

3. Secant Line Approximation Exploration (Worksheet outline).

In calculus many of the important ideas are related to the line that is tangent to the graph of a function, and its slope. At this point you are not quite ready to find the equation of a line tangent to any function at any point, but you can come close. The way you come close is only one step away from how you actually find the tangent line. You find the equation of a secant line, that is, a line that intersects a graph at two points. The two points you will use are very close together.

- ▶ **Step 1:** Pick a function to work with. Anything except a line will do. Write the equation of your function.

My function: _____

- ▶ **Step 2:** Graph the function as Y1 in the standard window, zoom in several times until the local linearity property makes the curve look like a line. Then trace to some point.

The point is (_____, _____)

The coordinates of this point are saved in your calculator and are called something like X and Y1, or xc and yc depending on the model of your calculator. Return to the home screen and store these two numbers to the variables A and B.

- ▶ **Step 3:** Return to the graph screen and move the trace cursor to a nearby point - the closer the better.

This point is (_____, _____)

Store these values to C and D

- ▶ **Step 4:** Use the points (A,B) and (C,D) to write the equation of a line.

The line is $y =$ _____

- ▶ **Step 5:** Enter the line's equation as Y2 and graph it with your original function in the zoomed in window.

Keeping in mind that the line goes through two points that are very close together. Write a brief description of what you see.

- ▶ **Step 6:** Regraph in the standard window. Write a brief description of what you see and sketch a copy of the graph.

- ▶ **Step 7:** Make a table of values on your calculator. On the Table set-up screen make the Table's starting value = A and the Table step a small number such as 0.001. In the table compare the function values and the values on your line for the same x values. Write a brief summary of what you observe.