MATH 20C: FUNDAMENTALS OF CALCULUS II
QUIZ #4

Problem 1. Evaluate the integral

$$\int \left(x^2 \cos x + 3.2e^{-2x}\right)\, dx.$$

Solution. First, we break it up into two integrals:

$$\int \left(x^2 \cos x + 3.2e^{-2x}\right)\, dx = \int x^2 \cos x\, dx + 3.2 \int e^{-2x}\, dx.$$

We have

$$\int 3.2e^{-2x}\, dx = \frac{3.2}{-2} e^{-2x} + C = -1.6e^{-2x} + C.$$

For the first integral, we use integration by parts, with $u = x^2$ and $v = \cos x$.

	D	I
$+$	x^2	$\cos x$
$-$	$2x$	$\sin x$
$+$	2	$-\cos x$
$-\int$	0	$-\sin x$

So

$$\int x^2 \cos x = x^2 \sin x - 2x(-\cos x) + 2(-\sin x) + C = x^2 \sin x + 2x \cos x - 2 \sin x + C.$$

So altogether:

$$\int \left(x^2 \cos x + 3.2e^{-2x}\right)\, dx = x^2 \sin x + 2x \cos x - 2 \sin x - 1.6e^{-2x} + C.$$

Problem 2. Evaluate the integral

$$\int \frac{\sin(2/x)}{x^2}\, dx.$$

Solution. We make the substitution $u = 2/x$, so that $du = -2/x^2\, dx$ hence $1/x^2\, dx = du/(-2)$. Thus

$$\int \frac{\sin(2/x)}{x^2}\, dx = \int \sin u \frac{du}{-2} = -\frac{1}{2} \int \sin u\, du = -\frac{1}{2}(-\cos u) + C = \frac{1}{2} \cos(2/x) + C.$$

Date: Wednesday, October 8, 2008.