

Answer on Question #46131 – Math – Integral Calculus

Integrate with respect to x :

$$\int_{-1}^2 \frac{x^2}{(x^3 + 4)^2} dx$$

Solution:

We'll make a substitution $t = x^3 + 4$:

$$\begin{aligned} \int_{-1}^2 \frac{x^2}{(x^3 + 4)^2} dx &= \left| \begin{array}{l} t = x^3 + 4 \\ dt = 3x^2 dx \\ t(x = -1) = 3 \\ t(x = 2) = 12 \end{array} \right| = \frac{1}{3} \int_{-1}^2 \frac{3x^2 dx}{(x^3 + 4)^2} = \frac{1}{3} \int_3^{12} \frac{dt}{t^2} = \frac{1}{3} \left(-\frac{1}{t} \right) \Big|_{t=3}^{t=12} \\ &= -\frac{1}{3} \left(\frac{1}{12} - \frac{1}{3} \right) = -\frac{1}{3} \left(-\frac{3}{12} \right) = \frac{1}{12} \end{aligned}$$

Answer: 1/12