

1. Define:

a. function

a relation in which each input has a unique output

b. domain

the set of all input values for which a function is defined

2. Write the domain in interval notation:

a.  $f(x) = \sqrt{x-3}$

$x-3 \geq 0$   
 $x \geq 3$        $[3, \infty)$

b.  $f(x) = \frac{2}{x+6}$

$x+6 \neq 0$   
 $x \neq -6$        $(-\infty, -6) \cup (-6, \infty)$

4. Fill in the blanks:

Two lines  $y = m_1x + b_1$  and  $y = m_2x + b_2$  are

a. parallel if  $m_1 = m_2$

b. perpendicular if  $m_1 = -\frac{1}{m_2}$

(or  $m_1 m_2 = -1$ )

3. State the formula/equation:

a. Slope of the line that passes through the points  $(x_1, y_1)$  and  $(x_2, y_2)$ .

$m = \frac{y_2 - y_1}{x_2 - x_1}$

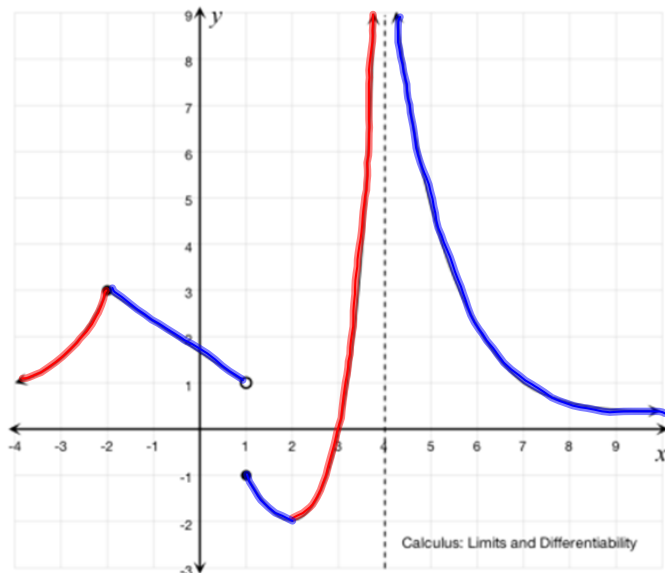
b. Slope-intercept form of the equation of a line.

$y = mx + b$

c. Point-slope form of the equation of a line.

$y - y_1 = m(x - x_1)$

5. Determine the (open) intervals (of x-values) on which the function is increasing, decreasing, and constant.



a. increasing:

$(-\infty, -2) \cup (2, 4)$

b. decreasing:

$(-2, 1) \cup (1, 2) \cup (4, \infty)$

c. constant:

nowhere

HW #1 that should have been turned in on Friday:

1.2#15-29odd; 40,41,42,45,48

1.4#35-41odd; 53-63odd

1.5#1-16all

HW assigned Monday:

1.6#23,29,31,71,75,81

1.7#9,11,39-47odd

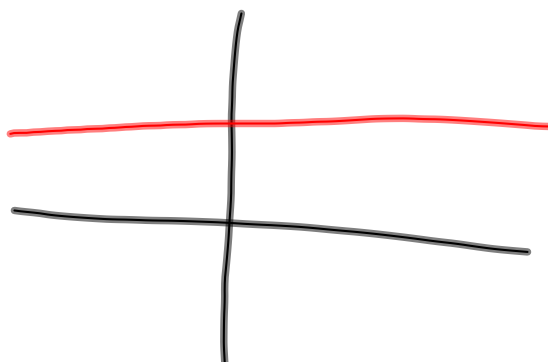
1.7 #47

$$f(x) = 8$$

even/odd/neither?

