Mathematica 11.3 Integration Test Results

Test results for the 84 problems in "4.6.11 (e x)^m (a+b csc(c+d x^n))^p.m"

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

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

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

$$\frac{a x^2}{2} - \frac{b \operatorname{ArcTanh}\left[\operatorname{Cos}\left[c + d x^2\right]\right]}{2 d}$$

Result (type 3, 57 leaves):

$$\frac{a x^2}{2} - \frac{b \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x^2}{2}\right]\right]}{2 d} + \frac{b \operatorname{Log}\left[\operatorname{Sin}\left[\frac{c}{2} + \frac{d x^2}{2}\right]\right]}{2 d}$$

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

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

Optimal (type 4, 125 leaves, 10 steps):

$$\frac{a^2 x^4}{4} - \frac{2 a b x^2 \operatorname{ArcTanh}\left[e^{i \left(c+d x^2\right)}\right]}{d} - \frac{b^2 x^2 \operatorname{Cot}\left[c + d x^2\right]}{2 d} + \frac{b^2 \operatorname{Log}\left[\operatorname{Sin}\left[c + d x^2\right]\right]}{2 d^2} + \frac{i a b \operatorname{PolyLog}\left[2, -e^{i \left(c+d x^2\right)}\right]}{d^2} - \frac{i a b \operatorname{PolyLog}\left[2, e^{i \left(c+d x^2\right)}\right]}{d^2}$$

Result (type 4, 590 leaves):

$$\frac{b^2 x^2 \operatorname{Cot}[c]\,\left(a+b\operatorname{Csc}[c+d x^2]\right)^2 \operatorname{Sin}[c+d x^2]^2}{2 d\,\left(b+a\operatorname{Sin}[c+d x^2]\right)^2}+$$

$$\left(x^2 \operatorname{Csc}\left[\frac{c}{2}\right]\left(a+b\operatorname{Csc}[c+d x^2]\right)^2 \operatorname{Sec}\left[\frac{c}{2}\right]\left(-2 b^2 \operatorname{Cos}[c]+a^2 d x^2 \operatorname{Sin}[c]\right)\operatorname{Sin}[c+d x^2]^2\right)\Big/$$
$$\left(8 d\,\left(b+a\operatorname{Sin}[c+d x^2]\right)^2\right)+$$
$$\left(b^2 \operatorname{Csc}[c]\,\left(a+b\operatorname{Csc}[c+d x^2]\right)^2\left(-d x^2 \operatorname{Cos}[c]+\operatorname{Log}\left[\operatorname{Cos}[d x^2]\operatorname{Sin}[c]+\operatorname{Cos}[c]\operatorname{Sin}[d x^2]\right]\operatorname{Sin}[c]\right)\right.$$
$$\left.\operatorname{Sin}[c+d x^2]^2\right)\Big/\left(2 d^2\left(\operatorname{Cos}[c]^2+\operatorname{Sin}[c]^2\right)\left(b+a\operatorname{Sin}[c+d x^2]\right)^2\right)+$$
$$\left(b^2 x^2 \operatorname{Csc}\left[\frac{c}{2}\right]\operatorname{Csc}\left[\frac{c}{2}+\frac{d x^2}{2}\right]\left(a+b\operatorname{Csc}[c+d x^2]\right)^2 \operatorname{Sin}\left[\frac{d x^2}{2}\right]\operatorname{Sin}[c+d x^2]^2\right)\Big/$$
$$\left(4 d\,\left(b+a\operatorname{Sin}[c+d x^2]\right)^2\right)+$$
$$\left(b^2 x^2 \left(a+b\operatorname{Csc}[c+d x^2]\right)^2 \operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{d x^2}{2}\right]\operatorname{Sin}\left[\frac{d x^2}{2}\right]\operatorname{Sin}[c+d x^2]^2\right)\Big/$$
$$\left(4 d\,\left(b+a\operatorname{Sin}[c+d x^2]\right)^2\right)+\left(a b\,\left(a+b\operatorname{Csc}[c+d x^2]\right)^2 \operatorname{Sin}[c+d x^2]^2\right.$$
$$\left(-\frac{2\operatorname{ArcTan}[\operatorname{Tan}[c]]\operatorname{ArcTanh}\left[\frac{-\operatorname{Cos}[c]+\operatorname{Sin}[c]\operatorname{Tan}\left[\frac{d x^2}{2}\right]}{\sqrt{\operatorname{Cos}[c]^2+\operatorname{Sin}[c]^2}}\right]}{\sqrt{\operatorname{Cos}[c]^2+\operatorname{Sin}[c]^2}}+\frac{1}{\sqrt{1+\operatorname{Tan}[c]^2}}\right.$$
$$\left(\left(d x^2+\operatorname{ArcTan}[\operatorname{Tan}[c]]\right)\left(\operatorname{Log}\left[1-e^{i\,(d x^2+\operatorname{ArcTan}[\operatorname{Tan}[c]])}\right]-\operatorname{Log}\left[1+e^{i\,(d x^2+\operatorname{ArcTan}[\operatorname{Tan}[c]])}\right]\right)+\right.$$
$$\left.i\left(\operatorname{PolyLog}\left[2,-e^{i\,(d x^2+\operatorname{ArcTan}[\operatorname{Tan}[c]])}\right]-\operatorname{PolyLog}\left[2,e^{i\,(d x^2+\operatorname{ArcTan}[\operatorname{Tan}[c]])}\right]\right)\right)$$
$$\left.\left.\operatorname{Sec}[c]\right)\right)\Big/\left(d^2\left(b+a\operatorname{Sin}[c+d x^2]\right)^2\right)$$

