

University of Utah
Math 1220, Fall 2007

Name: Solutions

Quiz # 3

Time: 15 minutes

Please try to carefully explain the steps leading to your solutions.

Part 1: (8 points) Find an antiderivative of the function $f(x) = xe^x$.

Integrate by parts:

$$\int x \cdot e^x \cdot dx = x \cdot e^x - \int e^x \cdot dx = x e^x - e^x (+C)$$
$$\begin{cases} u(x) = x \rightarrow u'(x) = 1 \\ v'(x) = e^x \rightarrow v(x) = e^x \end{cases}$$

Part 2: (12 points) Evaluate the integral:

$$\int_0^{\pi/2} \cos^3 x \, dx$$

The power of $\cos x$ is odd, so we can break up $\cos^3 x = \cos^2 x \cdot \cos x = (1 - \sin^2 x) \cos x$
and substitute:

$$\int_0^{\pi/2} \cos^3 x \cdot dx = \int_0^{\pi/2} (1 - \sin^2 x) \cos x \cdot dx = \int_0^1 (1 - u^2) du = \left[u - \frac{u^3}{3} \right]_0^1 = \frac{2}{3}$$
$$\begin{cases} u(x) = \sin x \\ du = \cos x \cdot dx \end{cases}$$