sqrt{-\frac{2\,b}{a-b}}\,b\cosh\left(\frac{x}{2}\right)\sinh\left(\frac{x}{2}\right)^2+\mathrm{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2\,b}{a-b}},\right.\right.$$

$$\left.\frac{\sqrt{\frac{-2\,a+2\,b}{b}}}{2}\right)\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\sqrt{\frac{2\,b\sinh\left(\frac{x}{2}\right)^2}{a-b}+\frac{a+b}{a-b}}\;a+\mathrm{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2\,b}{a-b}},\right.$$

$$\left.\frac{\sqrt{\frac{-2a+2b}{b}}}{2}\right)\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\sqrt{\frac{2b\sinh\left(\frac{x}{2}\right)^2}{a-b}+\frac{a+b}{a-b}}\,b-2\,\mathrm{EllipticE}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2b}{a-b}},\right.$$

$$\left.\left.\left.\frac{\sqrt{\frac{-2a+2b}{b}}}{2}\right)\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\sqrt{\frac{2b\sinh\left(\frac{x}{2}\right)^2}{a-b}+\frac{a+b}{a-b}}\,b\right)\right)+\frac{1}{b}\left(2\,(A\,b-a\,B)\left(-\frac{\cosh\left(\frac{x}{2}\right)\sqrt{2b\sinh\left(\frac{x}{2}\right)^4+(a+b)\sinh\left(\frac{x}{2}\right)^2}}{6\,b\,(a-b)\,(a+b)\left(\cosh\left(\frac{x}{2}\right)^2+\frac{a-b}{2b}\right)^2}\right.\right.$$

$$-\frac{8\,b\sinh\left(\frac{x}{2}\right)^2\cosh\left(\frac{x}{2}\right)a}{3\,(a-b)^2\,(a+b)^2\sqrt{\left(2\cosh\left(\frac{x}{2}\right)^2b+a-b\right)\sinh\left(\frac{x}{2}\right)^2}}$$

$$+\frac{(3a-b)\sqrt{\frac{2\cosh\left(\frac{x}{2}\right)^2b+a-b}{a-b}}\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2b}{a-b}},\frac{\sqrt{\frac{-2a+2b}{b}}}{2}\right)}{(3a^3+3a^2b-3ab^2-3b^3)\sqrt{-\frac{2b}{a-b}}\sqrt{2b\sinh\left(\frac{x}{2}\right)^4+(a+b)\sinh\left(\frac{x}{2}\right)^2}}-\left(16\,a\,b\,(-a\right.$$

$$+b)\sqrt{\frac{2\cosh\left(\frac{x}{2}\right)^2b+a-b}{a-b}}\sqrt{-\sinh\left(\frac{x}{2}\right)^2}\left(\mathrm{EllipticF}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2b}{a-b}},\frac{\sqrt{\frac{-2a+2b}{b}}}{2}\right)-\mathrm{EllipticE}\left(\cosh\left(\frac{x}{2}\right)\sqrt{-\frac{2b}{a-b}},\right.\right.$$

$$\left.\left.\left.\left.\left.\frac{\sqrt{\frac{-2a+2b}{b}}}{2}\right)\right)\right)\Big/\left(3\,(a+b)^2\,(a-b)^2\sqrt{-\frac{2b}{a-b}}\sqrt{2b\sinh\left(\frac{x}{2}\right)^4+(a+b)\sinh\left(\frac{x}{2}\right)^2}\,(2a-2b)\right)\right)\right)\right)$$

Problem 38: Result more than twice size of optimal antiderivative.

$$\int\frac{1}{\left(a\cosh(x)^2\right)^{3/2}}\,dx$$

Optimal(type 3, 34 leaves, 3 steps):

$$\frac{\arctan(\sinh(x))\cosh(x)}{2\,a\sqrt{a\cosh(x)^2}}+\frac{\tanh(x)}{2\,a\sqrt{a\cosh(x)^2}}$$

Result(type 3, 81 leaves):

$$\frac{\sqrt{a\sinh(x)^2}\left(-\ln\left(\frac{2\left(\sqrt{-a}\sqrt{a\sinh(x)^2}-a\right)}{\cosh(x)}\right)a\cosh(x)^2+\sqrt{-a}\sqrt{a\sinh(x)^2}\right)}{2a^2\cosh(x)\sqrt{-a}\sinh(x)\sqrt{a\cosh(x)^2}}$$

Problem 39: Unable to integrate problem.

$$\int \frac{1}{\sqrt{a\cosh(x)^3}}\,dx$$

Optimal(type 4, 55 leaves, 3 steps):

$$\frac{2\,\mathrm{I}\cosh(x)^{3/2}\sqrt{\cosh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticE}\left(\mathrm{I}\sinh\left(\frac{x}{2}\right),\sqrt{2}\right)}{\cosh\left(\frac{x}{2}\right)\sqrt{a\cosh(x)^3}}+\frac{2\cosh(x)\sinh(x)}{\sqrt{a\cosh(x)^3}}$$

Result(type 8, 10 leaves):

$$\int \frac{1}{\sqrt{a\cosh(x)^3}}\,dx$$

Problem 40: Unable to integrate problem.

$$\int \frac{1}{\left(a\cosh(x)^3\right)^{5/2}}\,dx$$

Optimal(type 4, 114 leaves, 6 steps):

$$\frac{154\,\mathrm{I}\cosh(x)^{3/2}\sqrt{\cosh\left(\frac{x}{2}\right)^2}\,\mathrm{EllipticE}\left(\mathrm{I}\sinh\left(\frac{x}{2}\right),\sqrt{2}\right)}{195\cosh\left(\frac{x}{2}\right)a^2\sqrt{a\cosh(x)^3}}+\frac{154\cosh(x)\sinh(x)}{195\,a^2\sqrt{a\cosh(x)^3}}+\frac{154\tanh(x)}{585\,a^2\sqrt{a\cosh(x)^3}}+\frac{22\,\mathrm{sech}(x)^2\tanh(x)}{117\,a^2\sqrt{a\cosh(x)^3}}+\frac{2\,\mathrm{sech}(x)^4\tanh(x)}{13\,a^2\sqrt{a\cosh(x)^3}}$$

Result(type 8, 10 leaves):

$$\int \frac{1}{\left(a\cosh(x)^3\right)^{5/2}}\,dx$$

Problem 44: Result more than twice size of optimal antiderivative.

$$\int \frac{\sinh(x)^8}{a+a\cosh(x)}\,dx$$

Optimal(type 3, 47 leaves, 5 steps):

$$\frac{5x}{16a}-\frac{5\cosh(x)\sinh(x)}{16a}+\frac{5\cosh(x)\sinh(x)^3}{24a}-\frac{\cosh(x)\sinh(x)^5}{6a}+\frac{\sinh(x)^7}{7a}$$

Result(type 3, 207 leaves):

$$-\frac{1}{7 a \left(\tanh\left(\frac{x}{2}\right)+1\right)^{7}}+\frac{2}{3 a \left(\tanh\left(\frac{x}{2}\right)+1\right)^{6}}-\frac{1}{a \left(\tanh\left(\frac{x}{2}\right)+1\right)^{5}}+\frac{1}{4 a \left(\tanh\left(\frac{x}{2}\right)+1\right)^{4}}+\frac{11}{24 a \left(\tanh\left(\frac{x}{2}\right)+1\right)^{3}}+\frac{1}{8 a \left(\tanh\left(\frac{x}{2}\right)+1\right)^{2}}$$
$$-\frac{5}{16 a \left(\tanh\left(\frac{x}{2}\right)+1\right)}+\frac{5 \ln\left(\tanh\left(\frac{x}{2}\right)+1\right)}{16 a}-\frac{1}{7 a \left(\tanh\left(\frac{x}{2}\right)-1\right)^{7}}-\frac{2}{3 a \left(\tanh\left(\frac{x}{2}\right)-1\right)^{6}}-\frac{1}{a \left(\tanh\left(\frac{x}{2}\right)-1\right)^{5}}$$
$$-\frac{1}{4 a \left(\tanh\left(\frac{x}{2}\right)-1\right)^{4}}+\frac{11}{24 a \left(\tanh\left(\frac{x}{2}\right)-1\right)^{3}}-\frac{1}{8 a \left(\tanh\left(\frac{x}{2}\right)-1\right)^{2}}-\frac{5}{16 a \left(\tanh\left(\frac{x}{2}\right)-1\right)}-\frac{5 \ln\left(\tanh\left(\frac{x}{2}\right)-1\right)}{16 a}$$

