Unit 01: Fundamentals of Functions

Unit Objectives

- Demonstrate understanding of functions, domain, and range
- Master linear, quadratic, and radical functions, and their graphs
- Perform transformations on functions
- Combine functions and determine inverses

Unit 1 Lesson 1: Using Equations of Lines

Lesson Objectives

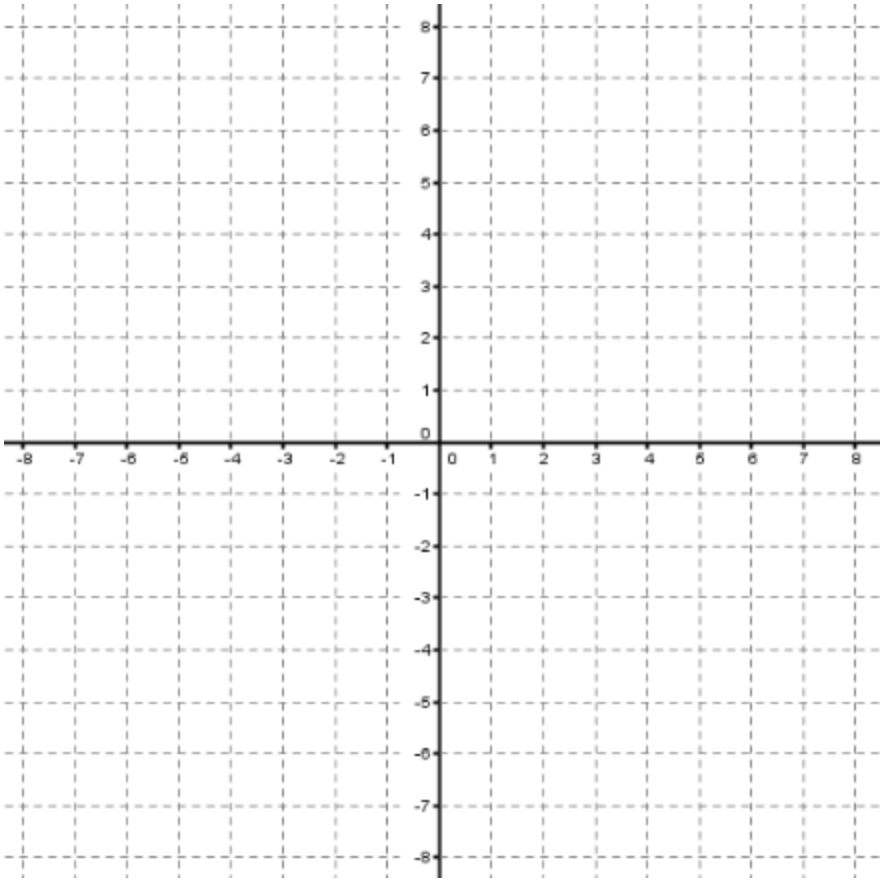
- Convert between equations of lines and graphs of lines, including horizontal and vertical lines
- Create equations of lines given information

The equation of a line is:

- **m** stands for _____.
- **b** stands for _____.

Slopes can be positive or negative

- Lines with **positive** slopes point _____.
- Lines with **negative** slopes point _____.
- Slopes of flatter lines are _____ _____.
- Slopes of steeper lines are _____ _____.



1. Graph the following lines.
   a. $y = \frac{1}{2}x + 3$
   b. $y = -3x - 2$
   c. $y = \frac{5}{2}x + 6$
   d. $y = -x$
   e. $y = 2$

2. Write the equations for the lines shown in the figure below.

a. _____

b. _____

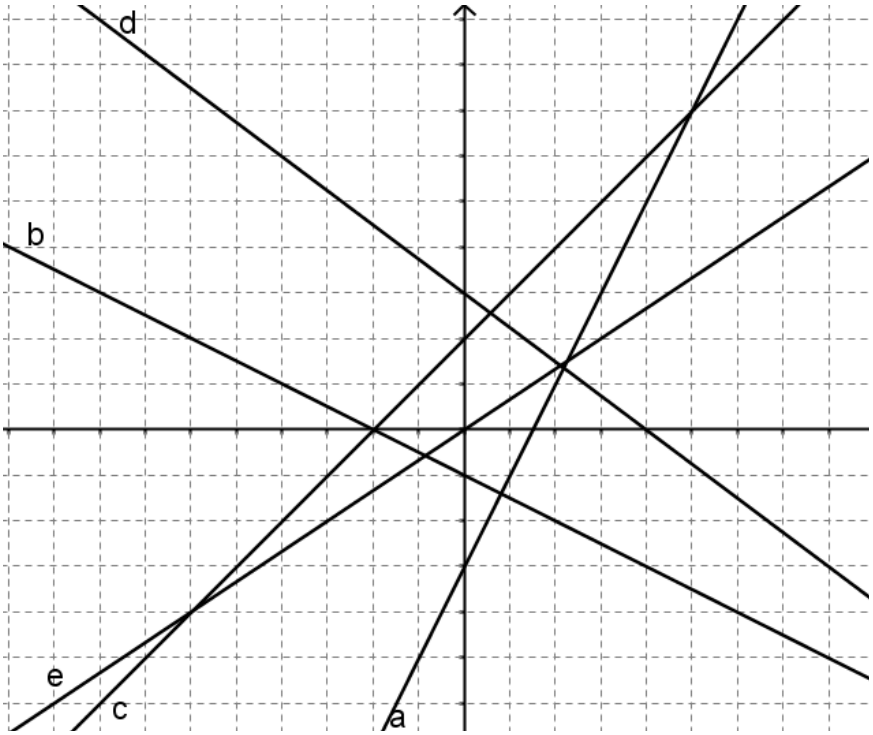
c. _____

d. _____

e. _____

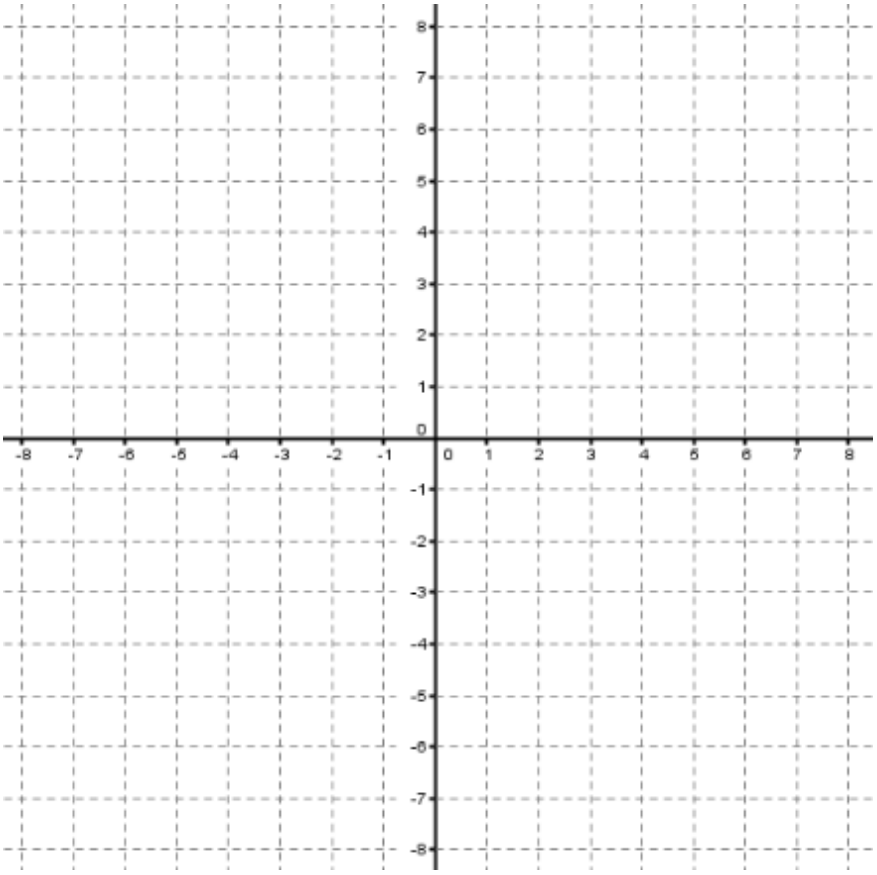
f. _____

g. _____



3. Use substitution to determine the equations of the following lines. Check your answers by graphing.
   a. Line with a slope of $\frac{2}{4}$ passing through point C = (-6,- 4)

   b. Line with a slope of $\frac{1}{3}$ passing through point D = (-6,- 1)



