1. (a) $f(-3) = 2(-3) + 5$
$= -1$

$f(2) = -(2+1)^2 + 5$
$= -9 + 5$
$= -4$

$f(5) = -2$

$= 1 - 3(-4) + -2$
$= 1 + 12 + -2$
$= 9$

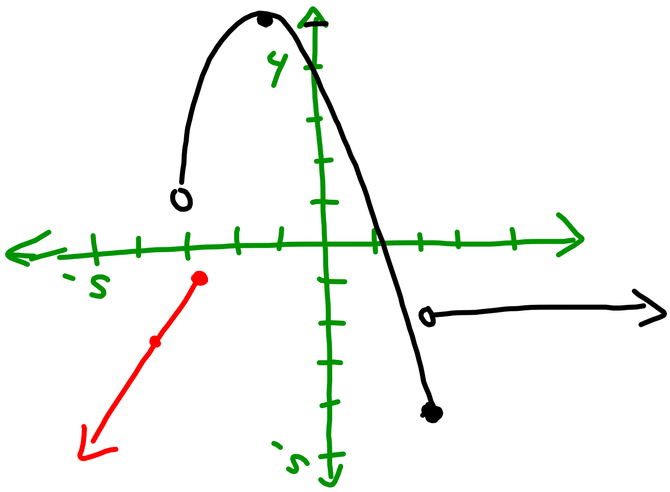
b) $y = 2x + 5$

x	y
-3	-1
-4	-3

$y = -(x+1)^2 + 5$
$V(-1, 5)$

x	y
-3	1
2	-4

$y = -2$



2. a)

D: $\{x \mid x \geq -3, x \neq -1, x \in R\}$

$\{x \mid -3 \leq x < -1$ or $-1 < x, x \in R\}$

$[-3, \infty)$ $x \neq -1$

$[-3, -1) \cup (-1, \infty)$

R: $\{y \mid y < 4, y \in R\}$

$(-\infty, 4)$

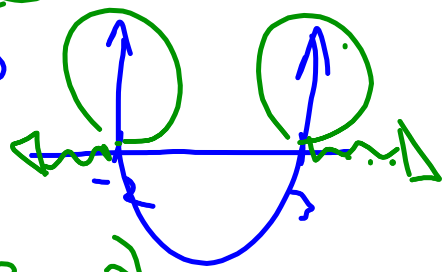
b) $f(x) = \sqrt{x^2 - x - 6}$

-> Can Not have a negative below a Square Root

up

$+x^2 - x - 6 \geq 0$ Above x-axis

$(x-3)(x+2) = 0$



D: $x = 3, -2$

$\{x \mid x \leq -2$ or $x \geq 3, x \in R\}$

R: $\{y \mid y \geq 0, y \in R\}$

3/ ① BBP

$3-5x \geq 0$

$\frac{-5x}{-5} \geq \frac{-3}{-5}$

$x \leq \frac{3}{5}$

$|6| = 6$

$6 = 6$

② BBN

$x > \frac{3}{5}$

$|-6| = 6$

$-(-6) = 6$

$f(x) = 4 + |3-5x|$

$$f(x) = \begin{cases} 4+(3-5x) & \text{if } x \leq \frac{3}{5} \\ 4-(3-5x) & \text{if } x > \frac{3}{5} \end{cases}$$

$h(7)$

4/ $h(\underbrace{w-1}_{x}) = 4-(w-1)^2$

$= 4-(w^2-2w+1)$

$= 4-w^2+2w-1$

$= 3-w^2+2w$

$f(\underbrace{3w^2-5}_{x}) = 2+3(3w^2-5)$

$= 2+9w^2-15$

$= 9w^2-13$

$r(\underbrace{5w}_{x}) = 4(5w)^2 - 1$

$= 100w^2-1$

$= 3(3-w^2+2w) + 9w^2-13-2(100w^2-1)$

$= 9-3w^2+6w+9w^2-13-200w^2+2$

$\boxed{= -194w^2+6w-2}$

Stretches and Compressions...

stretch

- a transformation in which the distance of each *x*-coordinate or *y*-coordinate from the line of reflection is multiplied by some scale factor

- scale factors between 0 and 1 result in the point moving closer to the line of reflection; scale factors greater than 1 result in the point moving farther away from the line of reflection

Vertical and Horizontal Stretches

A **stretch**, unlike a translation or a reflection, changes the shape of the graph. However, like translations, stretches do not change the orientation of the graph.

- When the output of a function $y = f(x)$ is multiplied by a non-zero constant a, the result, $y = af(x)$ or $\frac{y}{a} = f(x)$, is a vertical stretch of the graph about the x-axis by a factor of $|a|$. If $a < 0$, then the graph is also reflected in the x-axis.
- When the input of a function $y = f(x)$ is multiplied by a non-zero constant b, the result, $y = f(bx)$, is a horizontal stretch of the graph about the y-axis by a factor of $\frac{1}{|b|}$. If $b < 0$, then the graph is also reflected in the y-axis.