$$f(-x) = 8 = f(x)$$

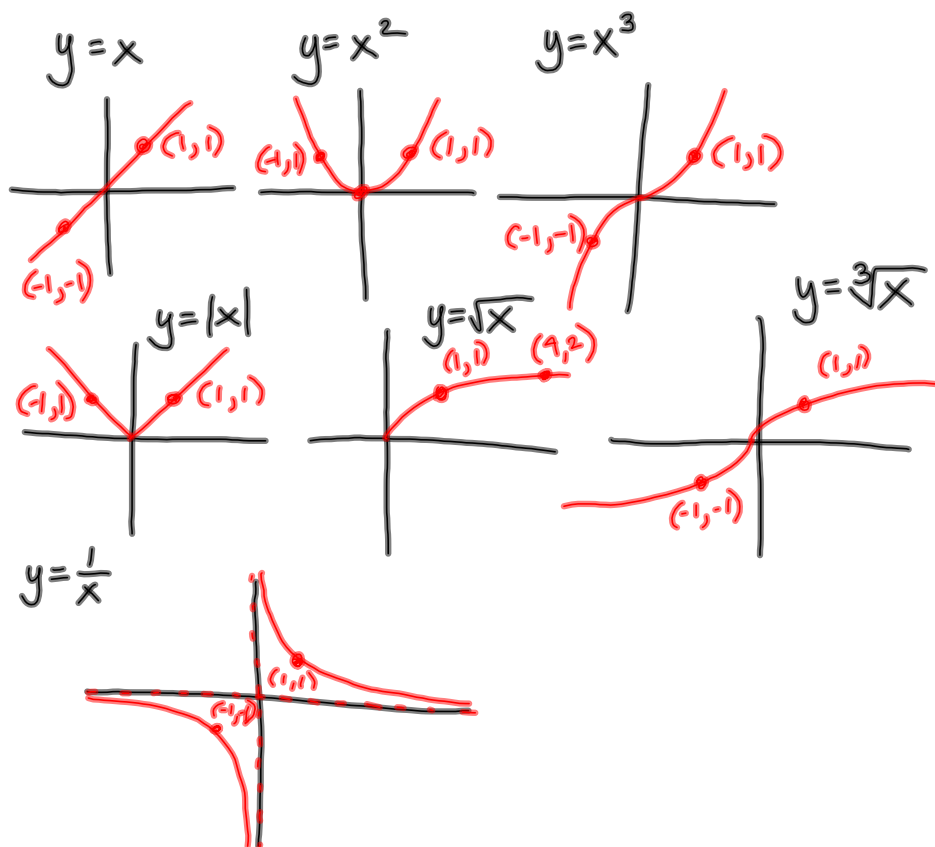
$\Rightarrow$  even



$$45. f(x) = x - |x|$$

$$f(-x) = -x - |-x| = -x - |x|$$

neither



## Graphing by transformations

$$y = f(x) \Rightarrow y = a f [bx + c] + d$$

$$y = a f \left[ b \left( x + \frac{c}{b} \right) \right] + d$$

$a$  = vertical shrink/stretch

If  $|a| > 1$  stretch

If  $|a| < 1$  shrink

If  $a < 0$  vertical flip

$b$  = horizontal shrink/stretch

If  $|b| > 1$  shrink

If  $|b| < 1$  stretch

If  $b < 0$  horizontal flip

$\frac{c}{b}$  = horizontal shift

