Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 46-49 #2 – 4, (5 – 7)ace, 12
[19, 20]

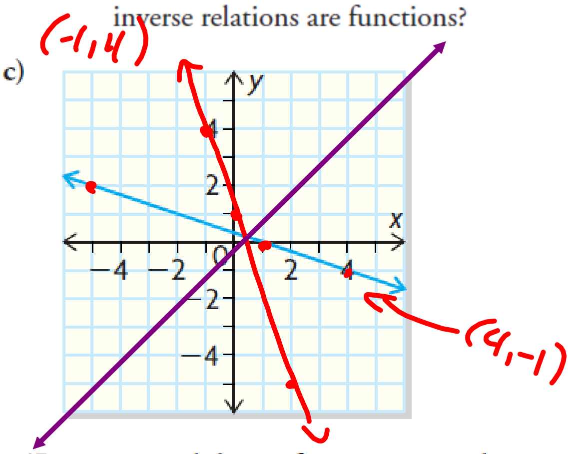
2c, 5f, 7e
4cb 6f

Today's Homework Practice includes:

pp. 76-77 #1 – 5, 7, 8, 10, 12* – 19
*use web fix

p. 46 **2.** Copy the graph of each function and graph its inverse. For each graph, identify the points that are common to the function and its inverse. Which inverse relations are functions?

c)



p. 47 **4.** For each linear function, interchange x and y. Then solve for y to determine the inverse.

a) $y = 4x - 3$ **c)** $3x + 4y = 6$ $\longrightarrow$ $3y + 4x = 6$

b) $y = 2 - \frac{1}{2}x$ **d)** $2y - 10 = 5x$

$3y = -4x + 6$

$y = -\frac{4}{3}x + \frac{6}{3}$

$= -\frac{4}{3}x + 2$

b) $x = 2 - \frac{1}{2}y$

$\frac{-2}{1}(x-2) = \left(\cancel{-\frac{1}{2}}y\right)\frac{\cancel{-2}}{1}$

$-2x + 4 = y$

p. 47 **5.** Determine the inverse of each linear function by ~~reversing the operations.~~

a) $f(x) = x - 4$ **c)** $f(x) = 5x$ **e)** $f(x) = 6 - 5x$

b) $f(x) = 3x + 1$ **d)** $f(x) = \frac{1}{2}x - 1$ **f)** $f(x) = \frac{3}{4}x + 2$

$y = \frac{3}{4}x + 2$

$x = \frac{3}{4}y + 2$

$4(x-2) = \cancel{4}\left(\frac{3}{\cancel{4}}y\right)$

$\frac{4x-8}{3} = \frac{3y}{3}$

$\frac{4x-8}{3} = y$

p. 47

6. Determine the inverse of each linear function by interchanging the variables.

a) $f(x) = x + 7$ c) $f(x) = 5$ e) $f(x) = x$

b) $f(x) = 2 - x$ d) $f(x) = -\frac{1}{5}x - 2$ f) $f(x) = \frac{x-3}{4}$

$4(x) = 4\left(\frac{y-3}{4}\right)$

$4x = y - 3$

$4x + 3 = y$

7. Sketch the graph of each function in questions 5 and 6, and sketch its inverse. Is each inverse linear? Is each inverse a function? Explain.

For 5e) **5.** Determine the inverse of each linear function by ~~reversing the operations.~~

