

# Review: Integrals

Monday, January 8, 2018 11:05 AM

$$\int x^3 dx = \frac{x^4}{4} + C$$

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

$$\begin{aligned} \text{let } u &= x^2+1 \\ du &= 2x dx \end{aligned}$$

$$= \int \frac{du}{u^3}$$

$$= \int u^{-3} du$$

$$= \frac{u^{-2}}{-2} + C$$

$$= \frac{(x^2+1)^{-2}}{-2} + C$$

$$= -\frac{1}{2(x^2+1)^2} + C$$

} either

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notation for definite integrals with substitution:

$$\int_2^3 x e^{x^2} dx$$

$$\begin{aligned} u &= x^2 \\ du &= 2x dx \\ \frac{du}{2} &= x dx \end{aligned}$$

$$= \int_4^9 e^u \frac{du}{2}$$

$$= \left. \frac{e^u}{2} \right|_4^9$$

$$= \frac{e^9}{2} - \frac{e^4}{2}$$

$$= \int_{x=2}^{x=3} e^u \frac{du}{2}$$

$$= \left. \frac{e^u}{2} \right|_{x=2}^{x=3}$$

$$= \left. \frac{e^{x^2}}{2} \right|_2^3$$

$$= \frac{e^9}{2} - \frac{e^4}{2}$$