Maple 2018.2 Integration Test Results
on the problems in "1 Algebraic functions/1.1 Binomial products/1.1.4 Improper"

Test results for the 123 problems in "1.1.4.2 (c x)^m (a x^j+b x^n)^p.txt"

Problem 27: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{x^4}{\sqrt{b x^4 + a x}}\, dx$$

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

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

Result(type 4, 996 leaves):

$$\frac{x\sqrt{b x^4 + a x}}{3 b} - \Bigg(a \left(\frac{(-a b^2)^{1/3}}{2 b} - \frac{I\sqrt{3}\,(-a b^2)^{1/3}}{2 b} \right) \sqrt{\frac{\left(-\frac{3 (-a b^2)^{1/3}}{2 b} + \frac{I\sqrt{3}\,(-a b^2)^{1/3}}{2 b} \right) x}{\left(-\frac{(-a b^2)^{1/3}}{2 b} + \frac{I\sqrt{3}\,(-a b^2)^{1/3}}{2 b} \right) \left(x - \frac{(-a b^2)^{1/3}}{b} \right)}} \Bigg(x$$

$$- \frac{(-a b^2)^{1/3}}{b} \Bigg)$$

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

$$\sqrt{\frac{(-a b^2)^{1/3} \left(x + \frac{(-a b^2)^{1/3}}{2 b} - \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right)}{b \left(-\frac{(-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right) \left(x - \frac{(-a b^2)^{1/3}}{b}\right)}} \Bigg(1 / b \Big((-a b^2)^{1/}$$

$$3 \operatorname{EllipticF}\left(\sqrt{\frac{\left(-\frac{3 (-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right) x}{\left(-\frac{(-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right) \left(x - \frac{(-a b^2)^{1/3}}{b}\right)}},\right.$$

$$\left.\sqrt{\frac{\left(\frac{3 (-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right) \left(\frac{(-a b^2)^{1/3}}{2 b} - \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right)}{\left(\frac{(-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right) \left(\frac{3 (-a b^2)^{1/3}}{2 b} - \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right)}}\right)\Big) - \frac{1}{b} \Big((-a b^2)^{1/}$$

$$3 \operatorname{EllipticPi}\left(\sqrt{\frac{\left(-\frac{3 (-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right) x}{\left(-\frac{(-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right) \left(x - \frac{(-a b^2)^{1/3}}{b}\right)}}, \frac{-\frac{(-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}}{-\frac{3 (-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}},\right.$$

$$\left.\sqrt{\frac{\left(\frac{3 (-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right) \left(\frac{(-a b^2)^{1/3}}{2 b} - \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right)}{\left(\frac{(-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right) \left(\frac{3 (-a b^2)^{1/3}}{2 b} - \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right)}}\right)\Big)\Bigg)\Bigg) \Bigg/ \left(\left(-\frac{3 (-a b^2)^{1/3}}{2 b} + \frac{I \sqrt{3}\, (-a b^2)^{1/3}}{2 b}\right) (\right.$$

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

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

$$\int \frac{x^5}{\sqrt{b x^4 + a x}}\, dx$$

Optimal(type 4, 521 leaves, 6 steps):

$$
-\frac{5 a x \left(b x^{3}+a\right) \left(1+\sqrt{3}\right)}{8 b^{5/3} \left(a^{1/3}+b^{1/3} x \left(1+\sqrt{3}\right)\right) \sqrt{b x^{4}+a x}}+\frac{x^{2} \sqrt{b x^{4}+a x}}{4 b}+\left(5\, 3^{1/4} a^{4/3} x \left(a^{1/3}+b^{1/3} x\right) \sqrt{\frac{\left(a^{1/3}+b^{1/3} x \left(1-\sqrt{3}\right)\right)^{2}}{\left(a^{1/3}+b^{1/3} x \left(1+\sqrt{3}\right)\right)^{2}}}\, \left(a^{1/3}\right.\right.
$$

$$
\left.\left.+b^{1/3} x \left(1+\sqrt{3}\right)\right) \mathrm{EllipticE}\left(\sqrt{1-\frac{\left(a^{1/3}+b^{1/3} x \left(1-\sqrt{3}\right)\right)^{2}}{\left(a^{1/3}+b^{1/3} x \left(1+\sqrt{3}\right)\right)^{2}}}, \frac{\sqrt{6}}{4}+\frac{\sqrt{2}}{4}\right) \sqrt{\frac{a^{2/3}-a^{1/3} b^{1/3} x+b^{2/3} x^{2}}{\left(a^{1/3}+b^{1/3} x \left(1+\sqrt{3}\right)\right)^{2}}}\right) \Bigg/ \left(8 \left(a^{1/3}+b^{1/3} x \left(1\right.\right.\right.
$$

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

$$
\left.\left.+b^{1/3} x \left(1+\sqrt{3}\right)\right) \mathrm{EllipticF}\left(\sqrt{1-\frac{\left(a^{1/3}+b^{1/3} x \left(1-\sqrt{3}\right)\right)^{2}}{\left(a^{1/3}+b^{1/3} x \left(1+\sqrt{3}\right)\right)^{2}}}, \frac{\sqrt{6}}{4}+\frac{\sqrt{2}}{4}\right) \left(1-\sqrt{3}\right) \sqrt{\frac{a^{2/3}-a^{1/3} b^{1/3} x+b^{2/3} x^{2}}{\left(a^{1/3}+b^{1/3} x \left(1+\sqrt{3}\right)\right)^{2}}}\, 3^{3/4}\right) \Bigg/
$$

$$
\left(48 \left(a^{1/3}+b^{1/3} x \left(1-\sqrt{3}\right)\right) b^{5/3} \sqrt{b x^{4}+a x}\, \sqrt{\frac{b^{1/3} x \left(a^{1/3}+b^{1/3} x\right)}{\left(a^{1/3}+b^{1/3} x \left(1+\sqrt{3}\right)\right)^{2}}}\right)
$$

Result(type 4, 1078 leaves):

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

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

$$
\left.-\frac{\left(-a b^{2}\right)^{1/3}}{b}\right)
$$

$$
\begin{aligned}
&2\sqrt{\frac{(-a\,b^2)^{1/3}\left(x+\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}{b\left(-\frac{(-a\,b^2)^{1/3}}{2\,b}-\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(x-\frac{(-a\,b^2)^{1/3}}{b}\right)}}\;\sqrt{\frac{(-a\,b^2)^{1/3}\left(x+\frac{(-a\,b^2)^{1/3}}{2\,b}-\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}{b\left(-\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(x-\frac{(-a\,b^2)^{1/3}}{b}\right)}}\\
&\Bigg(1\Big/\left(\left(-\frac{3\,(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)(-a\,b^2)^{1/3}\right)\Bigg(\Bigg(\frac{\left(-\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)(-a\,b^2)^{1/3}}{b}\\
&+\frac{(-a\,b^2)^{2/3}}{b^2}\Bigg)\,b\,\mathrm{EllipticF}\Bigg(\sqrt{\frac{\left(-\frac{3\,(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)x}{\left(-\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(x-\frac{(-a\,b^2)^{1/3}}{b}\right)}},\\
&\sqrt{\frac{\left(\frac{3\,(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(\frac{(-a\,b^2)^{1/3}}{2\,b}-\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}{\left(\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(\frac{3\,(-a\,b^2)^{1/3}}{2\,b}-\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}}\Bigg)\Bigg)+\frac{1}{(-a\,b^2)^{1/3}}\Bigg(\Bigg(\frac{(-a\,b^2)^{1/3}}{2\,b}\\
&+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\Bigg)\mathrm{EllipticE}\Bigg(\sqrt{\frac{\left(-\frac{3\,(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)x}{\left(-\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(x-\frac{(-a\,b^2)^{1/3}}{b}\right)}},\\
&\sqrt{\frac{\left(\frac{3\,(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(\frac{(-a\,b^2)^{1/3}}{2\,b}-\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}{\left(\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(\frac{3\,(-a\,b^2)^{1/3}}{2\,b}-\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}}\Bigg)\,b\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/\\
&\left(8\,b\sqrt{b\,x\left(x-\frac{(-a\,b^2)^{1/3}}{b}\right)\left(x+\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(x+\frac{(-a\,b^2)^{1/3}}{2\,b}-\frac{\mathrm{I}\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}\right)
\end{aligned}
$$