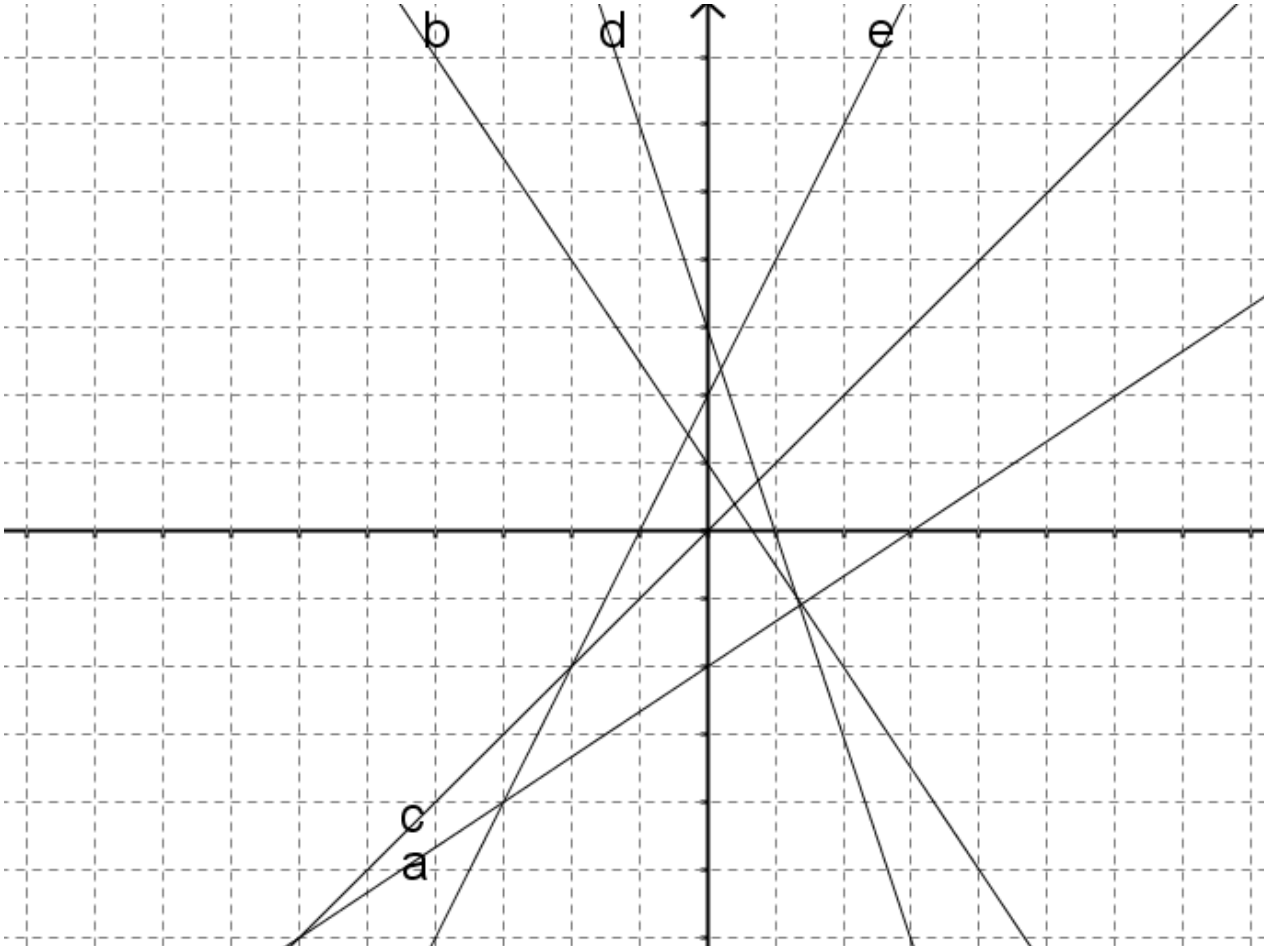
4. Answer the following questions. Check your answers by graphing.
   a. Does the line y = -$\frac{1}{2}$x + 5 contain the point A = (6, 2)?

~~~Homework~~~ "Checking Points on Lines"

~~~Classwork~~~ (graph paper)

5. Graph the following lines (x: -8→8 y: -8→8)
   a. $y = -2x - 3$ b. $y = \frac{2}{5}x + 1$ c. $y = \frac{3}{2}x + 2$ d. $y = x$ e. $x = -4$

6. Write the equations for the lines shown in the figure below.



7. Use substitution to determine the equations of the following lines. Check your answers by graphing
   a. Line with a slope of -2 passing through point E = (-3, 2)

   b. Line with a slope of 0 passing through point F = (4,- 2)

   c. Line with a slope of 1 passing through point G = (7, 4)

   d. Line with a slope of $\frac{3}{2}$ passing through point H = (-1, 1)

   e. Line with a slope of $-\frac{2}{3}$ passing through point J = (5, 0)

Unit 1 Lesson 2: Slope Formula

Lesson Objectives

- Create equations of lines given information

Slope Formula: Equation of a Line:

<u>Solve by substitution. Show all work. Check answers by graphing. (graph paper, graph 1 and 2 on the same axes)</u>

Uku is programming NPCs for Halo 6. He needs to program the direction of the lasers for a fight scene.

<u>Soldiers</u>	<u>Aliens</u>
Soldier A: (-8, -3)	Alien C: (-4, 5)
Soldier B: (1, -5)	Alien D: (2. 2)

1. Soldier A shoots at Alien D
    a. What is the equation of the line for the laser?

    b. Uku wants to place a rock at L = (-5, -1.5). Will Rock L block Soldier A's laser?

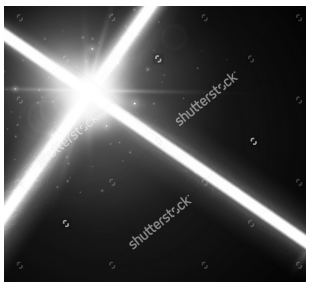
    c. During the fight scene, Alien D will dodge the laser, and the laser will explode a tree behind him. If Uku wants the tree to have an **x-coordinate** of 4, what should be the ordered pair of Tree M?

2. Soldier B shoots at Alien C
    a. What is the equation of the line for the laser?

    b. Uku wants to place a space buffalo at N = (-3, 2). Will Space Buffalo N block Soldier B's laser?

    c. During the fight scene, Alien C will create a magical shield to block the laser. If Uku wants the shield to have an **y-coordinate** of 6, what should be the ordered pair of Shield O?

    d. Uku wants special effects where any lasers are crossing. At what point does Soldier A's laser cross with Soldier B's laser?



~~~Homework~~~ 1.1: 43, 44, 70, 85bc

~~~Classwork~~~ (graph paper)

Solve by substitution. Show all work. Check answers by graphing. (graph paper, graph 3, 4, and 5 on the same axes)

Soldiers		Aliens	
Soldier E:	(-9, -4)	Alien H:	(-13, -6)
Soldier F:	(5, 0)	Alien J:	(-5, 2)
Soldier G:	(3, -6)	Alien K:	(1, 6)

3. Soldier E shoots at Alien K
    a. What is the equation of the line for the laser?

    b. Uku wants to place The Weeknd at P = (-1.5, 4.5). Will The Weeknd P block Soldier E's laser?

    c. Don't be disappointed! During the fight scene, Alien K will use telekinesis to move The Weeknd to block the laser. If Uku wants the overrated singer to have an **x-coordinate** of -3.1, what should be the ordered pair of The Weeknd Q?

4. Soldier G shoots at Alien H
    a. What is the equation of the line for the laser?

    b. Uku wants to place a rock at R = (4, -6). Will Rock R block Soldier G's laser?

    c. During the fight scene, Alien H will dodge the laser, and the laser will explode a tree behind him. If Uku wants the tree to have an **y-coordinate** of -5, what should be the ordered pair of Tree S?

    d. Uku wants special effects where any lasers are crossing. At what point does Soldier G's laser cross with Soldier E's laser?

    e. Question 4 shows the importance of checking by graphing. Were there any trick questions? Which questions would the algebra have given you a wrong answer on if you hadn't checked by graphing?

Unit 1 Lesson 3: Slope Criterion for Parallel Lines

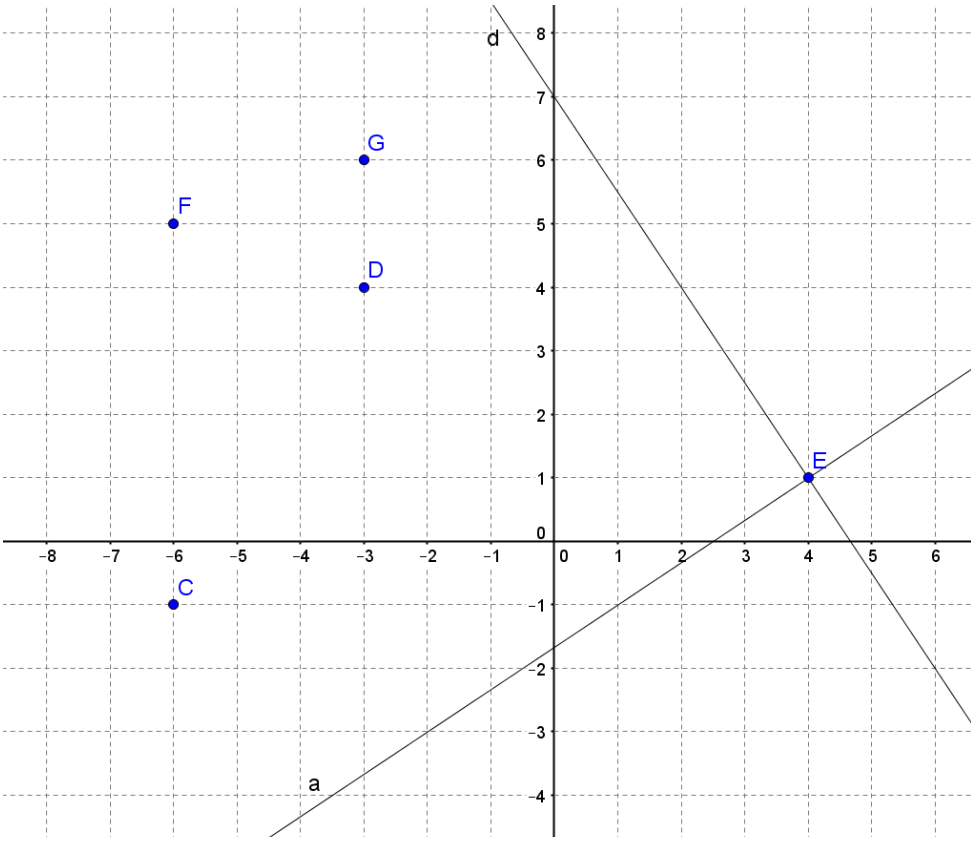
Lesson Objectives

- Determine equations of parallel lines

Parallel Lines:

1. Solve the following questions by graphing
   a. What is the equation of road n, which is parallel to road a and passes through point C?

   b. What is the equation of road p, which is parallel to road d and passes through point F?



