Math 2 Due: February 29, 2008

Written Problem 8

On page 457 in Chapter 7 is the proof of the reduction formula

$$\int \sin^n x\,dx = -\frac{1}{n}\cos x \sin^{n-1} x + \frac{n-1}{n}\int \sin^{n-2} x\,dx.$$

It also explains why this is called a reduction formula, and how it is useful.

Follow the methods used in the test to derive a similar reduction formula for

$$\int \cos^n x\,dx.$$

After you have found the formula, use it to evaluate

$$\int \cos^3 x\,dx.$$

Now, use a different technique, perhaps from 7.2, to solve the integral. The antiderivatives found using the different methods will most likely look different. Check, by taking their derivatives, that both are correct. Remember to use the Product and Chain Rules where applicable, and the **very** helpful trigonometric identity

$$\sin^2 x + \cos^2 x = 1$$

in all of its forms.