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

$$\int \frac{x^2}{\sqrt{b x^4 + a x}}\, dx$$

Optimal(type 4, 500 leaves, 5 steps):

$$\frac{x\left(b x^3+a\right)\left(1+\sqrt{3}\right)}{b^{2/3}\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)\sqrt{b x^4+a x}}-\left(3^{1/4} a^{1/3} x\left(a^{1/3}+b^{1/3} x\right)\sqrt{\frac{\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right) \mathrm{EllipticE}\left(\sqrt{1-\frac{\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}, \frac{\sqrt{6}}{4}+\frac{\sqrt{2}}{4}\right)\sqrt{\frac{a^{2/3}-a^{1/3} b^{1/3} x+b^{2/3} x^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\right) \Big/ \left(\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right) b^{2/3}\sqrt{b x^4+a x}\sqrt{\frac{b^{1/3} x\left(a^{1/3}+b^{1/3} x\right)}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\right)-\left(a^{1/3} x\left(a^{1/3}+b^{1/3} x\right)\sqrt{\frac{\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right) \mathrm{EllipticF}\left(\sqrt{1-\frac{\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}, \frac{\sqrt{6}}{4}+\frac{\sqrt{2}}{4}\right)\left(1-\sqrt{3}\right)\sqrt{\frac{a^{2/3}-a^{1/3} b^{1/3} x+b^{2/3} x^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\, 3^{3/4}\right) \Big/ \left(6\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right) b^{2/3}\sqrt{b x^4+a x}\sqrt{\frac{b^{1/3} x\left(a^{1/3}+b^{1/3} x\right)}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\right)$$

Result(type 4, 1053 leaves):

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

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

$$- \frac{(-a\, b^{2})^{1/3}}{b} \Bigg)$$

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

$$\Bigg(1 \Big/ \left(\left(- \frac{3\, (-a\, b^{2})^{1/3}}{2\, b} + \frac{\mathrm{I} \sqrt{3}\, (-a\, b^{2})^{1/3}}{2\, b}\right) (-a\, b^{2})^{1/3} \right) \Bigg(\Bigg(\frac{\left(- \frac{(-a\, b^{2})^{1/3}}{2\, b} + \frac{\mathrm{I} \sqrt{3}\, (-a\, b^{2})^{1/3}}{2\, b}\right) (-a\, b^{2})^{1/3}}{b}$$

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

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

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

$$\sqrt{\frac{\left(\frac{3\,(-a\,b^2)^{1/3}}{2\,b}+\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(\frac{(-a\,b^2)^{1/3}}{2\,b}-\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}{\left(\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(\frac{3\,(-a\,b^2)^{1/3}}{2\,b}-\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}}\;b\left.\Bigg)\Bigg)\Bigg)\right/$$

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

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

$$\int \frac{1}{x\sqrt{b\,x^4+a\,x}}\,\mathrm{d}x$$

Optimal(type 4, 523 leaves, 6 steps):

$$\frac{2\,b^{1/3}\,x\,(b\,x^3+a)\,(1+\sqrt{3})}{a\,\left(a^{1/3}+b^{1/3}\,x\,(1+\sqrt{3})\right)\sqrt{b\,x^4+a\,x}}-\frac{2\sqrt{b\,x^4+a\,x}}{a\,x}-\Bigg(2\,3^{1/4}\,b^{1/3}\,x\,(a^{1/3}+b^{1/3}\,x)\sqrt{\frac{\left(a^{1/3}+b^{1/3}\,x\,(1-\sqrt{3})\right)^2}{\left(a^{1/3}+b^{1/3}\,x\,(1+\sqrt{3})\right)^2}}\,\Big(a^{1/3}+b^{1/3}\,x\,(1$$

$$+\sqrt{3})\Big)\,\mathrm{EllipticE}\left(\sqrt{1-\frac{\left(a^{1/3}+b^{1/3}\,x\,(1-\sqrt{3})\right)^2}{\left(a^{1/3}+b^{1/3}\,x\,(1+\sqrt{3})\right)^2}},\frac{\sqrt{6}}{4}+\frac{\sqrt{2}}{4}\right)\sqrt{\frac{a^{2/3}-a^{1/3}\,b^{1/3}\,x+b^{2/3}\,x^2}{\left(a^{1/3}+b^{1/3}\,x\,(1+\sqrt{3})\right)^2}}\Bigg)\Bigg/\Bigg(\Big(a^{1/3}+b^{1/3}\,x\,(1$$

$$-\sqrt{3})\Big)\,a^{2/3}\sqrt{b\,x^4+a\,x}\,\sqrt{\frac{b^{1/3}\,x\,(a^{1/3}+b^{1/3}\,x)}{\left(a^{1/3}+b^{1/3}\,x\,(1+\sqrt{3})\right)^2}}\Bigg)-\Bigg(b^{1/3}\,x\,(a^{1/3}+b^{1/3}\,x)\sqrt{\frac{\left(a^{1/3}+b^{1/3}\,x\,(1-\sqrt{3})\right)^2}{\left(a^{1/3}+b^{1/3}\,x\,(1+\sqrt{3})\right)^2}}\,\Big(a^{1/3}+b^{1/3}\,x\,(1$$

$$+\sqrt{3})\Big)\,\mathrm{EllipticF}\left(\sqrt{1-\frac{\left(a^{1/3}+b^{1/3}\,x\,(1-\sqrt{3})\right)^2}{\left(a^{1/3}+b^{1/3}\,x\,(1+\sqrt{3})\right)^2}},\frac{\sqrt{6}}{4}+\frac{\sqrt{2}}{4}\right)(1-\sqrt{3})\sqrt{\frac{a^{2/3}-a^{1/3}\,b^{1/3}\,x+b^{2/3}\,x^2}{\left(a^{1/3}+b^{1/3}\,x\,(1+\sqrt{3})\right)^2}}\;3^{3/4}\Bigg)\Bigg/\Bigg(3\,\Big(a^{1/3}$$

$$+b^{1/3}\,x\,(1-\sqrt{3})\Big)\,a^{2/3}\sqrt{b\,x^4+a\,x}\,\sqrt{\frac{b^{1/3}\,x\,(a^{1/3}+b^{1/3}\,x)}{\left(a^{1/3}+b^{1/3}\,x\,(1+\sqrt{3})\right)^2}}\Bigg)$$

Result(type 4, 1082 leaves):

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

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

$$-\frac{(-a\,b^2)^{1/3}}{b}\Bigg)$$

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

$$\Bigg(1\Bigg/\left(\left(-\frac{3\,(-a\,b^2)^{1/3}}{2\,b}+\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)(-a\,b^2)^{1/3}\right)\Bigg(\Bigg(\frac{\left(-\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)(-a\,b^2)^{1/3}}{b}$$

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

$$\sqrt{\frac{\left(\frac{3\,(-a\,b^2)^{1/3}}{2\,b}+\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(\frac{(-a\,b^2)^{1/3}}{2\,b}-\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}{\left(\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(\frac{3\,(-a\,b^2)^{1/3}}{2\,b}-\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}}\Bigg)\Bigg)+\frac{1}{(-a\,b^2)^{1/3}}\Bigg(\Bigg(\frac{(-a\,b^2)^{1/3}}{2\,b}$$

$$+\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\Bigg)\,\mathrm{EllipticE}\left(\sqrt{\frac{\left(-\frac{3\,(-a\,b^2)^{1/3}}{2\,b}+\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)x}{\left(-\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(x-\frac{(-a\,b^2)^{1/3}}{b}\right)}},\right.$$

$$\left.\sqrt{\frac{\left(\frac{3\,(-a\,b^2)^{1/3}}{2\,b}+\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(\frac{(-a\,b^2)^{1/3}}{2\,b}-\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}{\left(\frac{(-a\,b^2)^{1/3}}{2\,b}+\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)\left(\frac{3\,(-a\,b^2)^{1/3}}{2\,b}-\frac{I\sqrt{3}\,(-a\,b^2)^{1/3}}{2\,b}\right)}}\right)b\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

