

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) .

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

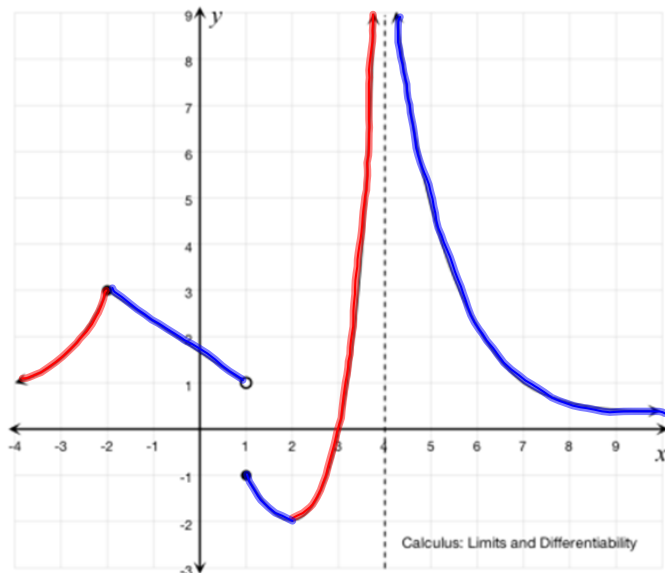
b. Slope-intercept form of the equation of a line.

$y = mx + b$

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

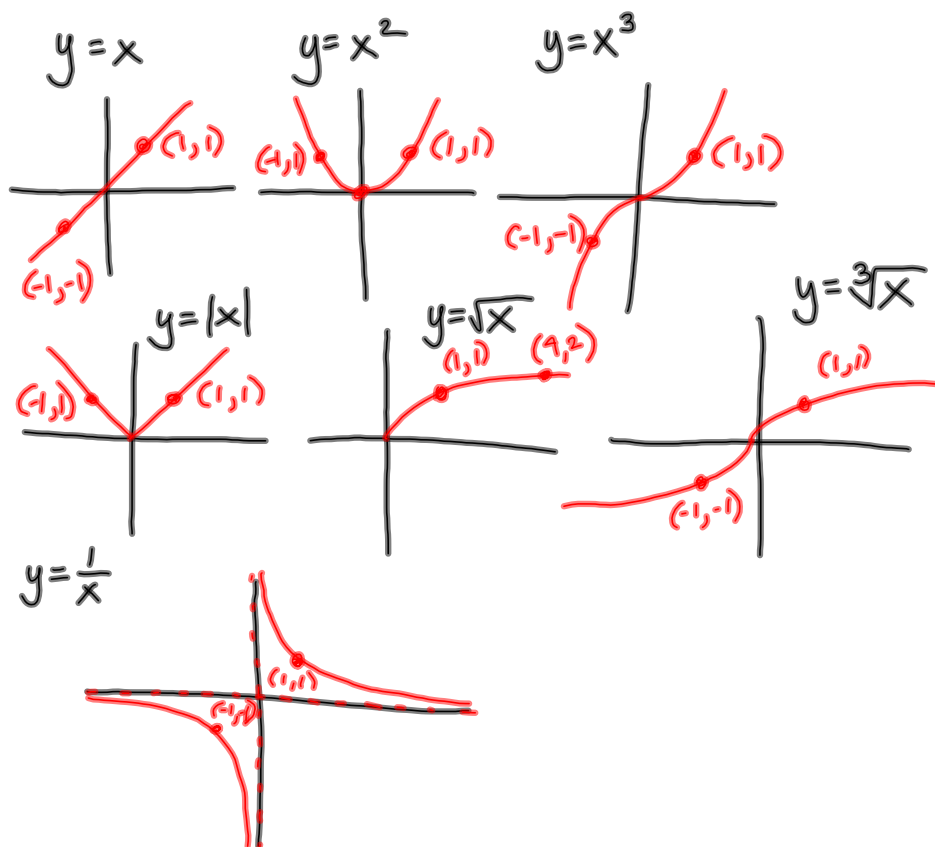
assigned Fri.: 1.5 ~

HW assigned Monday:

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

1.7#9,11,39-47odd

Homework questions?



