

Math 2
February 29, 2008

Name: Solutions

Quiz 6

Show your work, and write clearly. No textbooks, notes, or calculators.
Just as a reminder...

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

1. (3 points) Find $\int xe^x dx$.

$$u = x \quad du = dx$$

$$dv = e^x dx \quad v = e^x$$

$$\int xe^x dx = xe^x - \int e^x dx$$

$$= xe^x - e^x + C$$

or

$$= e^x(x-1) + C$$

2. (4 points) Find $\int_{-\frac{\pi}{3}}^{\frac{\pi}{6}} x \cos x dx$.

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

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

$$\int_{-\frac{\pi}{3}}^{\frac{\pi}{6}} x \cos x dx = x \sin x \Big|_{-\frac{\pi}{3}}^{\frac{\pi}{6}} - \int \sin x dx$$

$$= \frac{\pi}{6} \sin \frac{\pi}{6} - \left(-\frac{\pi}{3}\right) \sin \left(-\frac{\pi}{3}\right) + \cos x \Big|_{-\frac{\pi}{3}}^{\frac{\pi}{6}}$$

$$= \frac{\pi}{6} \left(\frac{1}{2}\right) + \frac{\pi}{3} \left(-\frac{\sqrt{3}}{2}\right) + \left[\cos \frac{\pi}{6} - \cos \left(-\frac{\pi}{3}\right)\right]$$

$$= \pi \left(\frac{1}{12} - \frac{\sqrt{3}}{6}\right) + \left(\frac{\sqrt{3}}{2} - \frac{1}{2}\right)$$

$$= \frac{\pi}{12} (1 - 2\sqrt{3}) + \frac{1}{2} (\sqrt{3} - 1)$$

3. (3 points) Find $\int \ln x \, dx$. (Hint: $u = \ln x$.)

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

$$dv = dx \quad v = x$$

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

$$= x \ln x - \int 1 \, dx$$

$$= x \ln x - x + C$$