a) $f(x) = x - 4$ c) $f(x) = 5x$ e) $f(x) = 6 - 5x$

b) $f(x) = 3x + 1$ d) $f(x) = \frac{1}{2}x - 1$ f) $f(x) = \frac{3}{4}x + 2$

e) $f(x) = 6 - 5x$

$y = 6 - 5x$

also $y = -5x + 6$

$b = 6 \quad m = -5$

$x = 6 - 5y$

$\frac{x - 6}{-5} = \frac{-5y}{-5}$

$\frac{x-6}{-5} = y$

or $y = \frac{-x+6}{5}$

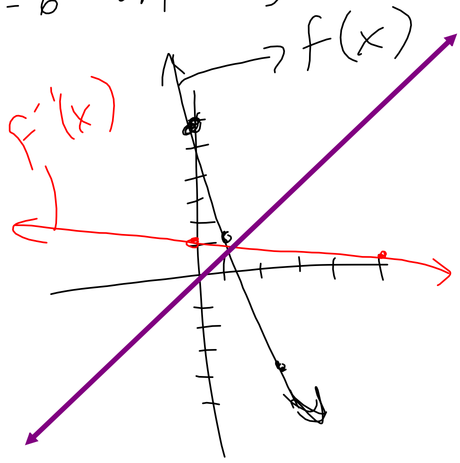
$= -\frac{1}{5}x + \frac{6}{5}$

$b = \frac{6}{5} \quad m = -\frac{1}{5}$

$x = 6 - 5y$

$5y = -x + 6$

$y = \frac{-x+6}{5}$



p. 47

12. The formula for converting a temperature in degrees Celsius into degrees Fahrenheit is $F = \frac{9}{5}C + 32$. Shirelle, an American visitor to Canada, uses a simpler rule to convert from Celsius to Fahrenheit: Double the Celsius temperature, then add 30.

A

a) Use function notation to write an equation for this rule. Call the function f and let x represent the temperature in degrees Celsius.

b) Write f^{-1} as a rule. Who might use this rule?

c) Determine $f^{-1}(x)$.

d) One day, the temperature was 14 °C. Use function notation to express this temperature in degrees Fahrenheit.

e) Another day, the temperature was 70 °F. Use function notation to express this temperature in degrees Celsius.

$f(x) = 2x + 30$

b) $y = 2x + 30$

$x = 2y + 30$

$x - 30 = 2y$

$\frac{x-30}{2} = y$

or $y = \frac{x-30}{2}$ or $y = \frac{x}{2} - \frac{30}{2}$

$= \frac{x}{2} - 15$

$f^{-1}(x) = \frac{x}{2} - 15$

$C(f) = \frac{f}{2} - 15$

$f(14) = 2(14) + 30$

$= 28 + 30$

$= 58$

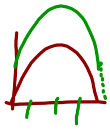
$C(70) = \frac{70}{2} - 15$

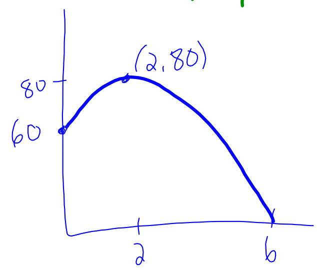
$= 35 - 15$

$= 20$

p. 76

7. A ball is thrown upward from the roof of a building 60 m tall. The ball reaches a height of 80 m above the ground after 2 s and hits the ground 6 s after being thrown.
   a) Sketch a graph that shows the height of the ball as a function of time.
   b) State the domain and range of the function.
   c) Determine an equation for the function.





D: $\{x \in \mathbb{R} \mid 0 \le x \le 6\}$

R: $\{y \in \mathbb{R} \mid 0 \le y \le 80\}$

(6, 0)

$y = a(x-d)^2 + c$

$y = a(x-2)^2 + 80$

$0 = a(6-2)^2 + 80$

$0 = a(4)^2 + 80$

$0 = 16a + 80$

$-80 = 16a$

$\frac{-80}{16} = a$

$-5 = a$

$\therefore y = -5(x-2)^2 + 80$ is the equation!