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

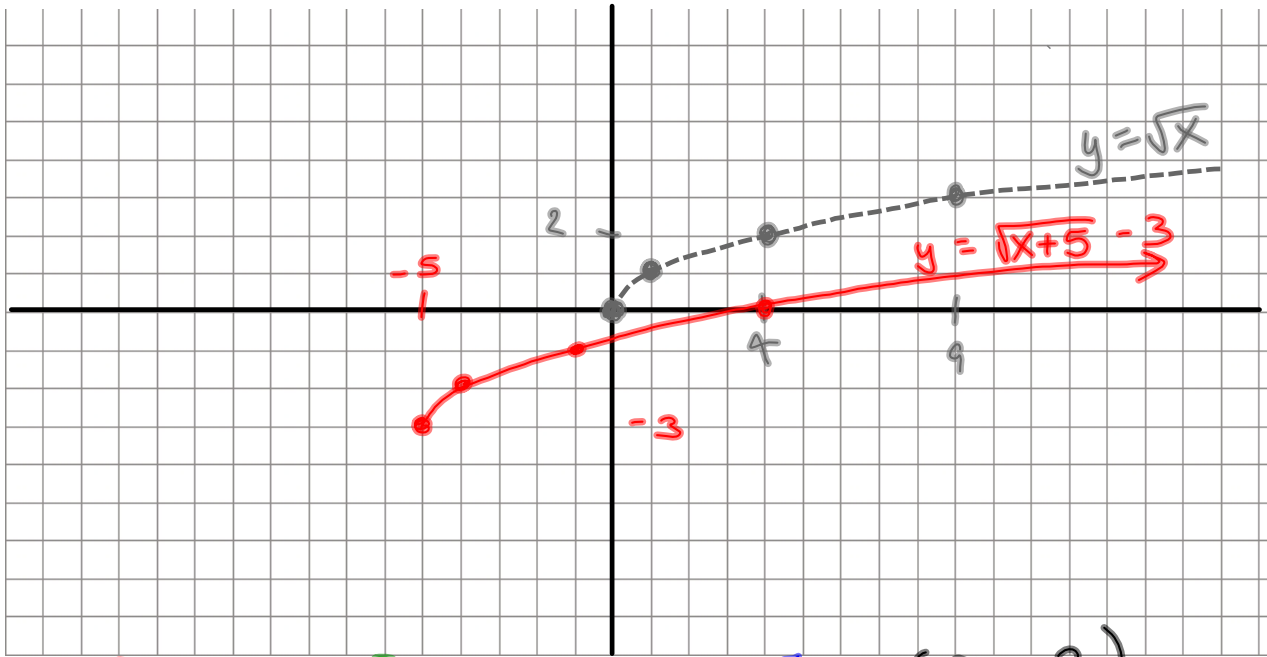
If $d < 0$ down

constants multiplied \leftrightarrow shrink/stretch

added/subt \leftrightarrow shifting

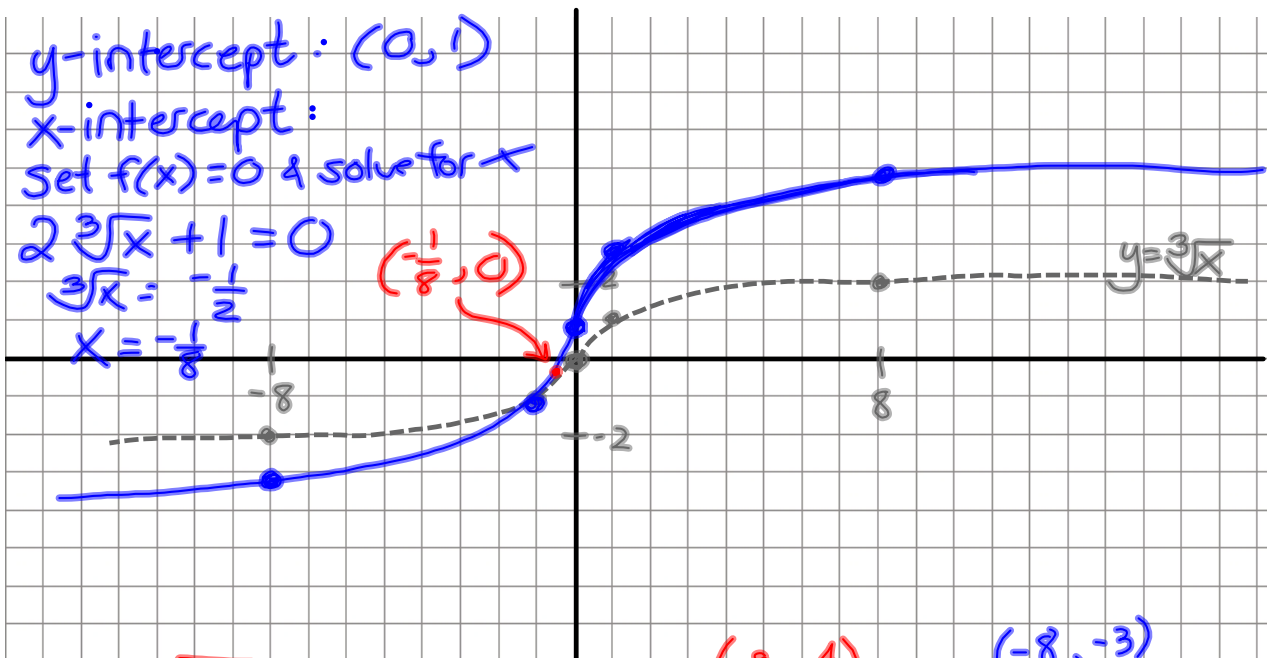
