

MATH 105

TI-89/92 Plus Graphing Calculator Tasks

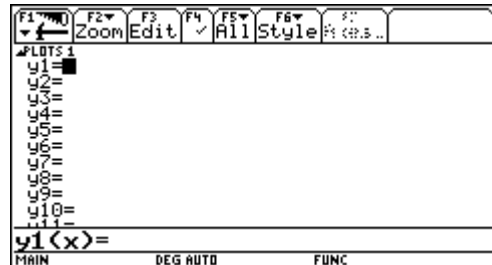
I. Graphing Functions

Enter the function into the calculator.

Press \blacklozenge [Y=] .

Type in the function and press $\boxed{\text{ENTER}}$. For the independent variable, use x .

This can also be done from the home screen using $\boxed{\text{F4}}$ 1: Define and then typing $y1(x)=$ and the function definition. Press $\boxed{\text{ENTER}}$.



Graph the function.

To graph and make sure your graphing screen displays the “standard window,” in which x and y both range from -10 to 10 , press $\boxed{\text{F2}}$ Zoom and then 6: ZoomStd. If you just press \blacklozenge [GRAPH], the function will appear in the last window the calculator used.

If you do not see the graph, or you only see part of it, press \blacklozenge [WINDOW] and choose a different window size.

II. Special Functions

Absolute Value function, $|x|$.

Press \blacklozenge [Y=] then type $abs(x)$ for the absolute value of x . Alternately, press \blacklozenge [Y=] then $\boxed{2\text{nd}}$ [MATH] and choose 1: Number and then 2: abs(. Type in what goes inside the absolute value symbols and don't forget to close the parentheses.

Greatest Integer function (step function)

Press \blacklozenge [Y=] then type $int(x)$ for the greatest integer function of x . Alternately, press \blacklozenge [Y=] then $\boxed{2\text{nd}}$ [MATH] and choose 1: Number and then 4: iPart(. Type in what goes inside and don't forget to close the parentheses.

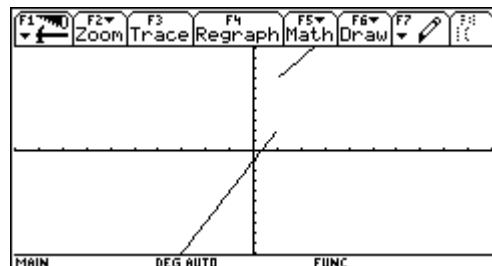
Piecewise Defined Functions

This is best explained by an example. To enter

$$y = \begin{cases} 3x - 1, & x < 1 \\ 2x + 5, & x \geq 1 \end{cases}, \text{ do the following.}$$

\blacklozenge [Y=] then type into $y1$ the function $3x - 1$ $\boxed{2\text{nd}}$ [I] (This is above the K key, the symbol is called “when.”) and then x $\boxed{2\text{nd}}$ [$<$] 1. For $y2$ type $2x + 5$ $\boxed{2\text{nd}}$ [I] $\boxed{2\text{nd}}$ [$>$] 1.

Press \blacklozenge [GRAPH] to see the graph.



III. Evaluating Functions

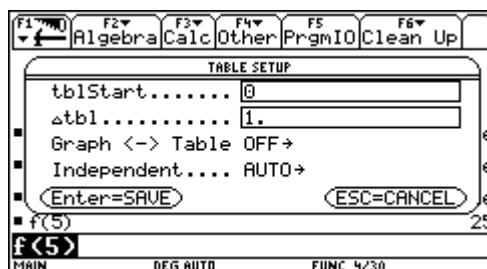
If you have a function $f(x)$ and wish to evaluate the function for certain values of x , you can enter the function into your calculator and have it evaluate for you.

From the home screen press $\boxed{F4}$ 1: Define and then type $f(x)=$ and the function definition. Press \boxed{ENTER} . Next type $f(5)$ (or whatever value for x you want) and press \boxed{ENTER} .

If you wish to evaluate the function at many different values, you can use a TABLE.

Enter the function into $y1$. Press $\boxed{\blacklozenge}$ [TblSet].

Use $\boxed{\odot}$ to change the settings. $tblStart$ is the first value for x that you wish to display; Δtbl is the increment for x (so if $tblStart$ is 0 and $\Delta tbl = 0.5$ the x values will be $0, .5, 1, 1.5$, etc.); if you choose AUTO, the table will be generated automatically; if you choose ASK, the calculator will ask you to type in the x value. Press \boxed{ENTER} to save this information. Once you are done setting up the table, press $\boxed{\blacklozenge}$ [TABLE]