$y = ax^2 + bx + c$

$y = ax^2 + bx + 60$

$(0) = a(6)^2 + b(6) + 60$

$0 = 36a + 6b + 60$

$-60 = 36a + 6b$

$-10 = 6a + b$

$-10 = -2a - b$

$-20 = 4a$

$a = -5$

use (2, 80)

$80 = a(2)^2 + b(2) + 60$

$80 = 4a + 2b + 60$

$80 - 60 = 4a + 2b$

$20 = 4a + 2b$

$10 = 2a + b$

$\therefore -10 = 6(-5) + b$

$-10 = -30 + b$

$-10 + 30 = b$

$20 = b$

$\therefore y = -5x^2 + 20x + 60$

$= -5(x^2 - 4x) + 60$

$= -5(x^2 - 4x + 4 - 4) + 60$

$= -5(x-2)^2 + 20 + 60$

$= -5(x-2)^2 + 80$

$y = -5(x-2)^2 + 80$

Review for Chapter 1 - Introduction to Functions

1. Describe the transformations to $f(x)$

$$g(x) = -3f\left(\frac{1}{2}(x-2)\right)+4$$

2. a) Write an equation using the **square root** mother function for the following transformations:

-Vertical compression by a factor of $\frac{1}{3}$

-Horizontal stretch by a factor of 2
-Reflection over the y-axis
-Translated vertically up 5
-Translated horizontally left 4

$y = \frac{1}{3} f\left(-\frac{1}{2}(x+4)\right) + 5$

$y = \dfrac{\frac{1}{3}}{-\frac{1}{2}(x+4)} + 5$

b) Write an equation for the above transformations if the mother function is the reciprocal function.

or

$y = \frac{1}{3}\left(\dfrac{1}{-\frac{1}{2}(x+4)}\right) + 5$

3. If (-2, 5) is a point on the function,
determine the coordinates of the image of this point on the graph.

$$f(x) = -2f\left(\frac{1}{3}(x-4)\right)+6$$

$y = af(k(x-d))+c$

$(x, y) \to \left(\frac{1}{k}x + d, ay + c\right)$

$(-2, 5) \to (3x + 4, -2y + 6)$

$\to (3(-2) + 4, -2(5) + 6)$

$\to (-6 + 4, -10 + 6)$

$\to (-2, -4)$

Extra example during Lunch

$y = 3(2f(x+5)) - 4$ $\quad (8, -10)$

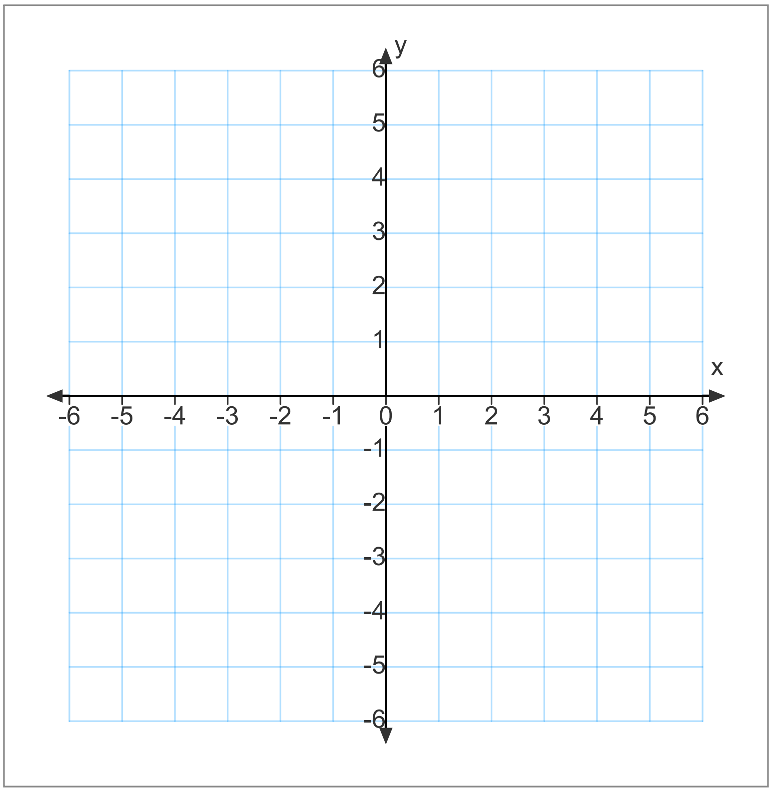
$(x, y) \rightarrow \left(\frac{1}{2}x - 5, \ 3y - 4\right)$