Problem 45: Result more than twice size of optimal antiderivative.

$$\int \frac{\sinh(x)^{5}}{a+a\cosh(x)}\, dx$$

Optimal(type 3, 29 leaves, 3 steps):

$$-\frac{2\,(a-a\cosh(x))^{3}}{3\,a^{4}}+\frac{(a-a\cosh(x))^{4}}{4\,a^{5}}$$

Result(type 3, 86 leaves):

$$\frac{1}{a}\left(32\left(\frac{1}{128\left(\tanh\left(\frac{x}{2}\right)+1\right)^{4}}-\frac{5}{192\left(\tanh\left(\frac{x}{2}\right)+1\right)^{3}}+\frac{5}{256\left(\tanh\left(\frac{x}{2}\right)+1\right)^{2}}+\frac{5}{256\left(\tanh\left(\frac{x}{2}\right)+1\right)}+\frac{1}{128\left(\tanh\left(\frac{x}{2}\right)-1\right)^{4}}\right.\right.$$
$$\left.\left.+\frac{5}{192\left(\tanh\left(\frac{x}{2}\right)-1\right)^{3}}+\frac{5}{256\left(\tanh\left(\frac{x}{2}\right)-1\right)^{2}}-\frac{5}{256\left(\tanh\left(\frac{x}{2}\right)-1\right)}\right)\right)$$

Problem 46: Result more than twice size of optimal antiderivative.

$$\int \frac{\sinh(x)^{4}}{a+a\cosh(x)}\, dx$$

Optimal(type 3, 25 leaves, 3 steps):

$$\frac{x}{2\,a}-\frac{\cosh(x)\sinh(x)}{2\,a}+\frac{\sinh(x)^{3}}{3\,a}$$

Result(type 3, 102 leaves):

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

Problem 47: Result more than twice size of optimal antiderivative.

$$\int\frac{\sinh(x)^7}{a+b\cosh(x)}\,dx$$

Optimal(type 3, 130 leaves, 3 steps):

$$-\frac{a\left(a^4-3a^2b^2+3b^4\right)\cosh(x)}{b^6}+\frac{\left(a^4-3a^2b^2+3b^4\right)\cosh(x)^2}{2b^5}-\frac{a\left(a^2-3b^2\right)\cosh(x)^3}{3b^4}+\frac{\left(a^2-3b^2\right)\cosh(x)^4}{4b^3}-\frac{a\cosh(x)^5}{5b^2}+\frac{\cosh(x)^6}{6b}$$
$$+\frac{\left(a^2-b^2\right)^3\ln(a+b\cosh(x))}{b^7}$$

Result(type 3, 1038 leaves):

$$\frac{5}{16b\left(\tanh\left(\frac{x}{2}\right)-1\right)^2}+\frac{1}{6b\left(\tanh\left(\frac{x}{2}\right)+1\right)^6}+\frac{1}{6b\left(\tanh\left(\frac{x}{2}\right)-1\right)^6}+\frac{\ln\left(a\tanh\left(\frac{x}{2}\right)^2-\tanh\left(\frac{x}{2}\right)^2b-a-b\right)}{a-b}-\frac{1}{2b\left(\tanh\left(\frac{x}{2}\right)+1\right)^5}$$
$$+\frac{1}{8b\left(\tanh\left(\frac{x}{2}\right)+1\right)^4}+\frac{7}{12b\left(\tanh\left(\frac{x}{2}\right)+1\right)^3}+\frac{\ln\left(\tanh\left(\frac{x}{2}\right)+1\right)}{b}+\frac{5}{16b\left(\tanh\left(\frac{x}{2}\right)+1\right)^2}+\frac{1}{2b\left(\tanh\left(\frac{x}{2}\right)-1\right)^5}$$
$$+\frac{1}{8b\left(\tanh\left(\frac{x}{2}\right)-1\right)^4}-\frac{7}{12b\left(\tanh\left(\frac{x}{2}\right)-1\right)^3}+\frac{\ln\left(\tanh\left(\frac{x}{2}\right)-1\right)}{b}-\frac{11}{16b\left(\tanh\left(\frac{x}{2}\right)+1\right)}+\frac{11}{16b\left(\tanh\left(\frac{x}{2}\right)-1\right)}$$
$$+\frac{\ln\left(a\tanh\left(\frac{x}{2}\right)^2-\tanh\left(\frac{x}{2}\right)^2b-a-b\right)a^7}{b^7(a-b)}-\frac{\ln\left(a\tanh\left(\frac{x}{2}\right)^2-\tanh\left(\frac{x}{2}\right)^2b-a-b\right)a^6}{b^6(a-b)}-\frac{3\ln\left(a\tanh\left(\frac{x}{2}\right)^2-\tanh\left(\frac{x}{2}\right)^2b-a-b\right)a^5}{b^5(a-b)}$$
$$+\frac{3\ln\left(a\tanh\left(\frac{x}{2}\right)^2-\tanh\left(\frac{x}{2}\right)^2b-a-b\right)a^4}{b^4(a-b)}+\frac{3\ln\left(a\tanh\left(\frac{x}{2}\right)^2-\tanh\left(\frac{x}{2}\right)^2b-a-b\right)a^3}{b^3(a-b)}-\frac{3\ln\left(a\tanh\left(\frac{x}{2}\right)^2-\tanh\left(\frac{x}{2}\right)^2b-a-b\right)a^2}{b^2(a-b)}$$

