TI-86 Graphing Video/DVD Notes

These notes are provided so that students watching the TI-86 Graphing Video will not have to take notes while watching the video, but can instead concentrate on using the calculator.

Entering functions

Enter functions at ***y(x),*** which is found with **GRAPH** and ***y(x)*** at **F1**. To type the variable ***x***, either use the **x-VAR** key, or the **x** that is directly below y(x) in the on-screen menu.

Graphing functions

After a function has been entered with **GRAPH** and ***y(x),*** choose **GRAPH** from the on-screen menu. To access the top row of the on-screen menu, use the **yellow 2nd key** and then the appropriate **F key**.

The process of graphing several functions is described below.

- **Square root functions** are entered with $\sqrt{\ }$ and parentheses. The $\sqrt{\ }$ is located above the x^2 key.
  For example $y = \sqrt{x+3} - 1$ is entered as y1= $\sqrt{\ }$ (*x*+3) – 1. The parentheses are important to show what is intended to be within the square root.
- **Rational functions** are entered with parentheses around the entire numerator and another set of parentheses around the entire denominator. For example, $y = \frac{x+3}{x-2}$ is entered as y1 = (x+3) **/** (x-2).
- **Absolute value functions** are entered using the **abs**, found in the catalog with CATLG (above CUSTOM) followed by CATLG from the on-screen menu. Pressing **A** will position the arrow at the beginning of the alphabet, at **abs**. As an example, y = |x+1| is entered as y1 = abs(x+1).
- **Greatest integer functions** are entered using the **int**, most easily found in the catalog. As an example, y = [[x – 2]] is entered as y1 = int(x – 2). Use the **dot MODE** to get a nice graph.
- **Piecewise functions** are entered in pieces, each piece being a separate function with its own restriction(s).
  For example,
  $y = \begin{cases} x+3, & x \le -1 \\ 4, & -1 < x \le 2 \end{cases}$ is entered as y1= (x+3)(x≤ -1) y2 = (4)(x>-1)(x≤ 2).
  It is preferable to use the **dot MODE** to graph piecewise functions, so that the pieces do not connect.

Tracing functions

To see the coordinates of an ordered pair at a point on the graph, press **TRACE**, with GRAPH and then TRACE from the on-screen menus. Use the gray ***left*** and ***right*** **arrow keys** to move the cursor to the *left* or *right* on the graph. Note the coordinates at the bottom of the screen. The *up* and *down* arrows will not move the cursor up and down on a graph. The up and down arrows are used to toggle between the graphs of several different functions.

Clearing a function

At *y(x), p*lace the cursor directly to the *right* of the equal sign of the function. Press the **CLEAR** key.

Turning functions off and on, but still leaving them entered

At *y(x),* choose **SELCT** from the on-screen menu. SELCT acts as a toggle switch to turn functions off and on. When the equal sign is in a black box, the function is on.

Dimensions of the graphing screen and using ZOOM

- The *dimensions* of the graphing window can be changed *manually* with **WIND**, an on-screen menu choice within GRAPH. Enter the desired values for the minimum and maximum values of x and y.
- The *dimensions* of the window can be changed *automatically* by pressing **ZOOM**, another on-screen menu choice in GRAPH. Some of the ZOOM options are explained below.
  - **ZSTD** (Zoom Standard) automatically changes the dimensions to $-10 \le x \le 10$ and $-10 \le y \le 10$, with the space between the tick marks equal to 1. A quick check with WIND will verify that this is so.

- **ZDECM** (Zoom Decimal) is located in the second ZOOM screen, which can be accessed with the MORE key. ZDECM automatically changes the dimensions to "nicer" x-values. A quick check of the window dimensions will show the change. Pressing TRACE and moving left and right will exhibit the "nicer" x-coordinates.
- **ZOUT** (Zoom Out) moves out for a wider view.
- **ZIN** (Zoom In) moves in closer.
- **BOX** makes it possible to draw a box around a portion of the graph and zoom in to it. Follow these steps: At GRAPH and ZOOM, choose BOX. Then move the cursor so that it is above and to the left of your area of interest. Press ENTER. Use the gray arrow keys to move the cursor to a point that will form the lower right corner of the box. The box will form as the cursor is moved. When the box has the desired position and size, press ENTER.
- **ZTRIG** automatically changes the graph window to fit trig functions nicely. In radian mode the new window will have x-axis increments of $\pi/2$ and will encompass $-2\pi<X<2\pi$. In degree mode the new window will have x-axis increments of 90° and will encompass $-360°<X<360°$. Y values range from -4 to +4 in both radian mode and degree mode.

Thick, thin, and dotted lines
In the **GRAPH** screen, access ***y(x)***. Use the **MORE** key to find **STYLE**. With the cursor at one of the functions that has been entered, repeatedly pressing STYLE will show the options.

