MATH 1310 Programming Project #6 (TI-83 Plus)

You have the whole class period to work on the project with your group. You are required to use your own calculator and turn in your own paper. Be sure to answer all of the questions asked.

Guessing the derivative of $f(x) = \sin x$.

1. Carefully sketch the graph of $f(x) = \sin x$ on a separate sheet of paper.
2. On your graph, plot the points where the derivative of $f(x)$ will be zero.
3. At which x values will the derivative be the greatest? Use MSEC at one of these points to find an estimate for the maximum value of the derivative of $f(x)$. Plot these on your graph as well.
4. Do the same for the minimum value of the derivative.
5. We will use the command nDeriv (numerical derivative) to graph the derivative. nDeriv is located on the CATALOG (2nd-0) menu on the TI-83. On your "Y=" screen, enter the following

   $Y_1 = \sin(X)$
   $Y_2 = \text{nDeriv}(Y_1, X, X)$

   This will graph $f(x)$ and its derivative. Sketch the derivative on your graph. Does it go through the points you already plotted?
6. Make a guess at which function is the derivative of $f(x) = \sin x$.
7. Think of a way to check your guess using your calculator. Describe your method and how well it worked.

Guessing the derivative of $f(x) = \cos x$.

Repeat steps 1-7 above for the function $f(x) = \cos x$.

Guessing the derivative of $f(x) = \ln x$.

1. Carefully sketch the graph of $f(x) = \ln x$ on a separate sheet of paper.
2. Use MSEC to estimate the derivative at the points $x = \frac{1}{3}, \frac{1}{2}, 1, 2, 3$.
3. Use nDeriv to graph the derivative of $f(x) = \ln x$.
4. Make a guess at which function is the derivative of $f(x) = \ln x$.
5. Use your method to check your guess.