$y = \sqrt{x}$

$y = 3\sqrt{x}$

=> Vertical stretch by a factor of $\underline{\underline{3}}$

$y = \sqrt{3x}$

=> Horizontal Stretch by a factor of $\frac{1}{3}$

$y = g(x)$

$y = 7g(x)$

=> Ver. stretch by factor of 7

$y = g(7x)$

=> Horizontal Stretch by a factor of $\frac{1}{7}$

$y = -\underline{\underline{3}}f[-2(x+7)] + 4$

=> Reflects in x-axis

=> Vertically stretched by a factor of 3

=> Reflect in y-axis

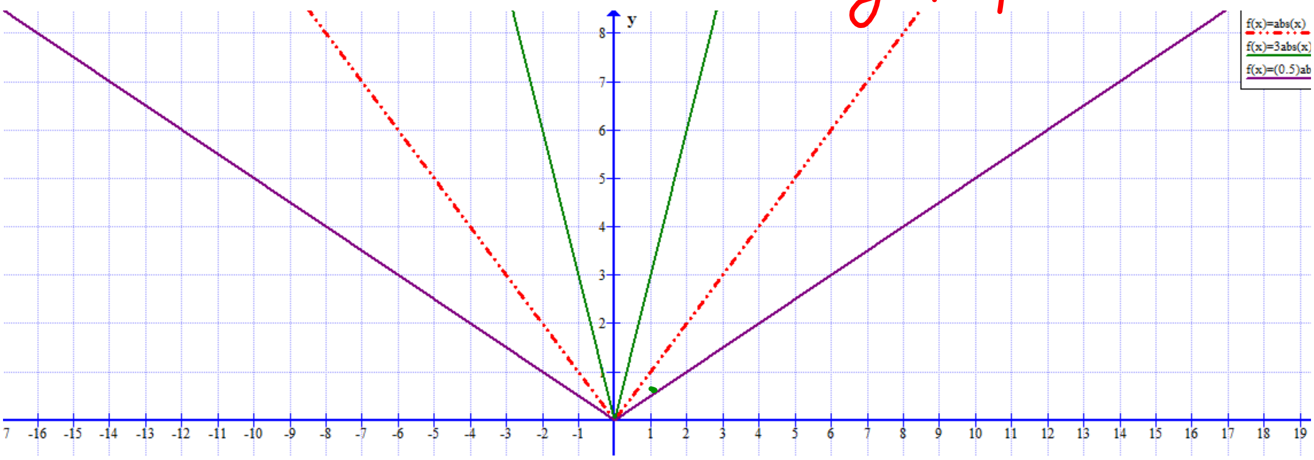
=> Horizontally stretched by a factor of $\frac{1}{2}$

=> Left 7 & Up 4

Vertical Stretch or Compression...

- When the output of a function $y = f(x)$ is multiplied by a non-zero constant a, the result, $y = af(x)$ or $\frac{y}{a} = f(x)$, is a vertical stretch of the graph about the x-axis by a factor of $|a|$. If $a < 0$, then the graph is also reflected in the x-axis.

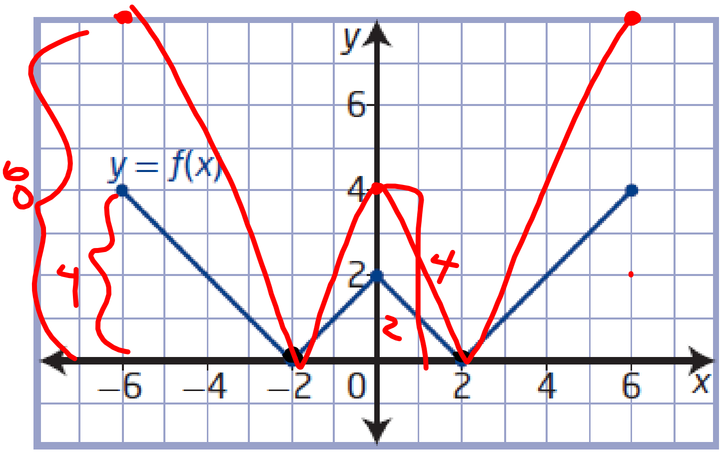
$y=|x|$



$y = |x|$

$y = 3|x|$

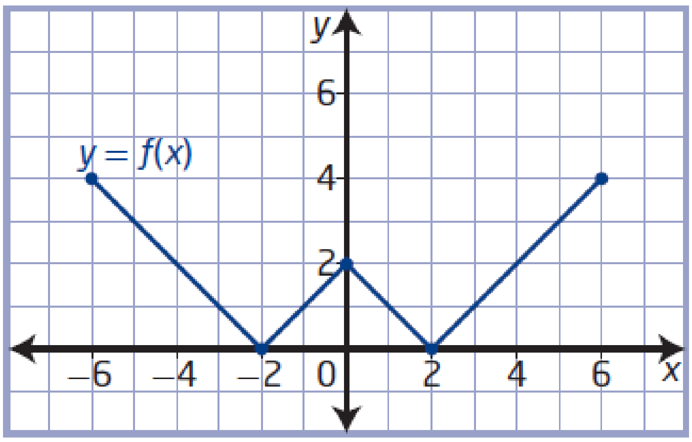
$y = \frac{1}{2}|x|$



Sketch each of the following:

a) $g(x) = 2f(x)$

b) $g(x) = \frac{1}{2}f(x)$



Horizontal Stretch or Compression...