Mathematica 11.3 Integration Test Results

Test results for the 175 problems in "6.6.3 Hyperbolic cosecant functions.m"

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

$$\int \text{Csch}[a+b\,x]\,dx$$

Optimal (type 3, 12 leaves, 1 step):

$$-\frac{\text{ArcTanh}[\text{Cosh}[a+b\,x]]}{b}$$

Result (type 3, 38 leaves):

$$-\frac{\text{Log}\left[\text{Cosh}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right]}{b}+\frac{\text{Log}\left[\text{Sinh}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right]}{b}$$

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

$$\int \text{Csch}[a+b\,x]^3\,dx$$

Optimal (type 3, 34 leaves, 2 steps):

$$\frac{\text{ArcTanh}[\text{Cosh}[a+b\,x]]}{2\,b}-\frac{\text{Coth}[a+b\,x]\,\text{Csch}[a+b\,x]}{2\,b}$$

Result (type 3, 75 leaves):

$$-\frac{\text{Csch}\left[\frac{1}{2}\,(a+b\,x)\right]^2}{8\,b}+\frac{\text{Log}\left[\text{Cosh}\left[\frac{1}{2}\,(a+b\,x)\right]\right]}{2\,b}-\frac{\text{Log}\left[\text{Sinh}\left[\frac{1}{2}\,(a+b\,x)\right]\right]}{2\,b}-\frac{\text{Sech}\left[\frac{1}{2}\,(a+b\,x)\right]^2}{8\,b}$$

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

$$\int \text{Csch}[a+b\,x]^5\,dx$$

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

$$-\frac{3\,\text{ArcTanh}[\text{Cosh}[a+b\,x]]}{8\,b}+\frac{3\,\text{Coth}[a+b\,x]\,\text{Csch}[a+b\,x]}{8\,b}-\frac{\text{Coth}[a+b\,x]\,\text{Csch}[a+b\,x]^3}{4\,b}$$

Result (type 3, 113 leaves):

$$\frac{3\,\text{Csch}\left[\frac{1}{2}\,(a+b\,x)\right]^2}{32\,b}-\frac{\text{Csch}\left[\frac{1}{2}\,(a+b\,x)\right]^4}{64\,b}-\frac{3\,\text{Log}\left[\text{Cosh}\left[\frac{1}{2}\,(a+b\,x)\right]\right]}{8\,b}+\frac{3\,\text{Log}\left[\text{Sinh}\left[\frac{1}{2}\,(a+b\,x)\right]\right]}{8\,b}+\frac{3\,\text{Sech}\left[\frac{1}{2}\,(a+b\,x)\right]^2}{32\,b}+\frac{\text{Sech}\left[\frac{1}{2}\,(a+b\,x)\right]^4}{64\,b}$$

Problem 23: Result more than twice size of optimal antiderivative.

$$\int\left(-\text{Csch}[x]^2\right)^{3/2}\,dx$$

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

$$\frac{1}{2}\,\text{ArcSin}[\text{Coth}[x]]+\frac{1}{2}\,\text{Coth}[x]\,\sqrt{-\text{Csch}[x]^2}$$

Result (type 3, 51 leaves):

$$\frac{1}{8}\,\sqrt{-\text{Csch}[x]^2}\,\left(\text{Csch}\left[\frac{x}{2}\right]^2-4\,\text{Log}\left[\text{Cosh}\left[\frac{x}{2}\right]\right]+4\,\text{Log}\left[\text{Sinh}\left[\frac{x}{2}\right]\right]+\text{Sech}\left[\frac{x}{2}\right]^2\right)\,\text{Sinh}[x]$$

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

$$\int\sqrt{-\text{Csch}[x]^2}\,dx$$

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

$$\text{ArcSin}[\text{Coth}[x]]$$

Result (type 3, 30 leaves):

$$\sqrt{-\text{Csch}[x]^2}\,\left(-\text{Log}\left[\text{Cosh}\left[\frac{x}{2}\right]\right]+\text{Log}\left[\text{Sinh}\left[\frac{x}{2}\right]\right]\right)\,\text{Sinh}[x]$$

Problem 54: Result more than twice size of optimal antiderivative.

$$\int\frac{1}{\sqrt{a+i\,a\,\text{Csch}[c+d\,x]}}\,dx$$

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

$$\frac{2\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Coth}[c+d\,x]}{\sqrt{a+i\,a\,\text{Csch}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Coth}[c+d\,x]}{\sqrt{2}\,\sqrt{a+i\,a\,\text{Csch}[c+d\,x]}}\right]}{\sqrt{a}\,d}$$

Result (type 3, 254 leaves):

$$\left(\sqrt{a}\ \mathrm{Coth}[c+d x]\left(\sqrt{2}\ \mathrm{ArcTan}\left[\frac{\sqrt{2}\ \sqrt{a}}{\sqrt{i a\,(i+\mathrm{Csch}[c+d x])}}\right]-i\left(\mathrm{Log}\left[-\left(\left(2 a\left(-2 i \sqrt{a}+\sqrt{i a\,(i+\mathrm{Csch}[c+d x])}+i \sqrt{a+i a\,\mathrm{Csch}[c+d x]}\right)\right)\Big/\left(-\sqrt{a}+\sqrt{a+i a\,\mathrm{Csch}[c+d x]}\right)\right)\right]+\mathrm{Log}\left[\left(2 i a\left(2 \sqrt{a}+i \sqrt{i a\,(i+\mathrm{Csch}[c+d x])}+\sqrt{a+i a\,\mathrm{Csch}[c+d x]}\right)\right)\Big/\left(\sqrt{a}+\sqrt{a+i a\,\mathrm{Csch}[c+d x]}\right)\right]\right)\right)\right)\Big/\left(d \sqrt{i a\,(i+\mathrm{Csch}[c+d x])}\ \sqrt{a+i a\,\mathrm{Csch}[c+d x]}\right)$$

Problem 55: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{(a+i a\,\mathrm{Csch}[c+d x])^{3/2}}\, dx$$

Optimal (type 3, 123 leaves, 6 steps):

$$\frac{2\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\ \mathrm{Coth}[c+d x]}{\sqrt{a+i a\,\mathrm{Csch}[c+d x]}}\right]}{a^{3/2}\, d}-\frac{5\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\ \mathrm{Coth}[c+d x]}{\sqrt{2}\ \sqrt{a+i a\,\mathrm{Csch}[c+d x]}}\right]}{2 \sqrt{2}\ a^{3/2}\, d}-\frac{\mathrm{Coth}[c+d x]}{2 d\,(a+i a\,\mathrm{Csch}[c+d x])^{3/2}}$$