outside \leftrightarrow vertically as we
would expect

inside \leftrightarrow horizontally,
opposite of what we
would expect



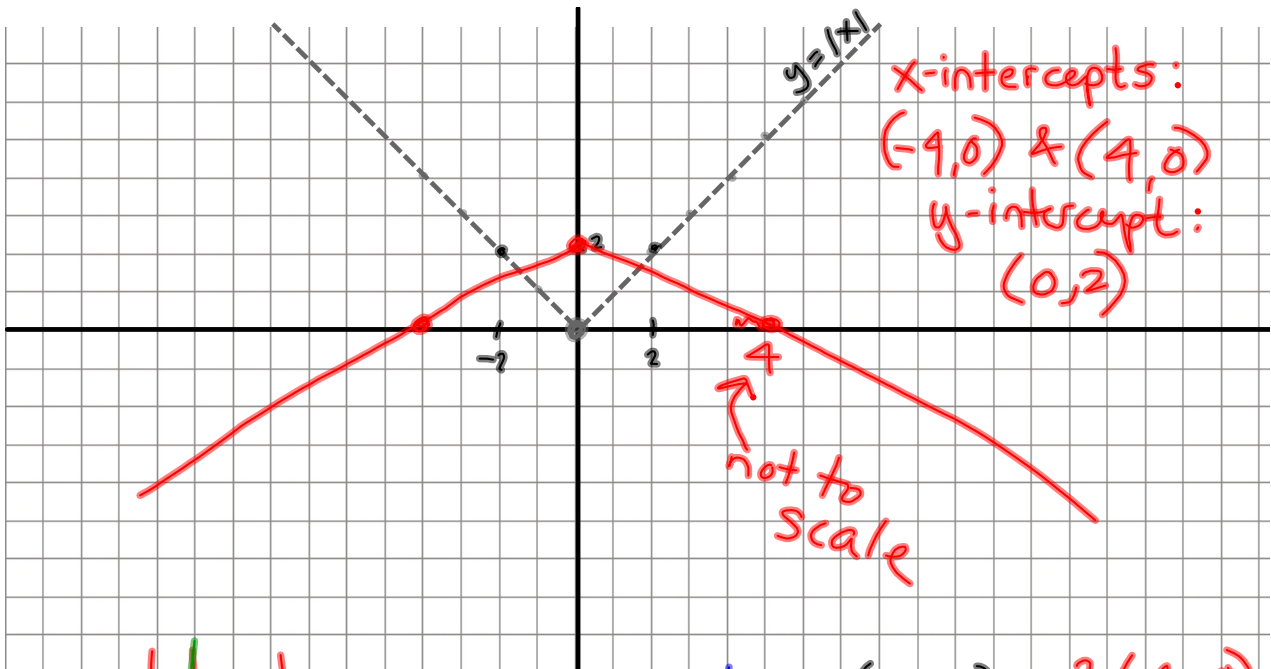
$y = \sqrt{x+5} - 3$
 original: $y = \sqrt{x}$
 left 5
 down 3