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

Problem 31: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

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

Optimal(type 2, 19 leaves, 1 step):

$$\frac{4\sqrt{x}}{b\sqrt{b\sqrt{x}+a\,x}}$$

Result(type 3, 403 leaves):

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

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

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

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

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

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

$$\int \frac{\sqrt{x}}{\sqrt{b\sqrt{x}+a x}}\, dx$$

Optimal(type 3, 63 leaves, 5 steps):

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

Result(type 3, 163 leaves):

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

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

$$\int \frac{1}{\sqrt{x}\,\sqrt{b\sqrt{x}+a x}}\, dx$$

Optimal(type 3, 24 leaves, 3 steps):

$$\frac{4 \operatorname{arctanh}\left(\frac{\sqrt{a}\,\sqrt{x}}{\sqrt{b\sqrt{x}+a x}}\right)}{\sqrt{a}}$$

Result(type 3, 135 leaves):

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

Problem 36: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{1}{x^{5/2}\sqrt{b\sqrt{x}+a x}}\, dx$$

Optimal(type 2, 84 leaves, 4 steps):

$$-\frac{4\sqrt{b\sqrt{x}+a x}}{7 b x^{2}}+\frac{24 a\sqrt{b\sqrt{x}+a x}}{35 b^{2} x^{3/2}}-\frac{32 a^{2}\sqrt{b\sqrt{x}+a x}}{35 b^{3} x}+\frac{64 a^{3}\sqrt{b\sqrt{x}+a x}}{35 b^{4}\sqrt{x}}$$

Result(type 3, 231 leaves):

$$-\frac{1}{35\sqrt{\sqrt{x}\left(b+a\sqrt{x}\right)}\, b^{5} x^{9/2}}\left(\sqrt{b\sqrt{x}+a x}\left(35 a^{7/2}\ln\left(\frac{2\sqrt{b\sqrt{x}+a x}\,\sqrt{a}+2 a\sqrt{x}+b}{2\sqrt{a}}\right) b x^{9/2}\right.\right.$$
$$-35 a^{7/2}\ln\left(\frac{2\sqrt{\sqrt{x}\left(b+a\sqrt{x}\right)}\,\sqrt{a}+2 a\sqrt{x}+b}{2\sqrt{a}}\right) b x^{9/2}+70 a^{4}\sqrt{\sqrt{x}\left(b+a\sqrt{x}\right)}\, x^{9/2}-140 a^{3}\left(b\sqrt{x}+a x\right)^{3/2} x^{7/2}$$
$$\left.\left.+70 a^{4}\sqrt{b\sqrt{x}+a x}\, x^{9/2}-44\left(b\sqrt{x}+a x\right)^{3/2} x^{5/2} a b^{2}+76 a^{2}\left(b\sqrt{x}+a x\right)^{3/2} b x^{3}+20\left(b\sqrt{x}+a x\right)^{3/2} x^{2} b^{3}\right)\right)$$

Problem 37: Result more than twice size of optimal antiderivative.

$$\int\frac{x^{5/2}}{\left(b\sqrt{x}+a x\right)^{3/2}}\, dx$$

Optimal(type 3, 125 leaves, 8 steps):

$$\frac{315 b^{4}\operatorname{arctanh}\left(\frac{\sqrt{a}\sqrt{x}}{\sqrt{b\sqrt{x}+a x}}\right)}{32 a^{11/2}}-\frac{4 x^{5/2}}{a\sqrt{b\sqrt{x}+a x}}-\frac{315 b^{3}\sqrt{b\sqrt{x}+a x}}{32 a^{5}}-\frac{21 b x\sqrt{b\sqrt{x}+a x}}{4 a^{3}}+\frac{9 x^{3/2}\sqrt{b\sqrt{x}+a x}}{2 a^{2}}+\frac{105 b^{2}\sqrt{x}\sqrt{b\sqrt{x}+a x}}{16 a^{4}}$$

Result(type 3, 530 leaves):

$$\frac{1}{64 a^{21/2}\sqrt{\sqrt{x}\left(b+a\sqrt{x}\right)}\left(b+a\sqrt{x}\right)^{2}}\left(\sqrt{b\sqrt{x}+a x}\left(32 a^{19/2}\left(b\sqrt{x}+a x\right)^{3/2} x^{3/2}-48 a^{17/2}\left(b\sqrt{x}+a x\right)^{3/2} x b\right.\right.$$
$$+276 a^{17/2}\sqrt{b\sqrt{x}+a x}\, x^{3/2} b^{2}-768 a^{15/2}\sqrt{\sqrt{x}\left(b+a\sqrt{x}\right)}\, x b^{3}-192 a^{15/2}\left(b\sqrt{x}+a x\right)^{3/2}\sqrt{x}\, b^{2}+690 a^{15/2}\sqrt{b\sqrt{x}+a x}\, x b^{3}$$
$$+256 b^{3} a^{13/2}\left(\sqrt{x}\left(b+a\sqrt{x}\right)\right)^{3/2}-1536 a^{13/2}\sqrt{\sqrt{x}\left(b+a\sqrt{x}\right)}\sqrt{x}\, b^{4}-112 a^{13/2}\left(b\sqrt{x}+a x\right)^{3/2} b^{3}+552 a^{13/2}\sqrt{b\sqrt{x}+a x}\sqrt{x}\, b^{4}$$
$$-768 a^{11/2}\sqrt{\sqrt{x}\left(b+a\sqrt{x}\right)}\, b^{5}+138 a^{11/2}\sqrt{b\sqrt{x}+a x}\, b^{5}-69\ln\left(\frac{2\sqrt{b\sqrt{x}+a x}\,\sqrt{a}+2 a\sqrt{x}+b}{2\sqrt{a}}\right) x a^{7} b^{4}$$
$$+384\ln\left(\frac{2\sqrt{\sqrt{x}\left(b+a\sqrt{x}\right)}\,\sqrt{a}+2 a\sqrt{x}+b}{2\sqrt{a}}\right) x a^{7} b^{4}-138\ln\left(\frac{2\sqrt{b\sqrt{x}+a x}\,\sqrt{a}+2 a\sqrt{x}+b}{2\sqrt{a}}\right)\sqrt{x}\, a^{6} b^{5}$$

$$+ 768 \ln\left(\frac{2\sqrt{\sqrt{x}\,(b+a\sqrt{x})}\,\sqrt{a}+2a\sqrt{x}+b}{2\sqrt{a}}\right)\sqrt{x}\,a^6 b^5 - 69\ln\left(\frac{2\sqrt{b\sqrt{x}+a x}\,\sqrt{a}+2a\sqrt{x}+b}{2\sqrt{a}}\right)a^5 b^6$$

$$+ 384 \ln\left(\frac{2\sqrt{\sqrt{x}\,(b+a\sqrt{x})}\,\sqrt{a}+2a\sqrt{x}+b}{2\sqrt{a}}\right)a^5 b^6\Bigg)\Bigg)$$

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

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

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

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

Result(type 3, 239 leaves):

$$-\frac{1}{a^{3/2}\sqrt{\sqrt{x}\,(b+a\sqrt{x})}\;b\,(b+a\sqrt{x})^2}\Bigg(2\sqrt{b\sqrt{x}+a x}\,\Bigg(2a^{5/2}\sqrt{\sqrt{x}\,(b+a\sqrt{x})}\;x-2a^{3/2}\left(\sqrt{x}\,(b+a\sqrt{x})\right)^{3/2}$$

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

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

Problem 74: Unable to integrate problem.