Result (type 3, 380 leaves):

$$\left(i\left(\left(a^{3/2}\,\mathrm{Coth}[c+d x]\left(-4 i \sqrt{2}\ \mathrm{ArcTan}\left[\frac{\sqrt{2}\ \sqrt{a}}{\sqrt{i a\,(i+\mathrm{Csch}[c+d x])}}\right]+\sqrt{2}\ \mathrm{Log}\left[-\frac{2\left(-i \sqrt{2}\ \sqrt{a}+\sqrt{i a\,(i+\mathrm{Csch}[c+d x])}\right)}{\sqrt{a+i a\,\mathrm{Csch}[c+d x]}}\right]-4\left(\mathrm{Log}\left[-\left(\left(2 a\left(-2 i \sqrt{a}+\sqrt{i a\,(i+\mathrm{Csch}[c+d x])}+i \sqrt{a+i a\,\mathrm{Csch}[c+d x]}\right)\right)\Big/\left(-\sqrt{a}+\sqrt{a+i a\,\mathrm{Csch}[c+d x]}\right)\right)\right]+\mathrm{Log}\left[\left(2 i a\left(2 \sqrt{a}+i \sqrt{i a\,(i+\mathrm{Csch}[c+d x])}+\sqrt{a+i a\,\mathrm{Csch}[c+d x]}\right)\right)\Big/\left(\sqrt{a}+\sqrt{a+i a\,\mathrm{Csch}[c+d x]}\right)\right]\right)\right)\right)\Big/\left(\sqrt{i a\,(i+\mathrm{Csch}[c+d x])}\right)+\frac{2 a\left(\mathrm{Cosh}\left[\frac{1}{2}(c+d x)\right]+i\,\mathrm{Sinh}\left[\frac{1}{2}(c+d x)\right]\right)}{\mathrm{Cosh}\left[\frac{1}{2}(c+d x)\right]-i\,\mathrm{Sinh}\left[\frac{1}{2}(c+d x)\right]}\right)\right)\Big/\left(4 a^2 d \sqrt{a+i a\,\mathrm{Csch}[c+d x]}\right)$$

Problem 57: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{\sqrt{a - i\, a \,\text{Csch}[c + d\, x]}}\, dx$$

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

$$\frac{2\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Coth}[c+d\,x]}{\sqrt{a-i\,a\,\text{Csch}[c+d\,x]}}\right]}{\sqrt{a}\,d} - \frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Coth}[c+d\,x]}{\sqrt{2}\,\sqrt{a-i\,a\,\text{Csch}[c+d\,x]}}\right]}{\sqrt{a}\,d}$$

Result (type 3, 253 leaves):

$$\left(\sqrt{a}\,\text{Coth}[c+d\,x]\left(\sqrt{2}\,\text{ArcTan}\left[\frac{\sqrt{2}\,\sqrt{a}}{\sqrt{-i\,a\,(-i+\text{Csch}[c+d\,x])}}\right] - i\left(\text{Log}\left[-\left(\left(2\,a\left(-2\,i\,\sqrt{a}+\sqrt{-i\,a\,(-i+\text{Csch}[c+d\,x])}+i\,\sqrt{a-i\,a\,\text{Csch}[c+d\,x]}\right)\right)\Big/\left(-\sqrt{a}+\sqrt{a-i\,a\,\text{Csch}[c+d\,x]}\right)\right)\right] + \text{Log}\left[\left(2\,i\,a\left(2\,\sqrt{a}+i\,\sqrt{-i\,a\,(-i+\text{Csch}[c+d\,x])}+\sqrt{a-i\,a\,\text{Csch}[c+d\,x]}\right)\right)\Big/\left(\sqrt{a}+\sqrt{a-i\,a\,\text{Csch}[c+d\,x]}\right)\right]\right)\right)\right)\Big/\left(d\,\sqrt{a\,(-1-i\,\text{Csch}[c+d\,x])}\,\sqrt{a-i\,a\,\text{Csch}[c+d\,x]}\right)$$

Problem 60: Result more than twice size of optimal antiderivative.

$$\int \sqrt{-3 + 3\, i\, \text{Csch}[x]}\, dx$$

Optimal (type 3, 23 leaves, 2 steps):

$$-2\sqrt{3}\,\text{ArcTan}\left[\frac{\text{Coth}[x]}{\sqrt{-1+i\,\text{Csch}[x]}}\right]$$

Result (type 3, 67 leaves):

$$\frac{\sqrt{3}\,\text{Coth}[x]\left(\text{Log}\left[1-\sqrt{1+i\,\text{Csch}[x]}\right]-\text{Log}\left[1+\sqrt{1+i\,\text{Csch}[x]}\right]\right)}{\sqrt{-1+i\,\text{Csch}[x]}\,\sqrt{1+i\,\text{Csch}[x]}}$$

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

$$\int \sqrt{-3 - 3\, i\, \text{Csch}[x]}\, dx$$

Optimal (type 3, 23 leaves, 2 steps):

$$-2\sqrt{3}\,\text{ArcTan}\left[\frac{\text{Coth}[x]}{\sqrt{-1-i\,\text{Csch}[x]}}\right]$$

Result (type 3, 67 leaves):

$$\frac{\sqrt{3}\,\text{Coth}[x]\left(\text{Log}\left[1-\sqrt{1-i\,\text{Csch}[x]}\right]-\text{Log}\left[1+\sqrt{1-i\,\text{Csch}[x]}\right]\right)}{\sqrt{-1-i\,\text{Csch}[x]}\,\sqrt{1-i\,\text{Csch}[x]}}$$

Problem 67: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Csch}[x]^2}{i+\text{Csch}[x]}\,dx$$

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

$$-\text{ArcTanh}[\text{Cosh}[x]]+\frac{\text{Coth}[x]}{i+\text{Csch}[x]}$$

Result (type 3, 46 leaves):

$$-\text{Log}\left[\text{Cosh}\left[\frac{x}{2}\right]\right]+\text{Log}\left[\text{Sinh}\left[\frac{x}{2}\right]\right]-\frac{2\,i\,\text{Sinh}\left[\frac{x}{2}\right]}{\text{Cosh}\left[\frac{x}{2}\right]+i\,\text{Sinh}\left[\frac{x}{2}\right]}$$

Problem 68: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Csch}[x]^3}{i+\text{Csch}[x]}\,dx$$

Optimal (type 3, 26 leaves, 4 steps):

$$i\,\text{ArcTanh}[\text{Cosh}[x]]-\text{Coth}[x]-\frac{i\,\text{Coth}[x]}{i+\text{Csch}[x]}$$

