Mathematica 11.3 Integration Test Results

Test results for the 83 problems in "6.6.2 (e x)^m (a+b csch(c+d x^n))^p.m"

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

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

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

$$\frac{a\,x^2}{2}-\frac{b\,\text{ArcTanh}\left[\text{Cosh}\left[c+d\,x^2\right]\right]}{2\,d}$$

Result (type 3, 57 leaves):

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

Problem 10: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int x^3 \left(a+b\,\text{Csch}\left[c+d\,x^2\right]\right)^2\,dx$$

Optimal (type 4, 108 leaves, 10 steps):

$$\frac{a^2\,x^4}{4}-\frac{2\,a\,b\,x^2\,\text{ArcTanh}\left[e^{c+d\,x^2}\right]}{d}-\frac{b^2\,x^2\,\text{Coth}\left[c+d\,x^2\right]}{2\,d}+\frac{b^2\,\text{Log}\left[\text{Sinh}\left[c+d\,x^2\right]\right]}{2\,d^2}-\frac{a\,b\,\text{PolyLog}\left[2,-e^{c+d\,x^2}\right]}{d^2}+\frac{a\,b\,\text{PolyLog}\left[2,e^{c+d\,x^2}\right]}{d^2}$$

Result (type 4, 598 leaves):

$$\frac{b^2 x^2 \operatorname{Coth}[c] \left(a+b \operatorname{Csch}\left[c+d x^2\right]\right)^2 \operatorname{Sinh}\left[c+d x^2\right]^2}{2 d \left(b+a \operatorname{Sinh}\left[c+d x^2\right]\right)^2}+$$

$$\left(x^2 \operatorname{Csch}\left[\frac{c}{2}\right] \left(a+b \operatorname{Csch}\left[c+d x^2\right]\right)^2 \operatorname{Sech}\left[\frac{c}{2}\right] \left(-2 b^2 \operatorname{Cosh}[c]+a^2 d x^2 \operatorname{Sinh}[c]\right) \operatorname{Sinh}\left[c+d x^2\right]^2\right) \Big/ \left(8 d \left(b+a \operatorname{Sinh}\left[c+d x^2\right]\right)^2\right)-\left(b^2 \operatorname{Csch}[c] \left(a+b \operatorname{Csch}\left[c+d x^2\right]\right)^2 \left(-d x^2 \operatorname{Cosh}[c]+\operatorname{Log}\left[\operatorname{Cosh}\left[d x^2\right] \operatorname{Sinh}[c]+\operatorname{Cosh}[c] \operatorname{Sinh}\left[d x^2\right]\right] \operatorname{Sinh}[c]\right) \operatorname{Sinh}\left[c+d x^2\right]^2\right) \Big/ \left(2 d^2 \left(-\operatorname{Cosh}[c]^2+\operatorname{Sinh}[c]^2\right) \left(b+a \operatorname{Sinh}\left[c+d x^2\right]\right)^2\right)+$$

$$\left(b^2 x^2 \operatorname{Csch}\left[\frac{c}{2}\right] \operatorname{Csch}\left[\frac{c}{2}+\frac{d x^2}{2}\right] \left(a+b \operatorname{Csch}\left[c+d x^2\right]\right)^2 \operatorname{Sinh}\left[\frac{d x^2}{2}\right] \operatorname{Sinh}\left[c+d x^2\right]^2\right) \Big/ \left(4 d \left(b+a \operatorname{Sinh}\left[c+d x^2\right]\right)^2\right)-$$

$$\left(b^2 x^2 \left(a+b \operatorname{Csch}\left[c+d x^2\right]\right)^2 \operatorname{Sech}\left[\frac{c}{2}\right] \operatorname{Sech}\left[\frac{c}{2}+\frac{d x^2}{2}\right] \operatorname{Sinh}\left[\frac{d x^2}{2}\right] \operatorname{Sinh}\left[c+d x^2\right]^2\right) \Big/ \left(4 d \left(b+a \operatorname{Sinh}\left[c+d x^2\right]\right)^2\right)+\left(a b \left(a+b \operatorname{Csch}\left[c+d x^2\right]\right)^2 \operatorname{Sinh}\left[c+d x^2\right]^2 \left(-\frac{2 \operatorname{ArcTan}\left[\frac{\operatorname{Cosh}[c]+\operatorname{Sinh}[c] \operatorname{Tanh}\left[\frac{d x^2}{2}\right]}{\sqrt{-\operatorname{Cosh}[c]^2+\operatorname{Sinh}[c]^2}}\right] \operatorname{ArcTanh}[\operatorname{Tanh}[c]]}{\sqrt{-\operatorname{Cosh}[c]^2+\operatorname{Sinh}[c]^2}}-\left(i \left(i \left(d x^2+\operatorname{ArcTanh}[\operatorname{Tanh}[c]]\right) \left(\operatorname{Log}\left[1-e^{-d x^2-\operatorname{ArcTanh}[\operatorname{Tanh}[c]]}\right]-\operatorname{Log}\left[1+e^{-d x^2-\operatorname{ArcTanh}[\operatorname{Tanh}[c]]}\right]\right)+i \left(\operatorname{PolyLog}\left[2,-e^{-d x^2-\operatorname{ArcTanh}[\operatorname{Tanh}[c]]}\right]-\operatorname{PolyLog}\left[2,e^{-d x^2-\operatorname{ArcTanh}[\operatorname{Tanh}[c]]}\right]\right)\right) \operatorname{Sech}[c]\right) \Big/ \left(\sqrt{1-\operatorname{Tanh}[c]^2}\right)\right)\right) \Big/ \left(d^2 \left(b+a \operatorname{Sinh}\left[c+d x^2\right]\right)^2\right)$$

Problem 18: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

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

Optimal (type 4, 225 leaves, 11 steps):

$$\frac{x^4}{4a}-\frac{b x^2 \text{Log}\left[1+\frac{a e^{c+d x^2}}{b-\sqrt{a^2+b^2}}\right]}{2 a \sqrt{a^2+b^2}\, d}+\frac{b x^2 \text{Log}\left[1+\frac{a e^{c+d x^2}}{b+\sqrt{a^2+b^2}}\right]}{2 a \sqrt{a^2+b^2}\, d}-\frac{b\, \text{PolyLog}\left[2,-\frac{a e^{c+d x^2}}{b-\sqrt{a^2+b^2}}\right]}{2 a \sqrt{a^2+b^2}\, d^2}+\frac{b\, \text{PolyLog}\left[2,-\frac{a e^{c+d x^2}}{b+\sqrt{a^2+b^2}}\right]}{2 a \sqrt{a^2+b^2}\, d^2}$$

Result (type 4, 1321 leaves):

$$\frac{x^4 \text{Csch}[c+d x^2]\left(b+a \text{Sinh}[c+d x^2]\right)}{4 a \left(a+b \text{Csch}[c+d x^2]\right)}+$$

$$\frac{1}{2 a d^2 \left(a+b \text{Csch}[c+d x^2]\right)} b \text{Csch}[c+d x^2] \left(\frac{i \pi \text{ArcTanh}\left[\frac{-a+b \text{Tanh}\left[\frac{1}{2}(c+d x^2)\right]}{\sqrt{a^2+b^2}}\right]}{\sqrt{a^2+b^2}}+\right.$$

$$\frac{1}{\sqrt{-a^2-b^2}}\left(2\left(-i c+\frac{\pi}{2}-i d x^2\right) \text{ArcTanh}\left[\frac{(-i a+b) \text{Cot}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^2\right)\right]}{\sqrt{-a^2-b^2}}\right]-\right.$$

$$2\left(-i c+\text{ArcCos}\left[-\frac{i b}{a}\right]\right) \text{ArcTanh}\left[\frac{(-i a-b) \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^2\right)\right]}{\sqrt{-a^2-b^2}}\right]+$$