2. Solve the following questions using substitution
   a. What is the equation of road q, which is parallel to road a and passes through point D?

   b. What is the equation of road r, which is parallel to road d and passes through point G?

3. Solve the following questions using substitution
   a. A line has an equation of y = 3x + 8. What is the equation of a parallel line that passes through (3, 6)?

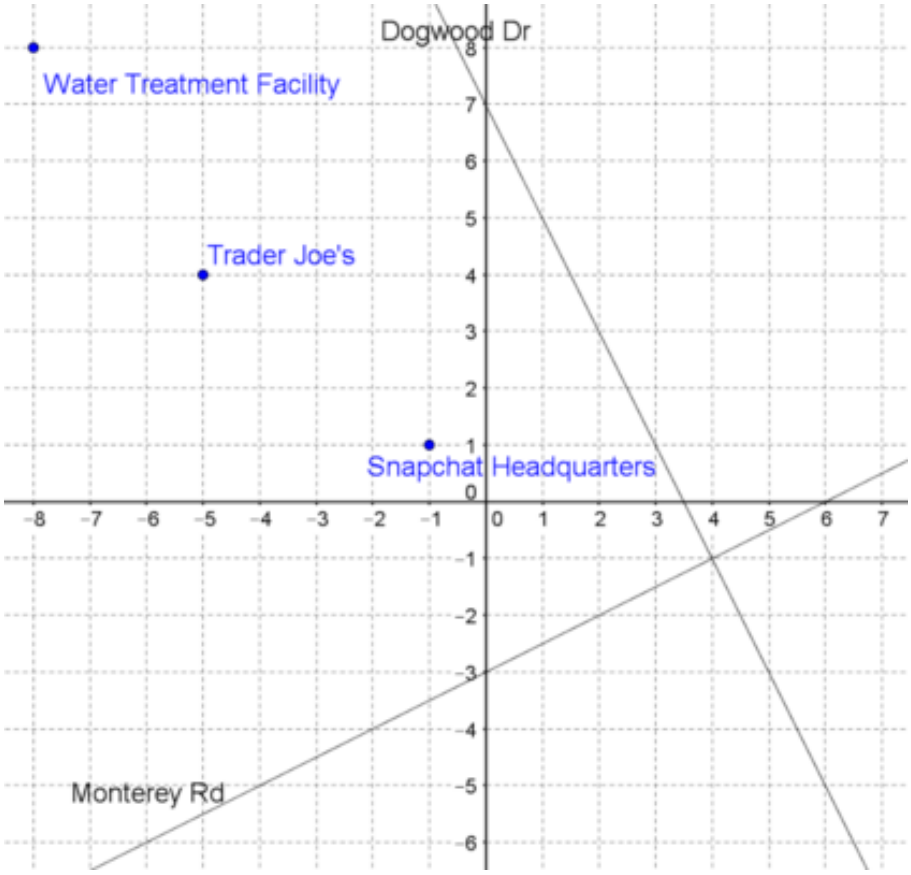
   b. A line goes through points H = (-3, 4) and J = (0, 5). What is the equation of a parallel line that goes through K = (9, -2)

   c. A line goes through points L = (3, -1) and J = (0, 5). What is the equation of a parallel line that goes through M = (5, 4)

~~~Homework~~~ "Parallel Lines Treasure Hunt"

~~~Classwork~~~

4. Visually determine the equations of Dogwood Drive and Monterey Road.



5. A new town is designing new roads. Solve the following questions using substitution. Check your answers by graphing when possible.
   a. Tasty Avenue is parallel to Dogwood Drive and passes through Trader Joes. Determine the equation of Tasty Ave.

   b. Yummy Lane is parallel to Monterey Road and passes through Trader Joes. Determine the equation of Yummy Lane.

   c. Drama Street is parallel to Dogwood Drive and passes through Snapchat headquarters. Determine the equation of Drama Street.

   d. Duck Face Drive is parallel to Monterey Road. and passes through Snapchat headquarters. Determine the equation of Duck Face Drive.

   e. H_2O Ave is parallel to Yummy Lane. and passes through the water treatment facility. Determine the equation of H_2O Ave.

   f. Aqua Boulevard is parallel to Drama Street. and passes through the water treatment facility. Determine the equation of Aqua Boulevard.

6. Apple Street has an equation of $y = 3x + 22$. Banana Street is parallel to Apple Street and passes through a fruit stand at (-3, -20). What is the equation of Banana Street?

7. Dog Avenue passes through points (-2, -1) and (1, -2). Cat Street is parallel to Dog Avenue and passes through the point (6, 7). What is the equation of Cat Street?

Unit 1 Lesson 4: Slope Criterion for Perpendicular Lines

Lesson Objectives

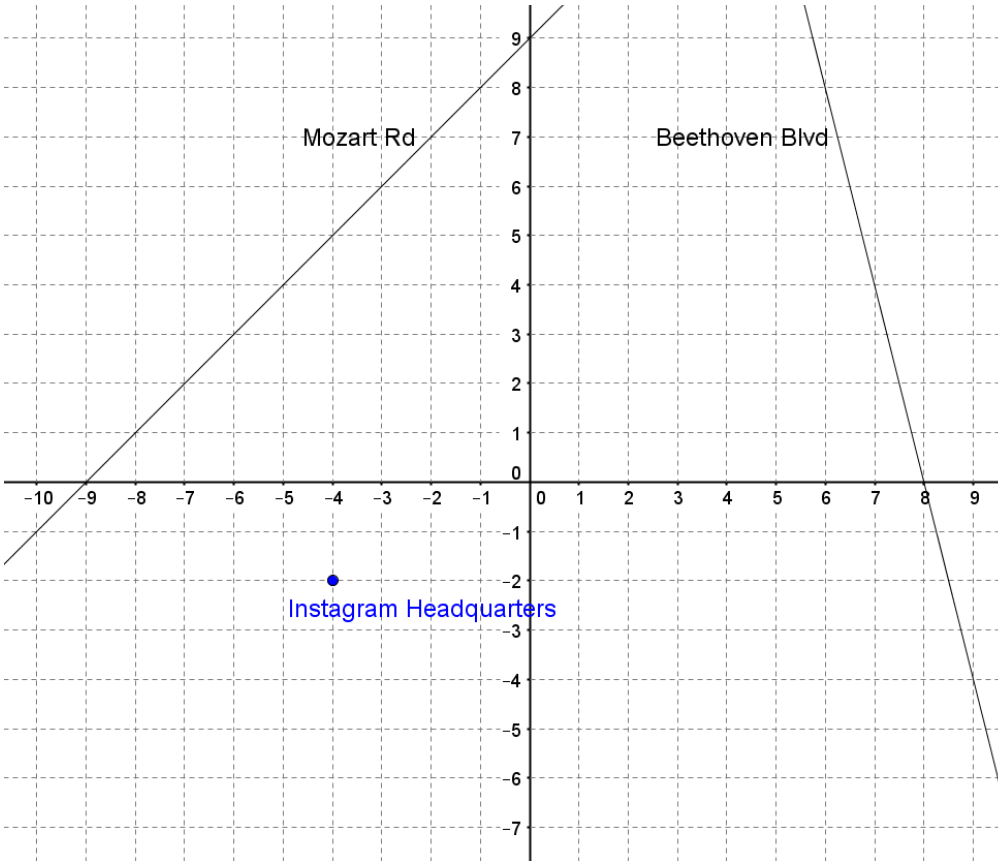
- Determine equations of perpendicular lines

Examples of slopes where $\overline{AB} \perp \overline{CD}$.

