

ILLINOIS INTEGRATION BEE

April 18, 2015

Problems

- $\int_0^1 x(1-x)^{2015} dx$
- $\int \frac{1}{x^2 + 4x + 5} dx$
- $\int_0^{\frac{\pi}{2}} \sin^2(x) dx$
- $\int \frac{e^{\arctan(2x)}}{5 + 20x^2} dx$
- $\int \frac{3x - 2}{x^2 + 1} dx$
- $\int \cos(\sqrt{x}) dx$
- $\int \ln(3x^2 + 6x + 3) - 2 \ln(x + 1) dx$
- $\int_{-1}^1 \frac{x^{2015}}{^{2015}\sqrt{1-x} + ^{2015}\sqrt{1+x}} dx$
- $\int \frac{dx}{x^2 \sqrt{x^2 + 25}} dx$
- $\int \frac{e^{2x}}{1 + e^{4x}} dx$
- $\int_0^{\pi} \cos^4(x) dx$
- $\int_{-2015}^{2015} \lfloor x \rfloor dx$
- $\int_0^1 \frac{x + 1}{\sqrt[3]{x + 1}} dx$
- $\int_1^7 \sqrt{(7-x)(x-1)} dx$
- $\int_0^1 \ln(x^2 + 1) dx$
- $\int \left(\frac{1}{\ln(x)} - \frac{1}{(\ln(x))^2} \right) dx$
- $\int_0^{\infty} 2^{-\lfloor x \rfloor} dx$
- $\int (1 - 4x^2)e^{-2x^2} dx$
- $\int \frac{5 \sin(x)}{\cos(x) + 2 \sin(x)} dx$
- $\int \frac{x + \sin x - \cos x - 1}{x + e^x + \sin x} dx$

**** Turn page for answers ****

Answers

- $\frac{1}{(2016)(2017)} = \frac{1}{4066272}$
- $\arctan(x + 2)$
- $\frac{\pi}{4}$
- $\frac{e^{\arctan(2x)}}{10}$
- $\frac{3}{2} \ln(x^2 + 1) - 2 \arctan(x)$
- $2 \cos(\sqrt{x}) + 2\sqrt{x} \sin(\sqrt{x})$
- $(\ln 3)x$
- 0
- $-\frac{\sqrt{25 + x^2}}{25x}$
- $\frac{1}{2} \arctan e^{2x}$
- $\frac{3\pi}{8}$
- 2015
- $\frac{17}{20}$
- $\frac{9\pi}{2}$
- $-2 + \frac{\pi}{2} + \ln(2)$
- $\frac{x}{\ln(x)}$
- 2
- xe^{-2x^2}
- $2x - \ln(2 \sin(x) + \cos(x))$
- $x - \ln(x + e^x + \sin(x))$