$$-\frac{\ln\left(a\tanh\left(\frac{x}{2}\right)^{2}-\tanh\left(\frac{x}{2}\right)^{2}b-a-b\right)a}{b\,(a-b)}-\frac{7\,a^{2}}{8\,b^{3}\left(\tanh\left(\frac{x}{2}\right)+1\right)^{2}}-\frac{7\,a}{8\,b^{2}\left(\tanh\left(\frac{x}{2}\right)+1\right)^{2}}-\frac{a^{5}}{b^{6}\left(\tanh\left(\frac{x}{2}\right)+1\right)}-\frac{a^{4}}{2\,b^{5}\left(\tanh\left(\frac{x}{2}\right)+1\right)}$$
$$+\frac{5\,a^{3}}{2\,b^{4}\left(\tanh\left(\frac{x}{2}\right)+1\right)}+\frac{9\,a^{2}}{8\,b^{3}\left(\tanh\left(\frac{x}{2}\right)+1\right)}-\frac{15\,a}{8\,b^{2}\left(\tanh\left(\frac{x}{2}\right)+1\right)}+\frac{a}{5\,b^{2}\left(\tanh\left(\frac{x}{2}\right)-1\right)^{5}}+\frac{a^{2}}{4\,b^{3}\left(\tanh\left(\frac{x}{2}\right)-1\right)^{4}}$$
$$+\frac{a}{2\,b^{2}\left(\tanh\left(\frac{x}{2}\right)-1\right)^{4}}-\frac{a}{5\,b^{2}\left(\tanh\left(\frac{x}{2}\right)+1\right)^{5}}+\frac{a^{3}}{3\,b^{4}\left(\tanh\left(\frac{x}{2}\right)-1\right)^{3}}+\frac{a^{2}}{2\,b^{3}\left(\tanh\left(\frac{x}{2}\right)-1\right)^{3}}-\frac{a}{4\,b^{2}\left(\tanh\left(\frac{x}{2}\right)-1\right)^{3}}$$
$$-\frac{\ln\left(\tanh\left(\frac{x}{2}\right)-1\right)a^{6}}{b^{7}}+\frac{3\ln\left(\tanh\left(\frac{x}{2}\right)-1\right)a^{4}}{b^{5}}-\frac{3\ln\left(\tanh\left(\frac{x}{2}\right)-1\right)a^{2}}{b^{3}}+\frac{a^{4}}{2\,b^{5}\left(\tanh\left(\frac{x}{2}\right)-1\right)^{2}}+\frac{a^{3}}{2\,b^{4}\left(\tanh\left(\frac{x}{2}\right)-1\right)^{2}}$$
$$-\frac{7\,a^{2}}{8\,b^{3}\left(\tanh\left(\frac{x}{2}\right)-1\right)^{2}}-\frac{7\,a}{8\,b^{2}\left(\tanh\left(\frac{x}{2}\right)-1\right)^{2}}+\frac{a^{5}}{b^{6}\left(\tanh\left(\frac{x}{2}\right)-1\right)}+\frac{a^{4}}{2\,b^{5}\left(\tanh\left(\frac{x}{2}\right)-1\right)}-\frac{5\,a^{3}}{2\,b^{4}\left(\tanh\left(\frac{x}{2}\right)-1\right)}$$
$$-\frac{9\,a^{2}}{8\,b^{3}\left(\tanh\left(\frac{x}{2}\right)-1\right)}+\frac{15\,a}{8\,b^{2}\left(\tanh\left(\frac{x}{2}\right)-1\right)}+\frac{a^{2}}{4\,b^{3}\left(\tanh\left(\frac{x}{2}\right)+1\right)^{4}}+\frac{a}{2\,b^{2}\left(\tanh\left(\frac{x}{2}\right)+1\right)^{4}}-\frac{a^{3}}{3\,b^{4}\left(\tanh\left(\frac{x}{2}\right)+1\right)^{3}}$$
$$-\frac{a^{2}}{2\,b^{3}\left(\tanh\left(\frac{x}{2}\right)+1\right)^{3}}+\frac{a}{4\,b^{2}\left(\tanh\left(\frac{x}{2}\right)+1\right)^{3}}-\frac{\ln\left(\tanh\left(\frac{x}{2}\right)+1\right)a^{6}}{b^{7}}+\frac{3\ln\left(\tanh\left(\frac{x}{2}\right)+1\right)a^{4}}{b^{5}}-\frac{3\ln\left(\tanh\left(\frac{x}{2}\right)+1\right)a^{2}}{b^{3}}$$
$$+\frac{a^{4}}{2\,b^{5}\left(\tanh\left(\frac{x}{2}\right)+1\right)^{2}}+\frac{a^{3}}{2\,b^{4}\left(\tanh\left(\frac{x}{2}\right)+1\right)^{2}}$$

Problem 48: Result more than twice size of optimal antiderivative.

$$\int \frac{\sinh(x)^{5}}{a+b\cosh(x)}\,dx$$

Optimal(type 3, 77 leaves, 3 steps):

$$-\frac{a\,(a^{2}-2\,b^{2})\cosh(x)}{b^{4}}+\frac{(a^{2}-2\,b^{2})\cosh(x)^{2}}{2\,b^{3}}-\frac{a\cosh(x)^{3}}{3\,b^{2}}+\frac{\cosh(x)^{4}}{4\,b}+\frac{(a^{2}-b^{2})^{2}\ln(a+b\cosh(x))}{b^{5}}$$

Result(type 3, 598 leaves):

$$-\frac{3}{8 b \left(\tanh\left(\frac{x}{2}\right)-1\right)^2} - \frac{\ln\left(a \tanh\left(\frac{x}{2}\right)^2 - \tanh\left(\frac{x}{2}\right)^2 b - a - b\right)}{a-b} + \frac{1}{4 b \left(\tanh\left(\frac{x}{2}\right)+1\right)^4} - \frac{1}{2 b \left(\tanh\left(\frac{x}{2}\right)+1\right)^3} - \frac{\ln\left(\tanh\left(\frac{x}{2}\right)+1\right)}{b}$$

$$- \frac{3}{8 b \left(\tanh\left(\frac{x}{2}\right)+1\right)^2} + \frac{1}{4 b \left(\tanh\left(\frac{x}{2}\right)-1\right)^4} + \frac{1}{2 b \left(\tanh\left(\frac{x}{2}\right)-1\right)^3} - \frac{\ln\left(\tanh\left(\frac{x}{2}\right)-1\right)}{b} + \frac{5}{8 b \left(\tanh\left(\frac{x}{2}\right)+1\right)} - \frac{5}{8 b \left(\tanh\left(\frac{x}{2}\right)-1\right)}$$

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

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

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

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

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

```
Problem 60: Unable to integrate problem.
```

$$\int \frac{x^3 \sinh(d x + c)^2}{a + b \cosh(d x + c)} \, dx$$

```
Optimal(type 4, 453 leaves, 18 steps):
```

$$-\frac{a x^4}{4 b^2} - \frac{6 \cosh(d x + c)}{b d^4} - \frac{3 x^2 \cosh(d x + c)}{b d^2} + \frac{6 x \sinh(d x + c)}{b d^3} + \frac{x^3 \sinh(d x + c)}{b d} + \frac{x^3 \ln\left(1 + \frac{b e^{d x + c}}{a - \sqrt{a^2 - b^2}}\right) \sqrt{a^2 - b^2}}{b^2 d}$$

$$-\frac{x^3\ln\left(1+\frac{b\,e^{dx+c}}{a+\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2 d}+\frac{3x^2\,\mathrm{polylog}\left(2,-\frac{b\,e^{dx+c}}{a-\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2 d^2}-\frac{3x^2\,\mathrm{polylog}\left(2,-\frac{b\,e^{dx+c}}{a+\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2 d^2}$$
$$-\frac{6x\,\mathrm{polylog}\left(3,-\frac{b\,e^{dx+c}}{a-\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2 d^3}+\frac{6x\,\mathrm{polylog}\left(3,-\frac{b\,e^{dx+c}}{a+\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2 d^3}+\frac{6\,\mathrm{polylog}\left(4,-\frac{b\,e^{dx+c}}{a-\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2 d^4}$$
$$-\frac{6\,\mathrm{polylog}\left(4,-\frac{b\,e^{dx+c}}{a+\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2 d^4}$$

Result(type 8, 130 leaves):

$$-\frac{a x^4}{4 b^2}+\frac{(x^3 d^3-3d^2x^2+6dx-6)\,e^{dx+c}}{2d^4 b}-\frac{x^3d^3+3d^2x^2+6dx+6}{2d^4 b\,e^{dx+c}}+\int\frac{2x^3\,(a^2-b^2)\,e^{dx+c}}{\left(b\,(e^{dx+c})^2+2a\,e^{dx+c}+b\right)b^2}\,dx$$

Problem 61: Result more than twice size of optimal antiderivative.

$$\int\frac{x\sinh(dx+c)^2}{a+b\cosh(dx+c)}\,dx$$

Optimal(type 4, 222 leaves, 12 steps):

$$-\frac{a x^2}{2b^2}-\frac{\cosh(dx+c)}{b d^2}+\frac{x\sinh(dx+c)}{b d}+\frac{x\ln\left(1+\frac{b\,e^{dx+c}}{a-\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2 d}-\frac{x\ln\left(1+\frac{b\,e^{dx+c}}{a+\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2 d}$$
$$+\frac{\mathrm{polylog}\left(2,-\frac{b\,e^{dx+c}}{a-\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2 d^2}-\frac{\mathrm{polylog}\left(2,-\frac{b\,e^{dx+c}}{a+\sqrt{a^2-b^2}}\right)\sqrt{a^2-b^2}}{b^2 d^2}$$

Result(type 4, 861 leaves):