Slope of $\overline{AB}$	Slope of $\overline{CD}$

Conclusion: _____

1. Find the equations of the roads described below using substitution. Check your answers by graphing.



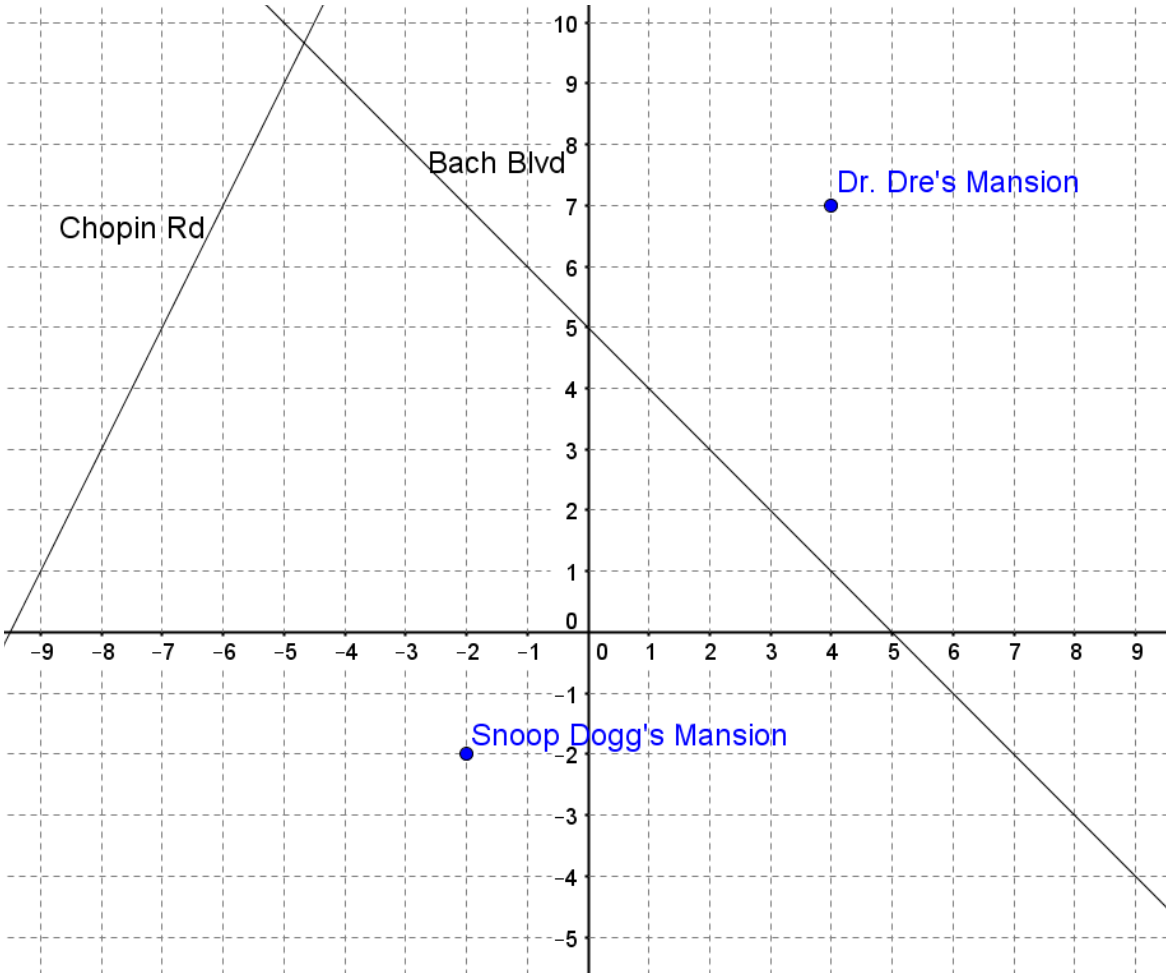
   a. Selfie Street, which is perpendicular to Mozart Road and passes through Instagram Headquarters

   b. OMG So Cute Street, which is perpendicular to Beethoven Boulevard and passes through Instagram Headquarters

~~~Homework~~~ "Deriving Equations of Parallel and Perpendicular Lines"

~~~Classwork~~~

2. Find the equations of the roads described below using substitution. Check your answers by graphing.



a. Ice Cube Avenue, which is perpendicular to Chopin Road and passes through Snoop Dogg's Mansion.

b. Eazy-E Avenue, which is perpendicular to Bach Boulevard and passes through Dr. Dre's Mansion.

c. Are Chopin Road and Bach Boulevard perpendicular? Explain why or why not.

d. Big Sean Street is going to be parallel to Chopin Road and pass through Dr. Dre's Mansion. Will Big Sean Street be perpendicular to Ice Cube Avenue? Explain why or why not.
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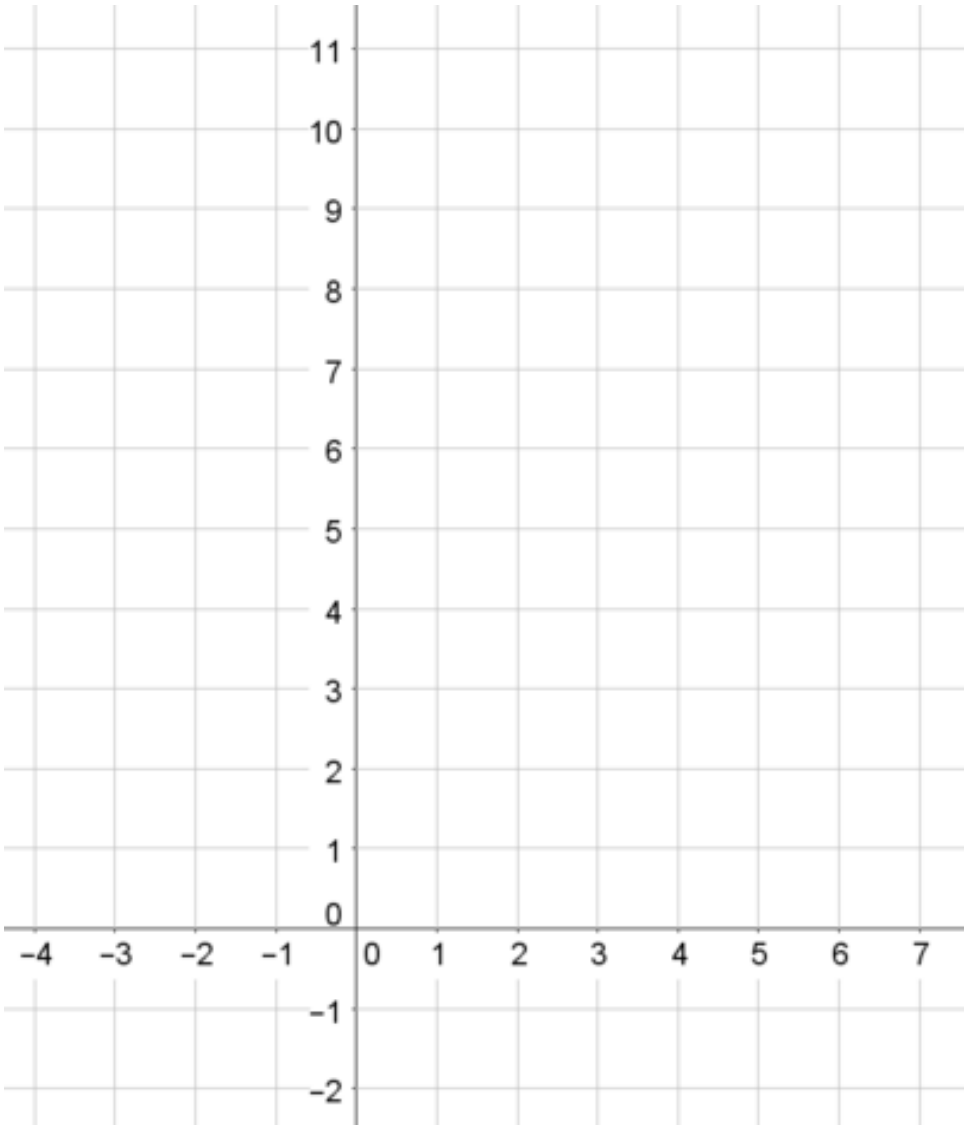
3. Solve using substitution. Check your answers by graphing.
    a. Find the equation of $\overline{AB}$ given A = (2, 3) and B= (4, 4) . Label this line *j*.



    b. Derive the equation of line *k*, which is parallel to $\overline{AB}$ and passes through point C =(4,7).

    a. Derive the equation of line *l*, which is perpendicular to $\overline{AB}$ and goes through D = (2,4).

Unit 1 Lesson 5: Concept of Functions

Lesson Objectives

- Understand the concept of a function
- Determine if situations, equations, and graphs are functions

Function:

1. Determine if the table describes a function. Explain your reasoning.

Input	-1	0	3	4	6
Output	0	2	1	3	1

2. Determine if x is a function of y. Then determine if y is a function of x. Explain your reasoning.

x	-1	0	2	4	0
y	0	5	3	2	1

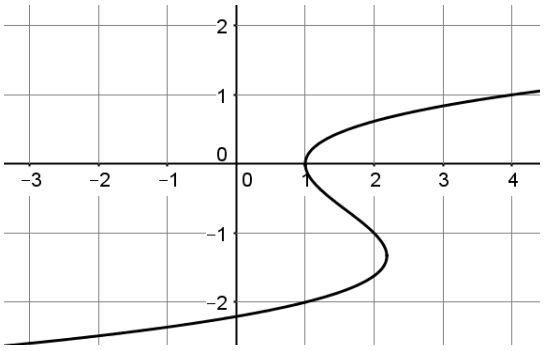
3. For the following equations, determine if y is a function of x. If y is not a function of x, give an example that shows this.
   a. $y^2 = x$

   b. $y = 2x - 1$

   c. $y = |x - 1|$

   d. $x = 2$

4. For the following equations, determine graphically if y is a function of x. Then determine if x is a function of y. If either is not a function, give an example that shows this (just give rough estimates based on the graph).
   a. $x = y^3 + 2y^2 + 1$



~~~Homework~~~ 1.2: 5-8 all, 13-23 odd

~~~Classwork~~~

5. Determine if the table describes a function. Explain your reasoning.

Input	-1	1	4	-2	-1
Output	0	2	1	3	1

6. Determine if x is a function of y. Then determine if y is a function of x. Explain your reasoning.

y	-1	0	2	4	2
x	0	2	1	2	1

7. For the following equations, determine if y is a function of x. If y is not a function of x, give an example that shows this.
   a. $y^2 + x^2 = 25$

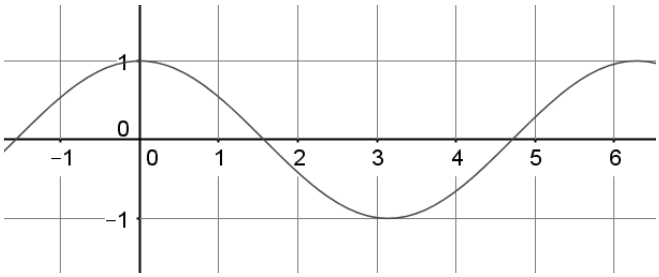
   b. $5y = 10x - 20$

   c. $|y| = x - 1$

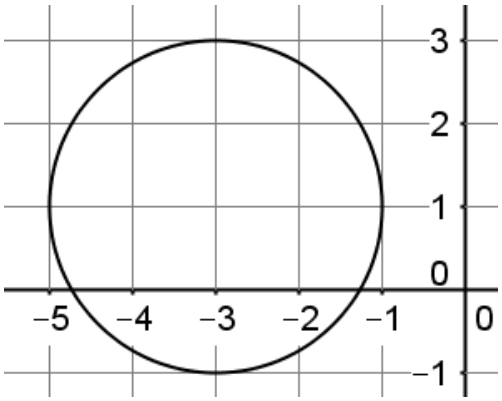
   d. $y = 3$

8. For the following equations, determine graphically if y is a function of x. Then determine if x is a function of y. If either is not a function, give an example that shows this (just give rough estimates based on the graph).

   a. $y = \cos(x)$



   b. $(x+3)^2 + (y-1)^2 = 4$


3
2
1
0
−5
−4
−3
−2
−1
0
−1

Unit 1 Lesson 6: Evaluate Functions

Lesson Objectives

- Evaluate linear, piecewise-defined, and non-linear rational functions
- Use functions to determine values

Function notation:

Piecewise-defined functions:

For the following functions:

- Evaluate the following functions for the given values. Express answers in simplest form.
- Use your answers to graph the function (graph paper)
- Is the function linear, piecewise-defined, or neither?

