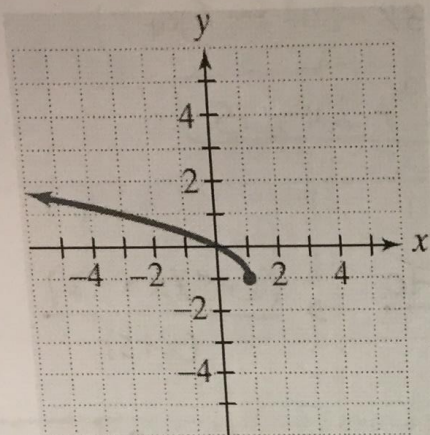


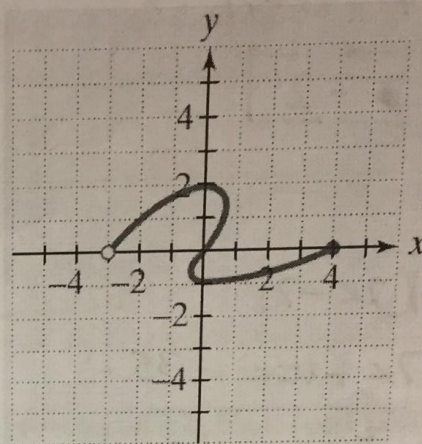
Review of Unit 1 – Part 1: Basics of Functions and Compositions

1. Given



- a. Domain: $(-\infty, 1]$
 b. Range: $[-1, \infty)$
 c. Is it a function? Yes No (circle one)

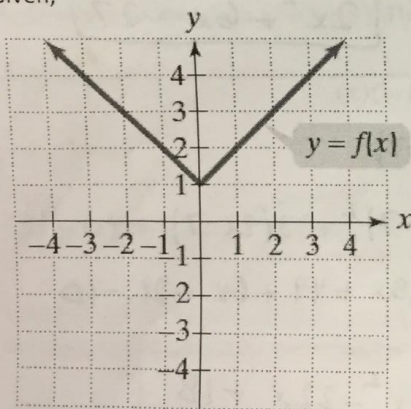
2. Given



- a. Domain: $(-3, 4]$
 b. Range: $[-1, 2]$
 c. Is it a function? Yes No (circle one)

Given the following graphs; find the domain and range, and evaluate the functions at the given value.

3. Given,



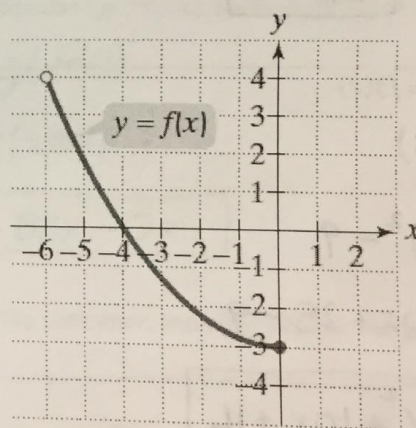
$f(-1) = ?$ $f(3) = ?$

$f(-1) =$ 2 $f(3) =$ 4

Domain: $(-\infty, \infty)$

Range: $[1, \infty)$

4. Given,



$f(-4) = ?$

$f(-4) =$ 0

Domain: $(-6, 0]$

Range: $[-3, 4)$

Given the following functions below, answer each problem.

$$f(x) = x + 5, \quad g(x) = x^2 + 3x - 10, \quad h(x) = \sqrt{x-3}, \quad j(x) = 2x - 7, \quad p(x) = x^2 - 9$$

