Plotting Piecewise Functions on the TI-85/86

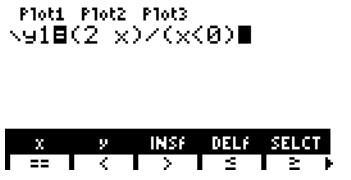
Being able to visualize a piecewise function can greatly help in understanding the graph's behavior. However, the process of plotting piecewise functions by hand is not necessarily trivial. With a little work, we can use a graphing calculator to plot these functions and, at the same time, gain a visual guide to assist with plotting them by hand. We will explore graphing the following two piecewise functions on the TI-85/86 family of graphing calculators.

$$f(x) = \begin{cases} 2x, & x < 0 \\ x + 3, & x \geq 0 \end{cases} \qquad g(x) = \begin{cases} \sqrt[3]{x}, & x \leq -1 \\ x^2 - 3x, & -1 < x < 4 \\ \sqrt{x-4}, & x \geq 4 \end{cases}$$

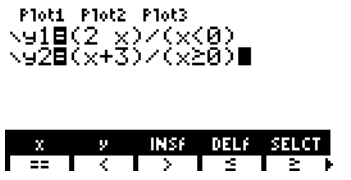
I will be using the TI-86 for these examples, so my screens may look a little different than yours, but the steps are the same. Every piece of the piecewise functions will be entered separately as its own equation. That is, the first piece will be entered as y1, the second piece as y2, and so on.

Graphing f(x):

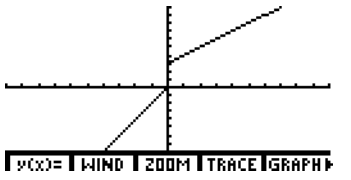
First, press the GRAPH key then F1 to enter the "y(x)=" screen. In parentheses, type the first piece into y1. Press the divide key, and in parentheses type the condition "x < 0". To find the "<" symbol, press 2nd then the "2" key to display the TEST menu. The F2 key corresponds to "<". Your screen should now look like this:



Repeat this process for the second piece into y2. The "≥" symbol is over F5 in the TEST menu. Your two functions should look like this:



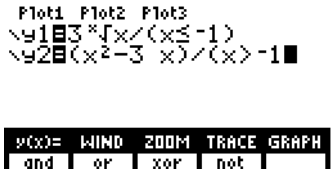
If you are still in the TEST menu like I was, press EXIT twice and then F5 to draw the graph. You may have to restore your viewing window to the default settings by pressing F3 for ZOOM then F4 for ZSTD (zoom standard).



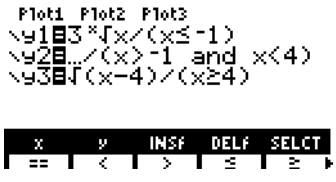
Graphing g(x):

For y1, enter the first piece in the same manner as *f(x)* above. Entering the cube root symbol requires a couple of steps, since the TI-85/86 does not contain a built-in cube root command. First type 3, then press 2^{nd} → MATH (above the multiplication key) → F5 → MORE → F4. Then, type "x" for the radicand.

For the second piece, the condition "-1 < x < 4" is not recognized by the calculator, so we need to enter it a little differently. "-1 < x < 4" is the same as "x > -1 and x < 4". So, after the division sign and parentheses, enter "x > -1", then press 2^{nd} → BASE (above the "1" key) → F4 → F1 to select "and". Finally, enter "x < 4" to finish y2.



Enter the third piece similar to the first piece; y1 through y3 should now look like this:



Press EXIT twice and then F5 to graph your function and watch it work!