

INTEGRAL 1

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

$$\boldsymbol{I} = ex + c$$

INTEGRAL 2

$$\int \frac{-x^3 \cos x + 3x^2 \sin x + 2x^2 \cos x - 4x \sin x}{\sin^2 x} dx$$

$$I = \frac{x^3 - 2x^2}{\sin x} + c$$

INTEGRAL 3

Find the area under the locus:

$$\arg(z - 2) - \arg(z + 2) = \frac{\pi}{6}$$

Note $z = x + iy$

$$A = \frac{40\pi}{3} + 4\sqrt[2]{3}$$

INTEGRAL 4

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

By method of partial fractions

$$I = \frac{i}{2} \log_e \left(\frac{x + i}{x - i} \right)$$

INTEGRAL 5

$$y = \sum_{n=0}^{\infty} \frac{x^n}{n!}$$

By finding

$$\frac{dy}{dx}$$

Show that:

$$y = e^x$$

INTEGRAL 6

$$\int_0^4 [x] \sin x dx$$

Note that $[x]$ takes any real x , and rounds down to the next integer

$$I = \cos 1 + \cos 2 + \cos 3 - 3 \cos 4$$