$$\left(\text{ArcCos}\left[-\frac{i b}{a}\right]-2 i \left(\text{ArcTanh}\left[\frac{(-i a+b) \text{Cot}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^2\right)\right]}{\sqrt{-a^2-b^2}}\right]-\text{ArcTanh}\left[\right.\right.\right.$$

$$\left.\left.\left.\frac{(-i a-b) \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^2\right)\right]}{\sqrt{-a^2-b^2}}\right]\right)\right) \text{Log}\left[\frac{\sqrt{-a^2-b^2}\, e^{-\frac{1}{2} i \left(-i c+\frac{\pi}{2}-i d x^2\right)}}{\sqrt{2}\sqrt{-i a}\sqrt{b+a \text{Sinh}[c+d x^2]}}\right]+$$

$$\left(\text{ArcCos}\left[-\frac{i b}{a}\right]+2 i \left(\text{ArcTanh}\left[\frac{(-i a+b) \text{Cot}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^2\right)\right]}{\sqrt{-a^2-b^2}}\right]-\text{ArcTanh}\left[\right.\right.\right.$$

$$\left.\left.\left.\frac{(-i a-b) \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^2\right)\right]}{\sqrt{-a^2-b^2}}\right]\right)\right) \text{Log}\left[\frac{\sqrt{-a^2-b^2}\, e^{\frac{1}{2} i \left(-i c+\frac{\pi}{2}-i d x^2\right)}}{\sqrt{2}\sqrt{-i a}\sqrt{b+a \text{Sinh}[c+d x^2]}}\right]-$$

$$\left(\text{ArcCos}\left[-\frac{i b}{a}\right]+2 i \text{ArcTanh}\left[\frac{(-i a-b) \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^2\right)\right]}{\sqrt{-a^2-b^2}}\right]\right)$$

$$\text{Log}\left[1-\left(i\left(b-i\sqrt{-a^2-b^2}\right)\left(-i a+b-\sqrt{-a^2-b^2}\, \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^2\right)\right]\right)\right)\Big/\right.$$

$$\left.\left(a\left(-i a+b+\sqrt{-a^2-b^2}\, \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^2\right)\right]\right)\right)\right]+$$

$$\left(-\text{ArcCos}\left[-\frac{i b}{a}\right]+2 i \text{ArcTanh}\left[\frac{(-i a-b) \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^2\right)\right]}{\sqrt{-a^2-b^2}}\right]\right)$$

$$\text{Log}\Big[1-\Big(\text{i}\left(b+\text{i}\sqrt{-a^2-b^2}\right)\left(-\text{i}\,a+b-\sqrt{-a^2-b^2}\,\text{Tan}\Big[\frac{1}{2}\left(-\text{i}\,c+\frac{\pi}{2}-\text{i}\,d\,x^2\right)\Big]\right)\Big)\Big/$$
$$\Big(a\left(-\text{i}\,a+b+\sqrt{-a^2-b^2}\,\text{Tan}\Big[\frac{1}{2}\left(-\text{i}\,c+\frac{\pi}{2}-\text{i}\,d\,x^2\right)\Big]\right)\Big)\Big]+$$
$$\text{i}\,\Big(\text{PolyLog}\Big[2,\Big(\text{i}\left(b-\text{i}\sqrt{-a^2-b^2}\right)\left(-\text{i}\,a+b-\sqrt{-a^2-b^2}\,\text{Tan}\Big[\frac{1}{2}\left(-\text{i}\,c+\frac{\pi}{2}-\text{i}\,d\,x^2\right)\Big]\right)\Big)\Big/$$
$$\Big(a\left(-\text{i}\,a+b+\sqrt{-a^2-b^2}\,\text{Tan}\Big[\frac{1}{2}\left(-\text{i}\,c+\frac{\pi}{2}-\text{i}\,d\,x^2\right)\Big]\right)\Big)\Big]-$$
$$\text{PolyLog}\Big[2,\Big(\text{i}\left(b+\text{i}\sqrt{-a^2-b^2}\right)\left(-\text{i}\,a+b-\sqrt{-a^2-b^2}\,\text{Tan}\Big[\frac{1}{2}\left(-\text{i}\,c+\frac{\pi}{2}-\text{i}\,d\,x^2\right)\Big]\right)\Big)\Big/$$
$$\Big(a\left(-\text{i}\,a+b+\sqrt{-a^2-b^2}\,\text{Tan}\Big[\frac{1}{2}\left(-\text{i}\,c+\frac{\pi}{2}-\text{i}\,d\,x^2\right)\Big]\right)\Big)\Big]\Big)\Bigg)\Bigg/\left(b+a\,\text{Sinh}\left[c+d\,x^2\right]\right)$$

Problem 24: Attempted integration timed out after 120 seconds.

$$\int\frac{x^4}{\left(a+b\,\text{Csch}\left[c+d\,x^2\right]\right)^2}\,dx$$

Optimal (type 8, 21 leaves, 0 steps):

$$\text{Int}\left[\frac{x^4}{\left(a+b\,\text{Csch}\left[c+d\,x^2\right]\right)^2},x\right]$$

Result (type 1, 1 leaves):

???

Problem 26: Attempted integration timed out after 120 seconds.

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

Optimal (type 8, 21 leaves, 0 steps):

$$\text{Int}\left[\frac{x^2}{\left(a+b\,\text{Csch}\left[c+d\,x^2\right]\right)^2},x\right]$$

Result (type 1, 1 leaves):

???

Problem 28: Attempted integration timed out after 120 seconds.

$$\int\frac{1}{x\left(a+b\,\text{Csch}\left[c+d\,x^2\right]\right)^2}\,dx$$

Optimal (type 8, 21 leaves, 0 steps):

$$\text{Int}\left[\frac{1}{x\,\left(a+b\,\text{Csch}\left[c+d\,x^2\right]\right)^2},\,x\right]$$

Result (type 1, 1 leaves):

???

Problem 29: Attempted integration timed out after 120 seconds.

$$\int \frac{1}{x^2\,\left(a+b\,\text{Csch}\left[c+d\,x^2\right]\right)^2}\,dx$$

Optimal (type 8, 21 leaves, 0 steps):

$$\text{Int}\left[\frac{1}{x^2\,\left(a+b\,\text{Csch}\left[c+d\,x^2\right]\right)^2},\,x\right]$$

Result (type 1, 1 leaves):

???

Problem 30: Attempted integration timed out after 120 seconds.

$$\int \frac{1}{x^3\,\left(a+b\,\text{Csch}\left[c+d\,x^2\right]\right)^2}\,dx$$

Optimal (type 8, 21 leaves, 0 steps):

$$\text{Int}\left[\frac{1}{x^3\,\left(a+b\,\text{Csch}\left[c+d\,x^2\right]\right)^2},\,x\right]$$

Result (type 1, 1 leaves):

???