Problem 18: Result more than twice size of optimal antiderivative.

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

Optimal (type 4, 271 leaves, 11 steps):

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

Result (type 4, 1104 leaves):

$$\frac{x^4 \operatorname{Csc}\left[c+d x^2\right]\left(b+a \operatorname{Sin}\left[c+d x^2\right]\right)}{4 a\left(a+b \operatorname{Csc}\left[c+d x^2\right]\right)}-$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$\int \frac{\text{Csc}\big[\sqrt{x}\big]^3}{\sqrt{x}}\,dx$$

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

$$-\text{ArcTanh}\Big[\text{Cos}\big[\sqrt{x}\big]\Big]-\text{Cot}\big[\sqrt{x}\big]\ \text{Csc}\big[\sqrt{x}\big]$$

Result (type 3, 57 leaves):

$$-\frac{1}{4}\text{Csc}\Big[\frac{\sqrt{x}}{2}\Big]^2-\text{Log}\Big[\text{Cos}\Big[\frac{\sqrt{x}}{2}\Big]\Big]+\text{Log}\Big[\text{Sin}\Big[\frac{\sqrt{x}}{2}\Big]\Big]+\frac{1}{4}\text{Sec}\Big[\frac{\sqrt{x}}{2}\Big]^2$$

Problem 75: Unable to integrate problem.

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

Optimal (type 4, 221 leaves, 11 steps):

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

Result (type 8, 24 leaves):

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

Problem 77: Result more than twice size of optimal antiderivative.

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

Optimal (type 4, 214 leaves, 11 steps):

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

Result (type 4, 687 leaves):