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

$$-\frac{\ln\left(\frac{-b\,e^{dx+c}+\sqrt{a^2-b^2}-a}{-a+\sqrt{a^2-b^2}}\right)c}{d^2\sqrt{a^2-b^2}}-\frac{\ln\left(\frac{b\,e^{dx+c}+\sqrt{a^2-b^2}+a}{a+\sqrt{a^2-b^2}}\right)c\,a^2}{b^2\,d^2\sqrt{a^2-b^2}}+\frac{\ln\left(\frac{b\,e^{dx+c}+\sqrt{a^2-b^2}+a}{a+\sqrt{a^2-b^2}}\right)c}{d^2\sqrt{a^2-b^2}}$$

$$+\frac{\operatorname{dilog}\left(\frac{-b\,e^{dx+c}+\sqrt{a^2-b^2}-a}{-a+\sqrt{a^2-b^2}}\right)a^2}{b^2\,d^2\sqrt{a^2-b^2}}-\frac{\operatorname{dilog}\left(\frac{-b\,e^{dx+c}+\sqrt{a^2-b^2}-a}{-a+\sqrt{a^2-b^2}}\right)}{d^2\sqrt{a^2-b^2}}-\frac{\operatorname{dilog}\left(\frac{b\,e^{dx+c}+\sqrt{a^2-b^2}+a}{a+\sqrt{a^2-b^2}}\right)a^2}{b^2\,d^2\sqrt{a^2-b^2}}$$

$$+\frac{\operatorname{dilog}\left(\frac{b\,e^{dx+c}+\sqrt{a^2-b^2}+a}{a+\sqrt{a^2-b^2}}\right)}{d^2\sqrt{a^2-b^2}}-\frac{2\,c\arctan\left(\frac{2\,b\,e^{dx+c}+2\,a}{2\sqrt{-a^2+b^2}}\right)a^2}{b^2\,d^2\sqrt{-a^2+b^2}}+\frac{2\,c\arctan\left(\frac{2\,b\,e^{dx+c}+2\,a}{2\sqrt{-a^2+b^2}}\right)}{d^2\sqrt{-a^2+b^2}}$$

Problem 62: Result more than twice size of optimal antiderivative.

$$\int\frac{\sinh(dx+c)^2}{a+b\cosh(dx+c)}\,dx$$

Optimal(type 3, 64 leaves, 4 steps):

$$-\frac{a\,x}{b^2}+\frac{\sinh(dx+c)}{b\,d}+\frac{2\operatorname{arctanh}\left(\frac{\sqrt{a-b}\,\tanh\left(\frac{c}{2}+\frac{dx}{2}\right)}{\sqrt{a+b}}\right)\sqrt{a-b}\,\sqrt{a+b}}{b^2\,d}$$

Result(type 3, 176 leaves):

$$\frac{2\operatorname{arctanh}\left(\frac{(a-b)\tanh\left(\frac{c}{2}+\frac{dx}{2}\right)}{\sqrt{(a+b)\,(a-b)}}\right)a^2}{d\,b^2\sqrt{(a+b)\,(a-b)}}-\frac{2\operatorname{arctanh}\left(\frac{(a-b)\tanh\left(\frac{c}{2}+\frac{dx}{2}\right)}{\sqrt{(a+b)\,(a-b)}}\right)}{d\sqrt{(a+b)\,(a-b)}}-\frac{1}{d\,b\left(\tanh\left(\frac{c}{2}+\frac{dx}{2}\right)+1\right)}-\frac{a\ln\left(\tanh\left(\frac{c}{2}+\frac{dx}{2}\right)+1\right)}{d\,b^2}$$

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

Problem 65: Unable to integrate problem.

$$\int\cosh(a+b\ln(c\,x^n))\,dx$$

Optimal(type 3, 54 leaves, 1 step):

$$\frac{x \cosh(a + b \ln(c x^n))}{-b^2 n^2 + 1} - \frac{b n x \sinh(a + b \ln(c x^n))}{-b^2 n^2 + 1}$$

Result(type 8, 13 leaves):

$$\int \cosh(a + b \ln(c x^n)) \, dx$$

Problem 66: Unable to integrate problem.

$$\int \cosh(a + b \ln(c x^n))^4 \, dx$$

Optimal(type 3, 191 leaves, 3 steps):

$$\frac{24 b^4 n^4 x}{64 b^4 n^4 - 20 b^2 n^2 + 1} - \frac{12 b^2 n^2 x \cosh(a + b \ln(c x^n))^2}{64 b^4 n^4 - 20 b^2 n^2 + 1} + \frac{x \cosh(a + b \ln(c x^n))^4}{-16 b^2 n^2 + 1} + \frac{24 b^3 n^3 x \cosh(a + b \ln(c x^n)) \sinh(a + b \ln(c x^n))}{64 b^4 n^4 - 20 b^2 n^2 + 1} - \frac{4 b n x \cosh(a + b \ln(c x^n))^3 \sinh(a + b \ln(c x^n))}{-16 b^2 n^2 + 1}$$

Result(type 8, 15 leaves):

$$\int \cosh(a + b \ln(c x^n))^4 \, dx$$

Problem 67: Unable to integrate problem.

$$\int x^m \cosh(a + b \ln(c x^n)) \, dx$$

Optimal(type 3, 73 leaves, 1 step):

$$\frac{(1 + m) x^{1+m} \cosh(a + b \ln(c x^n))}{(1 + m)^2 - b^2 n^2} - \frac{b n x^{1+m} \sinh(a + b \ln(c x^n))}{(1 + m)^2 - b^2 n^2}$$

Result(type 8, 17 leaves):

$$\int x^m \cosh(a + b \ln(c x^n)) \, dx$$

Problem 70: Unable to integrate problem.

$$\int \cosh\left(a + \frac{2 \ln(c x^n)}{n}\right)^{5/2} dx$$

Optimal(type 3, 202 leaves, 8 steps):

$$-\frac{x\cosh\left(a+\frac{2\ln(c x^n)}{n}\right)^{5/2}}{4}+\frac{5 x\cosh\left(a+\frac{2\ln(c x^n)}{n}\right)^{5/2}}{4\,e^{2a}\,(c x^n)^{\frac{4}{n}}\left(1+\frac{1}{e^{2a}\,(c x^n)^{\frac{4}{n}}}\right)^2}+\frac{5 x\cosh\left(a+\frac{2\ln(c x^n)}{n}\right)^{5/2}}{12\left(1+\frac{1}{e^{2a}\,(c x^n)^{\frac{4}{n}}}\right)}$$

$$-\frac{5 x\,\mathrm{arccsch}\left(e^{a}\,(c x^n)^{\frac{2}{n}}\right)\cosh\left(a+\frac{2\ln(c x^n)}{n}\right)^{5/2}}{4\,e^{3a}\,(c x^n)^{\frac{6}{n}}\left(1+\frac{1}{e^{2a}\,(c x^n)^{\frac{4}{n}}}\right)^{5/2}}$$

Result(type 8, 18 leaves):

$$\int \cosh\left(a+\frac{2\ln(c x^n)}{n}\right)^{5/2} dx$$

Problem 71: Unable to integrate problem.

$$\int \sqrt{\cosh\left(a+\frac{2\ln(c x^n)}{n}\right)}\, dx$$

Optimal(type 3, 95 leaves, 6 steps):

$$\frac{x\sqrt{\cosh\left(a+\frac{2\ln(c x^n)}{n}\right)}}{2}-\frac{x\,\mathrm{arccsch}\left(e^{a}\,(c x^n)^{\frac{2}{n}}\right)\sqrt{\cosh\left(a+\frac{2\ln(c x^n)}{n}\right)}}{2\,e^{a}\,(c x^n)^{\frac{2}{n}}\sqrt{1+\frac{1}{e^{2a}\,(c x^n)^{\frac{4}{n}}}}}$$

Result(type 8, 18 leaves):

$$\int \sqrt{\cosh\left(a+\frac{2\ln(c x^n)}{n}\right)}\, dx$$

Problem 77: Result is not expressed in closed-form.