Result (type 3, 70 leaves):

$$-\frac{1}{2}\text{Coth}\left[\frac{x}{2}\right]+i\,\text{Log}\left[\text{Cosh}\left[\frac{x}{2}\right]\right]-i\,\text{Log}\left[\text{Sinh}\left[\frac{x}{2}\right]\right]-\frac{2\,\text{Sinh}\left[\frac{x}{2}\right]}{\text{Cosh}\left[\frac{x}{2}\right]+i\,\text{Sinh}\left[\frac{x}{2}\right]}-\frac{1}{2}\text{Tanh}\left[\frac{x}{2}\right]$$

Problem 69: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Csch}[x]^4}{i+\text{Csch}[x]}\,dx$$

Optimal (type 3, 37 leaves, 6 steps):

$$\frac{3}{2}\text{ArcTanh}[\text{Cosh}[x]]+2\,i\,\text{Coth}[x]-\frac{3}{2}\text{Coth}[x]\,\text{Csch}[x]+\frac{\text{Coth}[x]\,\text{Csch}[x]^2}{i+\text{Csch}[x]}$$

Result (type 3, 90 leaves):

$$\frac{1}{8}\left(4\,i\,\text{Coth}\left[\frac{x}{2}\right]-\text{Csch}\left[\frac{x}{2}\right]^2+12\,\text{Log}\left[\text{Cosh}\left[\frac{x}{2}\right]\right]-12\,\text{Log}\left[\text{Sinh}\left[\frac{x}{2}\right]\right]-\text{Sech}\left[\frac{x}{2}\right]^2+\frac{16\,\text{Sinh}\left[\frac{x}{2}\right]}{-i\,\text{Cosh}\left[\frac{x}{2}\right]+\text{Sinh}\left[\frac{x}{2}\right]}+4\,i\,\text{Tanh}\left[\frac{x}{2}\right]\right)$$

Problem 70: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Csch}[c+d\,x])^4\,dx$$

Optimal (type 3, 109 leaves, 6 steps):

$$a^4\,x-\frac{2\,a\,b\,\left(2\,a^2-b^2\right)\,\text{ArcTanh}[\text{Cosh}[c+d\,x]]}{d}-\frac{b^2\,\left(17\,a^2-2\,b^2\right)\,\text{Coth}[c+d\,x]}{3\,d}-\frac{4\,a\,b^3\,\text{Coth}[c+d\,x]\,\text{Csch}[c+d\,x]}{3\,d}-\frac{b^2\,\text{Coth}[c+d\,x]\,(a+b\,\text{Csch}[c+d\,x])^2}{3\,d}$$

Result (type 3, 567 leaves):

$$\frac{a^4 (c+d x) (a+b \operatorname{Csch}[c+d x])^4 \operatorname{Sinh}[c+d x]^4}{d (b+a \operatorname{Sinh}[c+d x])^4}+$$
$$\left(\left(-9 a^2 b^2 \operatorname{Cosh}\left[\frac{1}{2} (c+d x)\right]+b^4 \operatorname{Cosh}\left[\frac{1}{2} (c+d x)\right]\right) \operatorname{Csch}\left[\frac{1}{2} (c+d x)\right] (a+b \operatorname{Csch}[c+d x])^4 \operatorname{Sinh}[c+d x]^4\right) \Big/ \left(3 d (b+a \operatorname{Sinh}[c+d x])^4\right)-$$
$$\frac{a b^3 \operatorname{Csch}\left[\frac{1}{2} (c+d x)\right]^2 (a+b \operatorname{Csch}[c+d x])^4 \operatorname{Sinh}[c+d x]^4}{2 d (b+a \operatorname{Sinh}[c+d x])^4}-$$
$$\left(b^4 \operatorname{Coth}\left[\frac{1}{2} (c+d x)\right] \operatorname{Csch}\left[\frac{1}{2} (c+d x)\right]^2 (a+b \operatorname{Csch}[c+d x])^4 \operatorname{Sinh}[c+d x]^4\right) \Big/ \left(24 d (b+a \operatorname{Sinh}[c+d x])^4\right)+$$
$$\left(2 (-2 a^3 b+a b^3) (a+b \operatorname{Csch}[c+d x])^4 \operatorname{Log}\left[\operatorname{Cosh}\left[\frac{1}{2} (c+d x)\right]\right] \operatorname{Sinh}[c+d x]^4\right) \Big/ \left(d (b+a \operatorname{Sinh}[c+d x])^4\right)-$$
$$\left(2 (-2 a^3 b+a b^3) (a+b \operatorname{Csch}[c+d x])^4 \operatorname{Log}\left[\operatorname{Sinh}\left[\frac{1}{2} (c+d x)\right]\right] \operatorname{Sinh}[c+d x]^4\right) \Big/ \left(d (b+a \operatorname{Sinh}[c+d x])^4\right)-\frac{a b^3 (a+b \operatorname{Csch}[c+d x])^4 \operatorname{Sech}\left[\frac{1}{2} (c+d x)\right]^2 \operatorname{Sinh}[c+d x]^4}{2 d (b+a \operatorname{Sinh}[c+d x])^4}+$$
$$\left((a+b \operatorname{Csch}[c+d x])^4 \operatorname{Sech}\left[\frac{1}{2} (c+d x)\right] \left(-9 a^2 b^2 \operatorname{Sinh}\left[\frac{1}{2} (c+d x)\right]+b^4 \operatorname{Sinh}\left[\frac{1}{2} (c+d x)\right]\right) \operatorname{Sinh}[c+d x]^4\right) \Big/ \left(3 d (b+a \operatorname{Sinh}[c+d x])^4\right)+$$
$$\left(b^4 (a+b \operatorname{Csch}[c+d x])^4 \operatorname{Sech}\left[\frac{1}{2} (c+d x)\right]^2 \operatorname{Sinh}[c+d x]^4 \operatorname{Tanh}\left[\frac{1}{2} (c+d x)\right]\right) \Big/ \left(24 d (b+a \operatorname{Sinh}[c+d x])^4\right)$$

Problem 71: Result more than twice size of optimal antiderivative.

$$\int (a+b \operatorname{Csch}[c+d x])^3 \, dx$$

Optimal (type 3, 75 leaves, 5 steps):

$$a^3 x-\frac{b (6 a^2-b^2) \operatorname{ArcTanh}[\operatorname{Cosh}[c+d x]]}{2 d}-\frac{5 a b^2 \operatorname{Coth}[c+d x]}{2 d}-\frac{b^2 \operatorname{Coth}[c+d x] (a+b \operatorname{Csch}[c+d x])}{2 d}$$