$$\frac{b^2 x^{1-n} (e x)^{-1+2n} \text{Cot}[c] \left(a+b \text{Csc}[c+d x^n]\right)^2 \text{Sin}[c+d x^n]^2}{d n \left(b+a \text{Sin}[c+d x^n]\right)^2}+\left(x^{1-n} (e x)^{-1+2n} \text{Csc}\left[\frac{c}{2}\right] \left(a+b \text{Csc}[c+d x^n]\right)^2 \text{Sec}\left[\frac{c}{2}\right] \left(-2 b^2 \text{Cos}[c]+a^2 d x^n \text{Sin}[c]\right) \text{Sin}[c+d x^n]^2\right) \Big/ \left(4 d n \left(b+a \text{Sin}[c+d x^n]\right)^2\right)+\left(b^2 x^{1-2n} (e x)^{-1+2n} \text{Csc}[c] \left(a+b \text{Csc}[c+d x^n]\right)^2 \left(-d x^n \text{Cos}[c]+\text{Log}\left[\text{Cos}[d x^n] \text{Sin}[c]+\text{Cos}[c] \text{Sin}[d x^n]\right] \text{Sin}[c]\right) \text{Sin}[c+d x^n]^2\right) \Big/ \left(d^2 n \left(\text{Cos}[c]^2+\text{Sin}[c]^2\right) \left(b+a \text{Sin}[c+d x^n]\right)^2\right)+\left(b^2 x^{1-n} (e x)^{-1+2n} \text{Csc}\left[\frac{c}{2}\right] \text{Csc}\left[\frac{c}{2}+\frac{d x^n}{2}\right] \left(a+b \text{Csc}[c+d x^n]\right)^2 \text{Sin}\left[\frac{d x^n}{2}\right] \text{Sin}[c+d x^n]^2\right) \Big/ \left(2 d n \left(b+a \text{Sin}[c+d x^n]\right)^2\right)+\left(b^2 x^{1-n} (e x)^{-1+2n} \left(a+b \text{Csc}[c+d x^n]\right)^2 \text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x^n}{2}\right] \text{Sin}\left[\frac{d x^n}{2}\right] \text{Sin}[c+d x^n]^2\right) \Big/ \left(2 d n \left(b+a \text{Sin}[c+d x^n]\right)^2\right)+\left(2 a b x^{1-2n} (e x)^{-1+2n} \left(a+b \text{Csc}[c+d x^n]\right)^2 \text{Sin}[c+d x^n]^2 \left(-\frac{2 \text{ArcTan}[\text{Tan}[c]] \text{ArcTanh}\left[\frac{-\text{Cos}[c]+\text{Sin}[c] \text{Tan}\left[\frac{d x^n}{2}\right]}{\sqrt{\text{Cos}[c]^2+\text{Sin}[c]^2}}\right]}{\sqrt{\text{Cos}[c]^2+\text{Sin}[c]^2}}+\frac{1}{\sqrt{1+\text{Tan}[c]^2}}\left(\left(d x^n+\text{ArcTan}[\text{Tan}[c]]\right) \left(\text{Log}\left[1-e^{i (d x^n+\text{ArcTan}[\text{Tan}[c]])}\right]-\text{Log}\left[1+e^{i (d x^n+\text{ArcTan}[\text{Tan}[c]])}\right]\right)+i \left(\text{PolyLog}\left[2,-e^{i (d x^n+\text{ArcTan}[\text{Tan}[c]])}\right]-\text{PolyLog}\left[2,e^{i (d x^n+\text{ArcTan}[\text{Tan}[c]])}\right]\right)\right) \text{Sec}[c]\right)\right) \Big/ \left(d^2 n \left(b+a \text{Sin}[c+d x^n]\right)^2\right)$$

Problem 78: Unable to integrate problem.

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

Optimal (type 4, 377 leaves, 16 steps):

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

Result (type 8, 26 leaves):

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

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

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

Optimal (type 4, 338 leaves, 12 steps):

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

Result (type 4, 1131 leaves):

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Problem 81: Unable to integrate problem.

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

Optimal (type 4, 499 leaves, 14 steps):

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

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

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

Result (type 8, 26 leaves):

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

Problem 83: Result more than twice size of optimal antiderivative.

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

Optimal (type 4, 778 leaves, 23 steps):

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

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

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

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

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

Result (type 4, 2850 leaves):

$$-\left(\left(b^2 x^{1-n} (e x)^{-1+2 n} \text{Csc}\left[\frac{c}{2}\right] \text{Csc}\left[c+d x^n\right]^2 \text{Sec}\left[\frac{c}{2}\right] \left(b \text{Cos}[c]+a \text{Sin}\left[d x^n\right]\right) \left(b+a \text{Sin}\left[c+d x^n\right]\right)\right)\Big/\right.$$

$$\left.\left(2 a^2 (-a+b) (a+b) d n \left(a+b \text{Csc}\left[c+d x^n\right]\right)^2\right)\right)-$$

$$\frac{b^2 x^{1-n} (e x)^{-1+2 n} \mathrm{Cot}[c] \mathrm{Csc}[c + d x^n]^2 \left(b + a \mathrm{Sin}[c + d x^n]\right)^2}{a^2 \left(-a^2 + b^2\right) d n \left(a + b \mathrm{Csc}[c + d x^n]\right)^2} -$$