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

Optimal(type 5, 50 leaves, 3 steps):

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

Result(type 8, 23 leaves):

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

Problem 79: Result more than twice size of optimal antiderivative.

$$\int \frac{x^{13/2}}{\sqrt{b x^5 + a x^2}}\, dx$$

Optimal(type 4, 272 leaves, 5 steps):

$$\frac{x^{5/2}\sqrt{b x^5+a x^2}}{5 b} - \frac{7 a\sqrt{b x^5+a x^2}}{20 b^2\sqrt{x}} + \left(7 a^{5/3} x^{3/2} \left(a^{1/3}+b^{1/3} x\right) \sqrt{\frac{\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}} \left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right) \mathrm{EllipticF}\left(\sqrt{1-\frac{\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}, \frac{\sqrt{6}}{4}+\frac{\sqrt{2}}{4}\right) \sqrt{\frac{a^{2/3}-a^{1/3} b^{1/3} x+b^{2/3} x^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\, 3^{3/4}\right) \Bigg/ \left(120 \left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right) b^2 \sqrt{b x^5+a x^2} \sqrt{\frac{b^{1/3} x\left(a^{1/3}+b^{1/3} x\right)}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\right)$$

Result(type ?, 2016 leaves): Display of huge result suppressed!

Problem 80: Result more than twice size of optimal antiderivative.

$$\int \frac{x^{5/2}}{\sqrt{b x^5 + a x^2}}\, dx$$

Optimal(type 4, 512 leaves, 5 steps):

$$\frac{x^{3/2}\left(b x^3+a\right)\left(1+\sqrt{3}\right)}{b^{2/3}\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)\sqrt{b x^5+a x^2}} - \left(3^{1/4} a^{1/3} x^{3/2}\left(a^{1/3}+b^{1/3} x\right) \sqrt{\frac{\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}} \left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right) \mathrm{EllipticE}\left(\sqrt{1-\frac{\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}, \frac{\sqrt{6}}{4}+\frac{\sqrt{2}}{4}\right) \sqrt{\frac{a^{2/3}-a^{1/3} b^{1/3} x+b^{2/3} x^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\right) \Bigg/ \left(\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right) b^{2/3} \sqrt{b x^5+a x^2} \sqrt{\frac{b^{1/3} x\left(a^{1/3}+b^{1/3} x\right)}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\right) - \left(a^{1/3} x^{3/2}\left(a^{1/3}+b^{1/3} x\right) \sqrt{\frac{\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}} \left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right) \mathrm{EllipticF}\left(\sqrt{1-\frac{\left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}, \frac{\sqrt{6}}{4}+\frac{\sqrt{2}}{4}\right) \left(1-\sqrt{3}\right) \sqrt{\frac{a^{2/3}-a^{1/3} b^{1/3} x+b^{2/3} x^2}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\, 3^{3/4}\right) \Bigg/ \left(6 \left(a^{1/3}+b^{1/3} x\left(1-\sqrt{3}\right)\right) b^{2/3} \sqrt{b x^5+a x^2} \sqrt{\frac{b^{1/3} x\left(a^{1/3}+b^{1/3} x\right)}{\left(a^{1/3}+b^{1/3} x\left(1+\sqrt{3}\right)\right)^2}}\right)$$

Result(type ?, 2373 leaves): Display of huge result suppressed!

Problem 81: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{\sqrt{x}\,\sqrt{b x^5 + a x^2}}\, dx$$

Optimal(type 4, 537 leaves, 6 steps):

$$\frac{2 b^{1/3} x^{3/2} (b x^3 + a) \left(1+\sqrt{3}\right)}{a \left(a^{1/3} + b^{1/3} x \left(1+\sqrt{3}\right)\right) \sqrt{b x^5 + a x^2}} - \frac{2 \sqrt{b x^5 + a x^2}}{a x^{3/2}} - \left(2\, 3^{1/4} b^{1/3} x^{3/2} (a^{1/3} + b^{1/3} x) \sqrt{\frac{\left(a^{1/3} + b^{1/3} x \left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3} + b^{1/3} x \left(1+\sqrt{3}\right)\right)^2}} \left(a^{1/3} + b^{1/3} x \left(1+\sqrt{3}\right)\right) \mathrm{EllipticE}\left(\sqrt{1 - \frac{\left(a^{1/3} + b^{1/3} x \left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3} + b^{1/3} x \left(1+\sqrt{3}\right)\right)^2}}, \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}\right) \sqrt{\frac{a^{2/3} - a^{1/3} b^{1/3} x + b^{2/3} x^2}{\left(a^{1/3} + b^{1/3} x \left(1+\sqrt{3}\right)\right)^2}}\right) \Big/ \left(\left(a^{1/3} + b^{1/3} x \left(1-\sqrt{3}\right)\right) a^{2/3} \sqrt{b x^5 + a x^2} \sqrt{\frac{b^{1/3} x (a^{1/3} + b^{1/3} x)}{\left(a^{1/3} + b^{1/3} x \left(1+\sqrt{3}\right)\right)^2}}\right) - \left(b^{1/3} x^{3/2} (a^{1/3} + b^{1/3} x) \sqrt{\frac{\left(a^{1/3} + b^{1/3} x \left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3} + b^{1/3} x \left(1+\sqrt{3}\right)\right)^2}} \left(a^{1/3} + b^{1/3} x \left(1+\sqrt{3}\right)\right) \mathrm{EllipticF}\left(\sqrt{1 - \frac{\left(a^{1/3} + b^{1/3} x \left(1-\sqrt{3}\right)\right)^2}{\left(a^{1/3} + b^{1/3} x \left(1+\sqrt{3}\right)\right)^2}}, \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}\right) \left(1-\sqrt{3}\right) \sqrt{\frac{a^{2/3} - a^{1/3} b^{1/3} x + b^{2/3} x^2}{\left(a^{1/3} + b^{1/3} x \left(1+\sqrt{3}\right)\right)^2}}\, 3^{3/4}\right) \Big/ \left(3 \left(a^{1/3} + b^{1/3} x \left(1-\sqrt{3}\right)\right) a^{2/3} \sqrt{b x^5 + a x^2} \sqrt{\frac{b^{1/3} x (a^{1/3} + b^{1/3} x)}{\left(a^{1/3} + b^{1/3} x \left(1+\sqrt{3}\right)\right)^2}}\right)$$

Result(type ?, 2859 leaves): Display of huge result suppressed!

Problem 86: Result more than twice size of optimal antiderivative.

$$\int x^{24} (b x^{38} + a x)^{12}\, dx$$

Optimal(type 1, 14 leaves, 2 steps):

$$\frac{(b x^{37} + a)^{13}}{481 b}$$

Result(type 1, 134 leaves):

$$\frac{1}{481} b^{12} x^{481} + \frac{1}{37} a b^{11} x^{444} + \frac{6}{37} a^2 b^{10} x^{407} + \frac{22}{37} a^3 b^9 x^{370} + \frac{55}{37} a^4 b^8 x^{333} + \frac{99}{37} a^5 b^7 x^{296} + \frac{132}{37} a^6 b^6 x^{259} + \frac{132}{37} a^7 b^5 x^{222} + \frac{99}{37} a^8 b^4 x^{185} + \frac{55}{37} a^9 b^3 x^{148} + \frac{22}{37} a^{10} b^2 x^{111} + \frac{6}{37} a^{11} b x^{74} + \frac{1}{37} a^{12} x^{37}$$

Problem 87: Result more than twice size of optimal antiderivative.

$$\int (b x^{14} + a x)^{12}\, dx$$

Optimal(type 1, 14 leaves, 2 steps):

$$\frac{(b x^{13} + a)^{13}}{169 b}$$

Result(type 1, 134 leaves):

$$\frac{1}{169} b^{12} x^{169} + \frac{1}{13} a b^{11} x^{156} + \frac{6}{13} a^2 b^{10} x^{143} + \frac{22}{13} a^3 b^9 x^{130} + \frac{55}{13} a^4 b^8 x^{117} + \frac{99}{13} a^5 b^7 x^{104} + \frac{132}{13} a^6 b^6 x^{91} + \frac{132}{13} a^7 b^5 x^{78} + \frac{99}{13} a^8 b^4 x^{65} + \frac{55}{13} a^9 b^3 x^{52} + \frac{22}{13} a^{10} b^2 x^{39} + \frac{6}{13} a^{11} b x^{26} + \frac{1}{13} a^{12} x^{13}$$

