

MATH 105

TI-86 Graphing Calculator Tasks

I. Graphing Functions

Enter the function into the calculator.

Press **GRAPH** and then **F1** for $y(x)=$.



Type in the function and press **ENTER**. For the independent variable, use x , which is entered using the **x-VAR** key.

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 **2nd** **M3** for **ZOOM** and then **F4** for **ZSTD**. If you just press **2nd** **M5** for **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 **2nd** **M2** for **WIND** and choose a different window size.

II. Special Functions

Absolute Value function, $|x|$.

Press **GRAPH** and then **F1** for $y(x)=$ then **2nd** **MATH**. Press **F1** for **NUM** and choose **F5** **abs**. This pastes **abs** into the screen and you can type in what goes in between the absolute value bars. Don't forget to use the parentheses.

Greatest Integer function (step function)

Press **GRAPH** and then **F1** for $y(x)=$ then **2nd** **MATH**. Press **F1** for **NUM** and choose **F4** **int**. This pastes **int** into the screen and you can type in the rest of the variables. Don't forget to use the parentheses.

Piecewise Defined functions

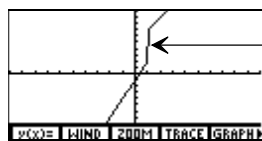
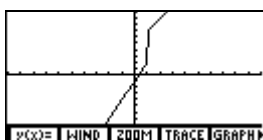
This is best explained by an example. To enter $y = \begin{cases} 3x-1, & x < 1 \\ 2x+5, & x \geq 1 \end{cases}$, do the following.

Press **GRAPH** and then **F1** for $y(x)=$ then type in $(3x-1)(x < 1) + (2x+5)(x \geq 1)$ **2nd** **TEST** **F2** **1** **)+(2x+5)(x >= 1)** **2nd** **TEST** **F5** **1** **)** **ENTER**.

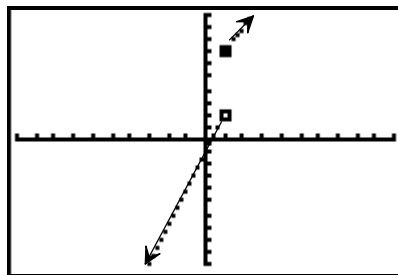
The screen looks like this.



Press **GRAPH** **F5** to see the graph.



You must keep in mind the piece connecting the two pieces of the graph is not really part of the graph. It is a feature of the calculator that it tries to connect the dots, even when it is not supposed to.



The **real** graph would look like this.

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.

Press **GRAPH** and then **F1** for $y(x)=$. Type in the function and press **ENTER**. Then press **2nd** **[QUIT]** to return to the home screen. Assume you entered the function into $y1$.

Press **2nd** **[CATLG-VARS]**, and then **MORE**. Then press **F4** for EQU and then scroll down until you highlight $y1$. Press **ENTER**. This pastes $y1$ into the home screen. Then type in (then the x value you want and then). Press **ENTER**.

Alternately, you can graph the function, press **MORE** twice, then **F1** EVAL. Type in the x value you want and press **ENTER**.

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

Enter the function into $y1$. Press **TABLE** then **F2** TBLST.

Use the arrow keys 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.

TABLE SETUP	
TblStart=	■
ΔTbl=	1
IndPnt:	AUTO Ask
TABLE TBLST	

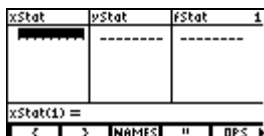
X	Y1
0	0
1	1
2	4
3	9
4	16
5	25
X=0	
TBLST	SELCT x y

Once you are done setting up the table, press **F1** TABLE.

IV. Plotting Points and Finding Regression Curves

1. Check to see if you have any data in your lists.

Press the **[2nd][STAT]** key, then choose option **[F2] EDIT**.



If there is data in your lists, you must clear that list (see #2). If not begin entering your data (see #3).

2. Clear your lists, if necessary.

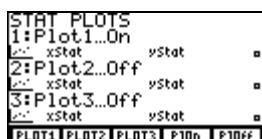
After completing Step 1, use the arrow keys to highlight **xStat**. Press **[CLEAR]**, then **[ENTER]**. Do the same for **yStat**.

3. Enter your data.

Enter your data by typing in the numbers and using the arrow keys. Continue in this manner.

4. Make a scatterplot of your data.

Press **[2nd][STAT]** then **[F3] PLOT**.

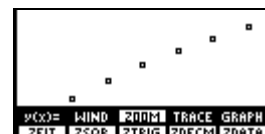


Press **[F1] PLOT1**.



Turn **PLOT1** by making sure the cursor is on **On** and pressing **[ENTER]**.

Press **[GRAPH]**, then **[F3] ZOOM**. Press **[MORE]** then **[F5] ZDATA**. You can press **[EXIT]** to get rid of the menus.



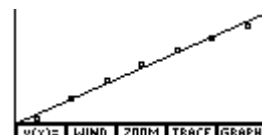
5. Find the correlation coefficient and the regression line.