$$\left(2 b^3 x^{1-2 n} (e x)^{-1+2 n} \mathrm{ArcTan}\left[\frac{a \mathrm{Cos}[c + d x^n] + i \left(b + a \mathrm{Sin}[c + d x^n]\right)}{\sqrt{-a^2 + b^2}}\right] \mathrm{Cot}[c] \mathrm{Csc}\left[c + d x^n\right]^2 \left(b + a \mathrm{Sin}\left[c + d x^n\right]\right)^2\right) \Big/ \left(a^2 \left(a^2 - b^2\right) \sqrt{-a^2 + b^2}\, d^2 n \left(a + b \mathrm{Csc}\left[c + d x^n\right]\right)^2\right) -$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$\mathrm{Sec}\left[\frac{c}{2}\right]$$

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

$$\left.\left(b+a\,\mathrm{Sin}\left[c+d\,x^n\right]\right)^2\right)\Big/\Big(4$$

$$a^2$$

$$(a-b)$$

$$(a+b)$$

$$d$$

$$n$$

$$\left.\left(a+b\,\mathrm{Csc}\left[c+d\,x^n\right]\right)^2\right)+\Bigg(b^2$$

$$x^{1-2\,n}$$

$$(e\,x)^{-1+2\,n}$$

$$\mathrm{Csc}[c]$$

$$\mathrm{Csc}\left[c+d\,x^n\right]^2$$

$$\Bigg(-a\,d\,x^n\,\mathrm{Cos}[c]+a\,\mathrm{Log}\left[b+a\,\mathrm{Cos}\left[d\,x^n\right]\,\mathrm{Sin}[c]+a\,\mathrm{Cos}[c]\,\mathrm{Sin}\left[d\,x^n\right]\right]\,\mathrm{Sin}[c]+$$

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

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

$$d^2$$
$$n$$
$$\left(a+b\,\text{Csc}\left[c+d\,x^n\right]\right)^2$$
$$\left.\left(a^2\,\text{Cos}[c]^2+a^2\,\text{Sin}[c]^2\right)\right)$$

Problem 84: Unable to integrate problem.

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

Optimal (type 4, 1417 leaves, 32 steps):

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

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

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

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

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

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

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

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

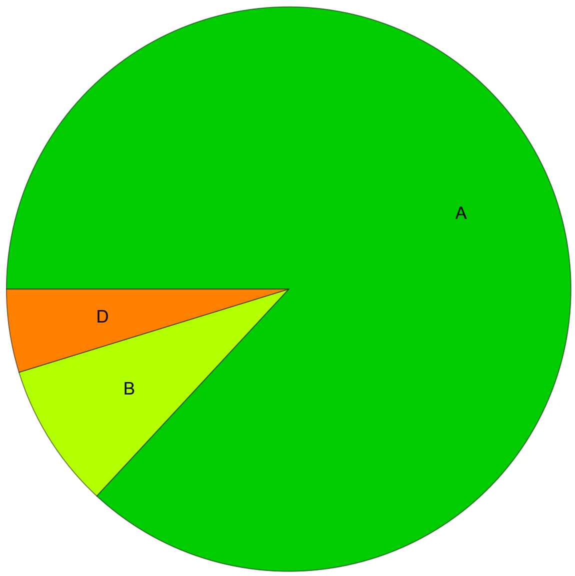
$$\frac{4 i b x^{-3n} (e x)^{3n} \operatorname{PolyLog}\left[3,\frac{i a e^{i (c+d x^n)}}{b+\sqrt{-a^2+b^2}}\right]}{a^2 \sqrt{-a^2+b^2}\, d^3 e n}-\frac{b^2 x^{-n} (e x)^{3n} \operatorname{Cos}[c+d x^n]}{a (a^2-b^2) d e n (b+a \operatorname{Sin}[c+d x^n])}$$

Result (type 8, 26 leaves):

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

Summary of Integration Test Results

84 integration problems



A - 73 optimal antiderivatives

B - 7 more than twice size of optimal antiderivatives

C - 0 unnecessarily complex antiderivatives

D - 4 unable to integrate problems

E - 0 integration timeouts