$\rightarrow \left(\frac{1}{2}(8) - 5, \ 3(-10) - 4\right)$

$\rightarrow (-1, -34)$

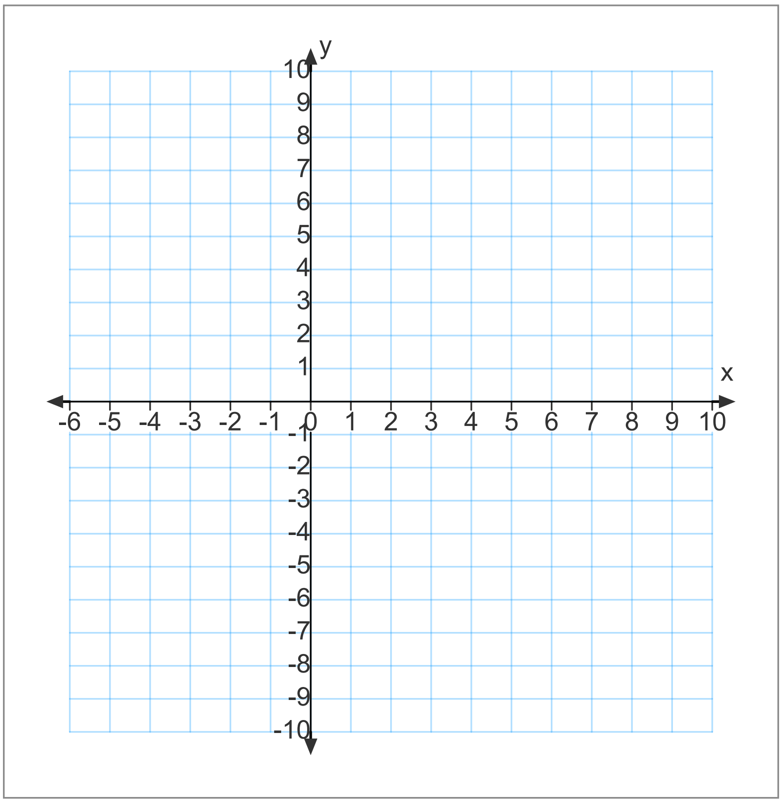
4. Graph each of the following functions and determine the domain and range.