Result (type 3, 151 leaves):

$$-\frac{1}{8 d}\left(-8 a^3 c-8 a^3 d x+12 a b^2 \operatorname{Coth}\left[\frac{1}{2}(c+d x)\right]+b^3 \operatorname{Csch}\left[\frac{1}{2}(c+d x)\right]^2+24 a^2 b \operatorname{Log}\left[\operatorname{Cosh}\left[\frac{1}{2}(c+d x)\right]\right]-4 b^3 \operatorname{Log}\left[\operatorname{Cosh}\left[\frac{1}{2}(c+d x)\right]\right]-24 a^2 b \operatorname{Log}\left[\operatorname{Sinh}\left[\frac{1}{2}(c+d x)\right]\right]+4 b^3 \operatorname{Log}\left[\operatorname{Sinh}\left[\frac{1}{2}(c+d x)\right]\right]+b^3 \operatorname{Sech}\left[\frac{1}{2}(c+d x)\right]^2+12 a b^2 \operatorname{Tanh}\left[\frac{1}{2}(c+d x)\right]\right)$$

Problem 72: Result more than twice size of optimal antiderivative.

$$\int (a+b \operatorname{Csch}[c+d x])^2 \, dx$$

Optimal (type 3, 34 leaves, 4 steps):

$$a^2 x-\frac{2 a b \operatorname{ArcTanh}[\operatorname{Cosh}[c+d x]]}{d}-\frac{b^2 \operatorname{Coth}[c+d x]}{d}$$

Result (type 3, 75 leaves):

$$-\frac{1}{2 d}\left(b^2 \operatorname{Coth}\left[\frac{1}{2}(c+d x)\right]-2 a\left(a c+a d x-2 b \operatorname{Log}\left[\operatorname{Cosh}\left[\frac{1}{2}(c+d x)\right]\right]+2 b \operatorname{Log}\left[\operatorname{Sinh}\left[\frac{1}{2}(c+d x)\right]\right]\right)+b^2 \operatorname{Tanh}\left[\frac{1}{2}(c+d x)\right]\right)$$

Problem 73: Result more than twice size of optimal antiderivative.

$$\int (a+b \operatorname{Csch}[c+d x]) \, dx$$

Optimal (type 3, 17 leaves, 2 steps):

$$a x-\frac{b \operatorname{ArcTanh}[\operatorname{Cosh}[c+d x]]}{d}$$

Result (type 3, 43 leaves):

$$a x-\frac{b \operatorname{Log}\left[\operatorname{Cosh}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{b \operatorname{Log}\left[\operatorname{Sinh}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}$$

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

$$\int \frac{\operatorname{Sech}[x]^2}{i+\operatorname{Csch}[x]} \, dx$$

Optimal (type 3, 19 leaves, 6 steps):

$$-\frac{1}{3} \operatorname{Sech}[x]^3-\frac{1}{3} i \operatorname{Tanh}[x]^3$$

Result (type 3, 64 leaves):

$$\frac{-3+\operatorname{Cosh}[x]+\operatorname{Cosh}[2 x]-2 i \operatorname{Sinh}[x]+i \operatorname{Cosh}[x] \operatorname{Sinh}[x]}{6\left(\operatorname{Cosh}\left[\frac{x}{2}\right]-i \operatorname{Sinh}\left[\frac{x}{2}\right]\right)\left(\operatorname{Cosh}\left[\frac{x}{2}\right]+i \operatorname{Sinh}\left[\frac{x}{2}\right]\right)^3}$$

Problem 91: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Sech}[x]^4}{i + \text{Csch}[x]} \, dx$$

Optimal (type 3, 29 leaves, 7 steps):

$$-\frac{1}{5} \text{Sech}[x]^5 - \frac{1}{3} i \,\text{Tanh}[x]^3 + \frac{1}{5} i \,\text{Tanh}[x]^5$$

Result (type 3, 96 leaves):

$$\left(-240 + 54 \text{Cosh}[x] + 32 \text{Cosh}[2x] + 18 \text{Cosh}[3x] + 16 \text{Cosh}[4x] - 96 i \text{Sinh}[x] + 18 i \text{Sinh}[2x] - 32 i \text{Sinh}[3x] + 9 i \text{Sinh}[4x]\right) \Big/ \left(960 \left(\text{Cosh}\left[\frac{x}{2}\right] - i \text{Sinh}\left[\frac{x}{2}\right]\right)^3 \left(\text{Cosh}\left[\frac{x}{2}\right] + i \text{Sinh}\left[\frac{x}{2}\right]\right)^5\right)$$

Problem 103: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Tanh}[x]^4}{i + \text{Csch}[x]} \, dx$$

Optimal (type 3, 52 leaves, 5 steps):

$$-i x + \frac{1}{15} (15 i - 8 \text{Csch}[x]) \text{Tanh}[x] + \frac{1}{15} (5 i - 4 \text{Csch}[x]) \text{Tanh}[x]^3 + \frac{1}{5} (i - \text{Csch}[x]) \text{Tanh}[x]^5$$

Result (type 3, 126 leaves):

$$\left(-200 + 6 (89 - 120 i x) \text{Cosh}[x] - 128 \text{Cosh}[2x] + 178 \text{Cosh}[3x] - 240 i x \text{Cosh}[3x] - 184 \text{Cosh}[4x] + 64 i \text{Sinh}[x] + 178 i \text{Sinh}[2x] + 240 x \text{Sinh}[2x] + 128 i \text{Sinh}[3x] + 89 i \text{Sinh}[4x] + 120 x \text{Sinh}[4x]\right) \Big/ \left(960 \left(\text{Cosh}\left[\frac{x}{2}\right] - i \text{Sinh}\left[\frac{x}{2}\right]\right)^3 \left(\text{Cosh}\left[\frac{x}{2}\right] + i \text{Sinh}\left[\frac{x}{2}\right]\right)^5\right)$$

Problem 109: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Coth}[x]^3}{i + \text{Csch}[x]} \, dx$$

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

$$-\text{Csch}[x] - i \text{Log}[\text{Sinh}[x]]$$

Result (type 3, 28 leaves):

$$-\frac{1}{2} \text{Coth}\left[\frac{x}{2}\right] - i \text{Log}[\text{Sinh}[x]] + \frac{1}{2} \text{Tanh}\left[\frac{x}{2}\right]$$

Problem 110: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Coth}[x]^4}{i+\text{Csch}[x]}\,dx$$