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

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

Optimal (type 4, 287 leaves, 18 steps):

$$-\frac{2 b^2 x^{3/2}}{d}+\frac{a^2 x^2}{2}-\frac{8 a b x^{3/2} \text{ArcTanh}\left[e^{c+d \sqrt{x}}\right]}{d}-\frac{2 b^2 x^{3/2} \text{Coth}\left[c+d \sqrt{x}\right]}{d}+\frac{6 b^2 x \text{Log}\left[1-e^{2 \left(c+d \sqrt{x}\right)}\right]}{d^2}-\frac{12 a b x \text{PolyLog}\left[2,-e^{c+d \sqrt{x}}\right]}{d^2}+\frac{12 a b x \text{PolyLog}\left[2,e^{c+d \sqrt{x}}\right]}{d^2}+\frac{6 b^2 \sqrt{x} \text{PolyLog}\left[2,e^{2 \left(c+d \sqrt{x}\right)}\right]}{d^3}+\frac{24 a b \sqrt{x} \text{PolyLog}\left[3,-e^{c+d \sqrt{x}}\right]}{d^3}-\frac{24 a b \sqrt{x} \text{PolyLog}\left[3,e^{c+d \sqrt{x}}\right]}{d^3}-\frac{3 b^2 \text{PolyLog}\left[3,e^{2 \left(c+d \sqrt{x}\right)}\right]}{d^4}-\frac{24 a b \text{PolyLog}\left[4,-e^{c+d \sqrt{x}}\right]}{d^4}+\frac{24 a b \text{PolyLog}\left[4,e^{c+d \sqrt{x}}\right]}{d^4}$$

Result (type 4, 591 leaves):

$$\frac{a^2 x^2 \left(a+b \text{Csch}\left[c+d \sqrt{x}\right]\right)^2 \text{Sinh}\left[c+d \sqrt{x}\right]^2}{2 \left(b+a \text{Sinh}\left[c+d \sqrt{x}\right]\right)^2}+\frac{1}{d^4 \left(b+a \text{Sinh}\left[c+d \sqrt{x}\right]\right)^2} b \left(a+b \text{Csch}\left[c+d \sqrt{x}\right]\right)^2 \left(-\frac{4 b d^3 e^{2 c} x^{3/2}}{-1+e^{2 c}}+12 b d^2 x \text{Log}\left[1-e^{c+d \sqrt{x}}\right]+4 a d^3 x^{3/2} \text{Log}\left[1-e^{c+d \sqrt{x}}\right]+12 b d^2 x \text{Log}\left[1+e^{c+d \sqrt{x}}\right]-4 a d^3 x^{3/2} \text{Log}\left[1+e^{c+d \sqrt{x}}\right]-6 b d^2 x \text{Log}\left[-1+e^{2 \left(c+d \sqrt{x}\right)}\right]-12 \left(-b d \sqrt{x}+a d^2 x\right) \text{PolyLog}\left[2,-e^{c+d \sqrt{x}}\right]+12 \left(b d \sqrt{x}+a d^2 x\right) \text{PolyLog}\left[2,e^{c+d \sqrt{x}}\right]+24 a d \sqrt{x} \text{PolyLog}\left[3,-e^{c+d \sqrt{x}}\right]-24 a d \sqrt{x} \text{PolyLog}\left[3,e^{c+d \sqrt{x}}\right]-3 b \text{PolyLog}\left[3,e^{2 \left(c+d \sqrt{x}\right)}\right]-24 a \text{PolyLog}\left[4,-e^{c+d \sqrt{x}}\right]+24 a \text{PolyLog}\left[4,e^{c+d \sqrt{x}}\right]\right) \text{Sinh}\left[c+d \sqrt{x}\right]^2+\left(b^2 x^{3/2} \text{Csch}\left[\frac{c}{2}\right] \text{Csch}\left[\frac{c}{2}+\frac{d \sqrt{x}}{2}\right] \left(a+b \text{Csch}\left[c+d \sqrt{x}\right]\right)^2 \text{Sinh}\left[c+d \sqrt{x}\right]^2 \text{Sinh}\left[\frac{d \sqrt{x}}{2}\right]\right) \Big/ \left(d \left(b+a \text{Sinh}\left[c+d \sqrt{x}\right]\right)^2\right)-\left(b^2 x^{3/2} \left(a+b \text{Csch}\left[c+d \sqrt{x}\right]\right)^2 \text{Sech}\left[\frac{c}{2}\right] \text{Sech}\left[\frac{c}{2}+\frac{d \sqrt{x}}{2}\right] \text{Sinh}\left[c+d \sqrt{x}\right]^2 \text{Sinh}\left[\frac{d \sqrt{x}}{2}\right]\right) \Big/ \left(d \left(b+a \text{Sinh}\left[c+d \sqrt{x}\right]\right)^2\right)$$

Problem 39: Attempted integration timed out after 120 seconds.

$$\int \frac{\left(a+b \text{Csch}\left[c+d \sqrt{x}\right]\right)^2}{x} \, dx$$

Optimal (type 8, 23 leaves, 0 steps):

$$\text{Int}\left[\frac{\left(a+b\,\text{Csch}\left[c+d\sqrt{x}\right]\right)^2}{x},x\right]$$

Result (type 1, 1 leaves):

???

Problem 49: Attempted integration timed out after 120 seconds.

$$\int \frac{1}{x\left(a+b\,\text{Csch}\left[c+d\sqrt{x}\right]\right)^2}\,dx$$

Optimal (type 8, 23 leaves, 0 steps):

$$\text{Int}\left[\frac{1}{x\left(a+b\,\text{Csch}\left[c+d\sqrt{x}\right]\right)^2},x\right]$$

Result (type 1, 1 leaves):

???

Problem 50: Attempted integration timed out after 120 seconds.

$$\int \frac{1}{x^2\left(a+b\,\text{Csch}\left[c+d\sqrt{x}\right]\right)^2}\,dx$$

Optimal (type 8, 23 leaves, 0 steps):

$$\text{Int}\left[\frac{1}{x^2\left(a+b\,\text{Csch}\left[c+d\sqrt{x}\right]\right)^2},x\right]$$

Result (type 1, 1 leaves):

???

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

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

Optimal (type 4, 209 leaves, 15 steps):

$$-\frac{2\,b^2\,x}{d}+\frac{2}{3}\,a^2\,x^{3/2}-\frac{8\,a\,b\,x\,\text{ArcTanh}\left[e^{c+d\sqrt{x}}\right]}{d}-\frac{2\,b^2\,x\,\text{Coth}\left[c+d\sqrt{x}\right]}{d}+\frac{4\,b^2\,\sqrt{x}\,\text{Log}\left[1-e^{2\left(c+d\sqrt{x}\right)}\right]}{d^2}-\frac{8\,a\,b\,\sqrt{x}\,\text{PolyLog}\left[2,-e^{c+d\sqrt{x}}\right]}{d^2}+\frac{8\,a\,b\,\sqrt{x}\,\text{PolyLog}\left[2,e^{c+d\sqrt{x}}\right]}{d^2}+\frac{2\,b^2\,\text{PolyLog}\left[2,e^{2\left(c+d\sqrt{x}\right)}\right]}{d^3}+\frac{8\,a\,b\,\text{PolyLog}\left[3,-e^{c+d\sqrt{x}}\right]}{d^3}-\frac{8\,a\,b\,\text{PolyLog}\left[3,e^{c+d\sqrt{x}}\right]}{d^3}$$

Result (type 4, 470 leaves):