1. f(x) = 2x -1
   a. f(0)
   b. f(3)
   c. f(-1)
   d. $f(x^2)$

2. g(x) = $2\sqrt{x}$ -1
   a. g(0)
   b. g(2)
   c. g(-1)
   d. g(1)
   e. $g(x^2)$

~~~Homework~~~ 1.2: 33, 35, 37

~~~Classwork~~~

3. $h(x) = \begin{cases} -x - 2, & x \leq 0 \\ x^2 - 2, & x > 0 \end{cases}$

a. h(0) b. h(2) c. h(-1)

d. h(1) e. h(-2)

4. g(x) = |x-1|-1

a. g(0) b. g(2) c. g(-1)

d. g(1) e. $g(x^2)$

5. Rewrite the absolute value function from question 4 as a piecewise-defined function with no absolute values.

Unit 1 Lesson 7: Domain and Range

Lesson Objectives

- Use a graphing calculator to solve problems
- Determine Domains
- Determine Ranges using graphs

Domain:

Range:

Domain of Rational Functions:

1. Determine the domains of the following functions. Express with and without bracket notation.
   a. $r(x) = \frac{5}{x+2}$

   b. p(t) = $t + \sqrt{t-7}$

   c. $r(x) = \frac{x}{x^2+2x-8}$

2. For the following functions
   - Determine the domain. Express with and without bracket notation.
   - Determine the range. Express with and without bracket notation.

   a. $h(x) = 2 - \sqrt{9-x^2}$

   b. $f(x) = 2 - \sqrt{x^2-9}$ such that $-5 \leq x \leq 5$

   c. g(a) = 2a + 1

3. For the function $f(x) = x^2 - 1$, find all x such that f(x) = 0

~~~U1L7 Homework~~~ 1.2: 59-62

~~~U1L7 Classwork~~~

4. Determine the domains of the following functions. Express with and without bracket notation.

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

   b. g(n) = $2 - \sqrt{8-n}$

   c. $h(x) = 2 - \sqrt{9-x^2}$

   d. $f(x) = 2 - \sqrt{x^2-9}$

5. For the following functions
   - Determine the domain. Express with and without bracket notation.
   - Determine the range. Express with and without bracket notation.

   a. $f(z) = z^2 + 1$

   b. q(t) = |t - 5|

   c. f(t) = |5 - t|

   d. f(t) = |5 - t| - 2

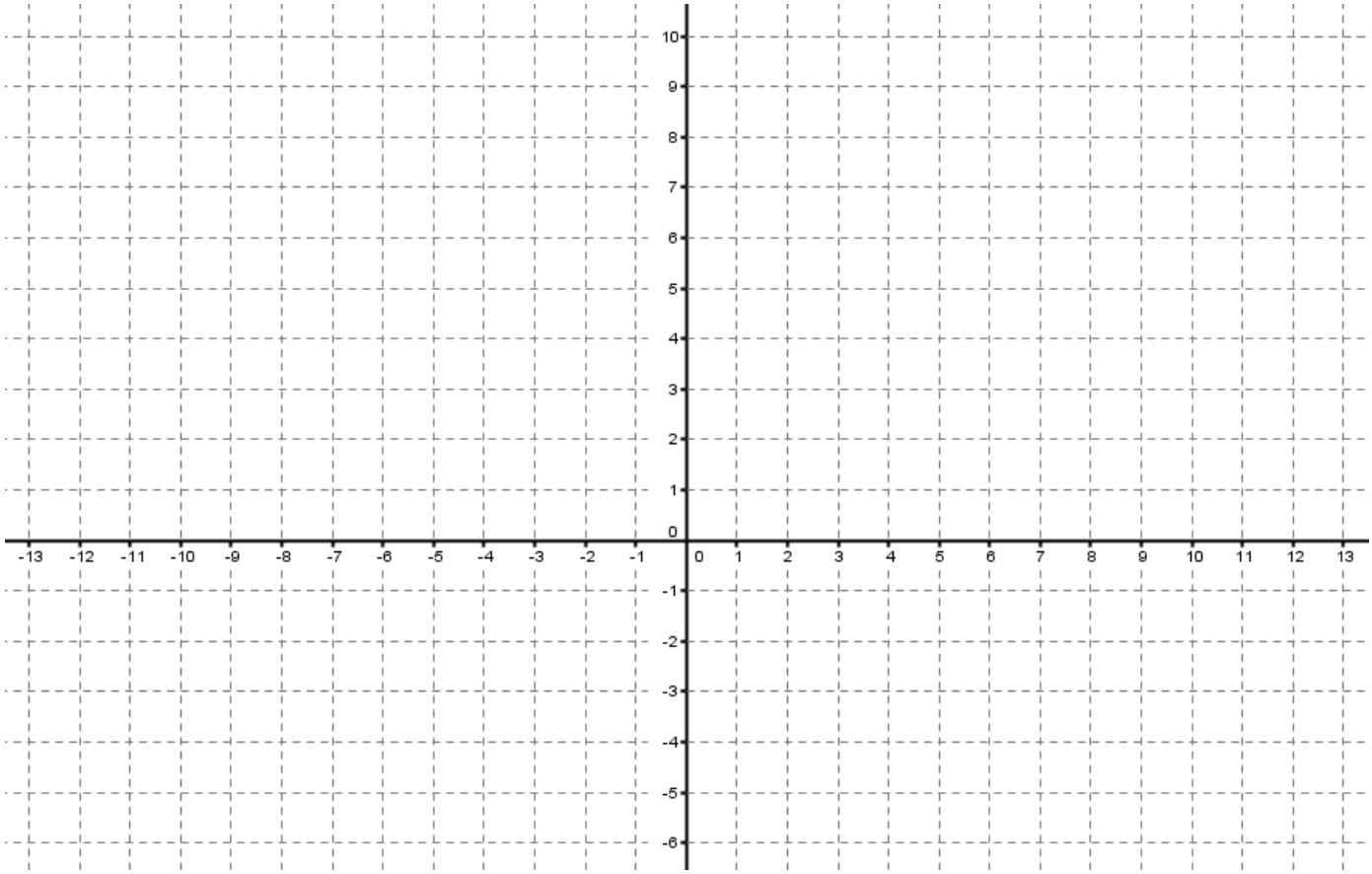
6. For the function f(x) = 2x + 1, find all x such that f(x) = 0

7. For the function $f(x) = x^2 + 5x + 6$, find all x such that f(x) = 0

Unit 1 Lesson 8: Quiz Study Guide

For questions 1-4, solve using substitution. Check by graphing.

Penodjira is creating a path for a pokemon animation.



1. In her animation, Charmander starts at point A = (3, -4), and walks left with a slope of -2 until he reaches point B. Point B has an **x-value** of -1.
    a. What is the equation of $\overline{AB}$?

    b. What is the ordered pair of point B?

