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Calculus IV Quiz 2 Fall 1999 9/24/99

In each problem make clear your choices of u, v, and any other stray letters your approach happens to drag in.

$$\frac{d}{dx}(\ln x) = \frac{1}{x}$$

1. Compute  $\int x \ln x \, dx$ .  $\int u v \, dx = uv - \int v \, du$

$$u = \ln x$$

$$v = x^2/2$$

$$du = \frac{1}{x} \, dx$$

$$dv = x \, dx$$



$$\int x \ln x \, dx = (\ln x) \left( \frac{x^2}{2} \right) - \int \frac{x^2}{2} \cdot \frac{1}{x} \, dx$$

$$= \frac{x^2 \ln x}{2} - \frac{1}{2} \int x \, dx = \frac{x^2 \ln x}{2} - \frac{1}{2} \left( \frac{x^2}{2} \right) + C$$

$$= \frac{x^2 \ln x}{2} - \frac{1}{4} x^2 + C$$

2.  $\int \sqrt{5y+1} \, dy$

$$\text{Let } u = 5y+1 \\ du = 5 \, dy$$

$$\therefore \int \sqrt{5y+1} \, dy = \int \sqrt{u} \frac{du}{5} = \frac{1}{5} \int u^{1/2} \, du$$



$$= \frac{1}{5} \frac{u^{3/2}}{\frac{3}{2}} + C = \frac{1}{5} \times \frac{2}{3} u^{3/2} + C = \frac{2}{15} (5y+1)^{3/2} + C$$