MAT220 **Show You Know #3** **Fall 2010**

We have worked to make sense of the fact that $\frac{d}{dx}(\sin x) = \cos x$ and $\frac{d}{dx}(\cos x) = -\sin x$. However, we have done so with the assumption that the angle, *x*, is measured using ***radians***. In this Show You Know Assignment, you will explore the derivatives of the sine and cosine functions but when the angle is measured in ***degrees***. Will the derivative rules stay the same? If so, why? Will the derivative rules change, if so how and why?

To help guide you through this exploration, do the following:

1. Look back at notes and a homework assignment that I verbally gave where we developed the derivative of the sine and cosine functions using the limit definition of derivative $\left(\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}\right)$.

2. Redo taking the derivative of the sine and cosine functions using the limit definition of derivative. Recall the sum and difference identities:

- $\sin(A+B) = \sin A\cos B + \cos A\sin B$
- $\cos(A+B) = \cos A\cos B - \sin A\sin B$

3. At a certain point in working with the limit definition, you will need to find some limits (refer to the previous work). When you get to this point, carefully "gather the evidence" and show these limits (i.e. show graphs and tables!). Make sure your calculator is in ***degree*** mode!

4. Make a concluding statement clearly stating the derivatives of the sine and cosine function if the angles are measured in degrees rather than radians.

As always, be thorough in your discussion and communicate clearly. Use graphs, tables, formulas as appropriate. The bottom line…SHOW YOU KNOW!