$(0, 0)$	subtr. 5 from x	$(-5, -3)$
$(1, 1)$		$(-4, -2)$
$(4, 2)$	subtr. 3 from y	$(-1, -1)$



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

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

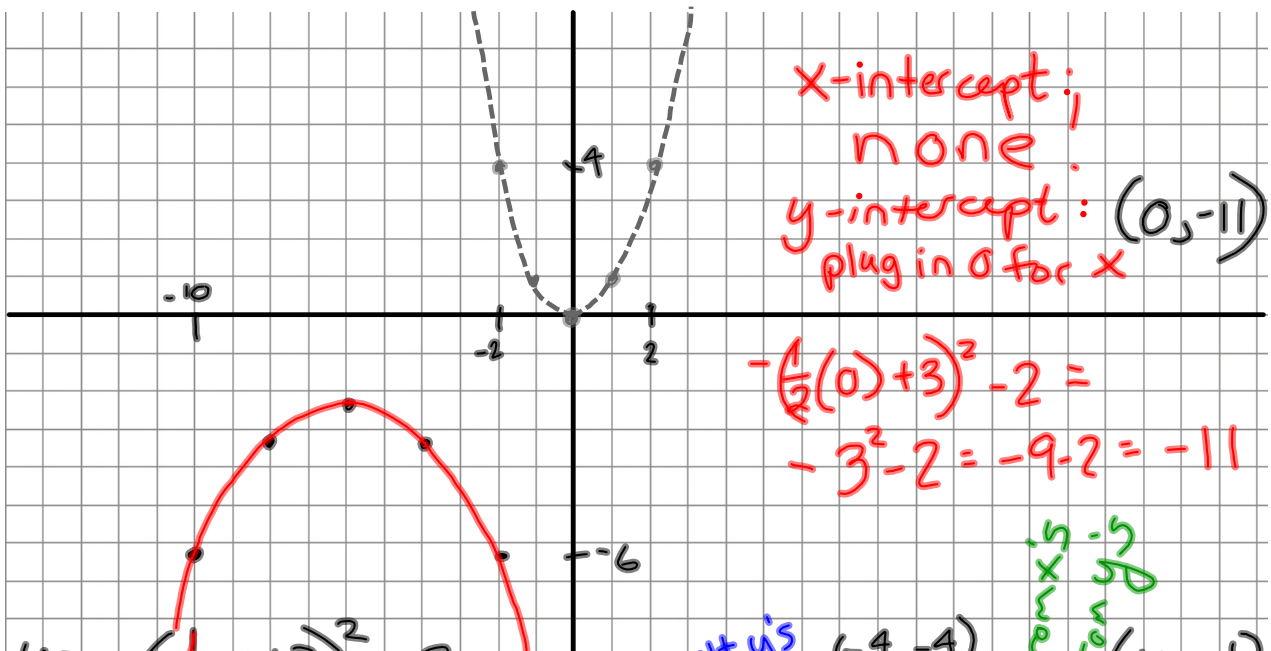


x-intercepts:
 $(-4, 0)$ & $(4, 0)$
 y-intercept:
 $(0, 2)$

not to scale

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

- | | | | | |
|-----------|-------------------------------|------------|--------------|-----------|