a) $y = -\frac{1}{2}\left|2x - 6\right| + 5$



b) $f(x) = -3\sqrt{-2x+10} - 2$

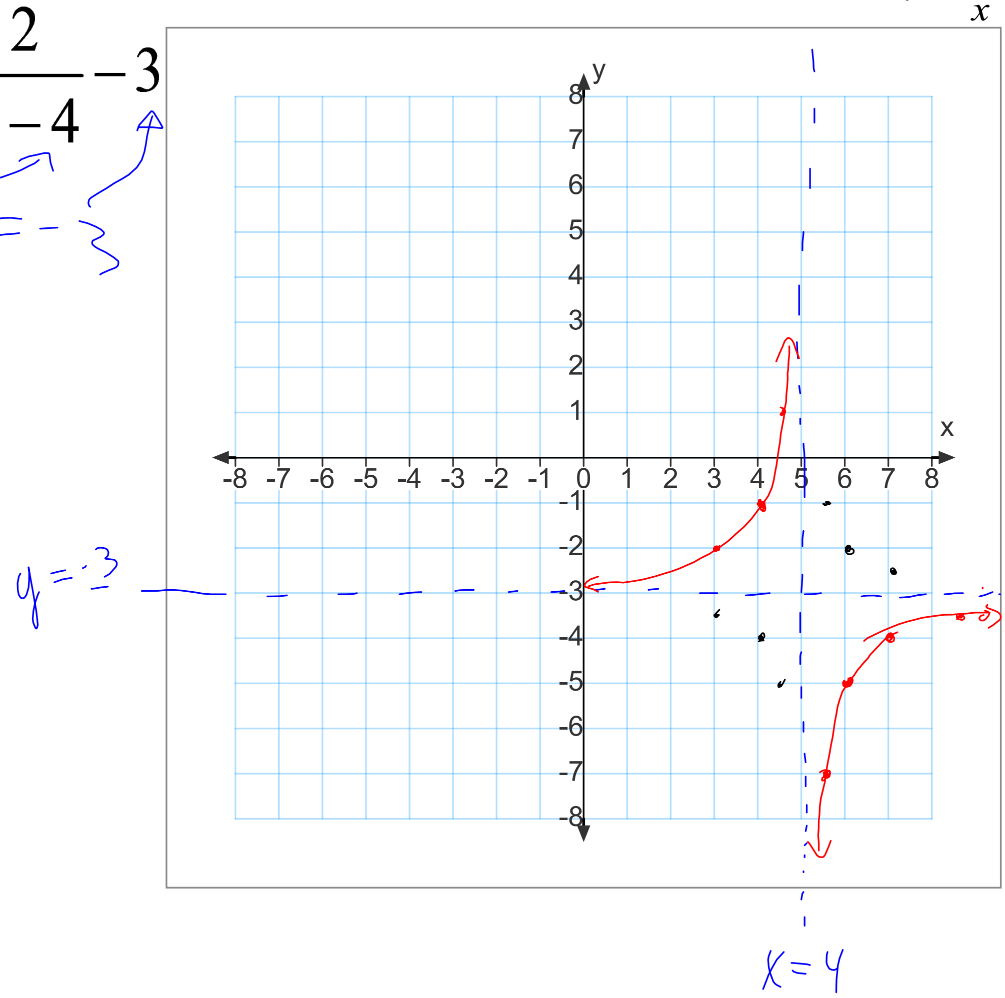
$y = -3\sqrt{-2x+10} - 2$



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

c) $y = -\frac{2}{x-4} - 3$

$x = 4$, $y = -3$



5. If $f(x) = 3x - 5$ and $g(x) = 2x^2 - 5$

Determine each of the following:

a) $f(-2) = 3(-2) - 5$

$= -6 - 5$

$= -11$

$(-2, -11)$

b) $f(2) + g(-2)$

$= 1 + 3$

$= 4$

$f(2) = 3(2) - 5$

$= 6 - 5$

$= 1 \quad (2, 1)$

$g(-2) = 2(-2)^2 - 5$

$= 2(4) - 5$

$= 3$

$(-2, 3)$

$(x-y)^2$

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

$(x-3)(x-3)$

$= x^2 - 3x - 3x + 9$

c) $g(x-3)$

$= 2(x-3)^2 - 5$

$= 2(x^2 - 6x + 9) - 5$

$= 2x^2 - 12x + 18 - 5$

$= 2x^2 - 12x + 13$

d) $f(x) = -3$

$-3 = 3x - 5 \quad \therefore \left(\frac{2}{3}, -3\right)$

$-3 + 5 = 3x$

$2 = 3x$

$\frac{2}{3} = x$

6. Determine the inverse of each of the following functions

a) $f(x)=4x-5$

b) $\{(-5,3),(2,4),(6,-1),(-2,8)\}$

c) $y=-3(x-5)^2+8$

d) $f(x)=-2\sqrt{3x-6}+5$

7. Graph each of the original functions and their inverses from #6

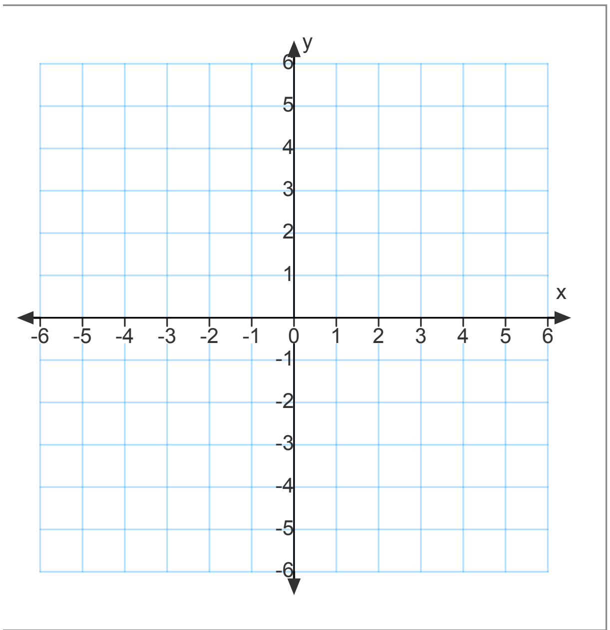
a) $f(x) = 4x - 5$ b) $\{(-5,3),(2,4),(6,-1),(-2,8)\}$