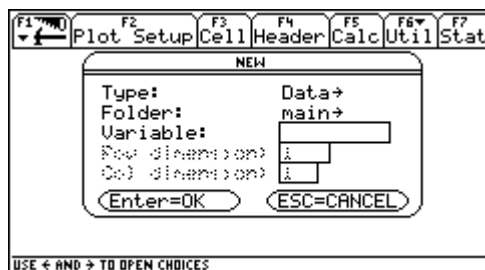


IV. Plotting Points and Finding Regression Curves

1. Enter your data values.

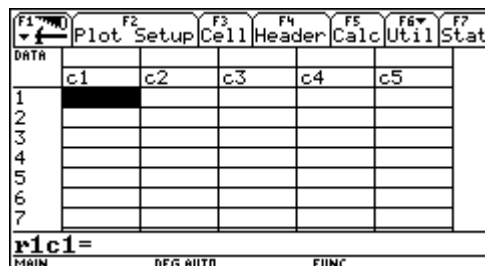
Press $\boxed{\blacklozenge}$ [HOME] to make sure you are on the main screen. Press \boxed{APPS} and choose 6: Data/Matrix Editor. Next choose 3: New.

Make sure Type is set to Data and Folder is set to main. In the Variable box type a variable name, for example $stat$, and press \boxed{ENTER} . Press \boxed{ENTER} again and you see the Data Editor.



Enter the values of the independent variable in $c1$ and the values of the dependent variable in $c2$.

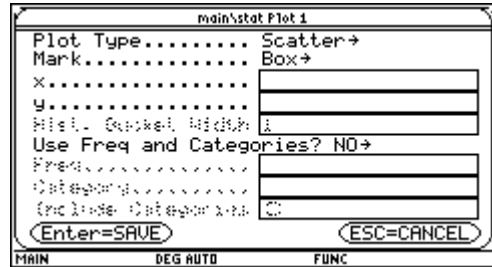
The next time you wish to enter data, you can press \boxed{APPS} , then 6: Data/Matrix Editor, and then 1: Current. Then simply clear the old lists and put in new ones.



2. Make a scatter plot of your data.

While still in the Data Editor, press **F2** Plot Setup. Highlight Plot 1 and press **F1** Define.

Make sure the Plot Type is set to Scatter. If not, use **⬆** to highlight the plot type and press **⬅**. Use **⬆** to highlight 1: Scatter and press **ENTER**. For Mark, use Box. You can change it just as you changed Plot Type if you wish.

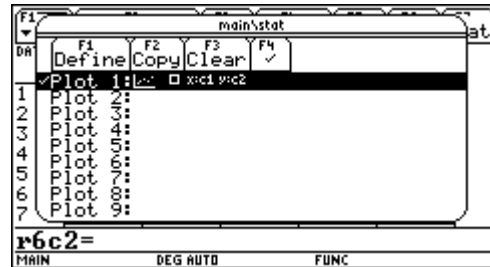


Use **⬆** to move the cursor to the box labeled x. Type in c1 and press **⬇** to move the cursor to the box labeled y. Type in c2 and press **ENTER**.

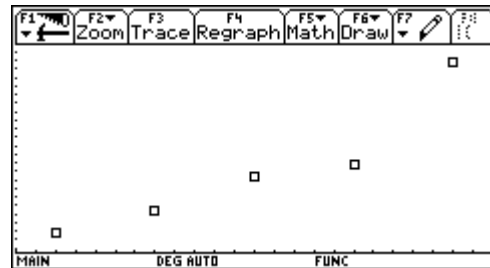
Make sure Use Freq and Categories? is set to NO.

Press **ENTER**.

Press **ESC** to return to the Data Editor.



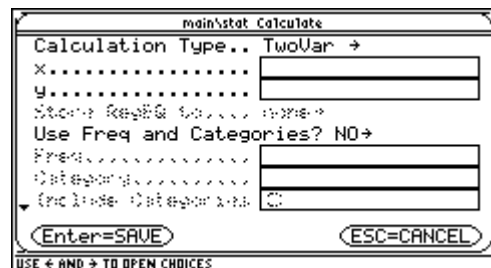
Press **⬆** [GRAPH] and then **F2** Zoom. Choose option 9: ZoomData. You should see your graph.



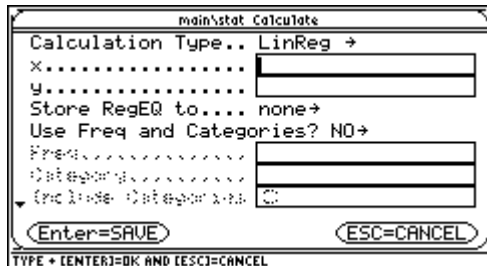
If the data look like a line would be a good fit, find the regression line.

3. Find the correlation coefficient and the regression line.

Press **⬆** [HOME] to return to the main screen. Press **APPS**, then 6:Data/Matrix Editor, and then 1:Current. Press **F5** Calc to get the calculate screen.



For Calculation Type press \odot and choose 5:LinReg.