Problem 88: Result more than twice size of optimal antiderivative.

$$\int \left(b x^{27} + a x^2\right)^{12} \mathrm{d}x$$

Optimal(type 1, 14 leaves, 2 steps):

$$\frac{\left(b x^{25} + a\right)^{13}}{325 b}$$

Result(type 1, 134 leaves):

$$\frac{1}{325} b^{12} x^{325} + \frac{1}{25} a b^{11} x^{300} + \frac{6}{25} a^2 b^{10} x^{275} + \frac{22}{25} a^3 b^9 x^{250} + \frac{11}{5} a^4 b^8 x^{225} + \frac{99}{25} a^5 b^7 x^{200} + \frac{132}{25} a^6 b^6 x^{175} + \frac{132}{25} a^7 b^5 x^{150} + \frac{99}{25} a^8 b^4 x^{125} + \frac{11}{5} a^9 b^3 x^{100} + \frac{22}{25} a^{10} b^2 x^{75} + \frac{6}{25} a^{11} b x^{50} + \frac{1}{25} a^{12} x^{25}$$

Problem 89: Result more than twice size of optimal antiderivative.

$$\int \left(a x^m + b x^{1+13 m}\right)^{12} \mathrm{d}x$$

Optimal(type 3, 25 leaves, 2 steps):

$$\frac{\left(a + b x^{1+12 m}\right)^{13}}{13 b \left(1 + 12 m\right)}$$

Result(type 3, 286 leaves):

$$\frac{b^{12} x^{13} \left(x^m\right)^{156}}{13 \left(1 + 12 m\right)} + \frac{a b^{11} x^{12} \left(x^m\right)^{144}}{1 + 12 m} + \frac{6 a^2 b^{10} x^{11} \left(x^m\right)^{132}}{1 + 12 m} + \frac{22 a^3 b^9 x^{10} \left(x^m\right)^{120}}{1 + 12 m} + \frac{55 a^4 b^8 x^9 \left(x^m\right)^{108}}{1 + 12 m} + \frac{99 a^5 b^7 x^8 \left(x^m\right)^{96}}{1 + 12 m} + \frac{132 a^6 b^6 x^7 \left(x^m\right)^{84}}{1 + 12 m} + \frac{132 a^7 b^5 x^6 \left(x^m\right)^{72}}{1 + 12 m} + \frac{99 a^8 b^4 x^5 \left(x^m\right)^{60}}{1 + 12 m} + \frac{55 a^9 b^3 x^4 \left(x^m\right)^{48}}{1 + 12 m} + \frac{22 a^{10} b^2 x^3 \left(x^m\right)^{36}}{1 + 12 m} + \frac{6 a^{11} b x^2 \left(x^m\right)^{24}}{1 + 12 m} + \frac{a^{12} x \left(x^m\right)^{12}}{1 + 12 m}$$

Problem 95: Result more than twice size of optimal antiderivative.

$$\int x^p \left(a x^n + b x^{1+13 n+p}\right)^{12} \mathrm{d}x$$

Optimal(type 3, 27 leaves, 2 steps):

$$\frac{\left(a + b x^{1+12 n+p}\right)^{13}}{13 b \left(1 + 12 n + p\right)}$$

Result(type 3, 362 leaves):

$$\frac{b^{12} x^{13} \left(x^{n}\right)^{156} \left(x^{p}\right)^{13}}{13 \left(1+12 n+p\right)}+\frac{a b^{11} x^{12} \left(x^{n}\right)^{144} \left(x^{p}\right)^{12}}{1+12 n+p}+\frac{6 a^{2} b^{10} x^{11} \left(x^{n}\right)^{132} \left(x^{p}\right)^{11}}{1+12 n+p}+\frac{22 a^{3} b^{9} x^{10} \left(x^{n}\right)^{120} \left(x^{p}\right)^{10}}{1+12 n+p}+\frac{55 a^{4} b^{8} x^{9} \left(x^{n}\right)^{108} \left(x^{p}\right)^{9}}{1+12 n+p}$$
$$+\frac{99 a^{5} b^{7} x^{8} \left(x^{n}\right)^{96} \left(x^{p}\right)^{8}}{1+12 n+p}+\frac{132 a^{6} b^{6} x^{7} \left(x^{n}\right)^{84} \left(x^{p}\right)^{7}}{1+12 n+p}+\frac{132 a^{7} b^{5} x^{6} \left(x^{n}\right)^{72} \left(x^{p}\right)^{6}}{1+12 n+p}+\frac{99 a^{8} b^{4} x^{5} \left(x^{n}\right)^{60} \left(x^{p}\right)^{5}}{1+12 n+p}+\frac{55 a^{9} b^{3} x^{4} \left(x^{n}\right)^{48} \left(x^{p}\right)^{4}}{1+12 n+p}$$
$$+\frac{22 a^{10} b^{2} x^{3} \left(x^{n}\right)^{36} \left(x^{p}\right)^{3}}{1+12 n+p}+\frac{6 a^{11} b x^{2} \left(x^{n}\right)^{24} \left(x^{p}\right)^{2}}{1+12 n+p}+\frac{a^{12} x \left(x^{n}\right)^{12} x^{p}}{1+12 n+p}$$

Problem 96: Result more than twice size of optimal antiderivative.

$$\int x^{12} \left(b x^{13}+a\right)^{12} \mathrm{d}x$$

Optimal(type 1, 14 leaves, 1 step):

$$\frac{\left(b x^{13}+a\right)^{13}}{169 b}$$

Result(type 1, 134 leaves):

$$\frac{1}{169} b^{12} x^{169}+\frac{1}{13} a b^{11} x^{156}+\frac{6}{13} a^{2} b^{10} x^{143}+\frac{22}{13} a^{3} b^{9} x^{130}+\frac{55}{13} a^{4} b^{8} x^{117}+\frac{99}{13} a^{5} b^{7} x^{104}+\frac{132}{13} a^{6} b^{6} x^{91}+\frac{132}{13} a^{7} b^{5} x^{78}+\frac{99}{13} a^{8} b^{4} x^{65}+\frac{55}{13} a^{9} b^{3} x^{52}$$
$$+\frac{22}{13} a^{10} b^{2} x^{39}+\frac{6}{13} a^{11} b x^{26}+\frac{1}{13} a^{12} x^{13}$$

Problem 97: Result more than twice size of optimal antiderivative.

$$\int x^{36} \left(b x^{37}+a\right)^{12} \mathrm{d}x$$

Optimal(type 1, 14 leaves, 1 step):

$$\frac{\left(b x^{37}+a\right)^{13}}{481 b}$$

Result(type 1, 134 leaves):

$$\frac{1}{481} b^{12} x^{481}+\frac{1}{37} a b^{11} x^{444}+\frac{6}{37} a^{2} b^{10} x^{407}+\frac{22}{37} a^{3} b^{9} x^{370}+\frac{55}{37} a^{4} b^{8} x^{333}+\frac{99}{37} a^{5} b^{7} x^{296}+\frac{132}{37} a^{6} b^{6} x^{259}+\frac{132}{37} a^{7} b^{5} x^{222}+\frac{99}{37} a^{8} b^{4} x^{185}$$
$$+\frac{55}{37} a^{9} b^{3} x^{148}+\frac{22}{37} a^{10} b^{2} x^{111}+\frac{6}{37} a^{11} b x^{74}+\frac{1}{37} a^{12} x^{37}$$

Problem 99: Unable to integrate problem.

$$\int x^{-1-\frac{j}{2}} \sqrt{a x^{j}+b x^{n}}\, \mathrm{d}x$$

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

$$\frac{2\,\mathrm{arctanh}\left(\frac{x^{\frac{j}{2}}\sqrt{a}}{\sqrt{a\,x^{j}+b\,x^{n}}}\right)\sqrt{a}}{j-n}-\frac{2\sqrt{a\,x^{j}+b\,x^{n}}}{(j-n)\,x^{\frac{j}{2}}}$$

Result(type 8, 23 leaves):

$$\int x^{-1-\frac{j}{2}}\sqrt{a\,x^{j}+b\,x^{n}}\,\mathrm{d}x$$

Problem 101: Unable to integrate problem.