$$\frac{2 a^2 x^{3/2} \left(a+b \,\text{Csch}\left[c+d \sqrt{x}\right]\right)^2 \text{Sinh}\left[c+d \sqrt{x}\right]^2}{3 \left(b+a \,\text{Sinh}\left[c+d \sqrt{x}\right]\right)^2}+\frac{1}{d^3 \left(b+a \,\text{Sinh}\left[c+d \sqrt{x}\right]\right)^2} 2 b \left(a+b \,\text{Csch}\left[c+d \sqrt{x}\right]\right)^2 \left(-\frac{2 b d^2 e^{2 c} x}{-1+e^{2 c}}+2 a d^2 x \,\text{Log}\left[1-e^{c+d \sqrt{x}}\right]-2 a d^2 x \,\text{Log}\left[1+e^{c+d \sqrt{x}}\right]+2 b d \sqrt{x} \,\text{Log}\left[1-e^{2 \left(c+d \sqrt{x}\right)}\right]-4 a d \sqrt{x} \,\text{PolyLog}\left[2,-e^{c+d \sqrt{x}}\right]+4 a d \sqrt{x} \,\text{PolyLog}\left[2,e^{c+d \sqrt{x}}\right]+b \,\text{PolyLog}\left[2,e^{2 \left(c+d \sqrt{x}\right)}\right]+4 a \,\text{PolyLog}\left[3,-e^{c+d \sqrt{x}}\right]-4 a \,\text{PolyLog}\left[3,e^{c+d \sqrt{x}}\right]\right) \text{Sinh}\left[c+d \sqrt{x}\right]^2+\left(b^2 x \,\text{Csch}\left[\frac{c}{2}\right] \text{Csch}\left[\frac{c}{2}+\frac{d \sqrt{x}}{2}\right] \left(a+b \,\text{Csch}\left[c+d \sqrt{x}\right]\right)^2 \text{Sinh}\left[c+d \sqrt{x}\right]^2 \text{Sinh}\left[\frac{d \sqrt{x}}{2}\right]\right) \Big/ \left(d \left(b+a \,\text{Sinh}\left[c+d \sqrt{x}\right]\right)^2\right)-\left(b^2 x \left(a+b \,\text{Csch}\left[c+d \sqrt{x}\right]\right)^2 \text{Sech}\left[\frac{c}{2}\right] \text{Sech}\left[\frac{c}{2}+\frac{d \sqrt{x}}{2}\right] \text{Sinh}\left[c+d \sqrt{x}\right]^2 \text{Sinh}\left[\frac{d \sqrt{x}}{2}\right]\right) \Big/ \left(d \left(b+a \,\text{Sinh}\left[c+d \sqrt{x}\right]\right)^2\right)$$

Problem 69: Attempted integration timed out after 120 seconds.

$$\int \frac{1}{x^{3/2} \left(a+b \,\text{Csch}\left[c+d \sqrt{x}\right]\right)^2} \, dx$$

Optimal (type 8, 25 leaves, 0 steps):

$$\text{Int}\left[\frac{1}{x^{3/2} \left(a+b \,\text{Csch}\left[c+d \sqrt{x}\right]\right)^2}, x\right]$$

Result (type 1, 1 leaves):

???

Problem 70: Attempted integration timed out after 120 seconds.

$$\int \frac{1}{x^{5/2} \left(a+b \,\text{Csch}\left[c+d \sqrt{x}\right]\right)^2} \, dx$$

Optimal (type 8, 25 leaves, 0 steps):

$$\text{Int}\left[\frac{1}{x^{5/2} \left(a+b \,\text{Csch}\left[c+d \sqrt{x}\right]\right)^2}, x\right]$$

Result (type 1, 1 leaves):

???

Problem 74: Unable to integrate problem.

$$\int (e\,x)^{-1+3\,n}\,\left(a+b\,\mathrm{Csch}\left[c+d\,x^{n}\right]\right)\,dx$$

Optimal (type 4, 197 leaves, 11 steps):

$$\frac{a\,(e\,x)^{3\,n}}{3\,e\,n}-\frac{2\,b\,x^{-n}\,(e\,x)^{3\,n}\,\mathrm{ArcTanh}\left[e^{c+d\,x^{n}}\right]}{d\,e\,n}-\frac{2\,b\,x^{-2\,n}\,(e\,x)^{3\,n}\,\mathrm{PolyLog}\left[2,\,-e^{c+d\,x^{n}}\right]}{d^{2}\,e\,n}+\frac{2\,b\,x^{-2\,n}\,(e\,x)^{3\,n}\,\mathrm{PolyLog}\left[2,\,e^{c+d\,x^{n}}\right]}{d^{2}\,e\,n}+\frac{2\,b\,x^{-3\,n}\,(e\,x)^{3\,n}\,\mathrm{PolyLog}\left[3,\,-e^{c+d\,x^{n}}\right]}{d^{3}\,e\,n}-\frac{2\,b\,x^{-3\,n}\,(e\,x)^{3\,n}\,\mathrm{PolyLog}\left[3,\,e^{c+d\,x^{n}}\right]}{d^{3}\,e\,n}$$

Result (type 8, 24 leaves):

$$\int (e\,x)^{-1+3\,n}\,\left(a+b\,\mathrm{Csch}\left[c+d\,x^{n}\right]\right)\,dx$$

Problem 76: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int (e\,x)^{-1+2\,n}\,\left(a+b\,\mathrm{Csch}\left[c+d\,x^{n}\right]\right)^{2}\,dx$$

Optimal (type 4, 198 leaves, 11 steps):

$$\frac{a^{2}\,(e\,x)^{2\,n}}{2\,e\,n}-\frac{4\,a\,b\,x^{-n}\,(e\,x)^{2\,n}\,\mathrm{ArcTanh}\left[e^{c+d\,x^{n}}\right]}{d\,e\,n}-\frac{b^{2}\,x^{-n}\,(e\,x)^{2\,n}\,\mathrm{Coth}\left[c+d\,x^{n}\right]}{d\,e\,n}+\frac{b^{2}\,x^{-2\,n}\,(e\,x)^{2\,n}\,\mathrm{Log}\left[\mathrm{Sinh}\left[c+d\,x^{n}\right]\right]}{d^{2}\,e\,n}-\frac{2\,a\,b\,x^{-2\,n}\,(e\,x)^{2\,n}\,\mathrm{PolyLog}\left[2,\,-e^{c+d\,x^{n}}\right]}{d^{2}\,e\,n}+\frac{2\,a\,b\,x^{-2\,n}\,(e\,x)^{2\,n}\,\mathrm{PolyLog}\left[2,\,e^{c+d\,x^{n}}\right]}{d^{2}\,e\,n}$$

Result (type 4, 696 leaves):

$$\frac{b^2 x^{1-n} (e x)^{-1+2 n} \text{Coth}[c] (a + b \text{Csch}[c + d x^n])^2 \text{Sinh}[c + d x^n]^2}{d n (b + a \text{Sinh}[c + d x^n])^2} +$$

$$\left(x^{1-n} (e x)^{-1+2 n} \text{Csch}\left[\frac{c}{2}\right] (a + b \text{Csch}[c + d x^n])^2 \text{Sech}\left[\frac{c}{2}\right] (-2 b^2 \text{Cosh}[c] + a^2 d x^n \text{Sinh}[c]) \text{Sinh}[c + d x^n]^2\right) \Big/ \left(4 d n (b + a \text{Sinh}[c + d x^n])^2\right) - \left(b^2 x^{1-2 n} (e x)^{-1+2 n} \text{Csch}[c] (a + b \text{Csch}[c + d x^n])^2 (-d x^n \text{Cosh}[c] + \text{Log}[\text{Cosh}[d x^n] \text{Sinh}[c] + \text{Cosh}[c] \text{Sinh}[d x^n]] \text{Sinh}[c]) \text{Sinh}[c + d x^n]^2\right) \Big/ \left(d^2 n (-\text{Cosh}[c]^2 + \text{Sinh}[c]^2) (b + a \text{Sinh}[c + d x^n])^2\right) +$$

$$\left(b^2 x^{1-n} (e x)^{-1+2 n} \text{Csch}\left[\frac{c}{2}\right] \text{Csch}\left[\frac{c}{2} + \frac{d x^n}{2}\right] (a + b \text{Csch}[c + d x^n])^2 \text{Sinh}\left[\frac{d x^n}{2}\right] \text{Sinh}[c + d x^n]^2\right) \Big/ \left(2 d n (b + a \text{Sinh}[c + d x^n])^2\right) -$$