5. $(f + j)(x)$

$$(x+5) + (2x-7)$$

$$\boxed{3x - 2}$$

6. $(g - f)(x)$

$$(x^2 + 3x - 10) - (x + 5)$$

$$\boxed{x^2 + 2x - 15}$$

7. $(fj)(x)$

$$(x+5)(2x-7)$$

$$2x^2 - 7x + 10x - 35$$

$$\boxed{2x^2 + 3x - 35}$$

8. $\left(\frac{g}{f}\right)(x)$

$$\frac{x^2 + 3x - 10}{x + 5} \rightarrow \frac{(x+5)(x-2)}{(x+5)}$$

$$\rightarrow \boxed{x - 2}, \quad x \neq -5$$

9. $(j \circ f)(x)$

$$j(x+5)$$

$$2(x+5) - 7$$

$$2x + 10 - 7$$

$$\boxed{2x + 3}$$

10. $(j \circ g)(x)$

$$j(x^2 + 3x - 10)$$

$$2(x^2 + 3x - 10) - 7$$

$$2x^2 + 6x - 20 - 7$$

$$\boxed{2x^2 + 6x - 27}$$

11. $(p \circ f)(x)$

$$p(x+5)$$

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

$$x^2 + 10x + 25 - 9$$

$$\boxed{x^2 + 10x + 16}$$

12. $(g \circ j)(x)$

$$g(2x-7)$$

$$(2x-7)^2 + 3(2x-7) - 10$$

$$4x^2 - 28x + 49 + 6x - 21 - 10$$

$$\boxed{4x^2 - 22x + 18}$$

13. $(f \circ h)(12)$

$$f(h(12))$$

$$f(3) \rightarrow \boxed{8}$$

14. $(j \circ p)(-6)$

$$j(p(-6))$$

$$j(27) \rightarrow \boxed{47}$$

State just the domain of each function.

15. $f(x) = \sqrt{3x - 24}$

$$3x - 24 \geq 0$$

$$3x \geq 24$$

$$x \geq 8$$

$$\boxed{[8, \infty)}$$

16. $f(x) = \frac{2}{x^2 - 81}$

$$\rightarrow \frac{2}{(x+9)(x-9)} \neq 0$$

$$\boxed{(-\infty, -9) \cup (-9, 9) \cup (9, \infty)}$$

17. $f(x) = x^2 - 10x + 21$

$$\boxed{(-\infty, \infty)}$$

18. $f(x) = \frac{1}{\sqrt{x-11}}$

$$x - 11 \neq 0$$

$$x - 11 \geq 0$$

$$x - 11 > 0$$

$$x > 11$$

$$\boxed{(11, \infty)}$$

19. Office Depot is offering a discount deal of 12% off the sale of any laptop sold in store over Labor Day weekend. The electronics company HP also has a flat instant rebate special on all of their laptops of \$300.00 off the price. You want to buy a 17" HP Envy-Series Laptop but the cashier is unsure of what order to process the percent discount and the rebate.

a. Write a function, $f(x)$, for the percent discount deal where x is the price of the laptop.

$$\boxed{f(x) = .88x}$$

b. Write a function, $g(x)$, for the flat rebate deal where x is the price of the laptop.

$$\boxed{g(x) = x - 300}$$

c. Perform the composition $(f \circ g)(x)$. Then perform the composition $(g \circ f)(x)$. Show work!!!!!!!

$$f(g(x))$$

$$f(x - 300)$$

$$.88(x - 300) \rightarrow \boxed{.88x - 264}$$

$$g(f(x))$$

$$g(.88x)$$

$$\boxed{.88x - 300}$$

d. Which order of the compositions yield the best deal for you, the consumer, and why? What is the difference in savings? EXPLAIN!!!!!! USE WORDS!!!!

Best order is % discount 1st, then -\$300 last. The difference is \$36.

Part 2: - Inverse Functions

Find an equation for $f^{-1}(x)$, the inverse function.