$$\int \frac{\left(a\,x^{2}+b\,x^{n}\right)^{3/2}}{c^{4}\,x^{4}}\,\mathrm{d}x$$

Optimal(type 3, 92 leaves, 5 steps):

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

Result(type 8, 68 leaves):

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

Problem 102: Unable to integrate problem.

$$\int (c\,x)^{7/2}\left(\frac{a}{x^{3}}+b\,x^{n}\right)^{3/2}\mathrm{d}x$$

Optimal(type 3, 100 leaves, 5 steps):

$$\frac{2\,(c\,x)^{9/2}\left(\frac{a}{x^{3}}+b\,x^{n}\right)^{3/2}}{3\,c\,(3+n)}-\frac{2\,a^{3/2}\,c^{4}\,\mathrm{arctanh}\left(\frac{\sqrt{a}}{x^{3/2}\sqrt{\frac{a}{x^{3}}+b\,x^{n}}}\right)\sqrt{x}}{(3+n)\sqrt{c\,x}}+\frac{2\,a\,c^{2}\,(c\,x)^{3/2}\sqrt{\frac{a}{x^{3}}+b\,x^{n}}}{3+n}$$

Result(type 8, 21 leaves):

$$\int (c\,x)^{7/2}\left(\frac{a}{x^{3}}+b\,x^{n}\right)^{3/2}\mathrm{d}x$$

Problem 106: Unable to integrate problem.

$$\int \frac{(c x)^{-1+\frac{j}{2}}}{\sqrt{a x^j + b x^n}}\, dx$$

Optimal(type 3, 52 leaves, 3 steps):

$$\frac{2 (c x)^{\frac{j}{2}} \operatorname{arctanh}\left(\frac{x^{\frac{j}{2}} \sqrt{a}}{\sqrt{a x^j + b x^n}}\right)}{c (j-n) x^{\frac{j}{2}} \sqrt{a}}$$

Result(type 8, 25 leaves):

$$\int \frac{(c x)^{-1+\frac{j}{2}}}{\sqrt{a x^j + b x^n}}\, dx$$

Problem 107: Unable to integrate problem.

$$\int \frac{1}{\sqrt{a x^2 + b x^n}}\, dx$$

Optimal(type 3, 31 leaves, 2 steps):

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

Result(type 8, 15 leaves):

$$\int \frac{1}{\sqrt{a x^2 + b x^n}}\, dx$$

Problem 108: Unable to integrate problem.

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

Optimal(type 3, 74 leaves, 4 steps):

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

Result(type 8, 21 leaves):

$$\int\frac{1}{(c\,x)^{5/2}\left(\frac{a}{x}+b\,x^{n}\right)^{3/2}}\,\mathrm{d}x$$

Problem 109: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{1}{\sqrt{\frac{b\,x^{3}+a}{x}}}\,\mathrm{d}x$$

Optimal(type 3, 24 leaves, 3 steps):

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

Result(type 4, 476 leaves):

$$\left(4\,(b\,x^{3}+a)\left(\mathrm{I}\sqrt{3}-1\right)\sqrt{-\frac{\left(\mathrm{I}\sqrt{3}-3\right)x\,b}{\left(\mathrm{I}\sqrt{3}-1\right)\left(-b\,x+\left(-a\,b^{2}\right)^{1/3}\right)}}\left(-b\,x+\left(-a\,b^{2}\right)^{1/3}\right)^{2}\sqrt{\frac{\mathrm{I}\sqrt{3}\left(-a\,b^{2}\right)^{1/3}+2\,b\,x+\left(-a\,b^{2}\right)^{1/3}}{\left(\mathrm{I}\sqrt{3}+1\right)\left(-b\,x+\left(-a\,b^{2}\right)^{1/3}\right)}}\sqrt{\frac{\mathrm{I}\sqrt{3}\left(-a\,b^{2}\right)^{1/3}-2\,b\,x-\left(-a\,b^{2}\right)^{1/3}}{\left(\mathrm{I}\sqrt{3}-1\right)\left(-b\,x+\left(-a\,b^{2}\right)^{1/3}\right)}}\left(\mathrm{EllipticPi}\left(\sqrt{-\frac{\left(\mathrm{I}\sqrt{3}-3\right)x\,b}{\left(\mathrm{I}\sqrt{3}-1\right)\left(-b\,x+\left(-a\,b^{2}\right)^{1/3}\right)}},\frac{\mathrm{I}\sqrt{3}-1}{\mathrm{I}\sqrt{3}-3},\sqrt{\frac{\left(\mathrm{I}\sqrt{3}+3\right)\left(\mathrm{I}\sqrt{3}-1\right)}{\left(\mathrm{I}\sqrt{3}+1\right)\left(\mathrm{I}\sqrt{3}-3\right)}}\right)-\mathrm{EllipticF}\left(\sqrt{-\frac{\left(\mathrm{I}\sqrt{3}-3\right)x\,b}{\left(\mathrm{I}\sqrt{3}-1\right)\left(-b\,x+\left(-a\,b^{2}\right)^{1/3}\right)}},\sqrt{\frac{\left(\mathrm{I}\sqrt{3}+3\right)\left(\mathrm{I}\sqrt{3}-1\right)}{\left(\mathrm{I}\sqrt{3}+1\right)\left(\mathrm{I}\sqrt{3}-3\right)}}\right)\right)\right)\Bigg/\left(b^{2}\sqrt{\frac{b\,x^{3}+a}{x}}\sqrt{x\,(b\,x^{3}+a)}\left(\mathrm{I}\sqrt{3}-3\right)\sqrt{\frac{x\left(-b\,x+\left(-a\,b^{2}\right)^{1/3}\right)\left(\mathrm{I}\sqrt{3}\left(-a\,b^{2}\right)^{1/3}+2\,b\,x+\left(-a\,b^{2}\right)^{1/3}\right)\left(\mathrm{I}\sqrt{3}\left(-a\,b^{2}\right)^{1/3}-2\,b\,x-\left(-a\,b^{2}\right)^{1/3}\right)}{b^{2}}}\right)$$

Problem 110: Unable to integrate problem.

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

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

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

Result(type 8, 19 leaves):

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

Problem 111: Unable to integrate problem.

$$\int \frac{1}{\sqrt{x \left(b x + a x^{-1 + n}\right)}}\, dx$$

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

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

Result(type 8, 17 leaves):

$$\int \frac{1}{\sqrt{x \left(b x + a x^{-1 + n}\right)}}\, dx$$

Problem 112: Unable to integrate problem.

$$\int (c x)^{m} \sqrt{a x^{j} + b x^{n}}\, dx$$

Optimal(type 5, 94 leaves, 3 steps):

$$\frac{2 x (c x)^{m} \operatorname{hypergeom}\left(\left[-\frac{1}{2}, \frac{1 + m + \frac{n}{2}}{j - n}\right], \left[1 + \frac{2 + 2 m + n}{2 j - 2 n}\right], -\frac{a x^{j - n}}{b}\right) \sqrt{a x^{j} + b x^{n}}}{(2 + 2 m + n) \sqrt{1 + \frac{a x^{j - n}}{b}}}$$

Result(type 8, 161 leaves):

$$\frac{2\, x\, \mathrm{e}^{m \left(\ln(c) + \ln(x) - \frac{\mathrm{I}\, \pi\, \mathrm{csgn}(\mathrm{I}\, c\, x)\, (-\mathrm{csgn}(\mathrm{I}\, c\, x) + \mathrm{csgn}(\mathrm{I}\, c))\, (-\mathrm{csgn}(\mathrm{I}\, c\, x) + \mathrm{csgn}(\mathrm{I}\, x))}{2} \right)} \sqrt{a\, \mathrm{e}^{j \ln(x)} + b\, \mathrm{e}^{n \ln(x)}}}{2 + 2\, m + n} + \int - \frac{\mathrm{e}^{m \left(\ln(c) + \ln(x) - \frac{\mathrm{I}\, \pi\, \mathrm{csgn}(\mathrm{I}\, c\, x)\, (-\mathrm{csgn}(\mathrm{I}\, c\, x) + \mathrm{csgn}(\mathrm{I}\, c))\, (-\mathrm{csgn}(\mathrm{I}\, c\, x) + \mathrm{csgn}(\mathrm{I}\, x))}{2} \right)} a\, \mathrm{e}^{j \ln(x)}\, (j - n)}{(2 + 2\, m + n) \sqrt{a\, \mathrm{e}^{j \ln(x)} + b\, \mathrm{e}^{n \ln(x)}}}\, \mathrm{d}x$$

