Integración por partes

Byte Planet

$$\int x^2 \ln x \, dx$$

$$\int u\,dv = uv - \int v\,du$$

$u = \ln x$ $\quad du = \frac{1}{x}dx$

$dv = x^2 dx$ $\quad v = \frac{x^3}{3}$

$$\int x^2 \ln x \, dx = \ln x \frac{x^3}{3} - \int \frac{x^3}{3} \frac{1}{x} dx$$

$$= \ln x \frac{x^3}{3} - \int \frac{1}{3} \frac{x^3}{x} dx$$

$$= \ln x \frac{x^3}{3} - \frac{1}{3} \int \frac{x^3}{x} dx$$

$$= \ln x \frac{x^3}{3} - \frac{1}{3} \int x^2 dx$$

$$= \ln x \frac{x^3}{3} - \frac{1}{3} \left[\frac{x^3}{3} \right] + C$$

$$= \frac{\ln(x) x^3}{3} - \frac{x^3}{9} + C$$

$$* \int x^n dx = \frac{x^{n+1}}{n+1}$$