Calculus I Calculations on the TI-85/86

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This instruction sheet contains the types of calculations used in most Calculus I courses. For instructions on how to do some of these computations with the graph of a function, refer to the sheet Calculations with Graphs on the web site above.

The Calculus commands can be found by pressing 2nd [CALC]. Below is a list of the commands and how they are entered.

**evalF**: Will evaluate any function at a particular point. The form of the entry to evaluate \( f(a) \) is evalF(f(x), x, a). For example, if \( f(x) = x^2 + 1 \) then to use the calculator to evaluate \( f(2) \), enter evalF(x^2+1, x, 2) and press ENTER to get 5.

**nDer**: Will evaluate the first derivative at any point. The form of the entry to evaluate \( f'(a) \) is nDer(f(x), x, a). For example, if \( f(x) = x^2 + 1 \) then to use the calculator to evaluate \( f'(2) \), enter nDer(x^2+1, x, 2) and press ENTER to get 4.

**der1**: Similar to nDer. It uses a different algorithm to do the calculation. I have never seen a difference in the two commands.

**der2**: Will evaluate the second derivative at any point. The form of the entry to evaluate \( f''(a) \) is der2(f(x), x, a). For example, if \( f(x) = x^2 + 1 \) then to use the calculator to evaluate \( f''(2) \), enter der2(x^2+1, x, 2) and press ENTER to get 2.

**fnInt**: Will evaluate a definite integral. The form of the entry to evaluate \( \int_a^b f(x) \, dx \) is fnInt(f(x), x, a, b). For example, to evaluate \( \int_0^3 x^2 + 1 \, dx \) enter fnInt(x^2+1, x, 0, 3) and press ENTER to get 12.

**fMin** and **fMax**: Will find the Minimum or Maximum of a function over an interval. The form of the entry is fMin(f(x), x, lower limit, upper limit) or fMax(f(x), x, lower limit, upper limit) where the upper and lower limit are values on the left and right of the maximum of minimum.

**arc**: Will evaluate the arc length of a function over a specified interval. The form of entry is arc(f(x), x, a, b) where a and b are the limits of the arc. For example, to find the arc length of \( f(x) = x^2 + 1 \) between 0 and 3 enter arc(x^2+1, x, 0, 3) and press ENTER to get 9.747.

**Tables** (TI-86 only): The Table will evaluate the y-coordinate of every function in the Y= editor. For example, enter \( f(x) = x^2 + 1 \) as y1 press TABLE and select [TBLST]. If Indpnt is set at ASK you will enter the x values by hand, if Indpnt is set at AUTO then the calculator will create a list of x values starting at the TblStart value and increasing by \( \Delta \text{Tbl} \). Screen 1 shows how to enter the function \( f(x) = x^2 + 1 \) and its derivative. Screen 2 shows the values of \( f(x) \) and its derivative for the values starting at \( x = 0 \) and increasing 0.5 each time.

**Notes**
Lists: All of the above commands will work with a list as the point at which the function needs to be evaluated. For example, if \( f(x) = x^2 + 1 \) and you need \( f(1), f(0), f(3), \) and \( f(5) \) enter as shown in screen 3. This will work with nDer, der1, and der2. The \{\} can be found by pressing 2nd [LIST].

The function in any of these commands can be called from the Y = editor (where functions are entered for graphing). For example, if \( f(x) = x^3 + 3x - 1 \) and you need \( f(1), f'(1), \) and \( f''(1) \), enter \( f(x) \) as y1 and evaluate all three as shown in screen 4. To type lower case y (which is different than Y), press 2nd [ALPHA] [Y].