Problem 113: Unable to integrate problem.

$$\int \frac{(c\, x)^m}{\left(a\, x^j + b\, x^n\right)^{5/2}}\, \mathrm{d}x$$

Optimal(type 5, 103 leaves, 3 steps):

$$\frac{2\, x^{1-2\, n}\, (c\, x)^m \mathrm{hypergeom}\left(\left[\frac{5}{2}, \frac{1 + m - \frac{5\, n}{2}}{j - n} \right], \left[1 + \frac{1 + m - \frac{5\, n}{2}}{j - n} \right], -\frac{a\, x^{j-n}}{b} \right) \sqrt{1 + \frac{a\, x^{j-n}}{b}}}{b^2\, (2 + 2\, m - 5\, n) \sqrt{a\, x^j + b\, x^n}}$$

Result(type 8, 21 leaves):

$$\int \frac{(c\, x)^m}{\left(a\, x^j + b\, x^n\right)^{5/2}}\, \mathrm{d}x$$

Problem 114: Unable to integrate problem.

$$\int \frac{1}{\left(a\, x^j + b\, x^n\right)^{5/2}}\, \mathrm{d}x$$

Optimal(type 5, 95 leaves, 3 steps):

$$\frac{2\, x^{1-2\, n} \mathrm{hypergeom}\left(\left[\frac{5}{2}, \frac{1 - \frac{5\, n}{2}}{j - n} \right], \left[1 + \frac{2 - 5\, n}{2\, j - 2\, n} \right], -\frac{a\, x^{j-n}}{b} \right) \sqrt{1 + \frac{a\, x^{j-n}}{b}}}{b^2\, (2 - 5\, n) \sqrt{a\, x^j + b\, x^n}}$$

Result(type 8, 15 leaves):

$$\int \frac{1}{\left(a\, x^j + b\, x^n\right)^{5/2}}\, \mathrm{d}x$$

Problem 118: Unable to integrate problem.

$$\int \frac{1}{\left(a\, x^{1/3} + b\, x^{2/3}\right)^{1/3}}\, \mathrm{d}x$$

Optimal(type 4, 738 leaves, 11 steps):

$$-\frac{45\,a\,(a+b\,x^{1/3})\,x^{1/3}}{28\,b^2\,(a\,x^{1/3}+b\,x^{2/3})^{1/3}}+\frac{9\,(a+b\,x^{1/3})\,x^{2/3}}{7\,b\,(a\,x^{1/3}+b\,x^{2/3})^{1/3}}-\frac{45\,a^2\,(a+2\,b\,x^{1/3})\left(-\frac{b\,(a\,x^{1/3}+b\,x^{2/3})}{a^2}\right)^{1/3}2^{2/3}}{28\,b^3\,(a\,x^{1/3}+b\,x^{2/3})^{1/3}\left(1-2^{2/3}\left(-\frac{b\,(a+b\,x^{1/3})\,x^{1/3}}{a^2}\right)^{1/3}-\sqrt{3}\right)}$$

$$+\left(15\,3^{3/4}\,a^4\left(1-2^{2/3}\left(-\frac{b\,(a+b\,x^{1/3})\,x^{1/3}}{a^2}\right)^{1/3}\right)\left(-\frac{b\,(a\,x^{1/3}+b\,x^{2/3})}{a^2}\right)^{1/3}\mathrm{EllipticF}\left(\frac{1-2^{2/3}\left(-\frac{b\,(a+b\,x^{1/3})\,x^{1/3}}{a^2}\right)^{1/3}+\sqrt{3}}{1-2^{2/3}\left(-\frac{b\,(a+b\,x^{1/3})\,x^{1/3}}{a^2}\right)^{1/3}-\sqrt{3}},2\,\mathrm{I}-\mathrm{I}\sqrt{3}\right)\right.$$

$$\left.+b\,x^{2/3})^{1/3}\sqrt{\frac{-1+2^{2/3}\left(-\frac{b\,(a+b\,x^{1/3})\,x^{1/3}}{a^2}\right)^{1/3}}{\left(1-2^{2/3}\left(-\frac{b\,(a+b\,x^{1/3})\,x^{1/3}}{a^2}\right)^{1/3}-\sqrt{3}\right)^2}}\right)-\left(45\,3^{1/4}\,a^4\left(1-2^{2/3}\left(-\frac{b\,(a+b\,x^{1/3})\,x^{1/3}}{a^2}\right)^{1/3}\right)\left(-\frac{b\,(a\,x^{1/3}+b\,x^{2/3})}{a^2}\right)\right.$$

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

Result(type 8, 15 leaves):

$$\int\frac{1}{(a\,x^{1/3}+b\,x^{2/3})^{1/3}}\,dx$$

Problem 119: Unable to integrate problem.

$$\int x^m\,(a\,x^j+b\,x^n)^p\,dx$$

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

$$\frac{x^{1+m}\,(a\,x^j+b\,x^n)^p\,(a+b\,x^{-j+n})\,\mathrm{hypergeom}\left(\left[1,1+p+\frac{jp+m+1}{-j+n}\right],\left[1+\frac{jp+m+1}{-j+n}\right],-\frac{b\,x^{-j+n}}{a}\right)}{a\,(jp+m+1)}$$

Result(type 8, 19 leaves):

$$\int x^m\,(a\,x^j+b\,x^n)^p\,dx$$

Problem 120: Unable to integrate problem.

$$\int(a\,x^m+b\,x^{mp+m+1})^p\,dx$$

Optimal(type 3, 45 leaves, 1 step):

$$\frac{\left(a x^{m}+b x^{m p+m+1}\right)^{1+p}}{b\, (1+p)\, (m p+1)\, x^{m (1+p)}}$$

Result(type 8, 20 leaves):

$$\int \left(a x^{m}+b x^{m p+m+1}\right)^{p} \mathrm{d}x$$

Problem 121: Unable to integrate problem.

$$\int x^{n} \left(a x^{m}+b x^{m p+m+n+1}\right)^{p} \mathrm{d}x$$

Optimal(type 3, 47 leaves, 1 step):

$$\frac{\left(a x^{m}+b x^{m p+m+n+1}\right)^{1+p}}{b\, (1+p)\, (m p+n+1)\, x^{m (1+p)}}$$

Result(type 8, 25 leaves):

$$\int x^{n} \left(a x^{m}+b x^{m p+m+n+1}\right)^{p} \mathrm{d}x$$

Problem 122: Unable to integrate problem.

$$\int \left(x^{\frac{-1+n}{p}} \left(a+b x^{n}\right)\right)^{p} \mathrm{d}x$$

Optimal(type 3, 59 leaves, 2 steps):

$$\frac{x^{\frac{(1-n)\,(1+p)}{p}} \left(b x^{n+\frac{-1+n}{p}}+\frac{a}{x^{\frac{1-n}{p}}}\right)^{1+p}}{b n\, (1+p)}$$

Result(type 8, 21 leaves):

$$\int \left(x^{\frac{-1+n}{p}} \left(a+b x^{n}\right)\right)^{p} \mathrm{d}x$$

Problem 123: Unable to integrate problem.

$$\int x^{-1+n-p\,(1+q)} \left(a x^{n}+b x^{p}\right)^{q} \mathrm{d}x$$

Optimal(type 3, 40 leaves, 1 step):

$$\frac{\left(a x^{n}+b x^{p}\right)^{1+q}}{a\, (n-p)\, (1+q)\, x^{p\,(1+q)}}$$

Result(type 8, 27 leaves):

$$\int x^{-1+n-p(1+q)}\left(a x^n+b x^p\right)^q dx$$

Test results for the 79 problems in "1.1.4.3 (e x)^m (a x^j+b x^k)^p (c+d x^n)^q.txt"