| $(-2, 2)$ | mult y's by -1 | $(-4, -2)$ | add 2 to y's | $(-4, 0)$ |
| $(0, 0)$ | divide x's by 1/2 (mult by 2) | $(0, 0)$ | | $(0, 2)$ |
| $(2, 2)$ | | $(4, -2)$ | | $(4, 0)$ |

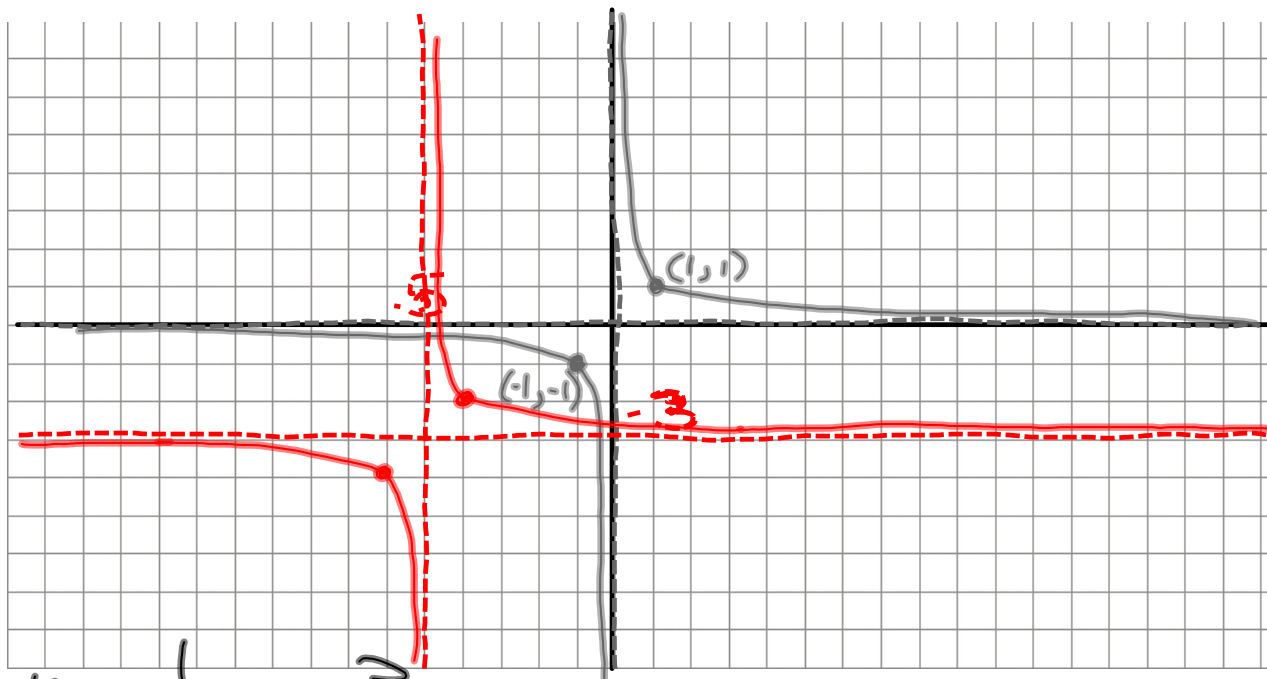


x-intercept:
 none.
 y-intercept: $(0, -11)$
 plug in 0 for x

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

$y = -\left(\frac{1}{2}x + 3\right)^2 - 2$
 $= -\left[\frac{1}{2}(x + 6)\right]^2 - 2$
 $y = x^2$ original

