

Plotting Piecewise Functions on the TI-89 and Voyage 200

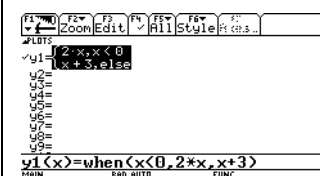
Being able to visualize a piecewise function can greatly help in understanding the graph's behavior. However, the process of plotting piecewise functions by hand is not necessarily trivial. With a little work, we can use a graphing calculator to plot these functions and, at the same time, gain a visual guide to assist with plotting them by hand. We will explore graphing the following two piecewise functions on the TI-89 and the Voyage 200 graphing calculators.

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

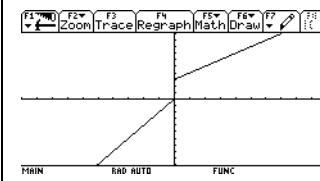
I will be using the Voyage 200 for these examples, so my screens may look a little different than yours, but the steps are the same. Graphing a piecewise function on these calculators is very different than graphing it on a TI-84 or 86. We cannot use the same methods that we used before - the calculator will not recognize them. Instead, we need to use the “when()” command. The syntax of this command is **when(condition, true result, false result)**.

Graphing $f(x)$:

Start the “Y=” editor by pressing $\blacklozenge \rightarrow$ F1 (or W). Enter this command into y1 (without quotes): “when($x < 0, 2x, x + 3$)”. In English, this command says, “when x is less than zero, return $2x$. If x is not less than zero, then return $x + 3$.”



Graph your equation and watch it draw! You may have to restore your viewing window to the default settings by pressing F2 for Zoom then “6” for ZoomStd (zoom standard).



Graphing $g(x)$:

The “when()” command for this function will be slightly different. Enter this command: “when($x \leq -1, x ^ (1/3),$ when($x < 4, x ^ 2 - 3x, \sqrt{x - 4}$))”. The first two pieces of the first “when()” command takes care of the first piece of $g(x)$, whereas the second “when()” command takes care of the last two pieces of $g(x)$. As you can see, the greater the number of pieces in a piecewise function, the more complex the “when()” commands become. (Note: If the first piece doesn't graph, make sure the “Complex Format” setting under the “MODE” button is set to “REAL”.)