Optimal (type 3, 27 leaves, 4 steps):

$$-i x-\frac{1}{2}\,\text{ArcTanh}[\text{Cosh}[x]]+\frac{1}{2}\,\text{Coth}[x]\,(2 i-\text{Csch}[x])$$

Result (type 3, 76 leaves):

$$-i x+\frac{1}{2}\,i\,\text{Coth}\left[\frac{x}{2}\right]-\frac{1}{8}\,\text{Csch}\left[\frac{x}{2}\right]^2-\frac{1}{2}\,\text{Log}\left[\text{Cosh}\left[\frac{x}{2}\right]\right]+\frac{1}{2}\,\text{Log}\left[\text{Sinh}\left[\frac{x}{2}\right]\right]-\frac{1}{8}\,\text{Sech}\left[\frac{x}{2}\right]^2+\frac{1}{2}\,i\,\text{Tanh}\left[\frac{x}{2}\right]$$

Problem 111: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Coth}[x]^5}{i+\text{Csch}[x]}\,dx$$

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

$$-\text{Csch}[x]+\frac{1}{2}\,i\,\text{Csch}[x]^2-\frac{\text{Csch}[x]^3}{3}-i\,\text{Log}[\text{Sinh}[x]]$$

Result (type 3, 92 leaves):

$$-\frac{5}{12}\,\text{Coth}\left[\frac{x}{2}\right]+\frac{1}{8}\,i\,\text{Csch}\left[\frac{x}{2}\right]^2-\frac{1}{24}\,\text{Coth}\left[\frac{x}{2}\right]\,\text{Csch}\left[\frac{x}{2}\right]^2-$$
$$i\,\text{Log}[\text{Sinh}[x]]-\frac{1}{8}\,i\,\text{Sech}\left[\frac{x}{2}\right]^2+\frac{5}{12}\,\text{Tanh}\left[\frac{x}{2}\right]-\frac{1}{24}\,\text{Sech}\left[\frac{x}{2}\right]^2\,\text{Tanh}\left[\frac{x}{2}\right]$$

Problem 112: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Coth}[x]^6}{i+\text{Csch}[x]}\,dx$$

Optimal (type 3, 43 leaves, 5 steps):

$$-i x-\frac{3}{8}\,\text{ArcTanh}[\text{Cosh}[x]]+\frac{1}{12}\,\text{Coth}[x]^3\,(4 i-3\,\text{Csch}[x])+\frac{1}{8}\,\text{Coth}[x]\,(8 i-3\,\text{Csch}[x])$$

Result (type 3, 140 leaves):

$$-i x+\frac{2}{3}\,i\,\text{Coth}\left[\frac{x}{2}\right]-\frac{5}{32}\,\text{Csch}\left[\frac{x}{2}\right]^2+\frac{1}{24}\,i\,\text{Coth}\left[\frac{x}{2}\right]\,\text{Csch}\left[\frac{x}{2}\right]^2-\frac{1}{64}\,\text{Csch}\left[\frac{x}{2}\right]^4-\frac{3}{8}\,\text{Log}\left[\text{Cosh}\left[\frac{x}{2}\right]\right]+$$
$$\frac{3}{8}\,\text{Log}\left[\text{Sinh}\left[\frac{x}{2}\right]\right]-\frac{5}{32}\,\text{Sech}\left[\frac{x}{2}\right]^2+\frac{1}{64}\,\text{Sech}\left[\frac{x}{2}\right]^4+\frac{2}{3}\,i\,\text{Tanh}\left[\frac{x}{2}\right]-\frac{1}{24}\,i\,\text{Sech}\left[\frac{x}{2}\right]^2\,\text{Tanh}\left[\frac{x}{2}\right]$$

Problem 122: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Coth}[x]^5}{a+b\,\text{Csch}[x]}\,dx$$

Optimal (type 3, 70 leaves, 3 steps):

$$-\frac{\left(a^2+2 b^2\right) \text{Csch}[x]}{b^3}+\frac{a\,\text{Csch}[x]^2}{2 b^2}-\frac{\text{Csch}[x]^3}{3 b}+\frac{\left(a^2+b^2\right)^2 \text{Log}[a+b\,\text{Csch}[x]]}{a b^4}+\frac{\text{Log}[\text{Sinh}[x]]}{a}$$

Result (type 3, 180 leaves):

$$\frac{1}{48 a b^4}\left(-4 a b \left(6 a^2+11 b^2\right) \text{Coth}\left[\frac{x}{2}\right]+6 a^2 b^2 \text{Csch}\left[\frac{x}{2}\right]^2-48 a^4 \text{Log}[\text{Sinh}[x]]-96 a^2 b^2 \text{Log}[\text{Sinh}[x]]+48 a^4 \text{Log}[b+a\,\text{Sinh}[x]]+96 a^2 b^2 \text{Log}[b+a\,\text{Sinh}[x]]+48 b^4 \text{Log}[b+a\,\text{Sinh}[x]]-6 a^2 b^2 \text{Sech}\left[\frac{x}{2}\right]^2-16 a b^3 \text{Csch}[x]^3 \text{Sinh}\left[\frac{x}{2}\right]^4-a b^3 \text{Csch}\left[\frac{x}{2}\right]^4 \text{Sinh}[x]+24 a^3 b\,\text{Tanh}\left[\frac{x}{2}\right]+44 a b^3 \text{Tanh}\left[\frac{x}{2}\right]\right)$$

Problem 124: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Coth}[x]^7}{a+b\,\text{Csch}[x]}\,dx$$

Optimal (type 3, 119 leaves, 3 steps):

$$-\frac{\left(a^4+3 a^2 b^2+3 b^4\right) \text{Csch}[x]}{b^5}+\frac{a\left(a^2+3 b^2\right) \text{Csch}[x]^2}{2 b^4}-\frac{\left(a^2+3 b^2\right) \text{Csch}[x]^3}{3 b^3}+\frac{a\,\text{Csch}[x]^4}{4 b^2}-\frac{\text{Csch}[x]^5}{5 b}+\frac{\left(a^2+b^2\right)^3 \text{Log}[a+b\,\text{Csch}[x]]}{a b^6}+\frac{\text{Log}[\text{Sinh}[x]]}{a}$$