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|-----------|-------------------------------|------------|------------------|-------------|
| $(-2, 4)$ | mult y's by -1 | $(-4, -4)$ | subtr 6 from x's | $(-10, -6)$ |
| $(-1, 1)$ | divide x's by 1/2 (mult by 2) | $(-2, -1)$ | subtr 2 from y's | $(-8, -3)$ |
| $(0, 0)$ | | $(0, 0)$ | | $(-6, -2)$ |
| $(1, 1)$ | | $(2, -1)$ | | $(-4, -3)$ |
| $(2, 4)$ | | $(4, -4)$ | | $(-2, -6)$ |



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

orig: $y = \frac{1}{x}$ left 5
down 3

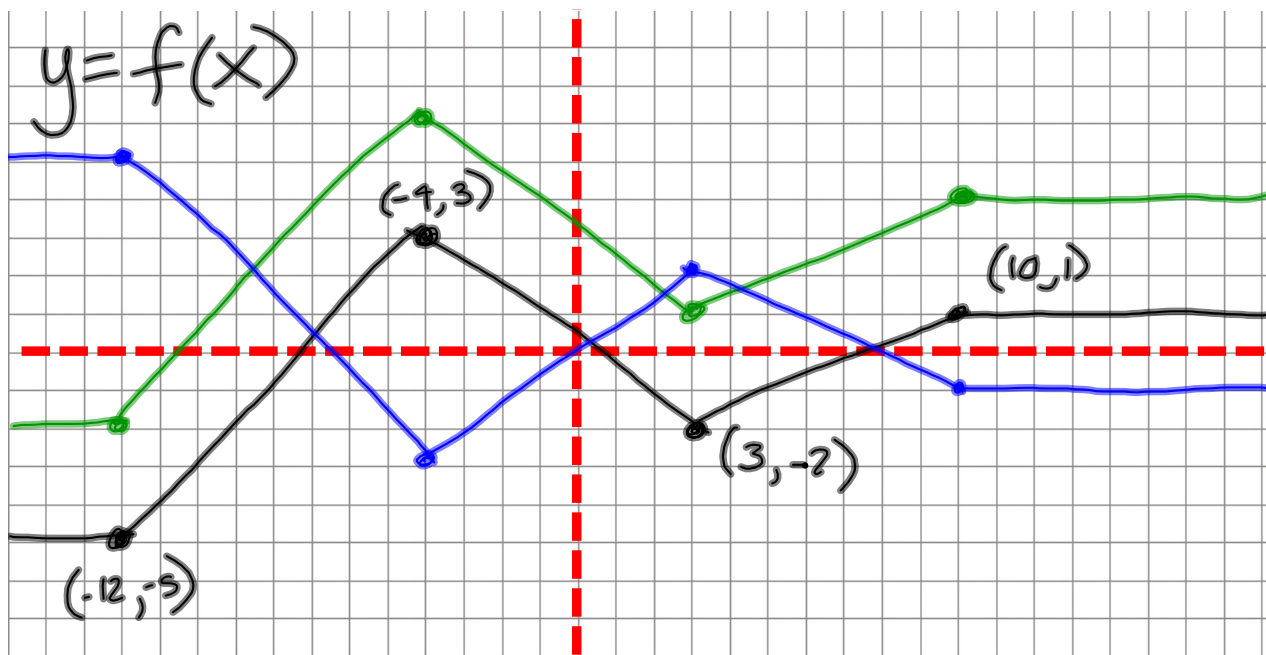
1.7

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

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

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

$$f(x) = \left| \frac{1}{2}x \right| - 5$$



$$y=f(x)+3$$

$$y=-f(x)$$

HW

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