$$\int e^{x}\,\mathrm{sech}(4x)^2\, dx$$

Optimal(type 3, 263 leaves, 22 steps):

$$-\frac{e^{x}}{2\left(1+e^{8 x}\right)}-\frac{\ln\left(1+e^{2 x}-e^{x}\sqrt{2-\sqrt{2}}\right)\sqrt{2-\sqrt{2}}}{32}+\frac{\ln\left(1+e^{2 x}+e^{x}\sqrt{2-\sqrt{2}}\right)\sqrt{2-\sqrt{2}}}{32}-\frac{\arctan\left(\frac{-2 e^{x}+\sqrt{2-\sqrt{2}}}{\sqrt{2+\sqrt{2}}}\right)}{8\sqrt{4-2\sqrt{2}}}$$

$$+\frac{\arctan\left(\frac{2 e^{x}+\sqrt{2-\sqrt{2}}}{\sqrt{2+\sqrt{2}}}\right)}{8\sqrt{4-2\sqrt{2}}}-\frac{\ln\left(1+e^{2 x}-e^{x}\sqrt{2+\sqrt{2}}\right)\sqrt{2+\sqrt{2}}}{32}+\frac{\ln\left(1+e^{2 x}+e^{x}\sqrt{2+\sqrt{2}}\right)\sqrt{2+\sqrt{2}}}{32}-\frac{\arctan\left(\frac{-2 e^{x}+\sqrt{2+\sqrt{2}}}{\sqrt{2-\sqrt{2}}}\right)}{8\sqrt{4+2\sqrt{2}}}$$

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

Result(type 7, 35 leaves):

$$-\frac{e^{x}}{2\left(1+e^{8 x}\right)}+4\left(\sum_{\_R=RootOf\left(281474976710656\ \_Z^{8}+1\right)}\_R\ln\left(e^{x}+64\ \_R\right)\right)$$

Problem 78: Unable to integrate problem.

$$\int F^{c\,(b\,x+a)}\,\mathrm{sech}(e\,x+d)^{2}\,dx$$

Optimal(type 5, 68 leaves, 1 step):

$$\frac{4\,e^{2\,e\,x+2\,d}\,F^{c\,(b\,x+a)}\,\mathrm{hypergeom}\left(\left[2,1+\frac{b\,c\ln(F)}{2\,e}\right],\left[2+\frac{b\,c\ln(F)}{2\,e}\right],-e^{2\,e\,x+2\,d}\right)}{b\,c\ln(F)+2\,e}$$

Result(type 8, 20 leaves):

$$\int F^{c\,(b\,x+a)}\,\mathrm{sech}(e\,x+d)^{2}\,dx$$

Problem 86: Unable to integrate problem.

$$\int\left(\frac{x}{\cosh(x)^{5/2}}-\frac{x}{3\sqrt{\cosh(x)}}\right)dx$$

Optimal(type 3, 16 leaves, 2 steps):

$$\frac{2\,x\sinh(x)}{3\cosh(x)^{3/2}}+\frac{4}{3\sqrt{\cosh(x)}}$$

Result(type 8, 16 leaves):

$$\int\left(\frac{x}{\cosh(x)^{5/2}}-\frac{x}{3\sqrt{\cosh(x)}}\right)dx$$

Problem 87: Unable to integrate problem.

$$\int \left(\frac{x^2}{\cosh(x)^{3/2}} + x^2 \sqrt{\cosh(x)} \right) dx$$

Optimal(type 4, 47 leaves, 3 steps):

$$-\frac{16\, I \sqrt{\cosh\left(\frac{x}{2}\right)^2}\, \mathrm{EllipticE}\left(I \sinh\left(\frac{x}{2}\right), \sqrt{2}\right)}{\cosh\left(\frac{x}{2}\right)} + \frac{2 x^2 \sinh(x)}{\sqrt{\cosh(x)}} - 8 x \sqrt{\cosh(x)}$$

Result(type 8, 19 leaves):

$$\int \left(\frac{x^2}{\cosh(x)^{3/2}} + x^2 \sqrt{\cosh(x)} \right) dx$$

Test results for the 25 problems in "6.2.7 hyper^m (a+b cosh^n)^p.txt"

Problem 1: Result more than twice size of optimal antiderivative.

$$\int \frac{\sinh(x)^4}{a - a\cosh(x)^2}\, dx$$

Optimal(type 3, 16 leaves, 3 steps):

$$\frac{x}{2a} - \frac{\cosh(x)\sinh(x)}{2a}$$

Result(type 3, 77 leaves):

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

Problem 2: Result unnecessarily involves higher level functions.

$$\int \frac{\sinh(x)^2}{a - a\cosh(x)^2}\, dx$$

Optimal(type 1, 6 leaves, 2 steps):

$$-\frac{x}{a}$$

Result(type 3, 10 leaves):

$$-\frac{2\,\mathrm{arctanh}\left(\tanh\left(\frac{x}{2}\right)\right)}{a}$$

Problem 3: Result more than twice size of optimal antiderivative.

$$\int \frac{\sinh(x)^5}{a+b\cosh(x)^2}\,dx$$

Optimal(type 3, 44 leaves, 4 steps):

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

Result(type 3, 213 leaves):

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

Problem 5: Result more than twice size of optimal antiderivative.

$$\int \frac{\sinh(x)^2}{a+b\cosh(x)^2}\,dx$$

Optimal(type 3, 31 leaves, 4 steps):

$$\frac{x}{b}-\frac{\operatorname{arctanh}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)\sqrt{a+b}}{b\sqrt{a}}$$

Result(type 3, 188 leaves):

$$\frac{\sqrt{a}\ln\left(-\sqrt{a+b}\tanh\left(\frac{x}{2}\right)^2+2\tanh\left(\frac{x}{2}\right)\sqrt{a}-\sqrt{a+b}\right)}{2b\sqrt{a+b}}-\frac{\sqrt{a}\ln\left(\sqrt{a+b}\tanh\left(\frac{x}{2}\right)^2+2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{2b\sqrt{a+b}}$$
$$+\frac{\ln\left(-\sqrt{a+b}\tanh\left(\frac{x}{2}\right)^2+2\tanh\left(\frac{x}{2}\right)\sqrt{a}-\sqrt{a+b}\right)}{2\sqrt{a}\sqrt{a+b}}-\frac{\ln\left(\sqrt{a+b}\tanh\left(\frac{x}{2}\right)^2+2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{2\sqrt{a}\sqrt{a+b}}+\frac{\ln\left(\tanh\left(\frac{x}{2}\right)+1\right)}{b}$$
$$-\frac{\ln\left(\tanh\left(\frac{x}{2}\right)-1\right)}{b}$$

Problem 6: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{a + b \cosh(x)^2} \, dx$$

Optimal(type 3, 21 leaves, 2 steps):

$$\frac{\operatorname{arctanh}\left(\frac{\sqrt{a}\,\tanh(x)}{\sqrt{a+b}}\right)}{\sqrt{a}\,\sqrt{a+b}}$$

Result(type 3, 80 leaves):

$$-\frac{\ln\left(-\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)^2 + 2\tanh\left(\frac{x}{2}\right)\sqrt{a} - \sqrt{a+b}\right)}{2\sqrt{a}\,\sqrt{a+b}} + \frac{\ln\left(\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)^2 + 2\tanh\left(\frac{x}{2}\right)\sqrt{a} + \sqrt{a+b}\right)}{2\sqrt{a}\,\sqrt{a+b}}$$

Problem 7: Result more than twice size of optimal antiderivative.

$$\int \frac{\operatorname{csch}(x)^4}{a + b \cosh(x)^2} \, dx$$

Optimal(type 3, 49 leaves, 4 steps):

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

Result(type 3, 179 leaves):

$$-\frac{\tanh\left(\frac{x}{2}\right)^3 a}{24(a+b)^2} - \frac{\tanh\left(\frac{x}{2}\right)^3 b}{24(a+b)^2} + \frac{3\tanh\left(\frac{x}{2}\right) a}{8(a+b)^2} + \frac{7\tanh\left(\frac{x}{2}\right) b}{8(a+b)^2} - \frac{1}{24(a+b)\tanh\left(\frac{x}{2}\right)^3} + \frac{3a}{8(a+b)^2\tanh\left(\frac{x}{2}\right)} + \frac{7b}{8(a+b)^2\tanh\left(\frac{x}{2}\right)}$$
$$- \frac{b^2\ln\left(-\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)^2 + 2\tanh\left(\frac{x}{2}\right)\sqrt{a} - \sqrt{a+b}\right)}{2(a+b)^{5/2}\sqrt{a}} + \frac{b^2\ln\left(\sqrt{a+b}\,\tanh\left(\frac{x}{2}\right)^2 + 2\tanh\left(\frac{x}{2}\right)\sqrt{a} + \sqrt{a+b}\right)}{2(a+b)^{5/2}\sqrt{a}}$$