1.) $f(x) = \sqrt[3]{x-5}$

$$x^3 = \sqrt[3]{y-5}$$

$$x^3 = y-5$$

$$x^3 + 5 = y$$

$$f^{-1}(x) = x^3 + 5$$

2.) $f(x) = \frac{x+13}{5}$

$$x = \frac{y+13}{5}$$

$$5x = y+13$$

$$5x - 13 = y$$

$$f^{-1}(x) = 5x - 13$$

3.) $f(x) = \sqrt{x+6}$

$$x^2 = \sqrt{y+6}$$

$$x^2 = y+6$$

$$x^2 - 6 = y$$

$$f^{-1}(x) = x^2 - 6$$

4.) $f(x) = x^3 + 9$

$$x = y^3 + 9$$

$$\sqrt[3]{x-9} = \sqrt[3]{y^3}$$

$$f^{-1}(x) = \sqrt[3]{x-9}$$

5.) $f(x) = \frac{7}{x} - 8$

$$x = \frac{7}{y} - 8$$

$$x+8 = \frac{7}{y}$$

$$y(x+8) = 7$$

$$f^{-1}(x) = \frac{7}{x+8}, \quad x \neq -8$$

6.) $f(x) = x^2 + 3$

$$x = y^2 + 3$$

$$\sqrt{x-3} = \sqrt{y^2}$$

$$y = \sqrt{x-3}$$

$$f^{-1}(x) = \sqrt{x-3}, \quad x \geq 3$$

7.) Given $f(x) = 5x + 11$ and $g(x) = \frac{x-11}{5}$

a. Find and simplify $f(g(x))$. Then find and simplify $g(f(x))$. MUST SHOW WORK!!!

$$f\left(\frac{x-11}{5}\right) \rightarrow 5\left(\frac{x-11}{5}\right) + 11 \rightarrow (x-11) + 11 \rightarrow \boxed{x}$$

$$g(5x+11) \rightarrow \frac{(5x+11)-11}{5} \rightarrow \frac{5x}{5} \rightarrow \boxed{x}$$

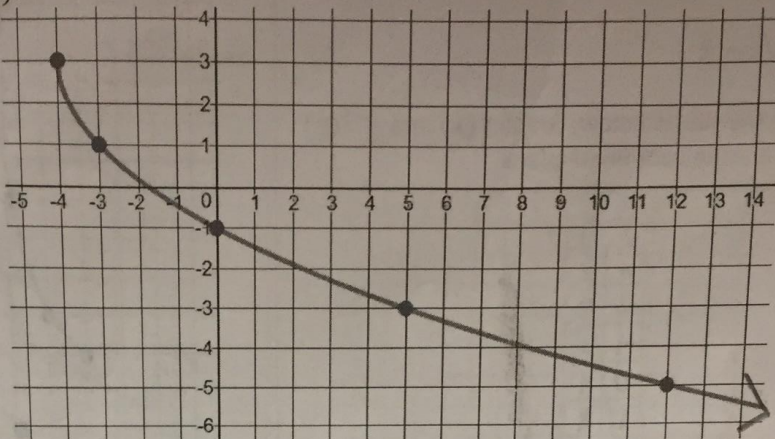
b. Compare your results from above. What conclusion can you make about $f(x)$ and $g(x)$?

$f(x)$ and $g(x)$ are inverses of each other.

Table for $f(x)$:

x	$f(x)$
-4	6
-3	1
-2	-2
-1	-3
0	-2
1	1
2	6
3	11
4	23
5	32

Graph for $g(x)$:



Equation of $h(x)$:

$$h(x) = 3x - 4$$

Typo! * 3

8.) $g^{-1}(3)$

-4

9.) $f^{-1}(-3)$

-1

10.) $h^{-1}(17)$

$$17 = 3x - 4$$

$$21 = 3x$$

7

11.) $h(f(g(0)))$

-13

12.) $f^{-1}(h(g^{-1}(-5)))$

5

13.) Given the function below,

$$f(x) = x^2 - 3, \text{ if } x \geq 0$$

a. Using the tables below, Graph $f(x)$ and $f^{-1}(x)$ on the same coordinate plane.

