Mathematica 11.3 Integration Test Results

Test results for the 70 problems in "4.6.0 (a csc)^m (b trg)^n.m"

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

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

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

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

Result (type 3, 38 leaves):

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

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

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

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

$$-\frac{\text{ArcTanh}[\text{Cos}[a+b\,x]]}{2\,b}-\frac{\text{Cot}[a+b\,x]\,\text{Csc}[a+b\,x]}{2\,b}$$

Result (type 3, 75 leaves):

$$-\frac{\text{Csc}\left[\frac{1}{2}\,(a+b\,x)\right]^2}{8\,b}-\frac{\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(a+b\,x)\right]\right]}{2\,b}+\frac{\text{Log}\left[\text{Sin}\left[\frac{1}{2}\,(a+b\,x)\right]\right]}{2\,b}+\frac{\text{Sec}\left[\frac{1}{2}\,(a+b\,x)\right]^2}{8\,b}$$

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

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

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

$$-\frac{3\,\text{ArcTanh}[\text{Cos}[a+b\,x]]}{8\,b}-\frac{3\,\text{Cot}[a+b\,x]\,\text{Csc}[a+b\,x]}{8\,b}-\frac{\text{Cot}[a+b\,x]\,\text{Csc}[a+b\,x]^3}{4\,b}$$

Result (type 3, 113 leaves):

$$-\frac{3\,\text{Csc}\left[\frac{1}{2}\,(a+b\,x)\right]^2}{32\,b}-\frac{\text{Csc}\left[\frac{1}{2}\,(a+b\,x)\right]^4}{64\,b}-\frac{3\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(a+b\,x)\right]\right]}{8\,b}+\frac{3\,\text{Log}\left[\text{Sin}\left[\frac{1}{2}\,(a+b\,x)\right]\right]}{8\,b}+\frac{3\,\text{Sec}\left[\frac{1}{2}\,(a+b\,x)\right]^2}{32\,b}+\frac{\text{Sec}\left[\frac{1}{2}\,(a+b\,x)\right]^4}{64\,b}$$

Problem 41: Result more than twice size of optimal antiderivative.

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

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

$$-\frac{1}{2}\,\text{ArcSinh}[\text{Cot}[x]]-\frac{1}{2}\,\text{Cot}[x]\,\sqrt{\text{Csc}[x]^2}$$

Result (type 3, 51 leaves):

$$\frac{1}{8}\,\sqrt{\text{Csc}[x]^2}\,\left(-\text{Csc}\left[\frac{x}{2}\right]^2-4\,\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]\right]+4\,\text{Log}\left[\text{Sin}\left[\frac{x}{2}\right]\right]+\text{Sec}\left[\frac{x}{2}\right]^2\right)\,\text{Sin}[x]$$

Problem 42: Result more than twice size of optimal antiderivative.

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

Optimal (type 3, 5 leaves, 2 steps):

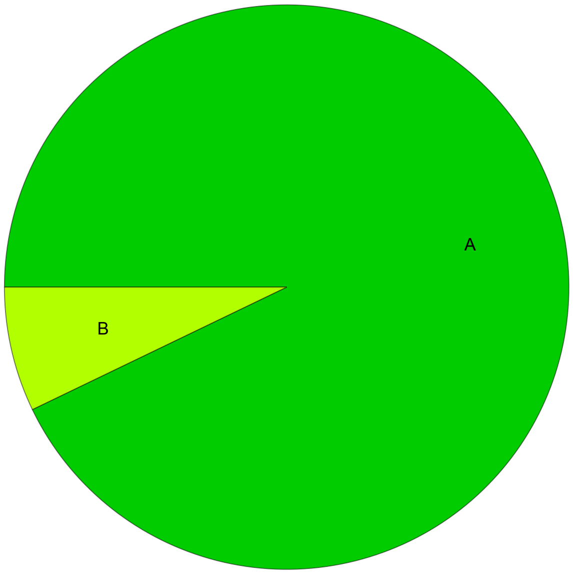
$$-\text{ArcSinh}[\text{Cot}[x]]$$

Result (type 3, 28 leaves):

$$\sqrt{\text{Csc}[x]^2}\,\left(-\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]\right]+\text{Log}\left[\text{Sin}\left[\frac{x}{2}\right]\right]\right)\,\text{Sin}[x]$$

Summary of Integration Test Results

70 integration problems



A - 65 optimal antiderivatives

B - 5 more than twice size of optimal antiderivatives

C - 0 unnecessarily complex antiderivatives

D - 0 unable to integrate problems

E - 0 integration timeouts