If  $\frac{c}{b} > 0$  left

If  $\frac{c}{b} < 0$  right

$d$  = vertical shift

If  $d > 0$  up

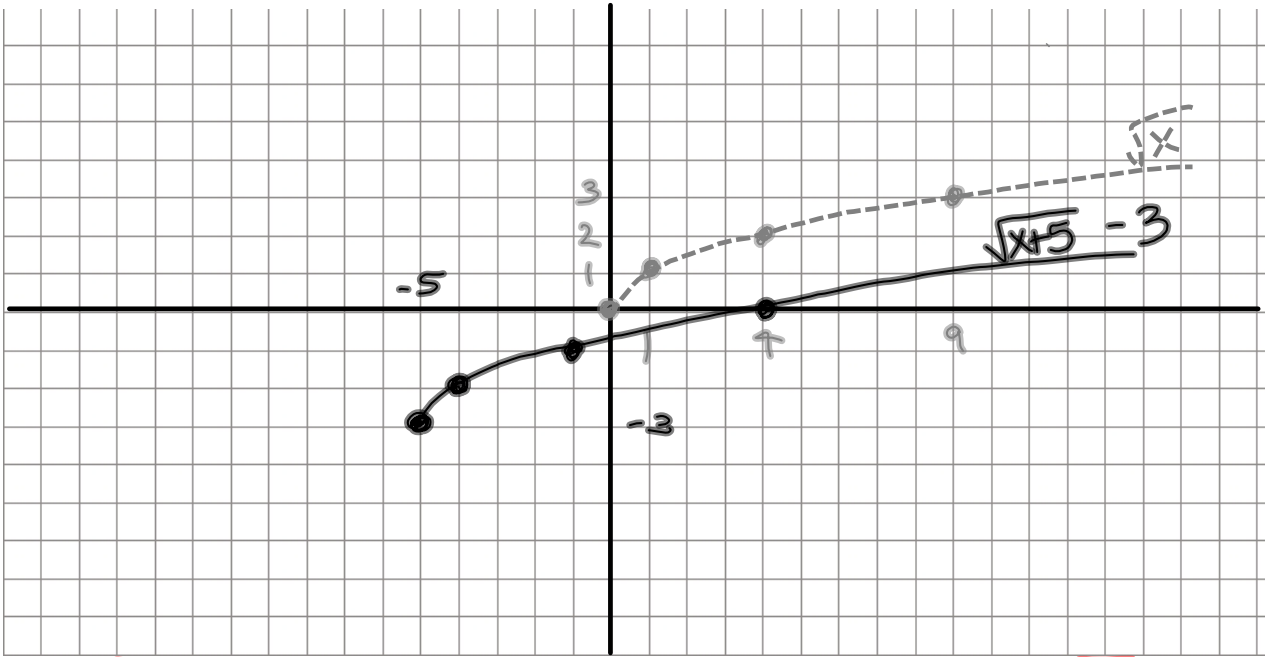
If  $d < 0$  down

constants multiplied  $\leftrightarrow$  shrink/stretch

added/subt  $\leftrightarrow$  shifting

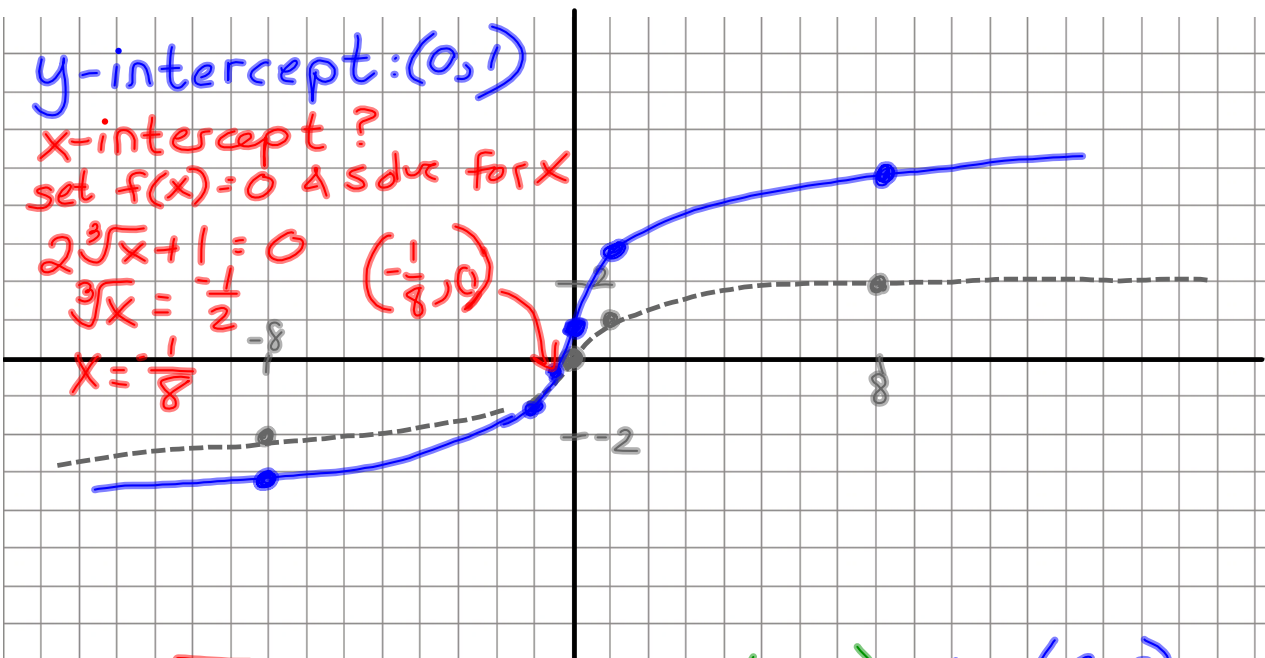
outside  $\leftrightarrow$  vertically as we would expect

inside  $\leftrightarrow$  horizontally, opposite of what we would expect



$y = \sqrt{x+5} - 3$   
 left 5    subtr. 5 from  $x$   
 down 3    subtr. 3 from  $y$