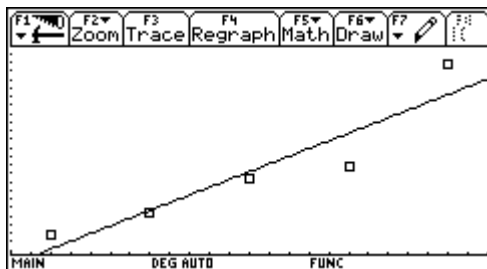
In the x box enter c1 and in the y box enter c2. Move down to Store RegEQ to and press \odot and then select y1(x) and press $\boxed{\text{ENTER}}$. Press $\boxed{\text{ENTER}}$ again to see the regression line. The equation of the regression line is stored in the [Y=] editor as y1.

Press $\boxed{\text{ENTER}}$ to clear this screen.



4. Plot the regression line through the points.

Press \blacklozenge [GRAPH].



5. Return your calculator back to normal graph mode.

To turn off the scatter plot, press \blacklozenge [Y=] and highlight Plot 1. Press $\boxed{\text{F4}}$ to deselect Plot 1 and then press $\boxed{\text{F2}}$ Zoom and choose option 6: ZoomStd.

6. Predict some values using the regression line.

Make sure the values you want to plug in for x are between the highest and lowest x values of your data (do not extrapolate).

Press \blacklozenge [HOME] to return to the home screen. In the command line type y1(#) where # is the input value you want to use and press $\boxed{\text{ENTER}}$.

V. Solving Equations/Finding Zeros of Functions

If you have an equation to solve, press \blacklozenge [HOME] to make sure you are on the home screen and then press $\boxed{\text{F2}}$ and then 1: solve. Type in the equation you wish to solve, followed by the variable you wish to solve for, for example solve($x^2 - 2x = 15, x$). Don't forget to close the parentheses. Press $\boxed{\text{ENTER}}$.

VI. Finding Points of Intersection of Curves

If you want to find where the graphs of $f(x)$ and $g(x)$ meet, solve the equation $f(x) = g(x)$ as above. This will give you the x coordinate of the point where they meet. Don't forget to find the y coordinate.

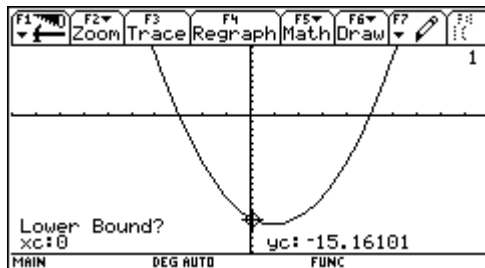
VII. Finding Maxima and Minima

This also relates to finding where a function is increasing and where it is decreasing, because the locations of the maxima/minima are the places where the function changes from increasing to decreasing or vice versa. This is also useful in finding the range of a function.

If you have a function $f(x)$, press $\boxed{\blacktriangledown}$ [Y=] and then type in the function $f(x)$ and press $\boxed{\text{ENTER}}$. Graph the function by pressing $\boxed{\blacklozenge}$ [GRAPH] and make sure the maximum/minimum you want to find is in the viewing window. Now press $\boxed{\text{F5}}$ and choose option 3: Minimum or 4: Maximum.

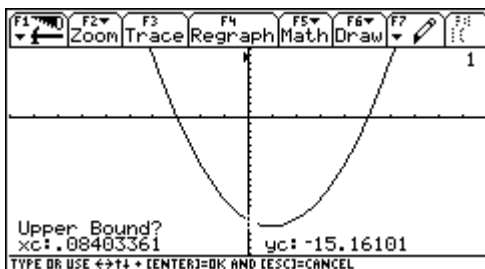
The calculator will ask you to move the cursor to find a lower bound to where the maximum/minimum is.

Use $\boxed{\blacktriangleleft}$ to move to the left of where the maximum/minimum is. Press $\boxed{\text{ENTER}}$.



You are now asked to move the cursor to find an upper bound to where the maximum/minimum is.

Use $\boxed{\blacktriangleright}$ to move to the right of where the maximum/minimum is. Press $\boxed{\text{ENTER}}$ and the calculator will locate the maximum/minimum



In both of these, instead of using $\boxed{\blacktriangleleft}$ to get to the left and right of the maximum/minimum, you can save time by simply typing in a number. For example, when you are asked for a lower bound in the above example, just press the $\boxed{-}$ and 1 keys and then $\boxed{\text{ENTER}}$, since -1 is to the left of the maximum/minimum we are looking for.

Occasionally you may get an answer such as -1.49999995 . You can be reasonably certain the answer is -1.5 . Also, keep in mind that a calculator answer of 2.3333333 is really $2\frac{1}{3}$ or $\frac{8}{3}$. If you get a decimal answer for which you do not recognize the rational number equivalent, make sure your instructor allows an approximate answer for the problem. If not, you will need to find the exact answer using algebra.

Also, make sure you look at the graph in a larger and/or smaller window. Doing this will ensure that you see all of the maxima/minima. You will need to find them all.