Problem 8: Result more than twice size of optimal antiderivative.

$$\int \frac{\operatorname{csch}(x)^6}{a + b \cosh(x)^2} \, dx$$

Optimal(type 3, 77 leaves, 4 steps):

$$-\frac{(a^2+3ab+3b^2)\coth(x)}{(a+b)^3}+\frac{(2a+3b)\coth(x)^3}{3(a+b)^2}-\frac{\coth(x)^5}{5(a+b)}-\frac{b^3\operatorname{arctanh}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{(a+b)^{7/2}\sqrt{a}}$$

```
Result(type 3, 309 leaves):
```

$$-\frac{\tanh\left(\frac{x}{2}\right)^5 a^2}{160(a+b)^3}-\frac{\tanh\left(\frac{x}{2}\right)^5 ab}{80(a+b)^3}-\frac{\tanh\left(\frac{x}{2}\right)^5 b^2}{160(a+b)^3}+\frac{5\tanh\left(\frac{x}{2}\right)^3 a^2}{96(a+b)^3}+\frac{7\tanh\left(\frac{x}{2}\right)^3 ab}{48(a+b)^3}+\frac{3\tanh\left(\frac{x}{2}\right)^3 b^2}{32(a+b)^3}-\frac{5\tanh\left(\frac{x}{2}\right) a^2}{16(a+b)^3}-\frac{\tanh\left(\frac{x}{2}\right) ab}{(a+b)^3}$$
$$-\frac{19\tanh\left(\frac{x}{2}\right) b^2}{16(a+b)^3}-\frac{1}{160(a+b)\tanh\left(\frac{x}{2}\right)^5}+\frac{5a}{96(a+b)^2\tanh\left(\frac{x}{2}\right)^3}+\frac{3b}{32(a+b)^2\tanh\left(\frac{x}{2}\right)^3}-\frac{5a^2}{16(a+b)^3\tanh\left(\frac{x}{2}\right)}-\frac{ab}{(a+b)^3\tanh\left(\frac{x}{2}\right)}$$
$$-\frac{19b^2}{16(a+b)^3\tanh\left(\frac{x}{2}\right)}+\frac{b^3\ln\left(-\sqrt{a+b}\tanh\left(\frac{x}{2}\right)^2+2\tanh\left(\frac{x}{2}\right)\sqrt{a}-\sqrt{a+b}\right)}{2(a+b)^{7/2}\sqrt{a}}-\frac{b^3\ln\left(\sqrt{a+b}\tanh\left(\frac{x}{2}\right)^2+2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{2(a+b)^{7/2}\sqrt{a}}$$

```
Problem 10: Result more than twice size of optimal antiderivative.
```

$$\int\frac{\cosh(x)^4}{a+b\cosh(x)^2}\,dx$$

```
Optimal(type 3, 47 leaves, 5 steps):
```

$$-\frac{(2a-b)x}{2b^2}+\frac{\cosh(x)\sinh(x)}{2b}+\frac{a^{3/2}\operatorname{arctanh}\left(\frac{\sqrt{a}\tanh(x)}{\sqrt{a+b}}\right)}{b^2\sqrt{a+b}}$$

```
Result(type 3, 187 leaves):
```

$$-\frac{a^{3/2}\ln\left(-\sqrt{a+b}\tanh\left(\frac{x}{2}\right)^2+2\tanh\left(\frac{x}{2}\right)\sqrt{a}-\sqrt{a+b}\right)}{2b^2\sqrt{a+b}}+\frac{a^{3/2}\ln\left(\sqrt{a+b}\tanh\left(\frac{x}{2}\right)^2+2\tanh\left(\frac{x}{2}\right)\sqrt{a}+\sqrt{a+b}\right)}{2b^2\sqrt{a+b}}-\frac{1}{2b\left(\tanh\left(\frac{x}{2}\right)+1\right)^2}$$
$$+\frac{1}{2b\left(\tanh\left(\frac{x}{2}\right)+1\right)}-\frac{a\ln\left(\tanh\left(\frac{x}{2}\right)+1\right)}{b^2}+\frac{\ln\left(\tanh\left(\frac{x}{2}\right)+1\right)}{2b}+\frac{1}{2b\left(\tanh\left(\frac{x}{2}\right)-1\right)^2}+\frac{1}{2b\left(\tanh\left(\frac{x}{2}\right)-1\right)}+\frac{a\ln\left(\tanh\left(\frac{x}{2}\right)-1\right)}{b^2}$$
$$-\frac{\ln\left(\tanh\left(\frac{x}{2}\right)-1\right)}{2b}$$

Problem 11: Result more than twice size of optimal antiderivative.

$$\int \frac{\operatorname{sech}(x)^2}{a + b\cosh(x)^2}\, dx$$

Optimal(type 3, 30 leaves, 3 steps):

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

Result(type 3, 101 leaves):

$$\frac{b\ln\left(-\sqrt{a+b}\tanh\left(\frac{x}{2}\right)^2 + 2\tanh\left(\frac{x}{2}\right)\sqrt{a} - \sqrt{a+b}\right)}{2a^{3/2}\sqrt{a+b}} - \frac{b\ln\left(\sqrt{a+b}\tanh\left(\frac{x}{2}\right)^2 + 2\tanh\left(\frac{x}{2}\right)\sqrt{a} + \sqrt{a+b}\right)}{2a^{3/2}\sqrt{a+b}} + \frac{2\tanh\left(\frac{x}{2}\right)}{a\left(\tanh\left(\frac{x}{2}\right)^2 + 1\right)}$$

Problem 12: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{\cosh(x)^2 + 1}\, dx$$

Optimal(type 3, 13 leaves, 2 steps):

$$\frac{\operatorname{arctanh}\left(\frac{\tanh(x)\sqrt{2}}{2}\right)\sqrt{2}}{2}$$

Result(type 3, 85 leaves):

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

Problem 13: Result more than twice size of optimal antiderivative.

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

Optimal(type 3, 9 leaves, 3 steps):

$$\coth(x) - \frac{\coth(x)^3}{3}$$

Result(type 3, 31 leaves):

$$-\frac{\tanh\left(\frac{x}{2}\right)^3}{24}+\frac{3\tanh\left(\frac{x}{2}\right)}{8}-\frac{1}{24\tanh\left(\frac{x}{2}\right)^3}+\frac{3}{8\tanh\left(\frac{x}{2}\right)}$$

Problem 14: Result more than twice size of optimal antiderivative.

$$\int\sqrt{a+b\cosh(x)^2}\,dx$$

Optimal(type 4, 47 leaves, 2 steps):

$$\frac{\sqrt{-\sinh(x)^2}\,\mathrm{EllipticE}\left(\cosh(x),\sqrt{-\frac{b}{a}}\right)\sqrt{a+b\cosh(x)^2}}{\sinh(x)\sqrt{1+\frac{b\cosh(x)^2}{a}}}$$

Result(type 4, 113 leaves):

$$\frac{\sqrt{\frac{a+b\cosh(x)^2}{a}}\sqrt{-\sinh(x)^2}\left(a\,\mathrm{EllipticF}\left(\cosh(x)\sqrt{-\frac{b}{a}},\sqrt{-\frac{a}{b}}\right)+b\,\mathrm{EllipticF}\left(\cosh(x)\sqrt{-\frac{b}{a}},\sqrt{-\frac{a}{b}}\right)-b\,\mathrm{EllipticE}\left(\cosh(x)\sqrt{-\frac{b}{a}},\sqrt{-\frac{a}{b}}\right)\right)}{\sqrt{-\frac{b}{a}}\sinh(x)\sqrt{a+b\cosh(x)^2}}$$