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

$$\int \frac{\left(B x^2+A\right)\left(c x^4+b x^2\right)^{3/2}}{x^{10}}\, dx$$

Optimal(type 3, 120 leaves, 5 steps):

$$-\frac{(-A c+6 b B)\left(c x^4+b x^2\right)^{3/2}}{24 b x^7}-\frac{A\left(c x^4+b x^2\right)^{5/2}}{6 b x^{11}}-\frac{c^2(-A c+6 b B) \operatorname{arctanh}\left(\frac{x \sqrt{b}}{\sqrt{c x^4+b x^2}}\right)}{16 b^{3/2}}-\frac{c(-A c+6 b B) \sqrt{c x^4+b x^2}}{16 b x^3}$$

Result(type 3, 272 leaves):

$$-\frac{1}{48 x^9\left(x^2 c+b\right)^{3/2} b^{9/2}}\left(\left(c x^4+b x^2\right)^{3/2}\left(-18 B c^2 \sqrt{x^2 c+b}\, b^{7/2} x^6-6 B c^2\left(x^2 c+b\right)^{3/2} b^{5/2} x^6+3 A c^3 \sqrt{x^2 c+b}\, b^{5/2} x^6+A c^3\left(x^2 c+b\right)^{3/2} x^6 b^{3/2}+6 B c\left(x^2 c+b\right)^{5/2} b^{5/2} x^4-A c^2\left(x^2 c+b\right)^{5/2} x^4 b^{3/2}+12 B\left(x^2 c+b\right)^{5/2} b^{7/2} x^2-2 A c\left(x^2 c+b\right)^{5/2} b^{5/2} x^2-3 A c^3 \ln\left(\frac{2\left(\sqrt{b} \sqrt{x^2 c+b}+b\right)}{x}\right) b^3 x^6+18 B c^2 \ln\left(\frac{2\left(\sqrt{b} \sqrt{x^2 c+b}+b\right)}{x}\right) b^4 x^6+8 A\left(x^2 c+b\right)^{5/2} b^{7/2}\right)\right)$$

Problem 76: Unable to integrate problem.

$$\int \frac{a x^m+b x^n}{c x^m+d x^n}\, dx$$

Optimal(type 5, 56 leaves, 4 steps):

$$\frac{a x}{c}+\frac{(-d a+b c)\, x \operatorname{hypergeom}\left(\left[1, \frac{1}{m-n}\right],\left[1+\frac{1}{m-n}\right],-\frac{c x^{m-n}}{d}\right)}{c d}$$

Result(type 8, 43 leaves):

$$\frac{b x}{d}+\int \frac{\mathrm{e}^{m \ln(x)}(d a-b c)}{\left(c\, \mathrm{e}^{m \ln(x)}+d\, \mathrm{e}^{n \ln(x)}\right) d}\, dx$$

Problem 77: Unable to integrate problem.

$$\int \frac{\left(a+\frac{b}{x}\right)^{n} x^{m}}{d x+c} \, dx$$

Optimal(type 6, 64 leaves, 4 steps):

$$\frac{\left(a+\frac{b}{x}\right)^{n} x^{m} \mathit{AppellF1}\left(-m, -n, 1, 1-m, -\frac{b}{a x}, -\frac{c}{d x}\right)}{d m \left(1+\frac{b}{a x}\right)^{n}}$$

Result(type 8, 22 leaves):

$$\int \frac{\left(a+\frac{b}{x}\right)^{n} x^{m}}{d x+c} \, dx$$

Problem 78: Unable to integrate problem.

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

Optimal(type 5, 86 leaves, 4 steps):

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

Result(type 8, 22 leaves):

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

Problem 79: Unable to integrate problem.

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

Optimal(type 5, 58 leaves, 3 steps):

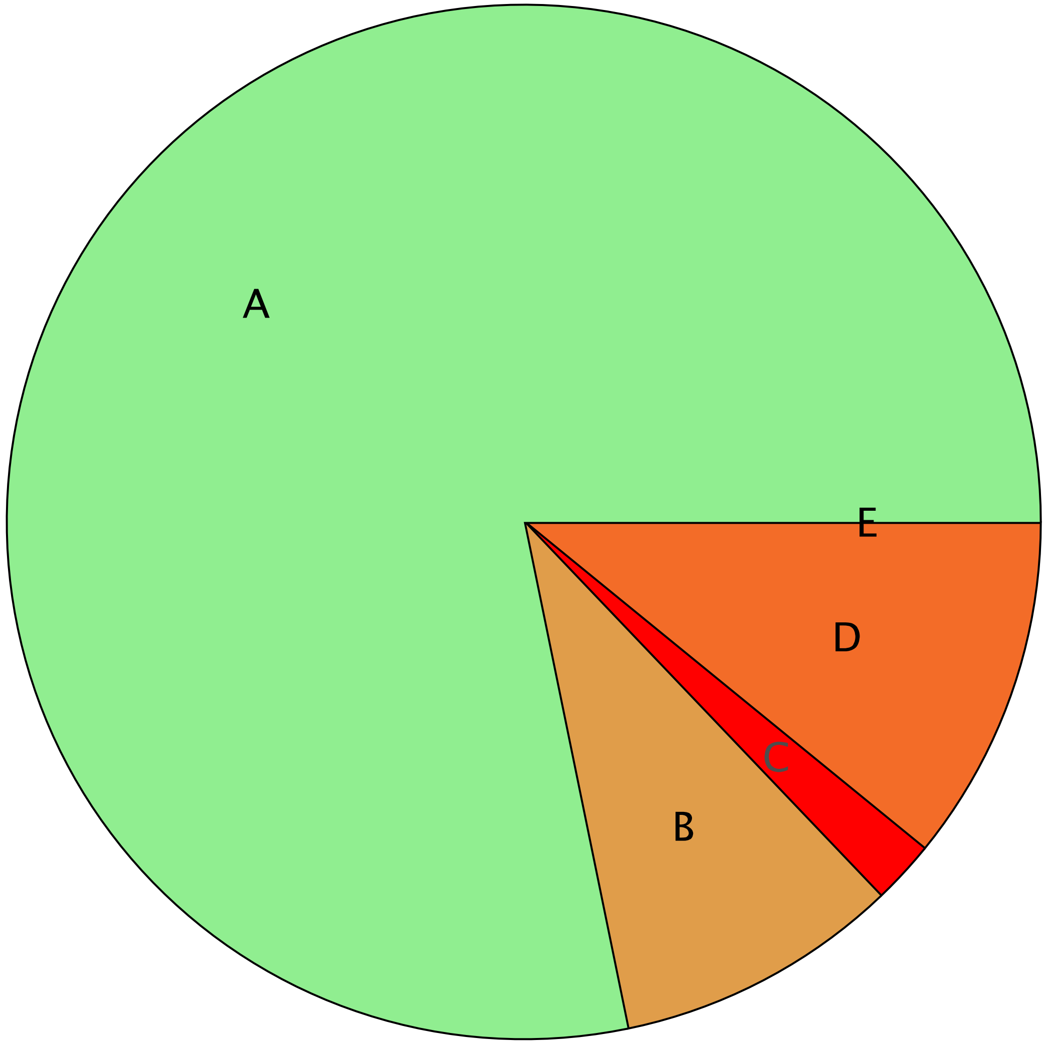
$$-\frac{b\left(a+\frac{b}{x}\right)^{1+n}\mathrm{hypergeom}\left([2,1+n],[2+n],\frac{c\left(a+\frac{b}{x}\right)}{ac-bd}\right)}{(ac-bd)^2(1+n)}$$

Result(type 8, 19 leaves):

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

Summary of Integration Test Results

202 integration problems




```
A - 158 optimal antiderivatives
B - 18 more than twice size of optimal antiderivatives
C - 4 unnecessarily complex antiderivatives
D - 22 unable to integrate problems
E - 0 integration timeouts
```