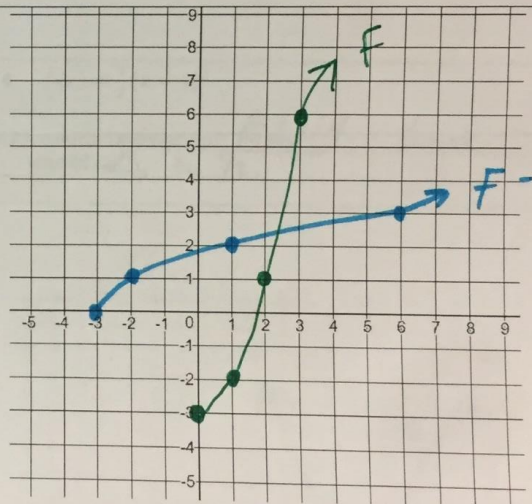
$f(x)$	
x	y
0	-3
1	-2
2	1
3	6

$f^{-1}(x)$	
x	y
-3	0
-2	1
1	2
6	3

b. State the domain and range of $f(x)$ and $f^{-1}(x)$.

$f(x)$: Domain: $[0, \infty)$, Range: $[-3, \infty)$

$f^{-1}(x)$: Domain: $[-3, \infty)$, Range: $[0, \infty)$



c. Find an equation for $f^{-1}(x)$.

$$x = y^2 - 3$$

$$\sqrt{x+3} = \sqrt{y^2}$$

$$f^{-1}(x) = \sqrt{x+3}, \quad x \geq -3$$

14.) Given the function below,

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

a. Using the tables below, Graph $f(x)$ and $f^{-1}(x)$ on the same coordinate plane.

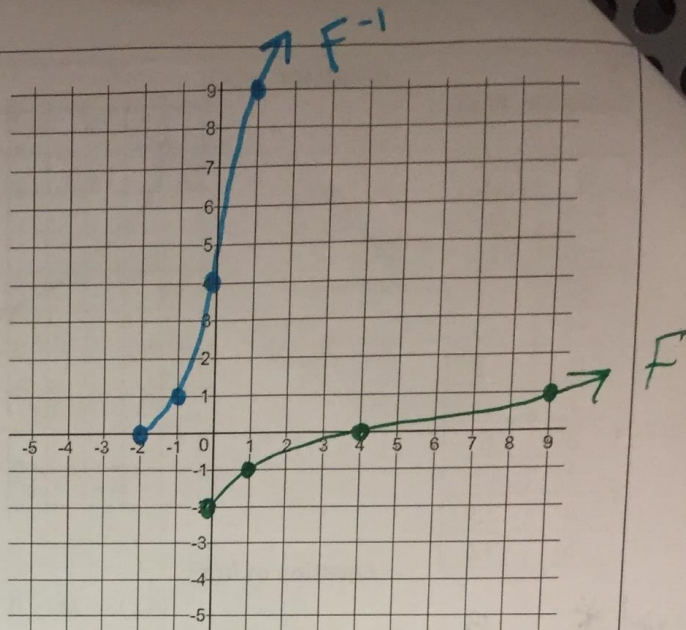
$f(x)$	
x	y
0	-2
1	-1
4	0
9	1

$f^{-1}(x)$	
x	y
-2	0
-1	1
0	4
1	9

b. State the domain and range of $f(x)$ and $f^{-1}(x)$.

$f(x)$: Domain: $[0, \infty)$, Range: $[-2, \infty)$

$f^{-1}(x)$: Domain: $[-2, \infty)$, Range: $[0, \infty)$



c. Find an equation for $f^{-1}(x)$.