Press **[2nd][STAT][F1] CALC** then **[F3] LinR**. This pastes **LinR** onto the home screen. If your **x** values are in **xStat** and your **y** values are in **yStat**, then just press **[ENTER]**.

The **a** and **b** form the regression equation $y = a + bx$. The correlation coefficient is **corr**.

6. Plot the regression line.

Press **[GRAPH]**, then **[F1] y1=**, then **[2nd] [CATLG-VARS]**, then **[F2] ALL** and press **[F1] Page↓** until you see **RegEq**. Select **RegEq** by using the arrow keys and pressing **[ENTER]**. Now press **[2nd][M5] GRAPH**.



7. 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). From the above set up, press **[MORE]** twice and choose **[F1]** EVAL. Enter the x value you want.

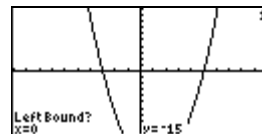
8. Return your calculator back to normal graph mode.

Return to the standard window by pressing **[GRAPH]** then **[F3]** ZOOM, then choosing **[F4]** ZSTD. Turn the statistical plot off by repeating step 4 but instead turn the plot Off.

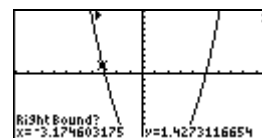
V. Solving Equations/Finding Zeros of Functions

If you have an equation, rewrite it in the form $f(x) = 0$. Press **[GRAPH]** and then **[F1]** for $y(x) =$. Type in the function $f(x)$ and press **[ENTER]**. Graph the function by pressing **[2nd]** **[M5]** (make sure the x intercept is in the viewing window), and then press **[MORE]** **[F1]** MATH and press **[F1]** for ROOT.

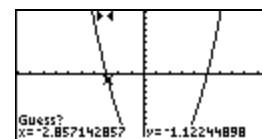
The calculator will ask you to move the cursor to the left of where the zero is. Use the left and right arrow keys to move to the left of where your zero is on the graph (the x intercept). Press **[ENTER]**.



You are now asked to move the cursor to the right of where the zero is. Use the right arrow key to move to the right of where your zero is on the graph (the x intercept). Press **[ENTER]**.



You are now asked to move the cursor close to where the zero is. Use the left arrow key to move close to where your zero is on the graph (the x intercept). Press **[ENTER]**. You will now get a decimal approximation of your answer.



In all of these, instead of using the arrow keys to get to the left and right of the intercept, you can save time by simply typing in a number. For example, when you are asked for a left bound in the above example, just press the **[(-)]** and 6 keys and then **[ENTER]**, since -6 is to the left of the one intercept we are looking for.

Important note on solving equations!

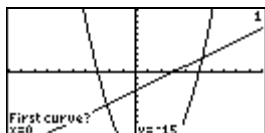
Occasionally you may get an answer such as -1.49999995 . You can be reasonably certain the answer is -1.5 . Also, keep in mind that a calculator answer of 2.3333333 is really $2\frac{1}{3}$ or $\frac{8}{3}$. If you get a decimal answer for which you do not recognize the rational number equivalent, make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

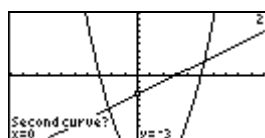
VI. Finding Points of Intersection of Curves

If you want to find where the graphs of $f(x)$ and $g(x)$ meet, one option is to find the zeros of the function $f(x) - g(x)$.

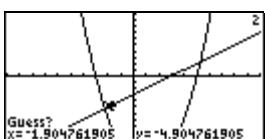
Alternately you can enter f and g into your calculator and graph them. After they are graphed and the point of intersection is in the viewing window press **[MORE]** **[F1]** MATH and press **[MORE]** then **[F3]** ISECT.



You will be asked which curve you want to use as the first curve (this is just in case you have more than two functions graphed). If you only have two curves graphed, press **[ENTER]** to accept the default first curve. If you have more than two, use the arrow keys to select the graph you want.



Next you will be asked which curve you want to use as the second curve (this is just in case you have more than two functions graphed). If you only have two curves graphed, press **[ENTER]** to accept the default second curve. If you have more than two, use the arrow keys to select the graph you want.



Next you are asked to move the cursor near the point of intersection. Use the arrow keys to do so and press **[ENTER]**. Your answer will appear.

The comments in the **Important note on solving equations** also apply here!

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. In addition, you can use this to find the range of a function.

If you have a function $f(x)$, press **[GRAPH]** and then **[F1]** for $y(x)=$. Type in the function $f(x)$ and press **[ENTER]**. Graph the function by pressing **[2nd]** **[M5]**, make sure the maximum/minimum you want to find is in the viewing window, and then press **[MORE]** **[F1]** MATH and press either **[F4]** FMIN or **[F5]** FMAX.

From here, this works just like section V on finding zeros. You are asked to first get to the left of the maximum/minimum, then to the right, and then to get close. The comments in the **Important note on solving equations** also apply here!