MATH 1310 Programming Project #8

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.

1. Write a program called NEWTON which performs one step of Newton's method (i.e., computes x_{n+1} given x_n), assuming a function $f(x)$ is entered into $y1$ in the graphing menu and the derivative $f'(x)$ is entered into $y2$. Your program should NOT prompt for an initial guess; rather, you should store your initial guess into a variable before running the program. Then, the program should store the next value into the same variable (this will make it easier to run the program several times in succession).

2. The function $f(x) = x^5 - 4x + 2$ has one root in $[-2, -1]$. Approximate it to six decimal places. (Be sure to write your initial guess, as well as each x_n value you used to arrive at your answer.)

3. Now use your program to find the other two zeros of $f(x)$, again giving your initial guess and each value.

4. Only one of the zeros of $f(x)$ is greater than 1. Give an interval of initial guesses that would yield this zero.

5. Give intervals of initial guesses that yield each of the other two zeros.

6. Give two x-values that would be extremely poor choices for an initial guess. Explain why, using both a graph and the formula for Newton's method.