

2017 Integration Bee

Society for Undergraduate Mathematics Students

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Figure: May the odds be ever in your favor



Integral Calisthenics



$$\int \sin x + \cos x + \csc x + \sec x \, dx$$



$$\int \frac{(9^3 + 10^3)x^{1728}}{\sin^2 x + \cos^2 x} dx$$



$$\int \frac{x+1}{x^2+2x+3} dx$$



$$\int \frac{x^{2017} \, dx}{(x^{2018} + \pi^{2018})}$$



$$\int e^{e^x} e^x dx$$



$$\int \sin(\sin x) \cos x \, dx$$



$$\int \sin(x) \cos(x) \cot(x) \tan(x) \, dx$$



$$\int 5x \sqrt{49 - 4x^2} \, dx$$



$$\int \cos^3(x) \sin(x) \, dx$$



$$\int \sin^2(\sin(x)) \cos(x) \, dx$$



$$\int \frac{4x + 6}{2x^2 + 5x - 3} dx$$



$$\int \frac{\cos(\ln(x))}{x} dx$$



$$\int \sin^2(x) \, dx$$



$$\int x e^x \, dx$$



$$\int \frac{2x^2 + 3}{x - 2} dx$$



$$\int x \ln(x) \, dx$$



$$\int \frac{\ln (x) \, dx}{x^2}$$



$$\int_{-\pi}^{\pi} x \sin(x) \, dx$$



$$\int \frac{\cos(x)}{\sqrt{1 + 16 \sin^2(x)}} dx$$



$$\int \frac{x}{\sqrt{1+x^2}} dx$$



Intermediate Integrals



$$\int \frac{2x + 6}{x^2 + 3x + 2} dx$$



$$\int e^{12x} \sqrt{e^{12x} - \pi} \, dx$$



$$\int \frac{\ln(\ln(x))}{x} dx$$



$$\int x^3 \cos(2x) \, dx$$



$$\int \frac{14 - 7x}{2x^2 + 5x - 3} dx$$



$$\int \sin(\sqrt{x})$$



$$\int \tanh x \, dx$$



$$\int \sec^8 x \tan x \, dx$$



$$\int x\sqrt{x+1} \, dx$$



$$\int \sin^2 (x) \cos^2 (x) \, dx$$



$$\int \pi^x dx$$



$$\int x^2 \ln(x) \, dx$$



Spicy Integrals



$$\int \cos x \sqrt{\sin^2 x + 1} \, dx$$



$$\int \cosh^{-1}(x) \, dx$$



$$\int \frac{x^2}{1+x^2}$$



$$\int \frac{1 + \sin x}{1 + \cos x}$$



$$\int \frac{1}{1-x+x^2}$$



$$\int_{-2017}^{2017} \sin \left(\sqrt[3]{x} \right) dx$$



$$\int \frac{1}{1 + e^x} dx$$



$$\int (1 + 2x^2)e^{x^2} dx$$



$$\int \frac{e^{ix}}{x^2 + 1} dx$$



$$\int x(1-x)^{2017}$$



$$\int_{-\pi}^{\pi} \frac{x^3 - 2x}{\sqrt{x^4 + 1}}$$



$$\int \frac{1}{x(x^5 + 1)} dx$$



Challenge



$$\int \sinh x \sin x \, dx$$



$$\int_{-\infty}^{\infty} \frac{1}{x^4 + 4} dx$$



$$\int \frac{\ln x \cos x - \frac{1}{x} \sin x}{\ln^2 x} dx$$



$$\int_{-\infty}^{\infty} \frac{1}{1+x^2} dx$$



$$\int_0^{\infty} \frac{3\sqrt{3}}{1+x^3} dx$$

