Check-up:

linear absolute Value Function

Given $f(x) = -2|x+3| + 4$ complete the chart shown below:

Shape of graph	V-shaped
Direction graph opens	Opens Down
Vertex	$(-3, 4)$
Equation of axis of symmetry	$x = -3$
Domain	$x \in R$
Range	$y \leq 4$

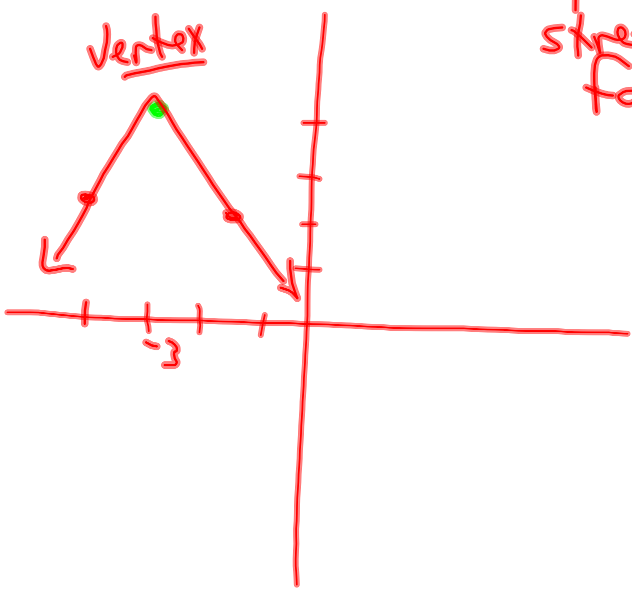
Sketch the graph of $f(x)$

$y = x^2$

x	y
2	4
1	1

$y = -2|x+3| + 4$

stretch factor



Sketch each of the following functions:

(1) $y = |x^2 + 4x - 5|$

$y = x^2 + 4x - 5$

x-Intercepts

$(x+5)(x-1) = 0$

$x = -5,\ 1$

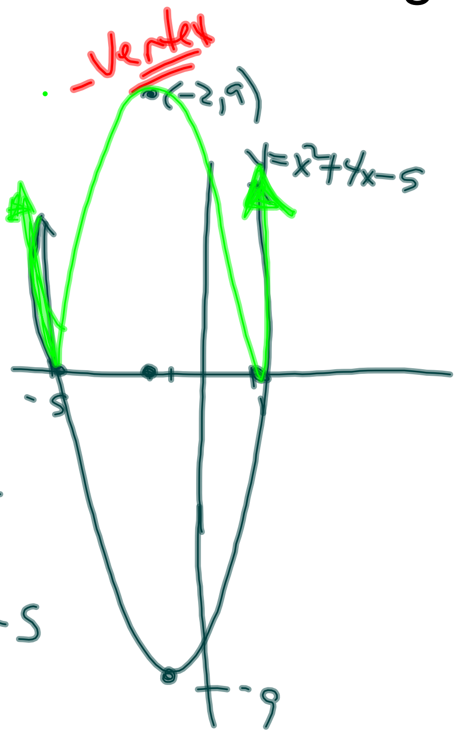
Vertex: $x = \frac{-5+1}{2}$

$x = -2$

$y = (-2)^2 + 4(-2) - 5$

$y = -9$

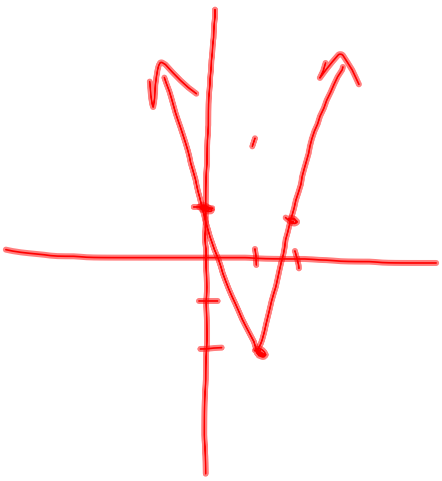
$(-2, -9)$



(3) $y = 3|x-1| - 2$

V$(1, -2)$

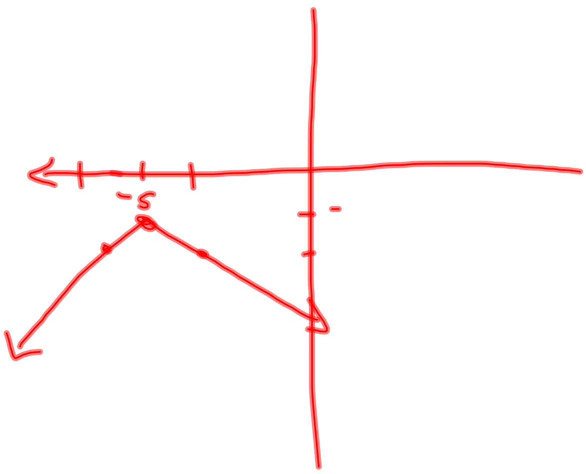
S. Factor: 3



(4) $y = -|x+5| - 1$

V$(-5, -1)$

S. Factor: -1



(2) $y = \left|-x^2 - 2x + 15\right|$

$y = -x^2 - 2x + 15$

$0 = -x^2 - 2x + 15$

$0 = x^2 + 2x - 15$

$0 = (x+5)(x-3)$

$x = {}^-5, 3$

Vertex: $x = \frac{{}^-5 + 3}{2}$

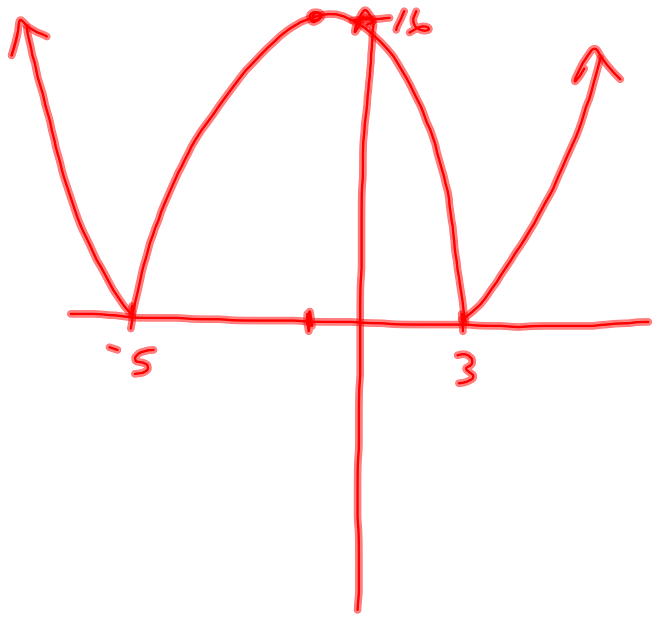
$x = {}^-1$

$y = -(-1)^2 - 2(-1) + 15$

$y = -1 + 2 + 15$

$y = 16$

$(-1, 16)$



Expressing absolute value functions as piecewise functions:

Must first understand how a piecewise function works...

Consider the piecewise-defined function

$$f(x) = \begin{cases} -x+2, & \text{if } x < 2, \\ x-2, & \text{if } x \geq 2. \end{cases}$$

Determine each of the following:

$f(-2) = 4$ $\qquad f(5) = 3$ $\qquad f(0) = 2$

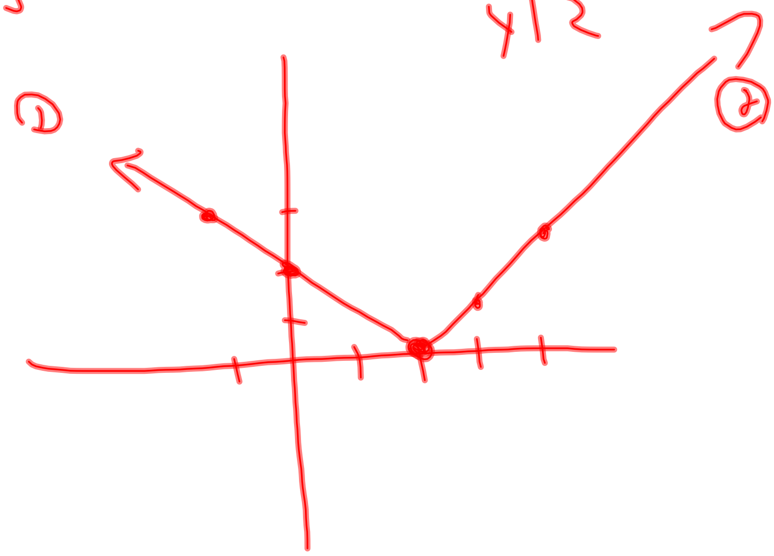
What would the sketch of this function look like?

$y = -x + 2, \ x < 2$

x	y
2	0
0	2
-1	3

$y = x - 2, \ x \geq 2$

x	y
2	0
3	1
4	2



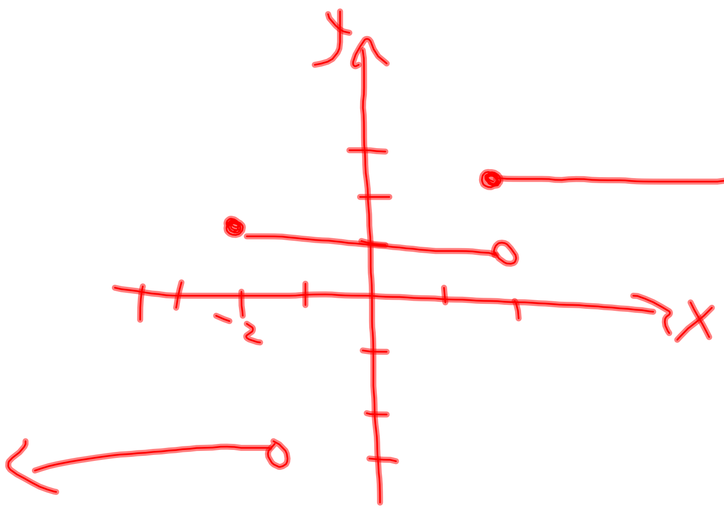
Given the function defined by the rule

$$g(x) = \begin{cases} -3, & \text{if } x < -2, \\ 1, & \text{if } -2 \le x < 2, \\ 3, & \text{if } x \ge 2, \end{cases}$$

evaluate $g(-3)$, $g(-2)$, and $g(5)$, then draw the graph of g ~~on a sheet of graph paper.~~ State the domain and range of g.

$g(-3) = -3$ $\quad$ $g(-2) = 1$ $\quad$ $g(5) = 3$

$x < -2$ $\quad$ $x = -2$ $\quad$ $x > 2$



Let's try to express these absolute value functions as piecewise defined functions...

Remember the following:

	If $\lvert x\rvert = 6$	
then	$x = 6$	$x = -6$

- Must examine the TWO possible cases that exist

$y = \lvert x+3\rvert$

Case 1: Between Bars Positive (ie $\lvert 6\rvert = 6$

If $x+3>0$, then $y = x+3$

$x>-3$

then $6 = 6$

Abs. Bars can be wiped

Case 2: Between Bars Negative ie. $\lvert -6\rvert = 6$

If $x+3<0$ then $y = -(x+3)$

$x\leqq -3$

$(-6 = 6)$

Need to multiply by (-1) to express without Absolute Bars

Piecewise Function

$$y = \begin{cases} x+3, & \text{if } x>-3 \\ -x-3, & \text{if } x\leqq -3 \end{cases}$$

$y = 2|x-5| + 4$

Case 1: BBP

$x - 5 \geqq 0$ Then $y = 2(x-5) + 4$

$x \geqq 5$

$y = 2x - 6$

Case 2: BBN

$x - 5 < 0$ then $y = -2(x-5) + 4$

$x < 5$

$y = -2x + 14$

$$y = \begin{cases} 2x - 6, & x \geqq 5 \\ -2x + 14, & x < 5 \end{cases}$$