$$\left(b^2 x^{1-n} (e x)^{-1+2 n} (a + b \text{Csch}[c + d x^n])^2 \text{Sech}\left[\frac{c}{2}\right] \text{Sech}\left[\frac{c}{2} + \frac{d x^n}{2}\right] \text{Sinh}\left[\frac{d x^n}{2}\right] \text{Sinh}[c + d x^n]^2\right) \Big/ \left(2 d n (b + a \text{Sinh}[c + d x^n])^2\right) + \left(2 a b x^{1-2 n} (e x)^{-1+2 n} (a + b \text{Csch}[c + d x^n])^2 \text{Sinh}[c + d x^n]^2 \left(-\frac{2 \text{ArcTan}\left[\frac{\text{Cosh}[c]+\text{Sinh}[c] \text{Tanh}\left[\frac{d x^n}{2}\right]}{\sqrt{-\text{Cosh}[c]^2+\text{Sinh}[c]^2}}\right] \text{ArcTanh}[\text{Tanh}[c]]}{\sqrt{-\text{Cosh}[c]^2 + \text{Sinh}[c]^2}} - \frac{1}{\sqrt{1 - \text{Tanh}[c]^2}} i \left(i (d x^n + \text{ArcTanh}[\text{Tanh}[c]]) \left(\text{Log}\left[1 - e^{-d x^n - \text{ArcTanh}[\text{Tanh}[c]]}\right] - \text{Log}\left[1 + e^{-d x^n - \text{ArcTanh}[\text{Tanh}[c]]}\right]\right) + i \left(\text{PolyLog}\left[2, -e^{-d x^n - \text{ArcTanh}[\text{Tanh}[c]]}\right] - \text{PolyLog}\left[2, e^{-d x^n - \text{ArcTanh}[\text{Tanh}[c]]}\right]\right)\right) \text{Sech}[c]\right)\right) \Big/ \left(d^2 n (b + a \text{Sinh}[c + d x^n])^2\right)$$

Problem 77: Attempted integration timed out after 120 seconds.

$$\int (e x)^{-1+3 n} (a + b \text{Csch}[c + d x^n])^2 \, dx$$

Optimal (type 4, 344 leaves, 16 steps):

$$\frac{a^2 (e x)^{3 n}}{3 e n}-\frac{b^2 x^{-n} (e x)^{3 n}}{d e n}-\frac{4 a b x^{-n} (e x)^{3 n} \text{ArcTanh}\left[e^{c+d x^n}\right]}{d e n}-\frac{b^2 x^{-n} (e x)^{3 n} \text{Coth}\left[c+d x^n\right]}{d e n}+\frac{2 b^2 x^{-2 n} (e x)^{3 n} \text{Log}\left[1-e^{2 \left(c+d x^n\right)}\right]}{d^2 e n}-\frac{4 a b x^{-2 n} (e x)^{3 n} \text{PolyLog}\left[2,-e^{c+d x^n}\right]}{d^2 e n}+\frac{4 a b x^{-2 n} (e x)^{3 n} \text{PolyLog}\left[2,e^{c+d x^n}\right]}{d^2 e n}+\frac{b^2 x^{-3 n} (e x)^{3 n} \text{PolyLog}\left[2,e^{2 \left(c+d x^n\right)}\right]}{d^3 e n}+\frac{4 a b x^{-3 n} (e x)^{3 n} \text{PolyLog}\left[3,-e^{c+d x^n}\right]}{d^3 e n}-\frac{4 a b x^{-3 n} (e x)^{3 n} \text{PolyLog}\left[3,e^{c+d x^n}\right]}{d^3 e n}$$

Result (type 1, 1 leaves):

???

Problem 79: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

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

Optimal (type 4, 291 leaves, 12 steps):

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

Result (type 4, 1347 leaves):

$$\frac{x (e x)^{-1+2 n} \text{Csch}\left[c+d x^n\right] \left(b+a \text{Sinh}\left[c+d x^n\right]\right)}{2 a n \left(a+b \text{Csch}\left[c+d x^n\right]\right)}+$$

$$\frac{1}{a d^2 n \left(a+b \text{Csch}\left[c+d x^n\right]\right)} b x^{1-2 n} (e x)^{-1+2 n} \text{Csch}\left[c+d x^n\right] \left(\frac{i \pi \text{ArcTanh}\left[\frac{-a+b \text{Tanh}\left[\frac{1}{2} \left(c+d x^n\right)\right]}{\sqrt{a^2+b^2}}\right]}{\sqrt{a^2+b^2}}+\right.$$

$$\frac{1}{\sqrt{-a^2-b^2}} \left(2 \left(-i c+\frac{\pi}{2}-i d x^n\right) \text{ArcTanh}\left[\frac{(-i a+b) \text{Cot}\left[\frac{1}{2} \left(-i c+\frac{\pi}{2}-i d x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]-\right.$$

$$2 \left(-i c+\text{ArcCos}\left[-\frac{i b}{a}\right]\right) \text{ArcTanh}\left[\frac{(-i a-b) \text{Tan}\left[\frac{1}{2} \left(-i c+\frac{\pi}{2}-i d x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]+$$

$$\left(\text{ArcCos}\left[-\frac{i b}{a}\right]-2 i \left(\text{ArcTanh}\left[\frac{(-i a+b) \text{Cot}\left[\frac{1}{2} \left(-i c+\frac{\pi}{2}-i d x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]-\text{ArcTanh}\left[\right.\right.\right.$$

$$\left.\left.\left.\frac{\left(-i a-b\right) \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]\right)\right) \text{Log}\left[\frac{\sqrt{-a^2-b^2}\, e^{-\frac{1}{2} i \left(-i c+\frac{\pi}{2}-i d x^n\right)}}{\sqrt{2}\, \sqrt{-i a}\, \sqrt{b+a \text{Sinh}\left[c+d x^n\right]}}\right]+$$

$$\left(\text{ArcCos}\left[-\frac{i b}{a}\right]+2 i \left(\text{ArcTanh}\left[\frac{\left(-i a+b\right) \text{Cot}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]-\text{ArcTanh}\left[\right.\right.\right.$$

$$\left.\left.\left.\frac{\left(-i a-b\right) \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]\right)\right) \text{Log}\left[\frac{\sqrt{-a^2-b^2}\, e^{\frac{1}{2} i \left(-i c+\frac{\pi}{2}-i d x^n\right)}}{\sqrt{2}\, \sqrt{-i a}\, \sqrt{b+a \text{Sinh}\left[c+d x^n\right]}}\right]-$$

$$\left(\text{ArcCos}\left[-\frac{i b}{a}\right]+2 i\, \text{ArcTanh}\left[\frac{\left(-i a-b\right) \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]\right)$$

$$\text{Log}\left[1-\left(i \left(b-i \sqrt{-a^2-b^2}\right) \left(-i a+b-\sqrt{-a^2-b^2}\, \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]\right)\right) \Big/\right.$$

$$\left.\left(a \left(-i a+b+\sqrt{-a^2-b^2}\, \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]\right)\right)\right]+$$

$$\left(-\text{ArcCos}\left[-\frac{i b}{a}\right]+2 i\, \text{ArcTanh}\left[\frac{\left(-i a-b\right) \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]\right)$$

$$\text{Log}\left[1-\left(i \left(b+i \sqrt{-a^2-b^2}\right) \left(-i a+b-\sqrt{-a^2-b^2}\, \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]\right)\right) \Big/\right.$$

$$\left.\left(a \left(-i a+b+\sqrt{-a^2-b^2}\, \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]\right)\right)\right]+$$

$$i \left(\text{PolyLog}\left[2, \left(i \left(b-i \sqrt{-a^2-b^2}\right) \left(-i a+b-\sqrt{-a^2-b^2}\, \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]\right)\right) \Big/\right.\right.$$

$$\left.\left(a \left(-i a+b+\sqrt{-a^2-b^2}\, \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]\right)\right)\right]-$$

$$\text{PolyLog}\left[2, \left(i \left(b+i \sqrt{-a^2-b^2}\right) \left(-i a+b-\sqrt{-a^2-b^2}\, \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]\right)\right) \Big/\right.$$

$$\left.\left.\left.\left(a \left(-i a+b+\sqrt{-a^2-b^2}\, \text{Tan}\left[\frac{1}{2}\left(-i c+\frac{\pi}{2}-i d x^n\right)\right]\right)\right)\right]\right)\right) \Big/ \left(b+a \text{Sinh}\left[c+d x^n\right]\right)$$