2. Next, Charmander goes up to point C = (-7, 8)
    a. What is the equation of $\overline{BC}$?

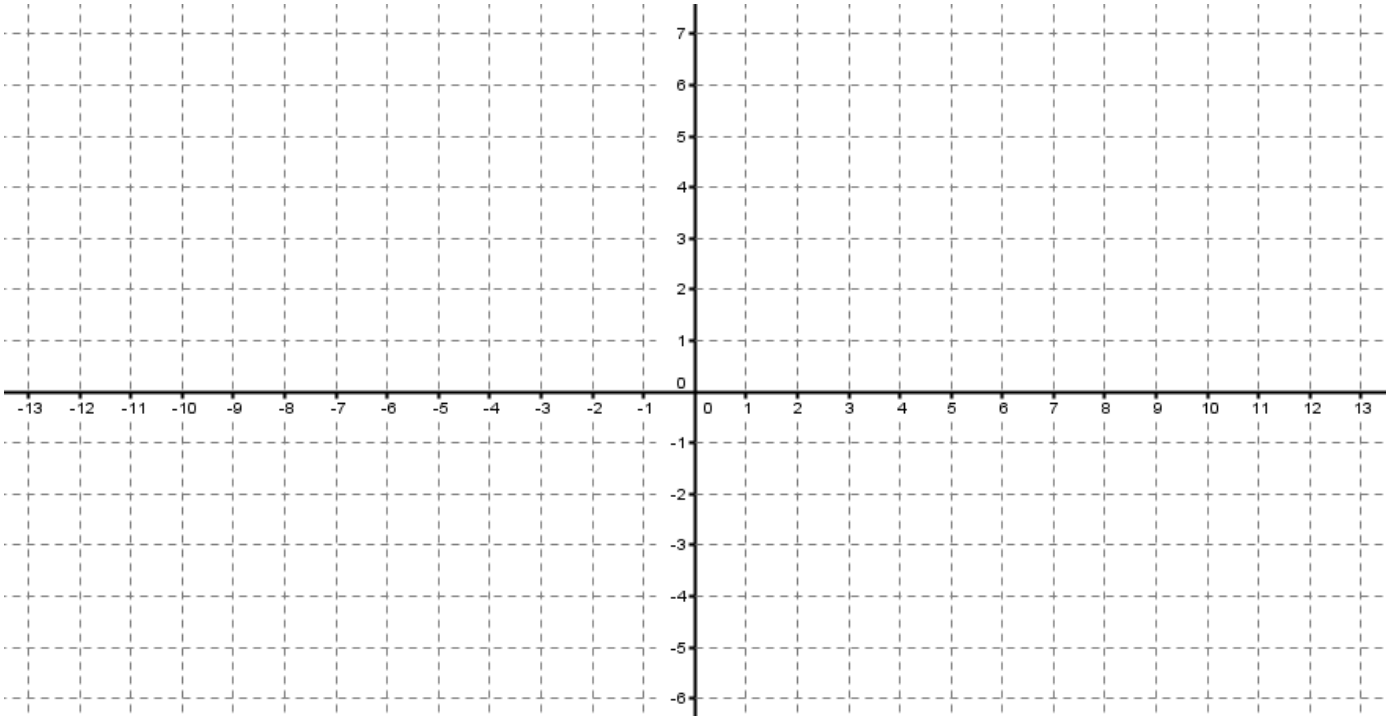
3. Then, Charmander heads right parallel to $\overline{AB}$ until he hits the y-axis at point D.
    a. What is the equation of $\overline{CD}$?

    b. What is the ordered pair of point D?

4. Finally, Charmander heads right perpendicular to $\overline{BC}$ until he hits the x-axis at point E.
    a. What is the equation of $\overline{DE}$?

    b. What is the ordered pair of point E?

5. y = f(x) such that $f(x) = \dfrac{-x^4 + 25}{x^2 - 5} + 9$



    a. Graph the function
    b. Is x a function of y? If not, give an example that proves your answer (use your graph, rough estimates are fine)

    c. Using substitution, determine f(0) and f($-\sqrt{5}$)

    d. State the domain and range of f(x) using bracket notation

    e. Find all values of x such that f(x) = 0. Challenge: determine these values algebraically

Unit 1 Lesson 9: Quiz

Lesson Objectives

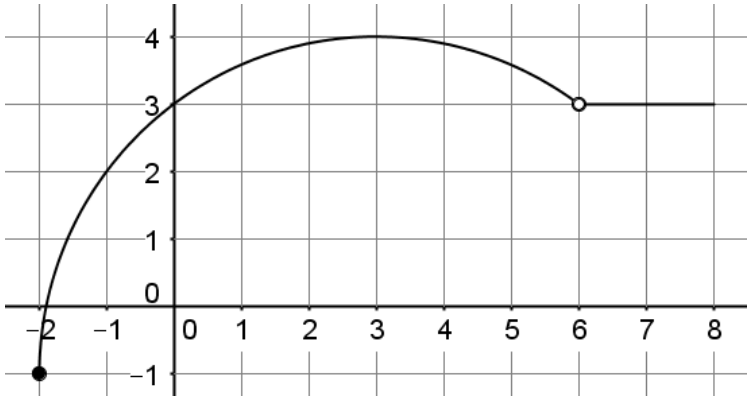
- Take a quiz. Technically if you write your name and turn it in, you have successfully completed this lesson.

Unit 1 Lesson 10: Identify Important Features Given Graphs

Lesson Objectives

- Given the graph of a function, determine the domain and range.
- Determine the intervals where the function is increasing, decreasing, and constant.
- Determine locations of relative maximums and relative minimums

1. Determine the features for the following graph.



   a. Domain

   b. Range

   c. Increasing

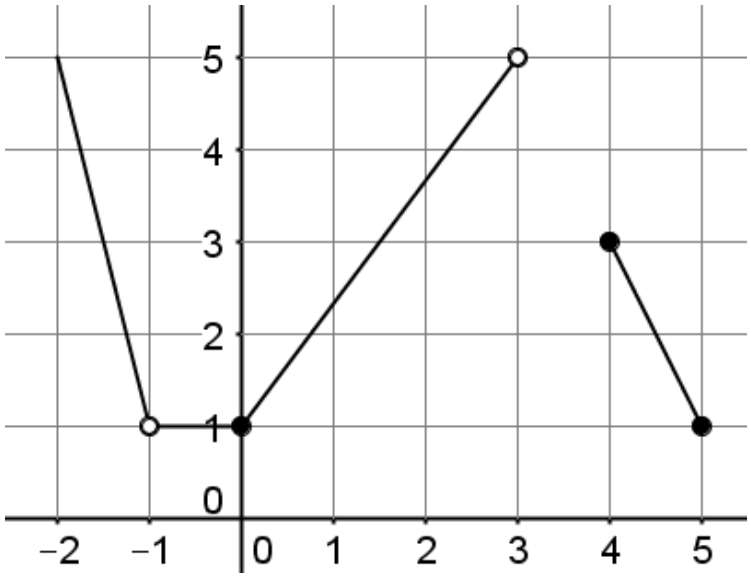
   d. Decreasing

   e. Constant

   f. Relative maximums

   g. Relative minimums

2. Determine the features for the following graph.



   a. Domain

   b. Range

   c. Increasing

   d. Decreasing

   e. Constant

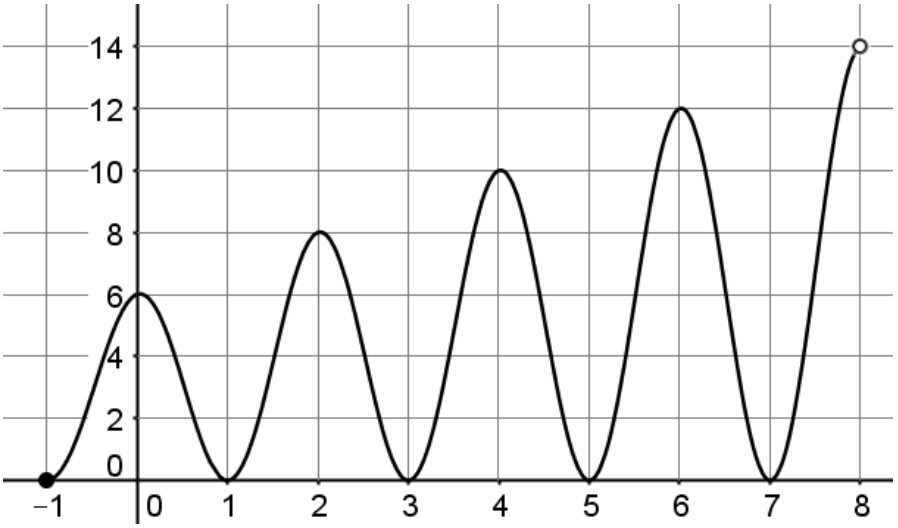
   f. Relative maximums

   g. Relative minimums

~~~Homework~~~ 1.3: 1-4

~~~Classwork U1L10~~~

3. Determine the features for the following graph.



   a. Domain

   b. Range

   c. Increasing

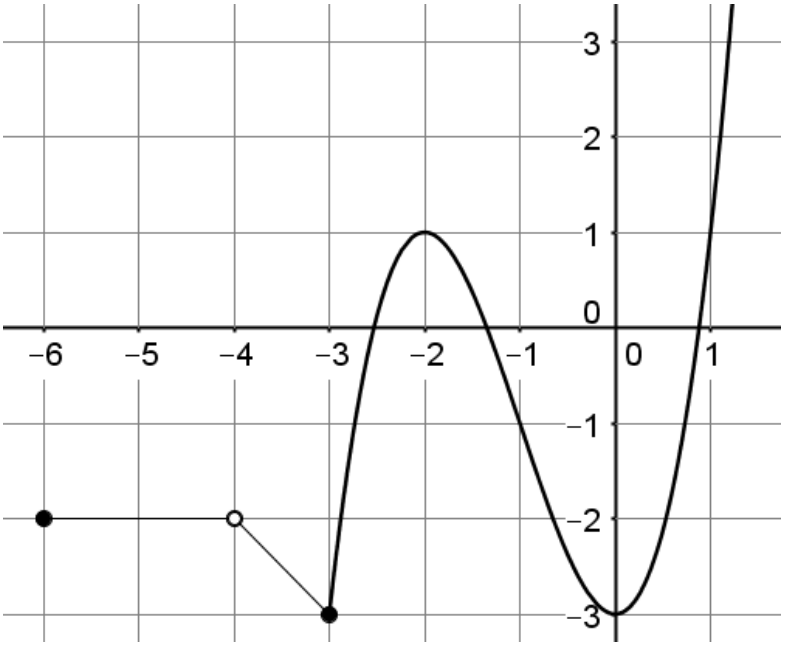
   d. Decreasing

   e. Constant

   f. Relative maximums

   g. Relative minimums

4. Determine the features for the following graph.



   a. Domain

   b. Range

   c. Increasing

   d. Decreasing

   e. Constant

   f. Relative maximums

   g. Relative minimums

Unit 1 Lesson 11: Identify Even and Odd Functions

Lesson Objectives

- Use algebra to determine if a function is either even or odd
- Use a graph to determine if a function is either even or odd