Problem 18: Result is not expressed in closed-form.

$$\int\frac{1}{a+b\cosh(x)^3}\,dx$$

Optimal(type 3, 182 leaves, 8 steps):

$$\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a^{1/3}-b^{1/3}}\tanh\left(\frac{x}{2}\right)}{\sqrt{a^{1/3}+b^{1/3}}}\right)}{3a^{2/3}\sqrt{a^{1/3}-b^{1/3}}\sqrt{a^{1/3}+b^{1/3}}}+\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a^{1/3}+(-1)^{1/3}b^{1/3}}\tanh\left(\frac{x}{2}\right)}{\sqrt{a^{1/3}-(-1)^{1/3}b^{1/3}}}\right)}{3a^{2/3}\sqrt{a^{1/3}-(-1)^{1/3}b^{1/3}}\sqrt{a^{1/3}+(-1)^{1/3}b^{1/3}}}$$
$$+\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a^{1/3}-(-1)^{2/3}b^{1/3}}\tanh\left(\frac{x}{2}\right)}{\sqrt{a^{1/3}+(-1)^{2/3}b^{1/3}}}\right)}{3a^{2/3}\sqrt{a^{1/3}-(-1)^{2/3}b^{1/3}}\sqrt{a^{1/3}+(-1)^{2/3}b^{1/3}}}$$

Result(type 7, 99 leaves):

$$\frac{\left(\sum_{\_R=RootOf\left((a-b)\,\_Z^6+(-3a-3b)\,\_Z^4+(3a-3b)\,\_Z^2-a-b\right)}\frac{\left(-\_R^4+2\,\_R^2-1\right)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right)}{\_R^5 a-\_R^5 b-2\,\_R^3 a-2\,\_R^3 b+\_R a-\_R b}\right)}{3}$$

Problem 19: Result more than twice size of optimal antiderivative.

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

Optimal(type 3, 71 leaves, 7 steps):

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

Result(type 3, 211 leaves):

$$\frac{3^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\,3^{3/4}\tanh\left(\frac{x}{2}\right)}{3}-1\right)}{6}+\frac{3^{1/4}\sqrt{2}\ln\left(\frac{\tanh\left(\frac{x}{2}\right)^2+3^{1/4}\tanh\left(\frac{x}{2}\right)\sqrt{2}+\sqrt{3}}{\tanh\left(\frac{x}{2}\right)^2-3^{1/4}\tanh\left(\frac{x}{2}\right)\sqrt{2}+\sqrt{3}}\right)}{12}+\frac{3^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\,3^{3/4}\tanh\left(\frac{x}{2}\right)}{3}+1\right)}{6}$$
$$-\frac{3^{3/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\,3^{3/4}\tanh\left(\frac{x}{2}\right)}{3}-1\right)}{18}-\frac{3^{3/4}\sqrt{2}\ln\left(\frac{\tanh\left(\frac{x}{2}\right)^2-3^{1/4}\tanh\left(\frac{x}{2}\right)\sqrt{2}+\sqrt{3}}{\tanh\left(\frac{x}{2}\right)^2+3^{1/4}\tanh\left(\frac{x}{2}\right)\sqrt{2}+\sqrt{3}}\right)}{36}$$
$$-\frac{3^{3/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\,3^{3/4}\tanh\left(\frac{x}{2}\right)}{3}+1\right)}{18}+\frac{1}{3\tanh\left(\frac{x}{2}\right)}$$

Problem 20: Result is not expressed in closed-form.

$$\int \frac{1}{a+b\cosh(x)^5}\,dx$$

Optimal(type 3, 312 leaves, 12 steps):

$$\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a^{1/5}-b^{1/5}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{a^{1/5}+b^{1/5}}}\right)}{5\,a^{4/5}\sqrt{a^{1/5}-b^{1/5}}\,\sqrt{a^{1/5}+b^{1/5}}}+\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a^{1/5}+(-1)^{1/5}b^{1/5}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{a^{1/5}-(-1)^{1/5}b^{1/5}}}\right)}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{1/5}b^{1/5}}\,\sqrt{a^{1/5}+(-1)^{1/5}b^{1/5}}}$$

$$+\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a^{1/5}-(-1)^{2/5}b^{1/5}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{a^{1/5}+(-1)^{2/5}b^{1/5}}}\right)}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{2/5}b^{1/5}}\,\sqrt{a^{1/5}+(-1)^{2/5}b^{1/5}}}+\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a^{1/5}+(-1)^{3/5}b^{1/5}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{a^{1/5}-(-1)^{3/5}b^{1/5}}}\right)}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{3/5}b^{1/5}}\,\sqrt{a^{1/5}+(-1)^{3/5}b^{1/5}}}$$

$$+\frac{2\,\mathrm{arctanh}\left(\frac{\sqrt{a^{1/5}-(-1)^{4/5}b^{1/5}}\,\tanh\left(\frac{x}{2}\right)}{\sqrt{a^{1/5}+(-1)^{4/5}b^{1/5}}}\right)}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{4/5}b^{1/5}}\,\sqrt{a^{1/5}+(-1)^{4/5}b^{1/5}}}$$

Result(type 7, 155 leaves):

$$\frac{1}{5}\left(\sum_{\_R=RootOf\left((a-b)\_Z^{10}+(-5a-5b)\_Z^{8}+(10a-10b)\_Z^{6}+(-10a-10b)\_Z^{4}+(5a-5b)\_Z^{2}-a-b\right)}\frac{\left(-\_R^{8}+4\_R^{6}-6\_R^{4}+4\_R^{2}-1\right)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right)}{\_R^{9}a-\_R^{9}b-4\_R^{7}a-4\_R^{7}b+6\_R^{5}a-6\_R^{5}b-4\_R^{3}a-4\_R^{3}b+\_Ra-\_Rb}\right)$$

Problem 21: Result is not expressed in closed-form.

$$\int\frac{1}{a+b\cosh(x)^{6}}\,dx$$

Optimal(type 3, 109 leaves, 7 steps):

$$\frac{\mathrm{arctanh}\left(\frac{a^{1/6}\tanh(x)}{\sqrt{a^{1/3}+b^{1/3}}}\right)}{3\,a^{5/6}\sqrt{a^{1/3}+b^{1/3}}}+\frac{\mathrm{arctanh}\left(\frac{a^{1/6}\tanh(x)}{\sqrt{a^{1/3}-(-1)^{1/3}b^{1/3}}}\right)}{3\,a^{5/6}\sqrt{a^{1/3}-(-1)^{1/3}b^{1/3}}}+\frac{\mathrm{arctanh}\left(\frac{a^{1/6}\tanh(x)}{\sqrt{a^{1/3}+(-1)^{2/3}b^{1/3}}}\right)}{3\,a^{5/6}\sqrt{a^{1/3}+(-1)^{2/3}b^{1/3}}}$$

Result(type 7, 176 leaves):

$$\frac{1}{6}\Bigg($$

$$\sum_{\_R=RootOf((a+b)\_Z^{12}+(-6a+6b)\_Z^{10}+(15a+15b)\_Z^{8}+(-20a+20b)\_Z^{6}+(15a+15b)\_Z^{4}+(-6a+6b)\_Z^{2}+a+b)} \frac{(-\_R^{10}+5\_R^{8}-10\_R^{6}+10\_R^{4}-5\_R^{2}+1)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right)}{\_R^{11}a+\_R^{11}b-5\_R^{9}a+5\_R^{9}b+10\_R^{7}a+10\_R^{7}b-10\_R^{5}a+10\_R^{5}b+5\_R^{3}a+5\_R^{3}b-\_Ra+\_Rb}\Bigg)$$

Problem 22: Result is not expressed in closed-form.