Problem 80: Unable to integrate problem.

$$\int \frac{(e x)^{-1+3 n}}{a+b \text{Csch}\left[c+d x^n\right]} \, dx$$

Optimal (type 4, 428 leaves, 14 steps) :

$$\frac{(e x)^{3 n}}{3 a e n}-\frac{b x^{-n} (e x)^{3 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a \sqrt{a^2+b^2} d e n}+\frac{b x^{-n} (e x)^{3 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a \sqrt{a^2+b^2} d e n}-\frac{2 b x^{-2 n} (e x)^{3 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a \sqrt{a^2+b^2} d^2 e n}+\frac{2 b x^{-2 n} (e x)^{3 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a \sqrt{a^2+b^2} d^2 e n}+\frac{2 b x^{-3 n} (e x)^{3 n} \text{PolyLog}\left[3,-\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a \sqrt{a^2+b^2} d^3 e n}-\frac{2 b x^{-3 n} (e x)^{3 n} \text{PolyLog}\left[3,-\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a \sqrt{a^2+b^2} d^3 e n}$$

Result (type 8, 26 leaves):

$$\int \frac{(e x)^{-1+3 n}}{a+b \text{Csch}[c+d x^n]} \, dx$$

Problem 82: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

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

Optimal (type 4, 681 leaves, 23 steps):

$$\frac{(e x)^{2 n}}{2 a^2 e n}+\frac{b^3 x^{-n} (e x)^{2 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right)^{3/2} d e n}-\frac{2 b x^{-n} (e x)^{2 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \sqrt{a^2+b^2} d e n}-\frac{b^3 x^{-n} (e x)^{2 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right)^{3/2} d e n}+\frac{2 b x^{-n} (e x)^{2 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \sqrt{a^2+b^2} d e n}+\frac{b^2 x^{-2 n} (e x)^{2 n} \text{Log}\left[b+a \text{Sinh}[c+d x^n]\right]}{a^2 \left(a^2+b^2\right) d^2 e n}+\frac{b^3 x^{-2 n} (e x)^{2 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right)^{3/2} d^2 e n}-\frac{2 b x^{-2 n} (e x)^{2 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \sqrt{a^2+b^2} d^2 e n}-\frac{b^3 x^{-2 n} (e x)^{2 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right)^{3/2} d^2 e n}+\frac{2 b x^{-2 n} (e x)^{2 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \sqrt{a^2+b^2} d^2 e n}-\frac{b^2 x^{-n} (e x)^{2 n} \text{Cosh}[c+d x^n]}{a \left(a^2+b^2\right) d e n \left(b+a \text{Sinh}[c+d x^n]\right)}$$

Result (type 4, 3256 leaves):

$$\left(b^2 x^{1-n} (e x)^{-1+2 n} \text{Csch}\left[\frac{c}{2}\right] \text{Csch}[c+d x^n]^2 \text{Sech}\left[\frac{c}{2}\right] \left(b \text{Cosh}[c]+a \text{Sinh}[d x^n]\right) \left(b+a \text{Sinh}[c+d x^n]\right)\right) \Big/ \left(2 a^2 \left(a^2+b^2\right) d n \left(a+b \text{Csch}[c+d x^n]\right)^2\right)+$$

$$\frac{b^2 x^{1-n} (e x)^{-1+2 n} \text{Coth}[c] \text{Csch}[c + d x^n]^2 (b + a \text{Sinh}[c + d x^n])^2}{a^2 (a^2 + b^2) d n (a + b \text{Csch}[c + d x^n])^2} -$$

$$\left(2 b^3 x^{1-2 n} (e x)^{-1+2 n} \text{ArcTan}\left[\frac{a - b \text{Tanh}\left[\frac{1}{2} (c + d x^n)\right]}{\sqrt{-a^2 - b^2}}\right] \text{Coth}[c] \text{Csch}\left[c + d x^n\right]^2 \left(b + a \text{Sinh}\left[c + d x^n\right]\right)^2\right) \Big/$$

$$\left(a^2 \sqrt{-a^2 - b^2} (a^2 + b^2) d^2 n \left(a + b \text{Csch}\left[c + d x^n\right]\right)^2\right) + \frac{1}{(a^2 + b^2) d^2 n (a + b \text{Csch}[c + d x^n])^2}$$

$$2 b x^{1-2 n} (e x)^{-1+2 n} \text{Csch}\left[c + d x^n\right]^2 \left(\frac{i \pi \text{ArcTanh}\left[\frac{-a+b \text{Tanh}\left[\frac{1}{2} (c+d x^n)\right]}{\sqrt{a^2+b^2}}\right]}{\sqrt{a^2 + b^2}} + \right.$$

$$\frac{1}{\sqrt{-a^2 - b^2}} \left(2 \left(-i c + \frac{\pi}{2} - i d x^n\right) \text{ArcTanh}\left[\frac{(-i a + b) \text{Cot}\left[\frac{1}{2} \left(-i c + \frac{\pi}{2} - i d x^n\right)\right]}{\sqrt{-a^2 - b^2}}\right] - \right.$$

$$2 \left(-i c + \text{ArcCos}\left[-\frac{i b}{a}\right]\right) \text{ArcTanh}\left[\frac{(-i a - b) \text{Tan}\left[\frac{1}{2} \left(-i c + \frac{\pi}{2} - i d x^n\right)\right]}{\sqrt{-a^2 - b^2}}\right] +$$

$$\left(\text{ArcCos}\left[-\frac{i b}{a}\right] - 2 i \left(\text{ArcTanh}\left[\frac{(-i a + b) \text{Cot}\left[\frac{1}{2} \left(-i c + \frac{\pi}{2} - i d x^n\right)\right]}{\sqrt{-a^2 - b^2}}\right] - \text{ArcTanh}\left[\right.\right.\right.$$

$$\left.\left.\left.\frac{(-i a - b) \text{Tan}\left[\frac{1}{2} \left(-i c + \frac{\pi}{2} - i d x^n\right)\right]}{\sqrt{-a^2 - b^2}}\right]\right)\right) \text{Log}\left[\frac{\sqrt{-a^2 - b^2}\, e^{-\frac{1}{2} i \left(-i c+\frac{\pi}{2}-i d x^n\right)}}{\sqrt{2} \sqrt{-i a} \sqrt{b + a \text{Sinh}[c + d x^n]}}\right] +$$

$$\left(\text{ArcCos}\left[-\frac{i b}{a}\right] + 2 i \left(\text{ArcTanh}\left[\frac{(-i a + b) \text{Cot}\left[\frac{1}{2} \left(-i c + \frac{\pi}{2} - i d x^n\right)\right]}{\sqrt{-a^2 - b^2}}\right] - \text{ArcTanh}\left[\right.\right.\right.$$

$$\left.\left.\left.\frac{(-i a - b) \text{Tan}\left[\frac{1}{2} \left(-i c + \frac{\pi}{2} - i d x^n\right)\right]}{\sqrt{-a^2 - b^2}}\right]\right)\right) \text{Log}\left[\frac{\sqrt{-a^2 - b^2}\, e^{\frac{1}{2} i \left(-i c+\frac{\pi}{2}-i d x^n\right)}}{\sqrt{2} \sqrt{-i a} \sqrt{b + a \text{Sinh}[c + d x^n]}}\right] -$$

$$\left(\text{ArcCos}\left[-\frac{i b}{a}\right] + 2 i \text{ArcTanh}\left[\frac{(-i a - b) \text{Tan}\left[\frac{1}{2} \left(-i c + \frac{\pi}{2} - i d x^n\right)\right]}{\sqrt{-a^2 - b^2}}\right]\right)$$

