Piecewise Defined Functions

A piecewise defined function is a function defined "in pieces" where the "piece" used is dependent on the input.

EX. Given the piecewise defined function $f(x) = \begin{cases} 2x & if\ x > 3 \\ x^2 - 12x & if\ x \le 3 \end{cases}$, we can find
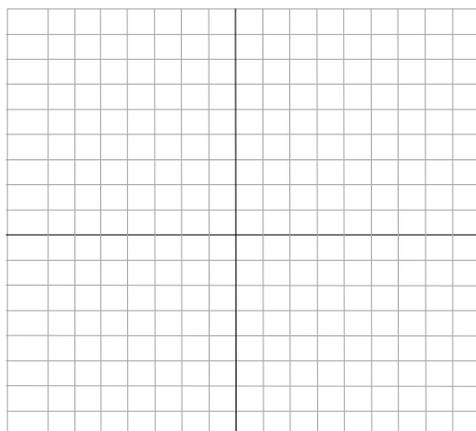
    (a) f(4): Since 4 > 3, we use the branch f(x) = 2x so f(4) = 8.

    (b) f(0): Since 0 < 3, we use f(x) = x^2 – 12x so f(0) = 0.

You try: Find f(5) _____, f(-1) _____ , f(3) _____

We graph a piecewise defined function as shown below. Remember that since it is a *function*, when you are finished your graph *should* satisfy the vertical line test.

EX: $f(x) = \begin{cases} \sqrt{x} & if\ x > 1 \\ 3x + 1 & if\ -2 < x \le 1 \\ 4 & if\ x \le -2 \end{cases}$

You try: $f(x) = \begin{cases} x^2 - 2 & if\ x \ge 1 \\ |x| & if\ -2 < x < 1 \\ -\frac{1}{2}x + 1 & if\ x \le -2 \end{cases}$