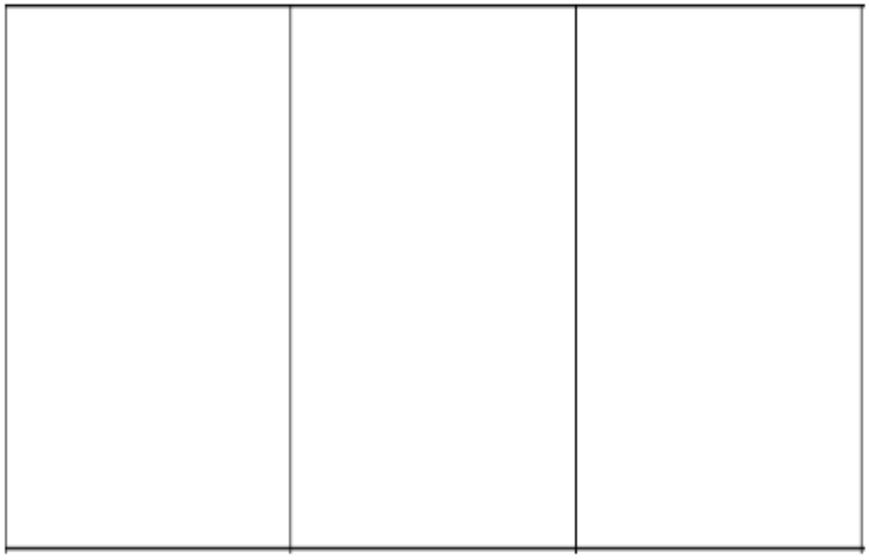
Odd function

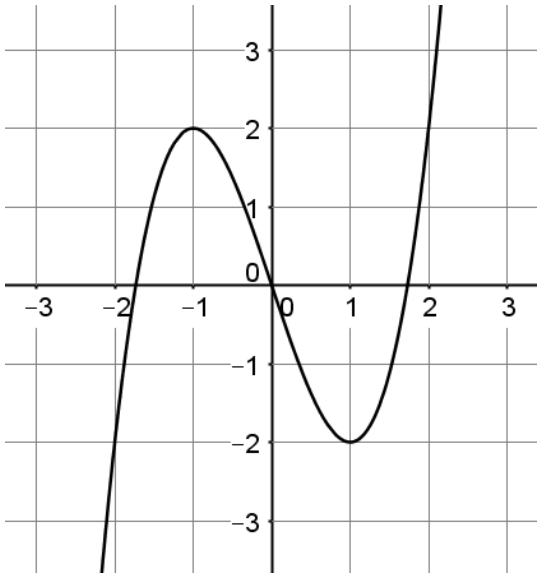
- A function that _____.
- f = (x , y) → (____ , ____)
- f(-x) = _____

Even function

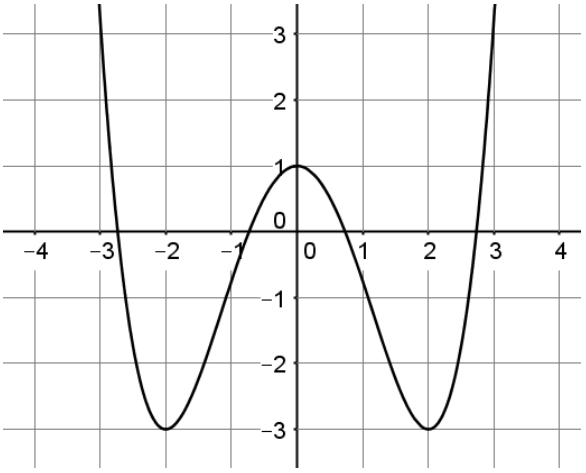
- A function that _____.
- f = (x , y) → (____ , ____)
- f(-x) = _____

1. Verify graphically and algebraically if $f(x) = x^3 - 3x$ is an odd function.





2. Verify graphically and algebraically if $f(x) = -0.25x^4 - 2x^2 + 1$ is an even function.



Ex Cred: Only 1 function is both even and odd. Can you figure out what it is?

~~~Homework U1L11~~~ 1.3: 53-56

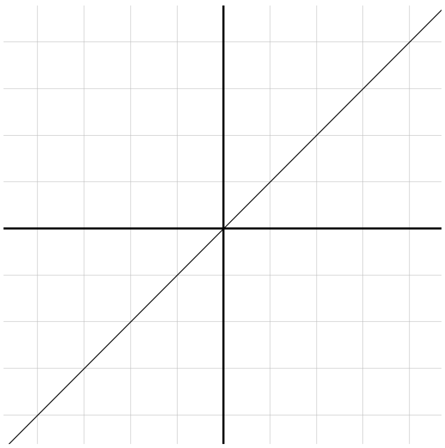
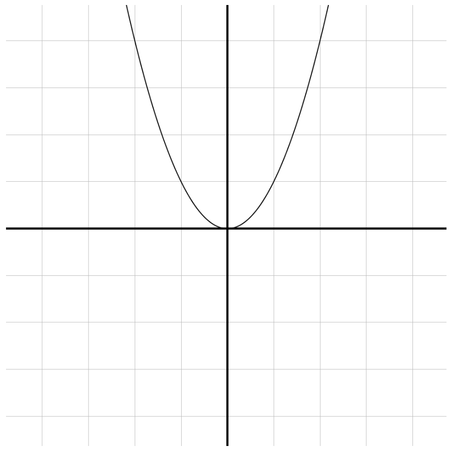
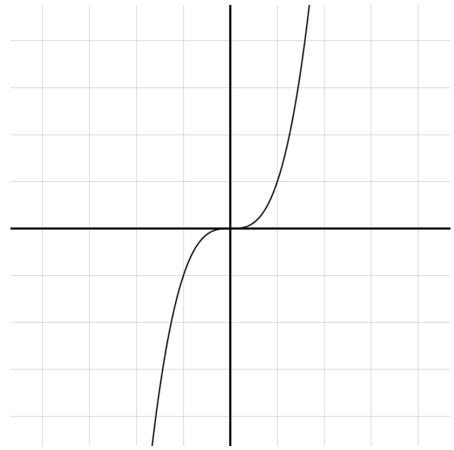
~~~Classwork U1L11~~~ 1.3: 49-52

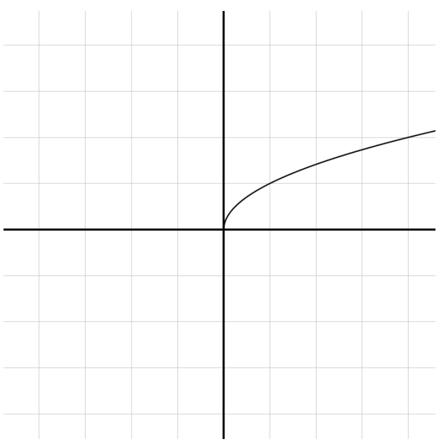
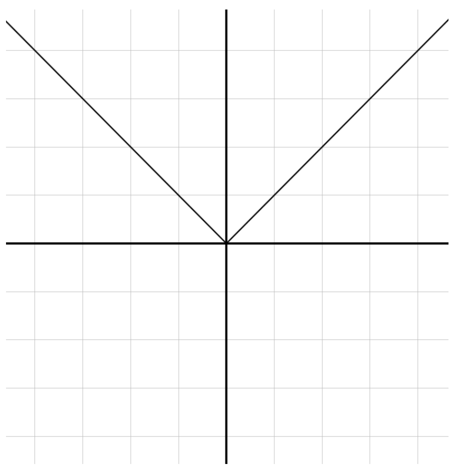
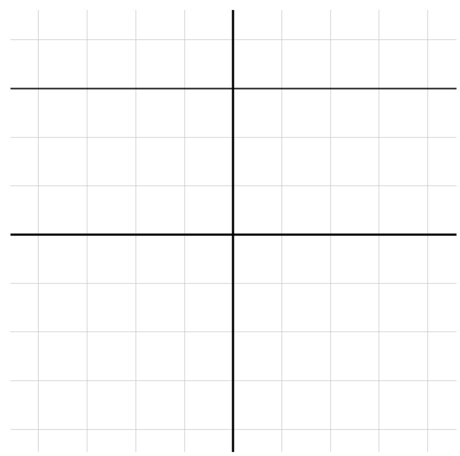
Unit 1 Lesson 12: Translate Graphs

Lesson Objectives

- Memorize the 6 foundational graphs of Alg II
- Use GeoGebra to discover how translating a graph affects an equation
- Convert between translated graphs, instructions of how to translate a foundational graph, and equations of translated graphs

Common functions

<u>GeoGebra investigation</u>

1. Draw $f(x) = \sqrt{x}$. Determine the equations when the following transformations have been performed
   a. Translate the graph __ spaces _____. ______________________________
   b. Translate the graph __ spaces _____. ______________________________
   c. Translate the graph __ space _____ and 4 spaces _____. ______________________________
   d. What would the equation be if you translated __ spaces _____ and __ spaces _____? ________________

2. Draw g(x) = |x|. Determine the equations when the following transformations have been performed.
   a. Translate the graph __ spaces _____. ______________________________

   b. Translate the graph __ spaces _____. ______________________________

   c. Translate the graph __ spaces _____ and __ spaces _____. ______________________________

   d. What would the equation be if you translated __ spaces _____ and __ spaces _____? ________________

3. Draw $h(x) = x^2$. Determine the equations when the following transformations have been performed.
   a. Translate the graph __ spaces _____. ______________________________

   b. Translate the graph __ spaces _____. ______________________________

      i. What did you expect the equation to be? ____________________

      ii. Show how what you expected and what GeoGebra gave you are actually the same equation