$$x = \sqrt{y} - 2$$

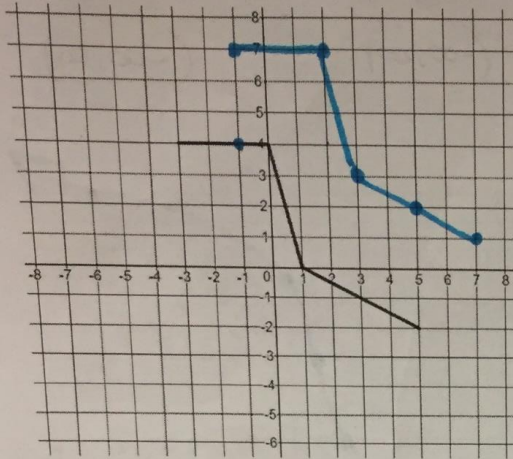
$$(x + 2)^2 = (\sqrt{y})^2$$

$$f^{-1}(x) = (x + 2)^2, x \geq -2$$

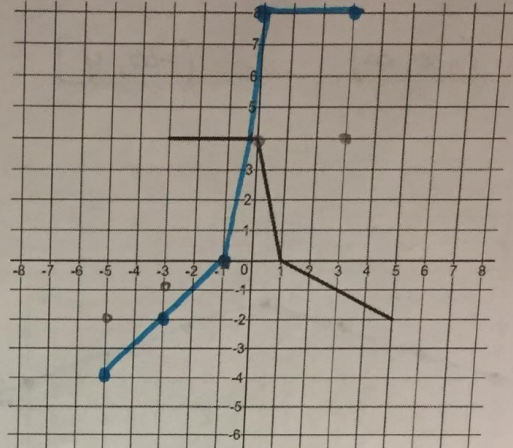
part 3: - Transformation of Functions

Given the graph of $f(x)$, draw the transformed graph $g(x)$ for each.

1. $g(x) = f(x - 2) + 3$



2. $g(x) = 2f(-x)$

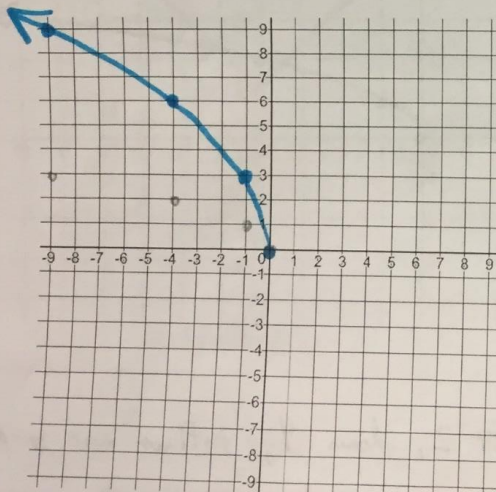


Graph each function $f(x)$, start with the parent function. Then, describe, in words, the transformation(s) that affect the parent function. Finally, state the domain and range if it is required.

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

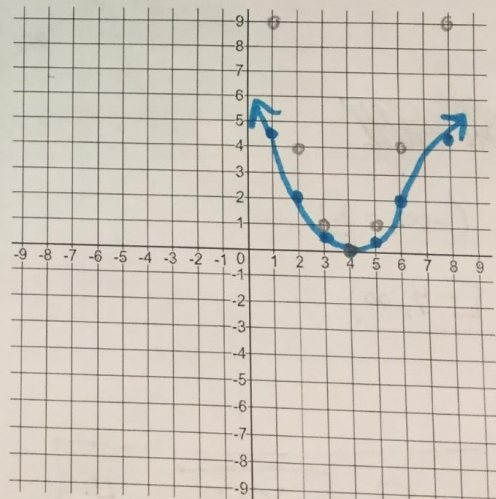
Transformation Description:

