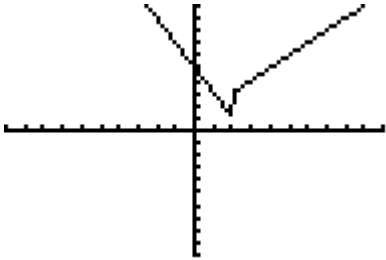
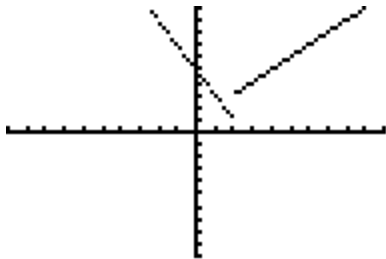


Graphing a Piecewise Function with the TI-84

1. Graph the piecewise function $f(x) = \begin{cases} -2x+5 & \text{if } x \leq 2 \\ x+1 & \text{if } x > 2 \end{cases}$

The procedure is to enter the function in the form $Y_1 = (-2x+5)(x \leq 2) + (x+1)(x > 2)$. Notice that we enter each piece in parentheses followed by the domain for that piece in parentheses. The individual pieces are separated by addition signs.

Key Strokes	Comment
Y=	Selects equation editor
$Y_1 = (-2x+5)$	Enter the first piece
$Y_1 = (-2x+5)(x \leq 2)$ \leq is found under the TEST menu: 2 ND [MATH] then 6: \leq	Enter the domain for the first piece
$Y_1 = (-2x+5)(x \leq 2) + (x+1)$	Enter the second piece
$Y_1 = (-2x+5)(x \leq 2) + (x+1)(x > 2)$ $>$ is found under the TEST menu: 2 ND [MATH] then 3: $>$	Enter domain for second piece
<pre> Plot1 Plot2 Plot3 \Y1(-2X+5)(X≤2) +(X+1)(X>2) </pre>	Your function should look like this.
Now graph using ZOOM 6	Plots in standard window. The two line segments are plotted. A TI-83 or older TI-84 calculator may erroneously connect the two pieces at $x=2$. This error can be eliminated by changing the plot from connected mode to dot mode. Newer versions of the TI-84 should graph correctly even in connected mode. 
To change to dot mode. Select MODE and then press the down arrow four times. Press the right arrow once to select DOT mode. Press ENTER and then press GRAPH to graph the function in dot mode.	If necessary, replot the graph in dot mode omitting the erroneous line connecting the two pieces. 

2. Given $f(x) = \begin{cases} -2x+5 & \text{if } x \leq 2 \\ x+1 & \text{if } x > 2 \end{cases}$. Using a graphics calculator find $f(0)$, $f(2)$ and $f(4)$.

Key Strokes	Comment
Graph as before, using ZOOM 6 then select TRACE.	If you selected ZOOM 6 then the cursor will start tracing at the point (0,5). The lower line of the screen displays: x=0 and y=5. So $f(0) = 5$. Calculated from the left piece
While tracing, type the number 2 then ENTER.	The cursor moves to the point (2,1). The lower line of the screen displays: x=2 and y=1 So $f(2) = 1$. Calculated from the left piece
While tracing, type the number 4 then ENTER	The cursor moves to the point (4,5). The lower line of the screen displays: x=4 and y=5. So $f(4) = 5$. Calculated from the right piece

Note: When entering the domain for a piece of a piecewise function, you may not use a combined inequality. For example you may not define a domain such as $(-2 < x < 5)$. To define this same domain, you would use two single inequalities: $(-2 < x)(x < 5)$.

3. Graph the piecewise function with your calculator and verify by tracing that

$$f(0) = 0, f(2) = 4, f(-2) = 2, f(-6) = 4.$$

$$f(x) = \begin{cases} 4 & \text{if } x < -4 \\ -x & \text{if } -4 \leq x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$$

Hint: Using your calculator, enter $Y1 = (4)(x < -4) + (-x)(-4 \leq x) + (x^2)(x \geq 0)$. You can then trace on the graph to verify the function values. Note that there are no gaps or jumps in the graph of this piecewise function. We say that the graph of this function is *continuous*.