Result (type 3, 344 leaves):

$$\frac{1}{960 a b^6}\left(-4 a b \left(120 a^4+340 a^2 b^2+309 b^4\right) \text{Coth}\left[\frac{x}{2}\right]+30 a^2 b^2 \left(4 a^2+11 b^2\right) \text{Csch}\left[\frac{x}{2}\right]^2-960 a^6 \text{Log}[\text{Sinh}[x]]-2880 a^4 b^2 \text{Log}[\text{Sinh}[x]]-2880 a^2 b^4 \text{Log}[\text{Sinh}[x]]+960 a^6 \text{Log}[b+a\,\text{Sinh}[x]]+2880 a^4 b^2 \text{Log}[b+a\,\text{Sinh}[x]]+2880 a^2 b^4 \text{Log}[b+a\,\text{Sinh}[x]]+960 b^6 \text{Log}[b+a\,\text{Sinh}[x]]-120 a^4 b^2 \text{Sech}\left[\frac{x}{2}\right]^2-330 a^2 b^4 \text{Sech}\left[\frac{x}{2}\right]^2+15 a^2 b^4 \text{Sech}\left[\frac{x}{2}\right]^4-320 a^3 b^3 \text{Csch}[x]^3 \text{Sinh}\left[\frac{x}{2}\right]^4-816 a b^5 \text{Csch}[x]^3 \text{Sinh}\left[\frac{x}{2}\right]^4-3 a b^5 \text{Csch}\left[\frac{x}{2}\right]^6 \text{Sinh}[x]-a b^3 \text{Csch}\left[\frac{x}{2}\right]^4 \left(-15 a b+20 a^2 \text{Sinh}[x]+51 b^2 \text{Sinh}[x]\right)+480 a^5 b\,\text{Tanh}\left[\frac{x}{2}\right]+1360 a^3 b^3 \text{Tanh}\left[\frac{x}{2}\right]+1236 a b^5 \text{Tanh}\left[\frac{x}{2}\right]+6 a b^5 \text{Sech}\left[\frac{x}{2}\right]^4 \text{Tanh}\left[\frac{x}{2}\right]\right)$$

Problem 132: Result unnecessarily involves higher level functions.

$$\int \frac{x^5}{\sqrt{\text{Csch}[2\,\text{Log}[c\,x]]}}\,dx$$

Optimal (type 4, 81 leaves, 6 steps):

$$-\frac{2 x^2}{21 c^4 \sqrt{\text{Csch}[2 \text{Log}[c x]]}}+\frac{x^6}{7 \sqrt{\text{Csch}[2 \text{Log}[c x]]}}+\frac{2 \text{EllipticF}[\text{ArcCsc}[c x],-1]}{21 c^7 \sqrt{1-\frac{1}{c^4 x^4}} x \sqrt{\text{Csch}[2 \text{Log}[c x]]}}$$

Result (type 5, 81 leaves):

$$\frac{1}{21 c^6} \sqrt{\frac{c^2 x^2}{-2+2 c^4 x^4}} \left(2-5 c^4 x^4+3 c^8 x^8-2 \sqrt{1-c^4 x^4} \text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},c^4 x^4\right]\right)$$

Problem 134: Result unnecessarily involves higher level functions.

$$\int \frac{x^3}{\sqrt{\text{Csch}[2 \text{Log}[c x]]}} \, dx$$

Optimal (type 4, 119 leaves, 9 steps):

$$-\frac{2}{5 c^4 \sqrt{\text{Csch}[2 \text{Log}[c x]]}}+\frac{x^4}{5 \sqrt{\text{Csch}[2 \text{Log}[c x]]}}-\frac{2 \text{EllipticE}[\text{ArcCsc}[c x],-1]}{5 c^5 \sqrt{1-\frac{1}{c^4 x^4}} x \sqrt{\text{Csch}[2 \text{Log}[c x]]}}+\frac{2 \text{EllipticF}[\text{ArcCsc}[c x],-1]}{5 c^5 \sqrt{1-\frac{1}{c^4 x^4}} x \sqrt{\text{Csch}[2 \text{Log}[c x]]}}$$

Result (type 5, 76 leaves):

$$\frac{1}{15 c^2} x^2 \sqrt{\frac{c^2 x^2}{-2+2 c^4 x^4}} \left(-3+3 c^4 x^4-2 \sqrt{1-c^4 x^4} \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},c^4 x^4\right]\right)$$

Problem 136: Result unnecessarily involves higher level functions.

$$\int \frac{x}{\sqrt{\text{Csch}[2 \text{Log}[c x]]}} \, dx$$

Optimal (type 4, 60 leaves, 5 steps):

$$\frac{x^2}{3 \sqrt{\text{Csch}[2 \text{Log}[c x]]}}+\frac{2 \text{EllipticF}[\text{ArcCsc}[c x],-1]}{3 c^3 \sqrt{1-\frac{1}{c^4 x^4}} x \sqrt{\text{Csch}[2 \text{Log}[c x]]}}$$

Result (type 5, 72 leaves):

$$\frac{1}{3 c^2} \sqrt{\frac{c^2 x^2}{-2+2 c^4 x^4}} \left(-1+c^4 x^4-2 \sqrt{1-c^4 x^4} \text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},c^4 x^4\right]\right)$$

Problem 140: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\sqrt{\text{Csch}[2\,\text{Log}[c\,x]]}}{x^3}\,dx$$

Optimal (type 4, 74 leaves, 7 steps):

$$-c^3\sqrt{1-\frac{1}{c^4\,x^4}}\;x\,\sqrt{\text{Csch}[2\,\text{Log}[c\,x]]}\;\text{EllipticE}[\text{ArcCsc}[c\,x],-1]+c^3\sqrt{1-\frac{1}{c^4\,x^4}}\;x\,\sqrt{\text{Csch}[2\,\text{Log}[c\,x]]}\;\text{EllipticF}[\text{ArcCsc}[c\,x],-1]$$

Result (type 4, 56 leaves):

$$c^2\sqrt{\text{Csch}[2\,\text{Log}[c\,x]]}\;\left(-\text{EllipticE}\left[\frac{\pi}{4}-i\,\text{Log}[c\,x],2\right]\sqrt{i\,\text{Sinh}[2\,\text{Log}[c\,x]]}+\text{Sinh}[2\,\text{Log}[c\,x]]\right)$$

Problem 142: Result unnecessarily involves higher level functions.

$$\int \frac{\sqrt{\text{Csch}[2\,\text{Log}[c\,x]]}}{x^5}\,dx$$

Optimal (type 4, 64 leaves, 5 steps):

$$\frac{1}{3}\left(c^4-\frac{1}{x^4}\right)\sqrt{\text{Csch}[2\,\text{Log}[c\,x]]}-\frac{1}{3}\,c^5\sqrt{1-\frac{1}{c^4\,x^4}}\;x\,\sqrt{\text{Csch}[2\,\text{Log}[c\,x]]}\;\text{EllipticF}[\text{ArcCsc}[c\,x],-1]$$