$$\text{Log}\left[1 - \left(i \left(b - i \sqrt{-a^2 - b^2}\right) \left(-i a + b - \sqrt{-a^2 - b^2} \text{Tan}\left[\frac{1}{2} \left(-i c + \frac{\pi}{2} - i d x^n\right)\right]\right)\right) \Big/\right.$$

$$\left.\left(a \left(-i a + b + \sqrt{-a^2 - b^2} \text{Tan}\left[\frac{1}{2} \left(-i c + \frac{\pi}{2} - i d x^n\right)\right]\right)\right)\right] +$$

$$\left(-\text{ArcCos}\left[-\frac{i b}{a}\right] + 2 i \text{ArcTanh}\left[\frac{(-i a - b) \text{Tan}\left[\frac{1}{2} \left(-i c + \frac{\pi}{2} - i d x^n\right)\right]}{\sqrt{-a^2 - b^2}}\right]\right)$$

$$\text{Log}\left[1 - \left(i \left(b + i \sqrt{-a^2 - b^2}\right) \left(-i a + b - \sqrt{-a^2 - b^2} \text{Tan}\left[\frac{1}{2} \left(-i c + \frac{\pi}{2} - i d x^n\right)\right]\right)\right) \Big/\right.$$

$$\left(a\left(-i\,a+b+\sqrt{-a^2-b^2}\;\text{Tan}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]\right)\right)\Big]+$$

$$i\left(\text{PolyLog}\Big[2,\left(i\left(b-i\sqrt{-a^2-b^2}\right)\left(-i\,a+b-\sqrt{-a^2-b^2}\;\text{Tan}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]\right)\right)\Big/\right.$$

$$\left(a\left(-i\,a+b+\sqrt{-a^2-b^2}\;\text{Tan}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]\right)\right)\Big]-$$

$$\text{PolyLog}\Big[2,\left(i\left(b+i\sqrt{-a^2-b^2}\right)\left(-i\,a+b-\sqrt{-a^2-b^2}\;\text{Tan}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]\right)\right)\Big/$$

$$\left.\left(a\left(-i\,a+b+\sqrt{-a^2-b^2}\;\text{Tan}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]\right)\right)\Big]\right)\Bigg)\Bigg)$$

$$\left(b+a\,\text{Sinh}\left[c+d\,x^n\right]\right)^2+\frac{1}{a^2\left(a^2+b^2\right)d^2\,n\left(a+b\,\text{Csch}\left[c+d\,x^n\right]\right)^2}$$

$$b^3$$
$$x^{1-2n}$$
$$(e\,x)^{-1+2n}$$
$$\text{Csch}\left[c+d\,x^n\right]^2$$

$$\left(\frac{i\,\pi\,\text{ArcTanh}\left[\frac{-a+b\,\text{Tanh}\left[\frac{1}{2}\left(c+d\,x^n\right)\right]}{\sqrt{a^2+b^2}}\right]}{\sqrt{a^2+b^2}}+\right.$$

$$\frac{1}{\sqrt{-a^2-b^2}}\left(2\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\text{ArcTanh}\left[\frac{\left(-i\,a+b\right)\text{Cot}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]-\right.$$

$$2\left(-i\,c+\text{ArcCos}\left[-\frac{i\,b}{a}\right]\right)\text{ArcTanh}\left[\frac{\left(-i\,a-b\right)\text{Tan}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]+$$

$$\left(\text{ArcCos}\left[-\frac{i\,b}{a}\right]-2\,i\left(\text{ArcTanh}\left[\frac{\left(-i\,a+b\right)\text{Cot}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]-\text{ArcTanh}\Big[\right.\right.$$

$$\left.\left.\frac{\left(-i\,a-b\right)\text{Tan}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]}{\sqrt{-a^2-b^2}}\Big]\right)\right)\text{Log}\left[\frac{\sqrt{-a^2-b^2}\;e^{-\frac{1}{2}i\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)}}{\sqrt{2}\;\sqrt{-i\,a}\;\sqrt{b+a\,\text{Sinh}\left[c+d\,x^n\right]}}\right]+$$

$$\left(\text{ArcCos}\left[-\frac{i\,b}{a}\right]+2\,i\left(\text{ArcTanh}\left[\frac{\left(-i\,a+b\right)\text{Cot}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]-\text{ArcTanh}\Big[\right.\right.$$

$$\left.\left.\frac{\left(-i\,a-b\right)\text{Tan}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]}{\sqrt{-a^2-b^2}}\Big]\right)\right)\text{Log}\left[\frac{\sqrt{-a^2-b^2}\;e^{\frac{1}{2}i\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)}}{\sqrt{2}\;\sqrt{-i\,a}\;\sqrt{b+a\,\text{Sinh}\left[c+d\,x^n\right]}}\right]-$$

$$\left(\text{ArcCos}\left[-\frac{i\,b}{a}\right]+2\,i\,\text{ArcTanh}\left[\frac{\left(-i\,a-b\right)\text{Tan}\left[\frac{1}{2}\left(-i\,c+\frac{\pi}{2}-i\,d\,x^n\right)\right]}{\sqrt{-a^2-b^2}}\right]\right)$$

$$\text{Log}\Big[1-\Big(\mathrm{i}\,\Big(b-\mathrm{i}\,\sqrt{-a^2-b^2}\Big)\,\Big(-\mathrm{i}\,a+b-\sqrt{-a^2-b^2}\;\text{Tan}\Big[\frac{1}{2}\,\Big(-\mathrm{i}\,c+\frac{\pi}{2}-\mathrm{i}\,d\,x^n\Big)\Big]\Big)\Big)\Big/$$
$$\Big(a\,\Big(-\mathrm{i}\,a+b+\sqrt{-a^2-b^2}\;\text{Tan}\Big[\frac{1}{2}\,\Big(-\mathrm{i}\,c+\frac{\pi}{2}-\mathrm{i}\,d\,x^n\Big)\Big]\Big)\Big)\Big]+$$
$$\Bigg(-\text{ArcCos}\Big[-\frac{\mathrm{i}\,b}{a}\Big]+2\,\mathrm{i}\,\text{ArcTanh}\Big[\frac{\big(-\mathrm{i}\,a-b\big)\,\text{Tan}\big[\frac{1}{2}\,\big(-\mathrm{i}\,c+\frac{\pi}{2}-\mathrm{i}\,d\,x^n\big)\big]}{\sqrt{-a^2-b^2}}\Big]\Bigg)$$
$$\text{Log}\Big[1-\Big(\mathrm{i}\,\Big(b+\mathrm{i}\,\sqrt{-a^2-b^2}\Big)\,\Big(-\mathrm{i}\,a+b-\sqrt{-a^2-b^2}\;\text{Tan}\Big[\frac{1}{2}\,\Big(-\mathrm{i}\,c+\frac{\pi}{2}-\mathrm{i}\,d\,x^n\Big)\Big]\Big)\Big)\Big/$$
$$\Big(a\,\Big(-\mathrm{i}\,a+b+\sqrt{-a^2-b^2}\;\text{Tan}\Big[\frac{1}{2}\,\Big(-\mathrm{i}\,c+\frac{\pi}{2}-\mathrm{i}\,d\,x^n\Big)\Big]\Big)\Big)\Big]+$$
$$\mathrm{i}\,\Big(\text{PolyLog}\Big[2,\,\Big(\mathrm{i}\,\Big(b-\mathrm{i}\,\sqrt{-a^2-b^2}\Big)\,\Big(-\mathrm{i}\,a+b-\sqrt{-a^2-b^2}\;\text{Tan}\Big[\frac{1}{2}\,\Big(-\mathrm{i}\,c+\frac{\pi}{2}-\mathrm{i}\,d\,x^n\Big)\Big]\Big)\Big)\Big/$$
$$\Big(a\,\Big(-\mathrm{i}\,a+b+\sqrt{-a^2-b^2}\;\text{Tan}\Big[\frac{1}{2}\,\Big(-\mathrm{i}\,c+\frac{\pi}{2}-\mathrm{i}\,d\,x^n\Big)\Big]\Big)\Big)\Big]-$$
$$\text{PolyLog}\Big[2,\,\Big(\mathrm{i}\,\Big(b+\mathrm{i}\,\sqrt{-a^2-b^2}\Big)\,\Big(-\mathrm{i}\,a+b-\sqrt{-a^2-b^2}\;\text{Tan}\Big[\frac{1}{2}\,\Big(-\mathrm{i}\,c+\frac{\pi}{2}-\mathrm{i}\,d\,x^n\Big)\Big]\Big)\Big)\Big/$$
$$\Big(a\,\Big(-\mathrm{i}\,a+b+\sqrt{-a^2-b^2}\;\text{Tan}\Big[\frac{1}{2}\,\Big(-\mathrm{i}\,c+\frac{\pi}{2}-\mathrm{i}\,d\,x^n\Big)\Big]\Big)\Big)\Big]\Big)\Bigg)\Bigg)$$