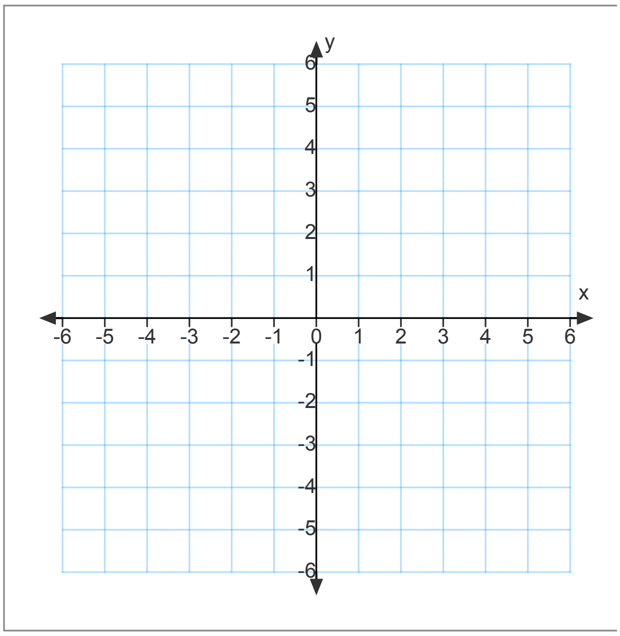
$y = 4x - 5$

$x = 4y - 5$

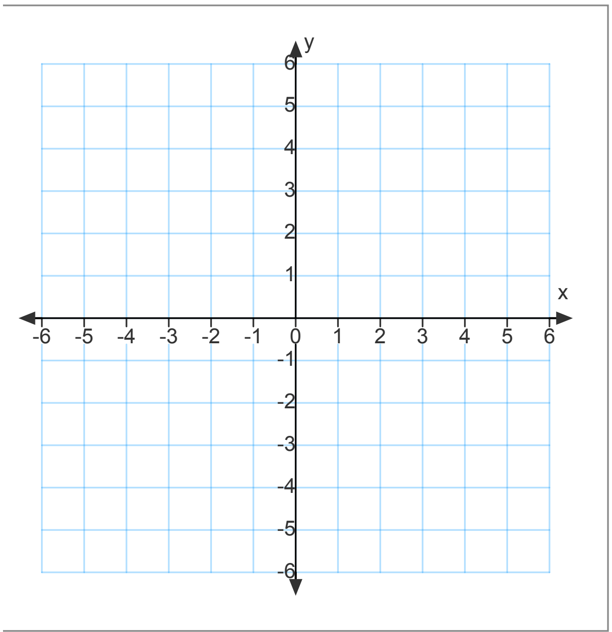
$x + 5 = 4y$

$\frac{x+5}{4} = y$

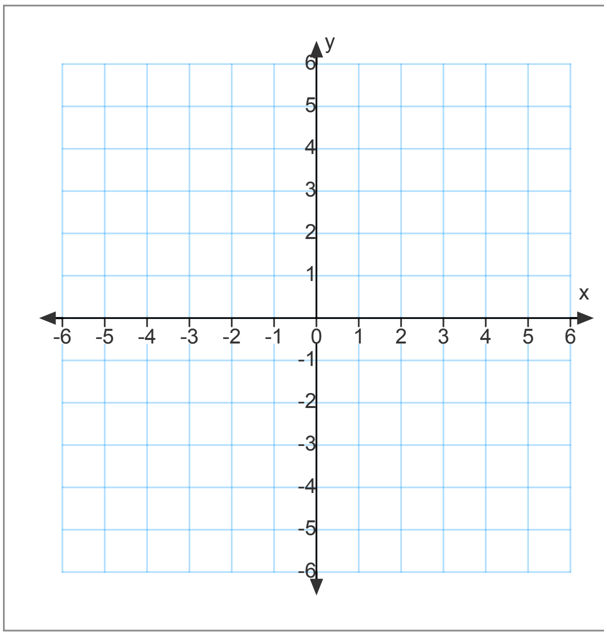




c) $y = -3(x-5)^2 + 8$

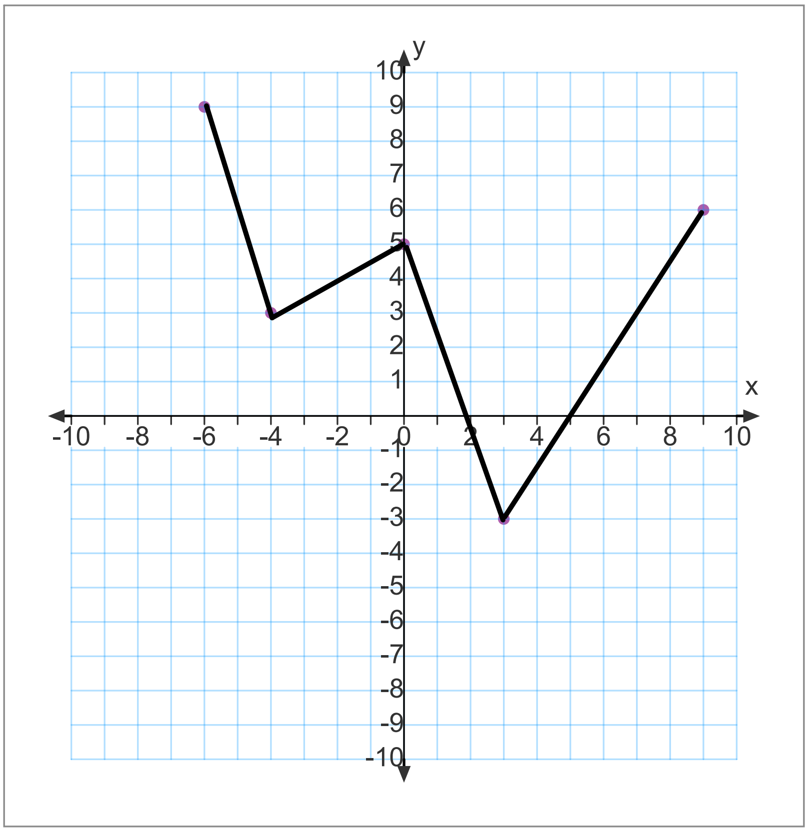


d) $f(x) = -2\sqrt{3x-6} + 5$



8. Determine the domain and range of each inverse function above.

9. Given $f(x)$, graph $f(-2x)$.



10. Determine the domain and range of each function in all the questions above.

11. Be able to identify what are functions and WHY - just like quiz

Go over old quizes and homework