Result (type 5, 81 leaves):

$$\frac{1}{3\,x^4}\sqrt{2}\,\sqrt{\frac{c^2\,x^2}{-1+c^4\,x^4}}\;\left(-1+c^4\,x^4+c^4\,x^4\sqrt{1-c^4\,x^4}\;\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},c^4\,x^4\right]\right)$$

Problem 144: Result unnecessarily involves higher level functions.

$$\int \frac{x^7}{\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}\,dx$$

Optimal (type 4, 118 leaves, 7 steps):

$$\frac{4}{77\,c^4\left(c^4-\frac{1}{x^4}\right)\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}-\frac{6\,x^4}{77\left(c^4-\frac{1}{x^4}\right)\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}+\frac{x^8}{11\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}-\frac{4\,\text{EllipticF}[\text{ArcCsc}[c\,x],-1]}{77\,c^{11}\left(1-\frac{1}{c^4\,x^4}\right)^{3/2}x^3\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}$$

Result (type 5, 89 leaves):

$$\frac{1}{154\,c^8}\sqrt{\frac{c^2 x^2}{-2+2\,c^4 x^4}}\left(-4+17\,c^4 x^4-20\,c^8 x^8+7\,c^{12} x^{12}+4\sqrt{1-c^4 x^4}\ \text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},c^4 x^4\right]\right)$$

Problem 146: Result unnecessarily involves higher level functions.

$$\int \frac{x^5}{\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}\,dx$$

Optimal (type 4, 162 leaves, 10 steps):

$$\frac{4}{15\,c^4\left(c^4-\frac{1}{x^4}\right)x^2\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}-\frac{2\,x^2}{15\left(c^4-\frac{1}{x^4}\right)\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}+\frac{x^6}{9\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}+\frac{4\,\text{EllipticE}[\text{ArcCsc}[c\,x],-1]}{15\,c^9\left(1-\frac{1}{c^4 x^4}\right)^{3/2}x^3\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}-\frac{4\,\text{EllipticF}[\text{ArcCsc}[c\,x],-1]}{15\,c^9\left(1-\frac{1}{c^4 x^4}\right)^{3/2}x^3\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}$$

Result (type 5, 84 leaves):

$$\frac{1}{90\,c^4}x^2\sqrt{\frac{c^2 x^2}{-2+2\,c^4 x^4}}\left(11-16\,c^4 x^4+5\,c^8 x^8+4\sqrt{1-c^4 x^4}\ \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},c^4 x^4\right]\right)$$

Problem 148: Result unnecessarily involves higher level functions.

$$\int \frac{x^3}{\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}\,dx$$

Optimal (type 4, 86 leaves, 6 steps):

$$-\frac{2}{7\left(c^4-\frac{1}{x^4}\right)\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}+\frac{x^4}{7\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}-\frac{4\,\text{EllipticF}[\text{ArcCsc}[c\,x],-1]}{7\,c^7\left(1-\frac{1}{c^4 x^4}\right)^{3/2}x^3\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}$$

Result (type 5, 80 leaves):

$$\frac{1}{14\,c^4}\sqrt{\frac{c^2 x^2}{-2+2\,c^4 x^4}}\left(3-4\,c^4 x^4+c^8 x^8+4\sqrt{1-c^4 x^4}\ \text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},c^4 x^4\right]\right)$$

Problem 150: Result unnecessarily involves higher level functions.

$$\int \frac{x}{\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}\,dx$$

Optimal (type 4, 130 leaves, 9 steps):

$$-\frac{6}{5\left(c^4-\frac{1}{x^4}\right)x^2\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}+\frac{x^2}{5\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}-\frac{12\,\text{EllipticE}[\text{ArcCsc}[c\,x],-1]}{5\,c^5\left(1-\frac{1}{c^4x^4}\right)^{3/2}x^3\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}+\frac{12\,\text{EllipticF}[\text{ArcCsc}[c\,x],-1]}{5\,c^5\left(1-\frac{1}{c^4x^4}\right)^{3/2}x^3\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}$$

Result (type 5, 83 leaves):

$$\frac{1}{10\,c^4x^2}\sqrt{\frac{c^2x^2}{-2+2\,c^4x^4}}\left(7-8\,c^4x^4+c^8x^8-12\sqrt{1-c^4x^4}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},c^4x^4\right]\right)$$

Problem 154: Result unnecessarily involves higher level functions.

$$\int\frac{\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}}{x^3}\,dx$$

Optimal (type 4, 69 leaves, 5 steps):

$$-\frac{1}{2}\left(c^4-\frac{1}{x^4}\right)x^2\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}+\frac{1}{2}c^5\left(1-\frac{1}{c^4x^4}\right)^{3/2}x^3\,\text{Csch}[2\,\text{Log}[c\,x]]^{3/2}\,\text{EllipticF}[\text{ArcCsc}[c\,x],-1]$$

Result (type 5, 66 leaves):

$$-\sqrt{2}\,c^2\sqrt{\frac{c^2x^2}{-1+c^4x^4}}\left(1+\sqrt{1-c^4x^4}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},c^4x^4\right]\right)$$

Problem 159: Result more than twice size of optimal antiderivative.

$$\int\text{Csch}[a+b\,\text{Log}[c\,x^n]]^4\,dx$$

Optimal (type 5, 68 leaves, 4 steps):

$$\frac{1}{1+4\,b\,n}16\,e^{4a}\,x\left(c\,x^n\right)^{4b}\,\text{Hypergeometric2F1}\left[4,\frac{1}{2}\left(4+\frac{1}{b\,n}\right),\frac{1}{2}\left(6+\frac{1}{b\,n}\right),e^{2a}\left(c\,x^n\right)^{2b}\right]$$