$$\big(b+a\,\text{Sinh}\big[c+d\,x^n\big]\big)^2+\Big(x^{1-n}\,(e\,x)^{-1+2\,n}\,\text{Csch}\Big[\frac{c}{2}\Big]\,\text{Csch}\big[c+d\,x^n\big]^2$$
$$\text{Sech}\Big[\frac{c}{2}\Big]$$
$$\big(-2\,b^2\,\text{Cosh}[c]+a^2\,d\,x^n\,\text{Sinh}[c]+b^2\,d\,x^n\,\text{Sinh}[c]\big)$$
$$\big(b+a\,\text{Sinh}\big[c+d\,x^n\big]\big)^2\Big)\Big/\Big(4$$
$$a^2$$
$$\big(a^2+b^2\big)$$
$$d$$
$$n$$
$$\big(a+b\,\text{Csch}\big[c+d\,x^n\big]\big)^2\Big)-\Bigg(b^2$$
$$x^{1-2\,n}$$
$$(e\,x)^{-1+2\,n}$$
$$\text{Csch}[c]$$
$$\text{Csch}\big[c+d\,x^n\big]^2$$
$$\Bigg(-a\,d\,x^n\,\text{Cosh}[c]+a\,\text{Log}\big[b+a\,\text{Cosh}\big[d\,x^n\big]\,\text{Sinh}[c]+a\,\text{Cosh}[c]\,\text{Sinh}\big[d\,x^n\big]\big]\,\text{Sinh}[c]+$$

$$\left.\frac{2\,a\,b\,\text{ArcTan}\left[\frac{a\,\text{Cosh}[c]+(-b+a\,\text{Sinh}[c])\,\text{Tanh}\left[\frac{d\,x^n}{2}\right]}{\sqrt{-b^2-a^2\,\text{Cosh}[c]^2+a^2\,\text{Sinh}[c]^2}}\right]\text{Cosh}[c]}{\sqrt{-b^2-a^2\,\text{Cosh}[c]^2+a^2\,\text{Sinh}[c]^2}}\right)$$

$$\left.(b+a\,\text{Sinh}[c+d\,x^n])^2\right)\Big/\Big(a\,(a^2+b^2)$$

$$d^2$$
$$n$$
$$(a+b\,\text{Csch}[c+d\,x^n])^2$$
$$\left(-a^2\,\text{Cosh}[c]^2+a^2\,\text{Sinh}[c]^2\right)\Big)$$

Problem 83: Attempted integration timed out after 120 seconds.

$$\int\frac{(e\,x)^{-1+3\,n}}{(a+b\,\text{Csch}[c+d\,x^n])^2}\,dx$$

Optimal (type 4, 1218 leaves, 32 steps):

$$\frac{(e x)^{3 n}}{3 a^2 e n}-\frac{b^2 x^{-n} (e x)^{3 n}}{a^2 \left(a^2+b^2\right) d e n}+\frac{2 b^2 x^{-2 n} (e x)^{3 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right) d^2 e n}+$$

$$\frac{b^3 x^{-n} (e x)^{3 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right)^{3/2} d e n}-\frac{2 b x^{-n} (e x)^{3 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \sqrt{a^2+b^2} d e n}+$$

$$\frac{2 b^2 x^{-2 n} (e x)^{3 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right) d^2 e n}-\frac{b^3 x^{-n} (e x)^{3 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right)^{3/2} d e n}+$$

$$\frac{2 b x^{-n} (e x)^{3 n} \text{Log}\left[1+\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \sqrt{a^2+b^2} d e n}+\frac{2 b^2 x^{-3 n} (e x)^{3 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right) d^3 e n}+$$

$$\frac{2 b^3 x^{-2 n} (e x)^{3 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right)^{3/2} d^2 e n}-\frac{4 b x^{-2 n} (e x)^{3 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \sqrt{a^2+b^2} d^2 e n}+$$

$$\frac{2 b^2 x^{-3 n} (e x)^{3 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right) d^3 e n}-\frac{2 b^3 x^{-2 n} (e x)^{3 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right)^{3/2} d^2 e n}+$$

$$\frac{4 b x^{-2 n} (e x)^{3 n} \text{PolyLog}\left[2,-\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \sqrt{a^2+b^2} d^2 e n}-\frac{2 b^3 x^{-3 n} (e x)^{3 n} \text{PolyLog}\left[3,-\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right)^{3/2} d^3 e n}+$$

$$\frac{4 b x^{-3 n} (e x)^{3 n} \text{PolyLog}\left[3,-\frac{a e^{c+d x^n}}{b-\sqrt{a^2+b^2}}\right]}{a^2 \sqrt{a^2+b^2} d^3 e n}+\frac{2 b^3 x^{-3 n} (e x)^{3 n} \text{PolyLog}\left[3,-\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \left(a^2+b^2\right)^{3/2} d^3 e n}-$$

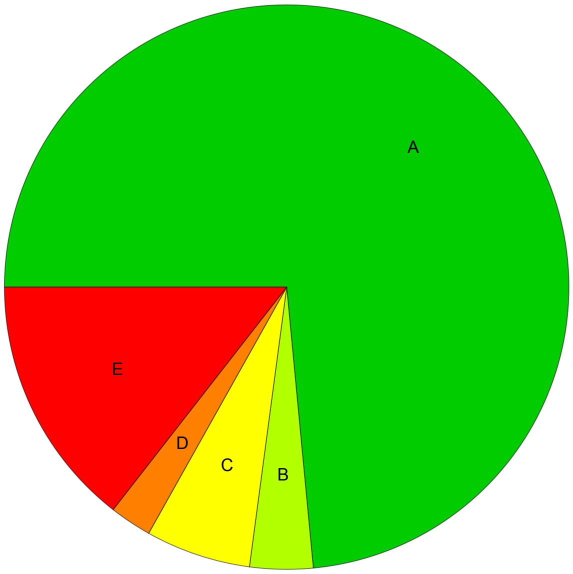
$$\frac{4 b x^{-3 n} (e x)^{3 n} \text{PolyLog}\left[3,-\frac{a e^{c+d x^n}}{b+\sqrt{a^2+b^2}}\right]}{a^2 \sqrt{a^2+b^2} d^3 e n}-\frac{b^2 x^{-n} (e x)^{3 n} \text{Cosh}\left[c+d x^n\right]}{a \left(a^2+b^2\right) d e n \left(b+a \text{Sinh}\left[c+d x^n\right]\right)}$$

Result (type 1, 1 leaves):

???

Summary of Integration Test Results

83 integration problems



A - 61 optimal antiderivatives

B - 3 more than twice size of optimal antiderivatives

C - 5 unnecessarily complex antiderivatives

D - 2 unable to integrate problems

E - 12 integration timeouts