

**Answer to question # 50940**

**Integrate with respect to x :**

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

**Solution**

To do this integral we'll use the following substitution

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

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

$$\begin{aligned} I &= \int u dv = uv - \int v du = \frac{x^3}{3} \ln x - \int \frac{x^3}{3} \frac{dx}{x} = \frac{x^3}{3} \ln x - \frac{1}{3} \int x^2 dx = \frac{x^3}{3} \ln x - \frac{1}{3} \left( \frac{x^3}{3} \right) + C \\ &= \frac{x^3}{3} \left( \ln x - \frac{1}{3} + C \right) \end{aligned}$$

**Answer:**

$$\frac{x^3}{3} \left( \ln x - \frac{1}{3} + C \right)$$