Result (type 5, 488 leaves):

$$-\frac{1}{6 b^3 n^3}\left(-1+4 b^2 n^2\right) x \operatorname{Csch}\left[a+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right]$$
$$\operatorname{Csch}\left[a+b n \operatorname{Log}[x]+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right] \operatorname{Sinh}[b n \operatorname{Log}[x]]+\frac{1}{3 b n}$$
$$x \operatorname{Csch}\left[a+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right] \operatorname{Csch}\left[a+b n \operatorname{Log}[x]+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right]^3$$
$$\operatorname{Sinh}[b n \operatorname{Log}[x]]-\frac{1}{6 b^2 n^2}$$
$$x \operatorname{Csch}\left[a+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right] \operatorname{Csch}\left[a+b n \operatorname{Log}[x]+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right]^2$$
$$\left(2 b n \operatorname{Cosh}\left[a+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right]+\operatorname{Sinh}\left[a+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right]\right)+$$
$$\frac{1}{6 b^3 n^3(1+2 b n)} e^{-\frac{a+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)}{b n}}\left(-1+4 b^2 n^2\right) \operatorname{Csch}\left[a+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right]$$
$$\left(e^{\left(2+\frac{1}{b n}\right)\left(a+b \operatorname{Log}\left[c x^n\right]\right)} \operatorname{Hypergeometric2F1}\left[1,1+\frac{1}{2 b n}, 2+\frac{1}{2 b n}, e^{2\left(a+b \operatorname{Log}\left[c x^n\right]\right)}\right]\right.$$
$$\operatorname{Sinh}\left[a+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right]+$$
$$e^{\frac{a}{b n}+\frac{-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]}{n}}(1+2 b n) x\left(\operatorname{Cosh}\left[a+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right]+\operatorname{Hypergeometric2F1}\left[1,\right.\right.$$
$$\left.\left.\left.\frac{1}{2 b n}, 1+\frac{1}{2 b n}, e^{2\left(a+b n \operatorname{Log}[x]+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right)}\right] \operatorname{Sinh}\left[a+b\left(-n \operatorname{Log}[x]+\operatorname{Log}\left[c x^n\right]\right)\right]\right]\right)\right)$$

Problem 161: Result more than twice size of optimal antiderivative.

$$\int \operatorname{Csch}\left[a+2 \operatorname{Log}\left[c \sqrt{x}\right]\right]^3 dx$$

Optimal (type 1, 26 leaves, 3 steps):

$$-\frac{2 c^6 e^{-a}}{\left(c^4-\frac{e^{-2 a}}{x^2}\right)^2}$$

Result (type 1, 62 leaves):

$$\left(2(\operatorname{Cosh}[a]-\operatorname{Sinh}[a])\left(-2 c^4 x^2+\operatorname{Cosh}[a]^2-2 \operatorname{Cosh}[a] \operatorname{Sinh}[a]+\operatorname{Sinh}[a]^2\right)\right) /$$
$$\left(c^2\left(\left(-1+c^4 x^2\right) \operatorname{Cosh}[a]+\left(1+c^4 x^2\right) \operatorname{Sinh}[a]\right)^2\right)$$

Problem 162: Result more than twice size of optimal antiderivative.

$$\int \operatorname{Csch}\left[a+2 \operatorname{Log}\left[\frac{c}{\sqrt{x}}\right]\right]^3 dx$$

Optimal (type 1, 26 leaves, 4 steps):

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

Result (type 1, 65 leaves):

$$-\left(\left(2 c^6\left(\left(c^4-2 x^2\right) \operatorname{Cosh}[a]+\left(c^4+2 x^2\right) \operatorname{Sinh}[a]\right)(\operatorname{Cosh}[2 a]+\operatorname{Sinh}[2 a])\right) /\right.$$
$$\left.\left(\left(-c^4+x^2\right) \operatorname{Cosh}[a]-\left(c^4+x^2\right) \operatorname{Sinh}[a]\right)^2\right)$$

Problem 164: Result more than twice size of optimal antiderivative.

$$\int \text{Csch}\left[a-\frac{\text{Log}\left[c\,x^n\right]}{n\,(-2+p)}\right]^p\,dx$$

Optimal (type 3, 66 leaves, 3 steps):

$$\frac{(2-p)\,x\left(1-e^{-2a}\,\left(c\,x^n\right)^{-\frac{2}{n\,(2-p)}}\right)\,\text{Csch}\left[a+\frac{\text{Log}\left[c\,x^n\right]}{n\,(2-p)}\right]^p}{2\,(1-p)}$$

Result (type 3, 140 leaves):

$$\frac{1}{-1+p}2^{-1+p}\,e^{-\frac{2ap}{-2+p}}\,(-2+p)\,x\left(e^{\frac{2ap}{-2+p}}-e^{\frac{4a}{-2+p}}\,\left(c\,x^n\right)^{\frac{2}{n\,(-2+p)}}\right)\left(-\frac{e^{\frac{a\,(2+p)}{-2+p}}\,\left(c\,x^n\right)^{\frac{1}{n\,(-2+p)}}}{-e^{\frac{2ap}{-2+p}}+e^{\frac{4a}{-2+p}}\,\left(c\,x^n\right)^{\frac{2}{n\,(-2+p)}}}\right)^p$$

Problem 165: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Csch}\left[a+b\,\text{Log}\left[c\,x^n\right]\right]}{x}\,dx$$

Optimal (type 3, 20 leaves, 2 steps):

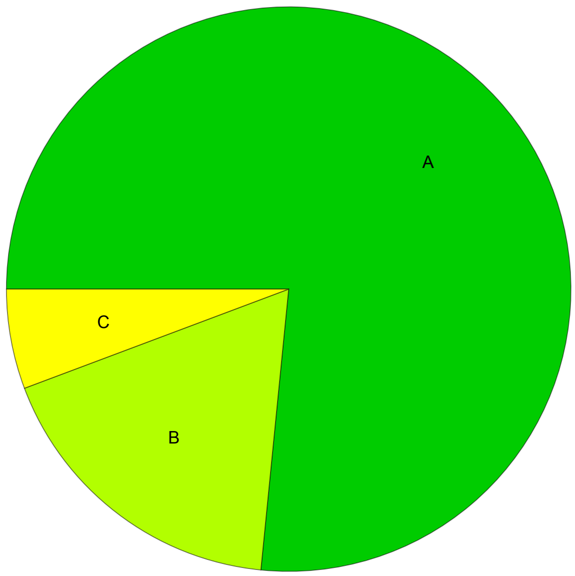
$$-\frac{\text{ArcTanh}\left[\text{Cosh}\left[a+b\,\text{Log}\left[c\,x^n\right]\right]\right]}{b\,n}$$

Result (type 3, 54 leaves):

$$-\frac{\text{Log}\left[\text{Cosh}\left[\frac{a}{2}+\frac{1}{2}\,b\,\text{Log}\left[c\,x^n\right]\right]\right]}{b\,n}+\frac{\text{Log}\left[\text{Sinh}\left[\frac{a}{2}+\frac{1}{2}\,b\,\text{Log}\left[c\,x^n\right]\right]\right]}{b\,n}$$

Summary of Integration Test Results

175 integration problems



A - 134 optimal antiderivatives

B - 31 more than twice size of optimal antiderivatives

C - 10 unnecessarily complex antiderivatives

D - 0 unable to integrate problems

E - 0 integration timeouts