*Reflect over y-axis,
Stretch vertically by 3.*



4. $f(x) = \frac{1}{2}(x - 4)^2$

Transformation Description: *Right 4, shrink vertically by 1/2.*

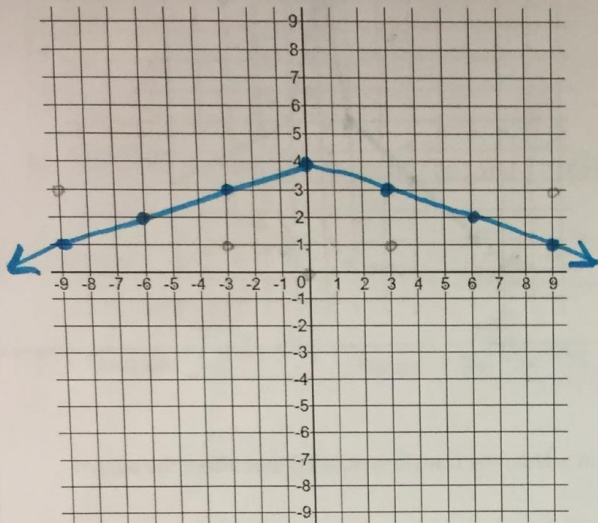


5. $f(x) = -\frac{1}{3}|x| + 4$

Transformation Description:

Horizontal stretch by 3,
reflect over x-axis, up 4.

Domain: $(-\infty, \infty)$ Range: $(-\infty, 4]$

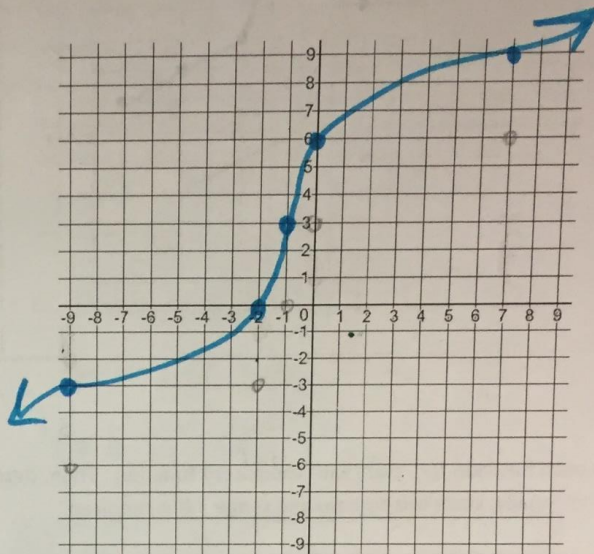


6. $f(x) = 3\sqrt[3]{x+1} + 3$

Transformation Description:

Left 1, vertical
Stretch by 3, up 3.

Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$



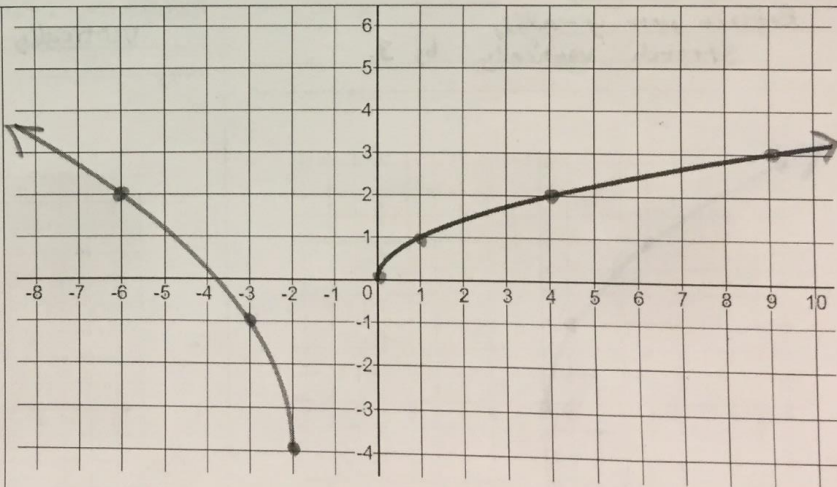
7.) Given the graphs of $f(x)$ and $g(x)$ to the right. Find the equation for the transformed parent function $g(x)$ from $f(x)$. Also, state the domain and range of $g(x)$.

Equation of $g(x) =$

~~$3\sqrt{-x+2} - 4$~~

Domain: $(-\infty, -2]$

Range: $[-4, \infty)$



$g(x) = 3\sqrt{-x+2} - 4$

~~Left~~ 2, down 4, reflect over y-axis
Right vertical stretch by 3.