TI-83 Procedures for Secant Lines and Numerical Derivatives

Finding slopes of successive secant lines near a given x-value, say x = a:

1. Type the function in y_1 = .
2. In y_2 = type, $(y_1(a + x) – y_1(a))/x$. This is the slope of the secant line joining the points $(a, y_1(a))$ and $(a+x, y_1(a + x))$. Remember that in the calculator notation, x represents the increment h.
3. 2nd WINDOW (TBLSET)
4. Highlight Ask for Indpnt. When the independent variable is set to Ask, the other entries do not matter.
5. 2nd GRAPH (TABLE)
6. Enter x values (remember these are h values) which are close to 0 from both the positive direction and the negative direction, e.g., x = .1, x = .01, x = .001, x = –.1, x = –.01, x = –.001, etc. The smaller the value of x (h), the closer the slope of the secant line is to the slope of the tangent line at x = a.

To estimate the numerical derivative of a function at a given x value, say x = a:

1. Enter the function in y_1 = .
1. MATH
2. Choose 8: nDeriv(
3. After the (, enter y_1, x, a). Actually, after the a, you could put in a comma and then enter a small h value. If you do not do this, the default h value is .001.
4. ENTER

One can also calculate numerical derivatives of a function by using the graph of the function: Enter the function in y_1 =. 2nd TRACE. Choose 6: dy/dx. Arrow to the x value at which you wish to calculate the derivative. ENTER.

To generate a number of successive values of the derivative of a function.

1. Enter the function in y_1 =.
2. In y_2 = , MATH
3. Choose 8: nDeriv(
4. After the (, enter y_1, x, x) The first x is the independent variable; the second x represents h values. The calculator knows which x is which.
5. 2nd WINDOW (TBLSET)
6. Set TblStart to initial x value at which you want to find the derivative.
7. Set ΔTbl to the increment (the intervals at which you want to find the derivative).
8. Set both Indpnt and Depend to Auto. (Highlight and press ENTER.)
9. 2nd TRACE (TABLE) This will generate a table with x values at which you are finding the derivative and a y_2 column with the corresponding numerical value of the derivative. If you leave y_1 on, you will also get the function values for the x values.