

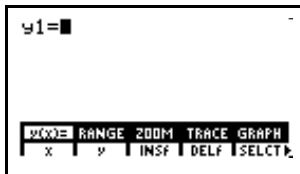
# MATH 105

## TI-85 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 RANGE 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

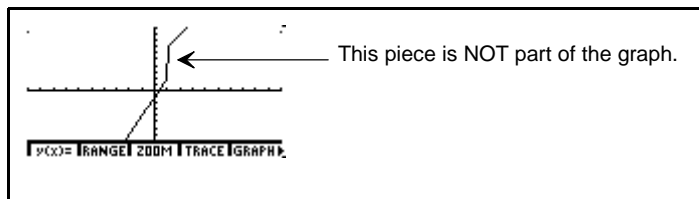
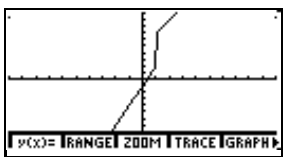
This is best explained by an example. To enter  $y = \begin{cases} 3x - 1, & x < 1 \\ 2x + 5, & x \geq 1 \end{cases}$ , do the following.

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

The screen looks like this.

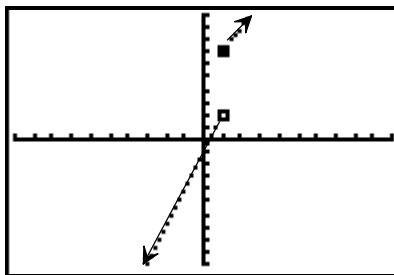


Press **GRAPH** **F5** to see the graph.



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.

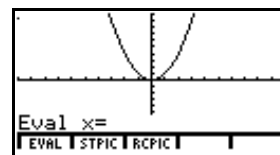
The **real** graph would look like this.



### 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**. Press **EXIT** to get rid of one level of the menu. Now press **MORE** twice and choose **F1** EVAL. Type in the  $x$  value you want and press **ENTER**.



### IV. Plotting Points and Finding Regression Curves

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

Press the **STAT** key, then choose option **F2** EDIT.

If the names  $xStat$  and  $yStat$  are acceptable to you, press **ENTER** twice.



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, press **F5** CLRxy.

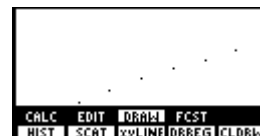
### 3. Enter your data.

Enter your data by typing in the numbers and using the arrow keys. Enter the data in  $x, y$  pairs.

### 4. Make a scatterplot of your data.

First make sure that all of the functions are cleared: Press **[GRAPH]** and then **[F1]** for  $y(x) =$ . Clear any functions that are present.

Press **[STAT]** then **[F3]** DRAW. Press **[GRAPH]**, then **[F2]** RANGE. Select the  $x$  and  $y$  ranges that will make your data appear on the screen. You can press **[STAT]** then option **[F2]** EDIT and **[ENTER]** twice to see your data as a reminder. After changing the ranges, press **[STAT]**, then **[F3]** DRAW. Now press **[F2]** SCAT. You can press **[EXIT]** to remove a menu for clearer viewing.

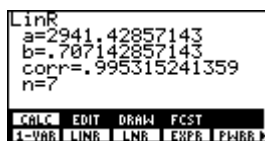


### 5. Find the correlation coefficient and the regression line.

Press **[2nd]** then **[F1]** CALC. Press **[ENTER]** twice and you will see:



Choose option **[F2]** LINR.

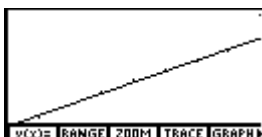
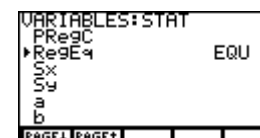


The  $a$  and  $b$  form the regression equation  $y = a+bx$ . The correlation coefficient is  $corr$ .

### 6. Plot the regression line.

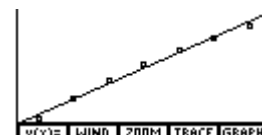
Press **[GRAPH]**, then **[F1]**  $y1 =$ , then **[2nd]** [VARS], then **[MORE]** twice. Press **[F3]** STAT

and use the arrow keys until the triangle is next to RegEq. Select RegEq by pressing **[ENTER]**. The regression equation is entered in as a  $Y$  value. Now press **[2nd]**[M5] GRAPH. If the points do not show up with the regression line, go back to step 4 and recreate the scatterplot.



### 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). Press **[GRAPH]**, 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.

## 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 **[F3]** for ROOT. Use **[◀]** or **[▶]** to move the cursor close to the  $x$  intercept and press **[ENTER]**.

### 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 **[F5]** ISECT.

Use **[▼]** or **[▲]** to get the cursor on the first graph. Press **[ENTER]**. The cursor jumps to the next graph. If this is the incorrect graph, use **[▼]** or **[▲]** to get the cursor on the graph you want. Next use **[◀]** or **[▶]** to move the cursor near the point of intersection and press **[ENTER]**. The answer appears.

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

## VI. 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 **MORE** again. Now press either **F1** FMIN or **F2** FMAX.

From here, this works just like section V on finding zeros. Use **◀** or **▶** to move the cursor close to the maximum/minimum and press **ENTER**. The comments in the **Important note on solving equations** also apply here!