

TI-83/84 Graphing Calculator Review Tips

I. Graphing

Press **Y=** to get to the equation screen. Type the desired function(s) in any location (Y_1 is the most common). Press **GRAPH**. This will graph most functions. Occasionally, it will be necessary to resize the graphing window to show the function. This can be done manually or automatically.

Manually. Press **WINDOW**. Type the smallest x-value for your window in **Xmin**. Enter the largest x-value for your window in **Xmax**. **Xscl** is used to indicate how often you want a tic mark along the x-axis. **Ymin** is the smallest y-value for your window. **Ymax** is the largest y-value for your window. **Yscl** is used to indicate how often you want a tic mark along the y-axis.

Automatically. Press **ZOOM**. The following explains each ZOOM feature.

- 1: ZBOX** Allows the user to set a window of any desired size that is smaller than the current window. After pressing **ZBOX**, use the directional arrows to move the cursor to a corner of your new window. Press **ENTER** to anchor that corner. Use directional arrows to expand the rectangle to the other corner of a diagonal. Press **ENTER** again. The rectangle will be resized to fill the entire screen.
- 2: Zoom In** This causes the window to zoom in by a fixed factor in both the x and y directions. The default factor is 4. Each time you press **ENTER** while in this mode, the screen will zoom in by the current factor. After pressing **Zoom In**, use directional arrows to move the cursor to the center of the desired screen. Press **ENTER**. The screen will zoom in by the specified factor. You may move the cursor and press **ENTER** as many times as you want to zoom in as close as you want. It is possible to change the default value.
- 3: Zoom Out** This causes the window to zoom out by a fixed factor in both the x and y directions. The default factor is 4. Each time you press **ENTER** while in this mode, the screen will zoom out by the current factor. After pressing **Zoom In**, use directional arrows to move the cursor to the center of the desired screen. Press **ENTER**. The screen will zoom out by the specified factor. You may move the cursor and press **ENTER** as many times as you want to zoom out as far as you want. It is possible to change the default value.
- 4: ZDecimal** This resizes the window so that each horizontal pixel represents a change of 0.1 in the x-coordinate. This gives a convenient window when using the **TRACE** button. The domain is from -4.7 to 4.7. The range is from -3.1 to 3.1.
- 5: ZSquare** This resizes the window so that each pixel represents the same number in both the x- and y- directions. The domain defaults to -15 to 15. The range goes from -10 to 10. This window is useful in seeing the true aspect ratio of the graph.

- 6: ZStandard** Defaults the domain from -10 to 10 and the range from -10 to 10. This window is usually large enough to show a representative portion of the graph. However, the graph will be distorted because the x and y units are not equal.
- 7: ZTrig** In **Radian** mode the domain is -2π to 2π . In **Degree** mode the domain is -360° to 360° . In both cases the range is -4 to 4.
- 8: ZInteger** This mode is similar to **ZDecimal** except that each pixel represents one unit along the horizontal and vertical axes. The default domain is -47 to 47 and -31 to 31 for the range. This window is useful when looking at a large scale view of the graph.
- 9: ZoomStat** Automatically sizes the window to show all data points in an active plot as shown in **STATPLOT**.
- 0: ZoomFit** Automatically adjusts the range so the function enters the window at a corner on the left side. If the function is odd, the range is adjusted so the function leaves the window at the other corner of the diagonal. If the function is even, the range is adjusted to cover the extreme y-value in the other direction of the entry point.

A common error message when graphing is **ERR: DIM MISMATCH**. This usually occurs when the **StatPlot** window is on and the referenced lists do not contain the same number of elements. To correct this error, press **2nd Y= [STAT PLOT]**. Press **4: PlotsOff**. This transfers the command to the home screen. Press **ENTER** and the command will be executed. The command should be used whenever you wish to graph an equation without plotting any data points.

II. Finding Roots

To find the roots of a function, type the function in the equation page (usually Y_1). Graph the function in an appropriate window. Press **2nd TRACE**. Choose **2: zero**. The calculator will then switch to the graphics screen, showing the graph of the function. Type in any x-value that is clearly to the left of the root and press **ENTER**. Next, type in an x-value that is clearly to the right of the root and press **ENTER**. Type in an approximate guess and press **ENTER**. The cursor will flash on the root and the coordinates will be displayed at the bottom of the screen. Often, the y-coordinate will not be zero but is so close to zero that the x-coordinate is correct to 13 decimal places. If the function has additional roots, repeat the process making sure to select x-coordinates clearly to the left and right of the desired root. Note: If you have several functions entered into the equation page, use the down arrow to select the proper function *after* pressing **2nd TRACE, 2: zero** but *before* choosing an x-coordinate to the left of the root.

III. Finding Points of Intersection

To find the intersection of two functions, enter both functions into the equation page. Press **2nd TRACE** and choose **5: intersection**. The cursor will flash on the first equation in the list. To accept this function as one of the two, press **ENTER**. The

cursor will then move to the next function. If this is one of the two functions, press **ENTER**. If not, press the down arrow to highlight the desired function, then press **ENTER**. Type in a reasonable value for the x-coordinate of the point of intersection and press **ENTER**. The coordinates of the point will be displayed at the bottom of the screen. If there are additional points of intersection, repeat the steps, making sure the guess for the x-coordinate is near the point of intersection.