Using **ISECT** to find the intersection of two graphs
Graph two functions. After the first function is entered, press ENTER to get *y2*. Access **GRAPH** and then **MATH** within the on-screen menu, using the **MORE** key as necessary to find MATH. Then choose **ISECT**, again using the MORE key as necessary.
First curve? is written at the bottom of the screen. **Move the cursor** close to the intersection point you are interested in, by using the left and right arrows. Press ENTER.
Second curve? is written at the bottom of the screen. Press ENTER.
Guess? is written at the bottom of the screen. Press ENTER.
Intersection is written at the bottom of the screen. Note the ordered pair that is displayed.

Finding the **x-intercepts** with **ROOT**
Graph a function. Access **GRAPH** and **MATH**, using the MORE key and the on-screen menus as necessary. Then choose **ROOT** from the on-screen menu.
Left Bound? is written at the bottom of the screen. There are two choices to answer this question: Either **move the cursor** to the left of the intercept you would like to find, *or* **type a number** value that is to the left of (smaller than) the x-value at the point. Press ENTER.
Right Bound? is written at the bottom of the screen. There are again two choices to answer this question: Either move the cursor to the right of the point, or type a number value that is to the right of (larger than) the x-value at the point. Press ENTER.
Guess? is written at the bottom of the screen. Press ENTER.
ROOT is written at the bottom of the screen. Note the ordered pair. You might see the y-coordinate as something like 1E-13. This means 1×10^{-13}, or .0000000000001, which is essentially zero.

Finding the maximum of a parabola
Graph a parabola that opens down. Access **GRAPH** and **MATH**. Then choose **FMAX**.
Left Bound? is written at the bottom of the screen. There are two choices to answer this question: Either **move the cursor** to the left of the maximum point, *or* **type a number** value that is smaller than the x-value at the maximum. Press ENTER.
Right Bound? is written at the bottom of the screen. Again, there are two choices to answer this question: Either move the cursor to the right of the maximum point, or type a number value that is larger than the x-value at the maximum. Press ENTER.
Guess? is written at the bottom of the screen. Press ENTER.
Maximum is written at the bottom of the screen. Note the ordered pair.

Finding the linear regression equation, plotting the data, and plotting the line

Consider the ordered pairs (1,2), (3,7), (-1,1).

- Begin by clearing *y(x)* and then EXIT back to the Home Screen.
- **Clear any stat data** that exists by: STAT (above the plus key) and then EDIT. Clear the date by placing the cursor *on* the word **xStat**, and then press CLEAR. Then, arrow down and the data should be gone. Follow the same steps for yStat and fStat.
- **Adding an L1 list to the list choices:**
  Though it is not necessary, a list named L1 can easily be added to the built-in list names. Here are the steps:
  Place the cursor *on* the xStat list name. Access INS (above DEL). Notice that the cursor is an alpha cursor, so just type the L. Now press the ALPHA key to turn off the alpha capability and then press 1 and ENTER. There is now a list named L1. To enter other lists, follow the same procedure.
- **Enter the ordered pairs**: Enter the x-values into a list, for example xStat or L1. Enter the corresponding y-values into the yStat or L2 list. EXIT.
- **Plot the ordered pairs**: Choose **STAT**, above the + key, and then **PLOT**, F3 in the on-screen menu. Choose **PLOT1** from the on-screen menu with F1. Turn it **On**. Arrow down to **Type**, and notice the new choices in the on-screen menu. Choose **SCAT**, which is a scatterplot. Arrow down to **Xlist Name** and choose the appropriate list name from the new on-screen menu. Arrow down to **Ylist Name** and follow the same procedure. Arrow down to **Mark** and make a choice. Now choose a workable window and plot the data by pressing the **GRAPH** key, followed by **ZOOM** from the on-screen menu. Use the **MORE** key to access **ZDATA** at F5. The data points should show on the screen.
- **Find the linear regression equation**:
  Press the **STAT** key and then choose **CALC**. Choose **LinR**, for linear regression, and *do not press ENTER yet*. Make the screen of the calculator look like this:
  LinR L1, L2, y1 or **LinR xStat, yStat, y1** depending on where your data is located.
  Note: To find the list names, go to **LIST** (above the minus sign) and then choose **NAMES**. Now choose the appropriate list names, separated by a comma. The comma is located on the left side of the keyboard. To type in **y1**, use a **lower case y** (with 2^{nd} ALPHA and Y) and then the number **1**. Press ENTER. Note: By typing the **y1** at the end of the LinR, the linear regression equation will automatically been entered into the **GRAPH y(x)** screen.
- **Plot the data points and the linear regression equation together**:
  Press the GRAPH key. Then, choose GRAPH from the on-screen menu. You can check your equation at *y1.*

NOTE: It would be wise to **turn off the Stat Plot** now, to prevent a conflict when graphing other functions in the future. One method to turn off Plot1 is: **STAT** $\rightarrow$ **PLOT** $\rightarrow$ **Plot1** $\rightarrow$ **Off**.

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