$$\int \frac{1}{a+b\cosh(x)^8}\,dx$$

Optimal(type 3, 169 leaves, 9 steps):

$$-\frac{\operatorname{arctanh}\left(\frac{(-a)^{1/8}\tanh(x)}{\sqrt{(-a)^{1/4}-b^{1/4}}}\right)}{4(-a)^{7/8}\sqrt{(-a)^{1/4}-b^{1/4}}}-\frac{\operatorname{arctanh}\left(\frac{(-a)^{1/8}\tanh(x)}{\sqrt{(-a)^{1/4}-Ib^{1/4}}}\right)}{4(-a)^{7/8}\sqrt{(-a)^{1/4}-Ib^{1/4}}}-\frac{\operatorname{arctanh}\left(\frac{(-a)^{1/8}\tanh(x)}{\sqrt{(-a)^{1/4}+Ib^{1/4}}}\right)}{4(-a)^{7/8}\sqrt{(-a)^{1/4}+Ib^{1/4}}}-\frac{\operatorname{arctanh}\left(\frac{(-a)^{1/8}\tanh(x)}{\sqrt{(-a)^{1/4}+b^{1/4}}}\right)}{4(-a)^{7/8}\sqrt{(-a)^{1/4}+b^{1/4}}}$$

Result(type 7, 232 leaves):

$$\frac{1}{8}\Bigg(\sum_{\_R=RootOf((a+b)\_Z^{16}+(-8a+8b)\_Z^{14}+(28a+28b)\_Z^{12}+(-56a+56b)\_Z^{10}+(70a+70b)\_Z^{8}+(-56a+56b)\_Z^{6}+(28a+28b)\_Z^{4}+(-8a+8b)\_Z^{2}+a+b)}\Big((-\_R^{14}+7\_R^{12}-21\_R^{10}+35\_R^{8}-35\_R^{6}+21\_R^{4}-7\_R^{2}+1)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right)\Big)\Big/\big(\_R^{15}a+\_R^{15}b-7\_R^{13}a+7\_R^{13}b+21\_R^{11}a+21\_R^{11}b-35\_R^{9}a+35\_R^{9}b+35\_R^{7}a+35\_R^{7}b-21\_R^{5}a+21\_R^{5}b+7\_R^{3}a+7\_R^{3}b-\_Ra+\_Rb\big)\Bigg)$$

Problem 23: Result is not expressed in closed-form.

$$\int \frac{1}{1+\cosh(x)^5}\,dx$$

Optimal(type 3, 160 leaves, 11 steps):

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

Result(type 7, 61 leaves):

$$\frac{\tanh\left(\frac{x}{2}\right)}{5}+\frac{\left(\sum_{\_R=RootOf(5\_Z^8+10\_Z^4+1)}\frac{(-5\_R^6+5\_R^4-5\_R^2+1)\ln\left(\tanh\left(\frac{x}{2}\right)-\_R\right)}{\_R^7+\_R^3}\right)}{50}$$

Problem 25: Result is not expressed in closed-form.

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

Optimal(type 3, 112 leaves, 11 steps):

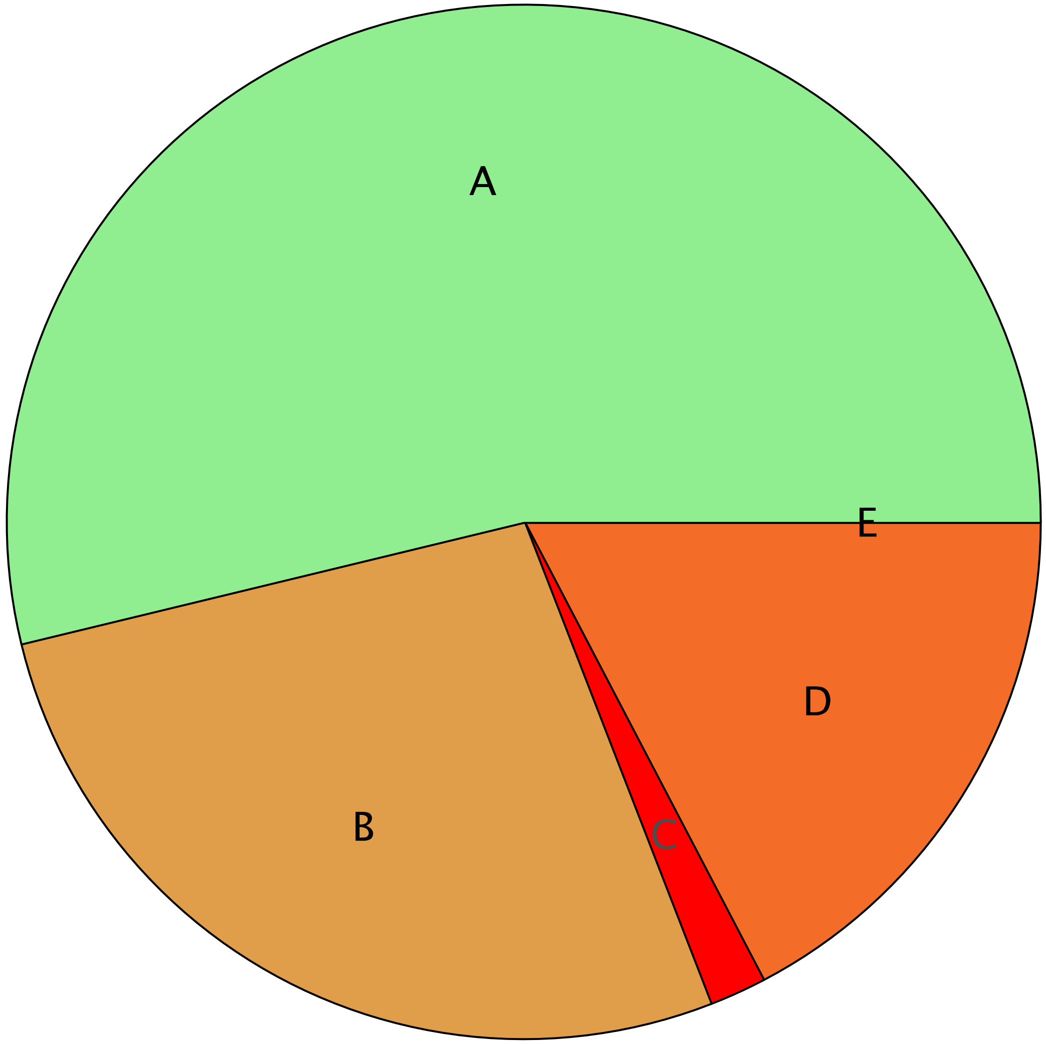
$$\frac{\ln(\cosh(x))}{a}+\frac{b^{2/3}\ln\left(a^{1/3}+b^{1/3}\cosh(x)\right)}{3a^{5/3}}-\frac{b^{2/3}\ln\left(a^{2/3}-a^{1/3}b^{1/3}\cosh(x)+b^{2/3}\cosh(x)^2\right)}{6a^{5/3}}-\frac{\ln\left(a+b\cosh(x)^3\right)}{3a}+\frac{\operatorname{sech}(x)^2}{2a}$$
$$-\frac{b^{2/3}\arctan\left(\frac{(a^{1/3}-2b^{1/3}\cosh(x))\sqrt{3}}{3a^{1/3}}\right)\sqrt{3}}{3a^{5/3}}$$

Result(type 7, 149 leaves):

$$-\frac{\sum_{\_R=RootOf((a-b)\_Z^3+(-3a-3b)\_Z^2+(3a-3b)\_Z-a-b)}\frac{(\_R^2a-\_R^2b-2\_Ra-4\_Rb+a+b)\ln\left(\tanh\left(\frac{x}{2}\right)^2-\_R\right)}{\_R^2a-\_R^2b-2\_Ra-2\_Rb+a-b}}{3a}+\frac{2}{a\left(\tanh\left(\frac{x}{2}\right)^2+1\right)^2}$$
$$+\frac{\ln\left(\tanh\left(\frac{x}{2}\right)^2+1\right)}{a}-\frac{2}{a\left(\tanh\left(\frac{x}{2}\right)^2+1\right)}$$

Summary of Integration Test Results

225 integration problems



A - 121 optimal antiderivatives
B - 61 more than twice size of optimal antiderivatives
C - 4 unnecessarily complex antiderivatives
D - 39 unable to integrate problems
E - 0 integration timeouts