IV. Plotting Two-Variable Data

The calculator makes a distinction between graphing *functions* and plotting *data*. Plotting any active data points is done before graphing any active functions. To plot data follow these steps.

First, make sure that all equations are turned off. This can be done by going to the equation page and deleting functions. If a function is still needed for future work, you can “turn off” the equation by placing the cursor directly on the “=” sign and pressing **ENTER**.

Second, enter your data in the Lists. Press **STAT**. Choose **1: Edit**. This will bring you to the Lists screen. Delete any unneeded data by moving the cursor to the title bar of that list. Press **CLEAR** and **ENTER**. Enter the x-coordinates into a list (usually **L1**). Enter the corresponding y-coordinates for all data points into another list (usually **L2**). Make sure that each y-coordinate corresponds to the correct x-coordinate.

Third, press **2nd Y= [STATPLOT**. You will see a screen that looks something like Figure 1. You may have up to three plots active at any given time. Choose a plot (usually **1**)

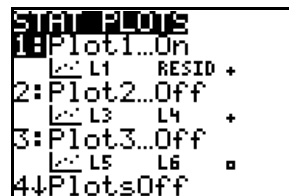


Figure 1

The screen will look something like Figure 2

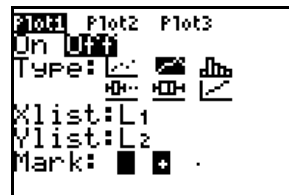


Figure 2

Select options until your screen looks like Figure 3. The **Xlist** must refer to your x-coordinates and the **Ylist** must refer to your y-coordinates.

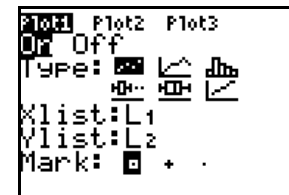


Figure 3

Fourth, press **ZOOM** and choose option **9: ZoomStat**. This will automatically size your window to fit the data. For example, if the data shown in Figure 4 were plotted, the plot of the data would look like Figure 5.

L1	L2	L3
1	3	
2	10	
3	15	
4	23	
5	34	
L3(1)=		

Figure 4

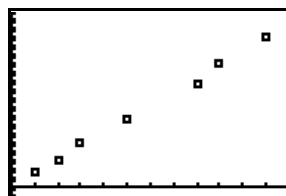


Figure 5

V. Fitting an equation to Data

Once data has been entered into the calculator as shown in Section IV, and equation can be fitted to the data. This requires the user to decide which parent function is a reasonable model for the data. Press **STAT**, then use the right arrow to move to the **CALC** submenu as shown in Figure 6.

EDIT	CALC	TESTS
1	1:1-Var Stats	
2	2:2-Var Stats	
3	3:Med-Med	
4	4:LinReg(ax+b)	
5	5:QuadReg	
6	6:CubicReg	
7	7:QuartReg	

Figure 6

Options range from **4: LinReg (ax+b)** to **C: SinReg**. The user must choose the model. The data in Figure 5 looks reasonably linear, so we will choose option **4: LinReg (ax+b)**. The command is pasted to the home screen. The correct format is *RegType, Xdata, Ydata, Equation*. The commas are required. The comma key is above the 7" key. For this example, the XData is in **L₁** and the YData is in **L₂**. We want to paste the equation into **Y₁**. **L₁** is the shift command of the "1" key and **L₂** is the shift command of the "2" key. To paste the equation into **Y₁**, follow these steps.

First, press **VARS**. Next, use the right arrow to choose the **Y-VARS** submenu as shown in Figure 7. Third, choose **1:Function**. Finally, choose **1:Y₁** as shown in Figure 8.

VARS	Y-VARS
1	1:Function...
2	2:Parametric...
3	3:Polar...
4	4:On/Off...

Figure 7

FUNCTION
1:Y ₁
2:Y ₂
3:Y ₃
4:Y ₄
5:Y ₅
6:Y ₆
7:Y ₇

Figure 8

The command on the home screen should look like Figure 9. (Don't worry if there is other information on the screen above this command). As always, press **ENTER** to execute this command. Your screen will look like Figure 10, showing the equation that represents the Least Squares Regression line.

```
LinReg(ax+b) L1,
L2,Y1
```

Figure 9

```
LinReg
y=ax+b
a=3.043973941
b=.0407166124
r^2=.9960061793
r=.9980010919
```

Figure 10

Press **Y=** to see that the equation has been pasted into equation Y_1 . As you can see, the equation has many more decimal places of accuracy than were shown on the home screen. Press **GRAPH**. The graph of the equation is superimposed over the data points as shown in Figure 11.

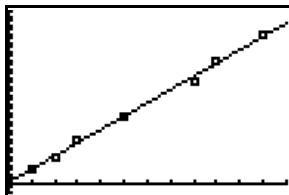


Figure 11

VI. Tracing on the Screen

To trace individual values, you can use the **TRACE** command. The calculator has a standard order that it follows. First, the cursor will jump to any **STATPLOTS** that are on. Press the left and right arrows will move the cursor to the next point in the list. The coordinates will appear at the bottom of the screen. Pressing the up and down arrows will move the cursor to other Statplots (up to three). If you press the down arrow again, the cursor then moves to the graph of the first function as store in the **Y=** screen. The left and right arrows will move you along the function, showing the coordinates at the bottom of the screen. The up and down arrows will move you to the next functions stored in the calculator.