

Each problem is worth 5 points. For full credit provide complete justification for your answers.

1. Integrate $\int 5x \cos x \, dx$.

$$u = 5x \quad dv = \cos x \, dx$$

$$du = 5 \, dx \quad v = \sin x$$

$$\begin{aligned} \int u \, dv &= uv - \int v \, du \\ &= 5x \sin x - \int \sin x \cdot 5 \, dx \quad \text{Great} \\ &= 5x \sin x - 5 \int \sin x \, dx \\ &= \underline{5x \sin x} + \underline{5 \cos x} + \underline{C} \end{aligned}$$

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

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

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

$$= \underline{\frac{1}{3} x^3 \ln x} - \underline{\frac{1}{9} x^3} + \underline{C}$$

$$\begin{aligned} \text{let } u &= \ln x & v &= \frac{1}{3} x^3 \\ du &= \frac{1}{x} \, dx & dv &= x^2 \end{aligned}$$

well
done