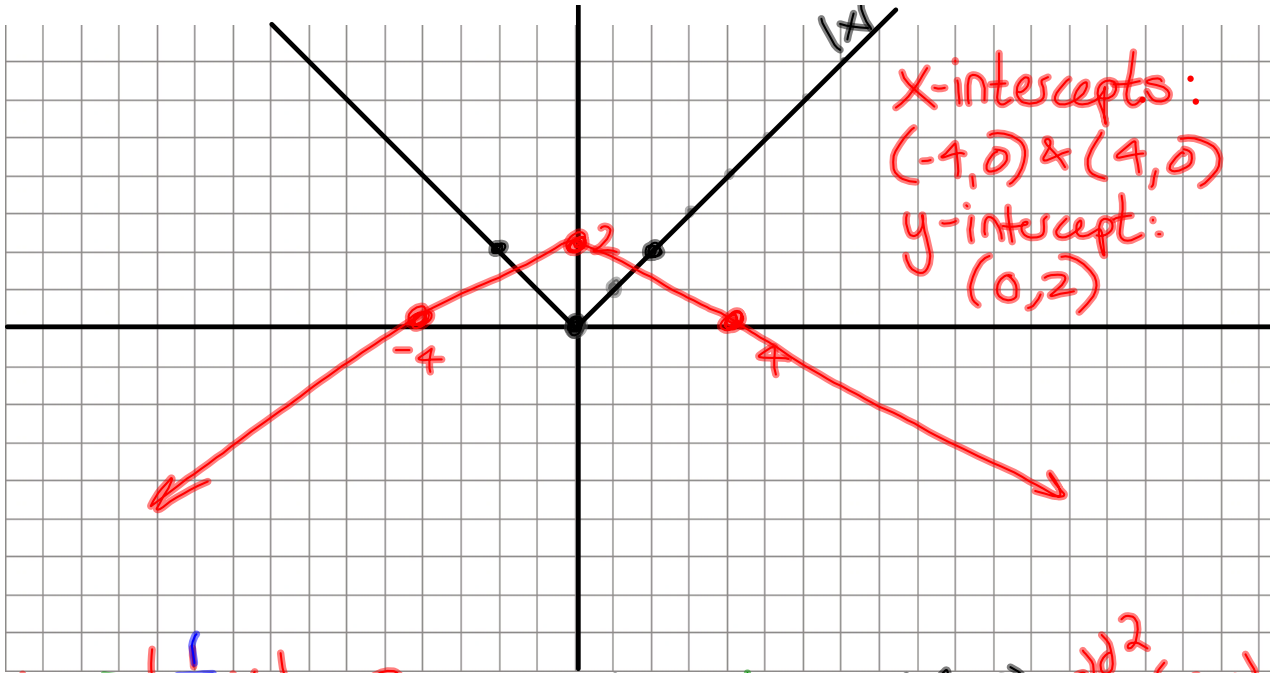
original:  $y = \sqrt{x}$   
 $(0,0) \rightarrow (-5, -3)$   
 $(1,1) \rightarrow (-4, -2)$   
 $(4,2) \rightarrow (-1, -1)$



y-intercept:  $(0,1)$   
 x-intercept?  
 set  $f(x) = 0$  & solve for  $x$   
 $2\sqrt[3]{x} + 1 = 0$   
 $\sqrt[3]{x} = -\frac{1}{2}$   
 $x = -\frac{1}{8}$   
 $(-\frac{1}{8}, 0)$

$y = 2\sqrt[3]{x} + 1$   
 orig:  
 $y = \sqrt[3]{x}$

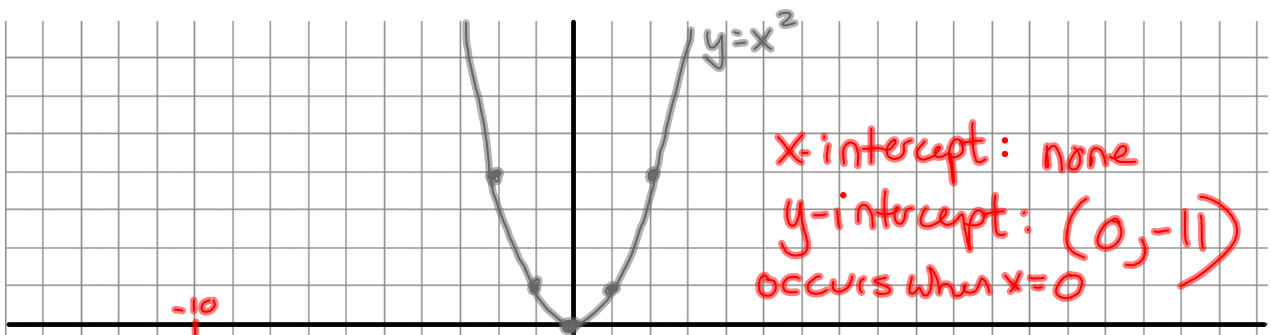
$(-8, -2)$	mult $y$ 's by 2	$(-8, -4)$	add to $y$ 's	$(-8, -3)$
$(-1, -1)$		$(-1, -2)$		$(-1, -1)$
$(0, 0)$		$(0, 0)$		$(0, 0)$
$(1, 1)$		$(1, 2)$		$(1, 3)$
$(8, 2)$		$(8, 4)$		$(8, 5)$



