

$$3. \int (x^2 \ln x) dx$$

$$= \int (\underbrace{\ln x}_u \underbrace{x^2 dx}_{dv})$$

"uv - $\int v du$ "

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

$$\underline{dv = x^2 dx}$$

$$v = \int x^2 dx$$

$$v = \frac{1}{3} x^3$$

$$= (\ln x) \left(\frac{1}{3} x^3 \right) - \int \frac{1}{3} x^3 \cdot \frac{1}{x} dx$$

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

$$= \frac{1}{3} x^3 \ln x - \frac{1}{3} \cdot \frac{1}{3} x^3 + C$$

$$= \left(\frac{1}{3} x^3 \ln x - \frac{1}{9} x^3 + C \right)$$