

Question #50930, Math, Integral Calculus

Integrate with respect to x :

$$\int 2-1x2(x3+4)2dx$$

Solution:

a) If this $\int 2-1x2(x3+4)2dx$ means Integrate with respect to x :

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

Then

$$\begin{aligned}\int \frac{1}{2}x^2(x^3 + 4)^2 dx &= \frac{1}{2 * 3} \int (x^3 + 4)^2 d(x^3) = \frac{1}{6} \int (x^3 + 4)^2 d(x^3 + 4) \\ &= \frac{(x^3 + 4)^3}{6 * 3} + C\end{aligned}$$

Where C is arbitrary constant. Here we use that $\int x^\alpha dx = \frac{x^{\alpha+1}}{\alpha+1} + C$ for all $\alpha \neq -1$.

b) If this $\int 2-1x2(x3+4)2dx$ means Integrate with respect to x :

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

Then

$$\begin{aligned}\int_{-1}^2 x^2(x^3 + 4)^2 dx &= \frac{1}{3} \int_{-1}^2 (x^3 + 4)^2 d(x^3) = \frac{1}{3} \int_{-1}^2 (x^3 + 4)^2 d(x^3 + 4) = \frac{(x^3 + 4)^3}{9} \Big|_{-1}^2 \\ &= \frac{(2^3 + 4)^3}{9} - \frac{((-1)^3 + 4)^3}{9} = \frac{12^3}{9} - \frac{3^3}{9} = 24 - 3 = \mathbf{21}\end{aligned}$$