Math 8 Assignment 2

Due: Start of class on Friday April 9.

On page 493 in Section 8.1 is the proof of the reduction formula

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

where $n \geq 2$. It also explains why this is called a reduction formula, and how it is useful.

Follow the methods used in the text 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 8.2, to calculate the value of $\int \cos^3 x\,dx$. 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.

As always, present your solution and reasoning clearly. Use complete sentences, and diagrams and graphs as needed. You do not need to type up your solution, but write and draw clearly. Proof read your work.