X-intercepts:  
 $(-4, 0)$  &  $(4, 0)$   
 y-intercept:  
 $(0, 2)$

$y = -|\frac{1}{2}x| + 2$   
 orig:  $y = |x|$

$(-2, 2)$  mult.  $y$ 's by  $-1$   
 $(0, 0)$  divide  $x$ 's by  $\frac{1}{2}$   
 $(2, 2)$  (mult by 2)  
 $(-4, 2)$  add 2 to  $y$ 's  $\rightarrow (-4, 0)$   
 $(0, 0) \rightarrow (0, 2)$   
 $(4, -2)$   $(4, 0)$

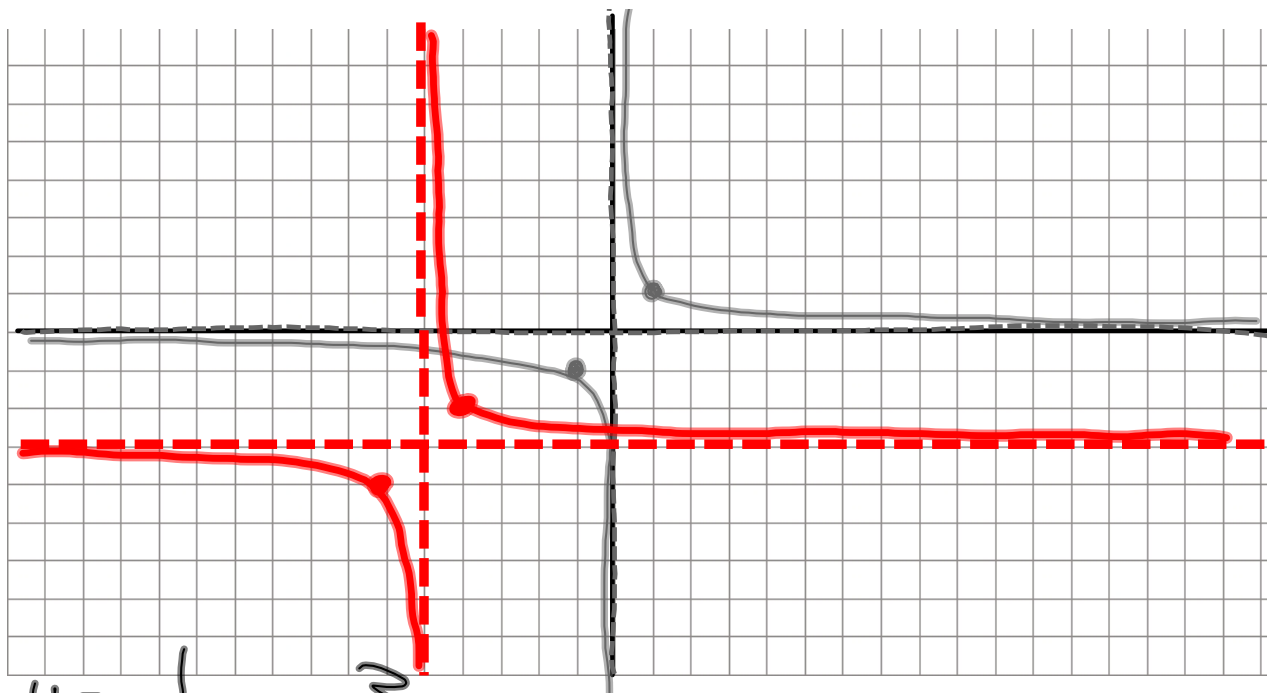


x-intercept: none  
 y-intercept:  $(0, -11)$   
 occurs when  $x=0$

$y = -(\frac{1}{2}(0)+3)^2 - 2$   
 $= -3^2 - 2$   
 $= -9 - 2 = -11$

$y = -(\frac{1}{2}x+3)^2 - 2$   
 $= -(\frac{1}{2}[x+6])^2 - 2$   
 orig:  $y = x^2$

$(-2, 4)$  mult  $y$ 's by  $-1$   
 $(-1, 1)$  divide  $x$ 's by  $\frac{1}{2}$   
 $(0, 0)$  (mult by 2)  
 $(1, 1)$   
 $(2, 4)$   
 $(-4, -4)$  subtract 6 from  $x$ 's  
 $(-2, -6)$   
 $(-2, -6)$   
 $(-8, -3)$   
 $(-6, -2)$   
 $(-4, -1)$   
 $(-2, -6)$



$$y = \frac{1}{x+5} - 3$$

$\frac{1}{x}$  left 5  
 down 3

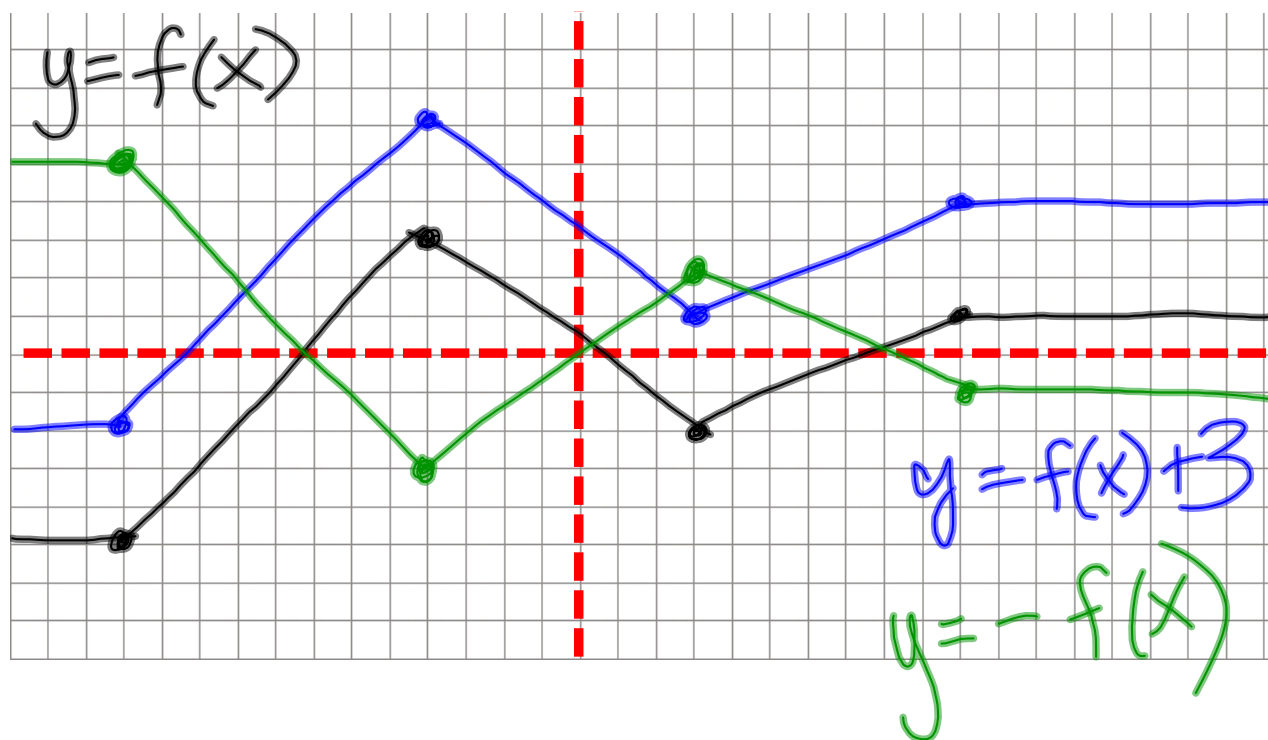
1.7

96.  $y = x^3$   
 upside down  
 right 5

$$y = -(x - 5)^3$$

100.  $y = |x|$   
 stretched horiz. by 2  
 down 5

$$y = |\frac{1}{2}x| - 5$$



HW

1.7 # 59-69 odd  
77-83 odd  
93-101 odd  
115-121 odd