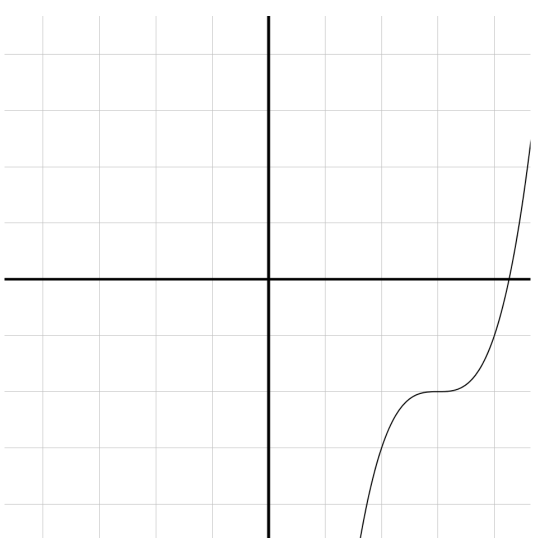
   c. Translate the graph __ space _____ and __ spaces _____. ______________________________

      i. What did you expect the equation to be? ____________________

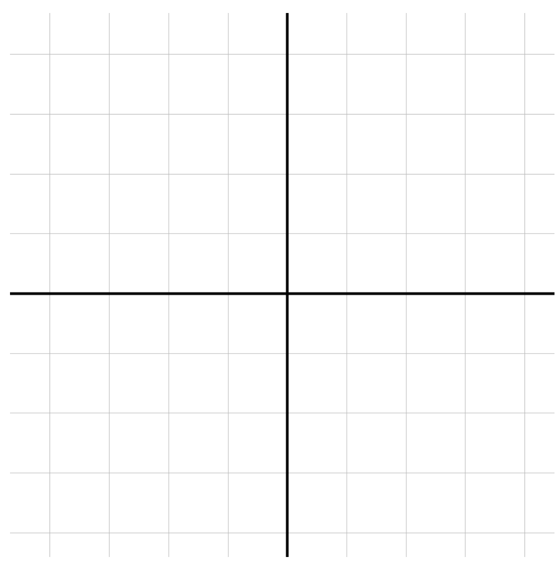
      ii. Show how what you expected and what GeoGebra gave you are actually the same equation

~~~~~~

1. Describe the transformation performed on a common function, and write the equation.



2. Graph the following equation: f(x) = (x+2)-1


~~~~~~

~~~Homework U1L12~~~ 1.4: 16,18,26 Write equation and describe transformation. 57,60 Sketch graph and describe transformation

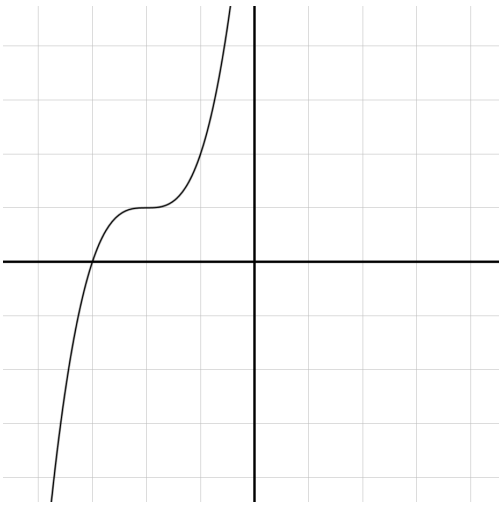
~~~Classwork U1L12~~~

For the following graphs, (a) describe the transformation performed on the parent function, and (b) write the equation.

1.

a.

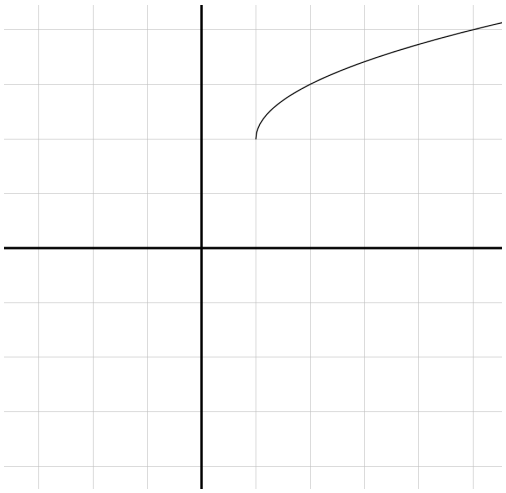
b.



2.

a.

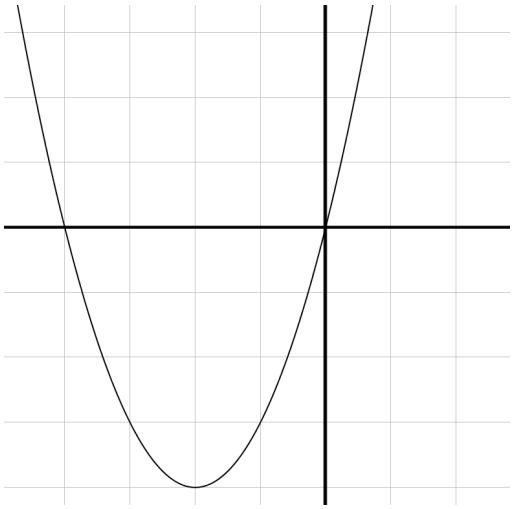
b.



3.

a.

b.



Graph the following functions, and describe the transformation performed on a common function.

4. $y = |x-4|-2$ 5. $f(x) = (x-2)+2$ 6. $g(x) = (x+2)^2+3$ 7. ex cred: $h(x) = x^2 - 8x + 13$

Unit 1 Lesson 13: Reflect Graphs

Lesson Objectives

- Use GeoGebra to discover how reflecting a graph affects an equation
- Convert between reflected graphs, instructions of how to reflect a foundational graph, and equations of reflected graphs
- Combine reflections and translations (Advice: reflect first)

GeoGebra investigation

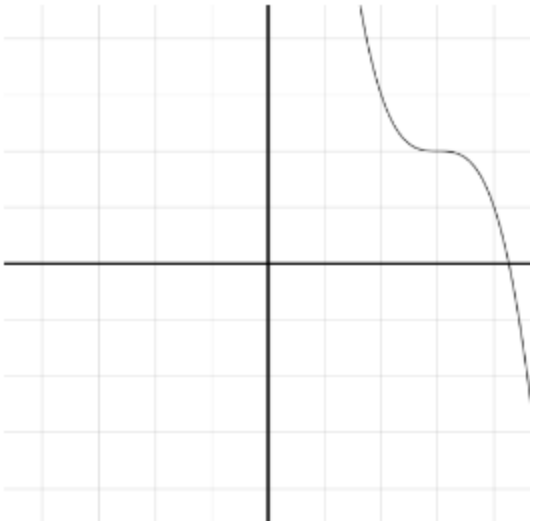
4. Draw g(x) = . Determine the equations when the following transformations have been performed.
    a. Reflect the graph about _____. _____
    b. Reflect the graph about _____. _____

5. Draw $f(x) = \sqrt{x + 1} + 2$. Determine the equations when the following transformations have been performed
    a. Reflect the graph about _____. _____
    b. Reflect the graph about _____. _____
    c. Looks like the secret of reflections about the x-axis is _____
    d. Looks like the secret of reflections about the x-axis is _____

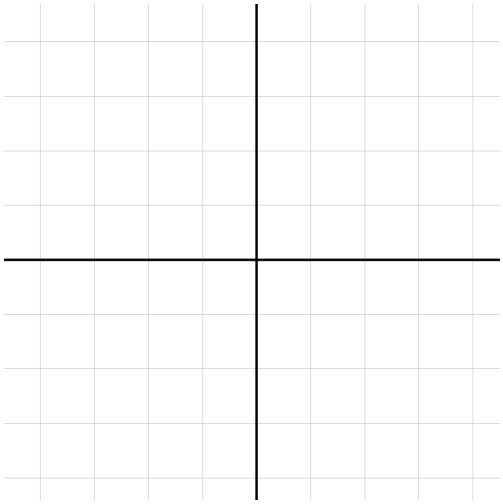
6. Draw h(x) = . Determine the equations when the following transformations have been performed.
    a. Reflect the graph about _____. _____
        i. What did you expect the equation to be? _____
        ii. Show how what you expected and what GeoGebra gave you are actually the same equation

    b. Reflect the graph about _____. _____
        i. What did you expect the equation to be? _____
        ii. Show how what you expected and what GeoGebra gave you are actually the same equation

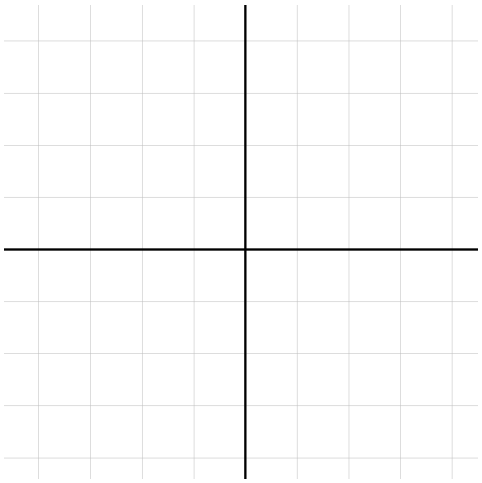
1. For the following graphs, (a) describe the transformation performed on the common function, and (b) write the equation for f(x). (c) Substitute f(2) to check your equation



2. (a) Graph the following equation: $f(x) = \sqrt{-x + 2} + 1$ (b) Substitute f(-2) to check your answer



3. (a) Graph the following equation: $f(x) = -\sqrt{-x + 3} + 1$ (b) Substitute f(-1) to check your answer



~~~Homework U1L13~~~ 1.4: 19, 20, 21, 22 Write equation and describe transformation.

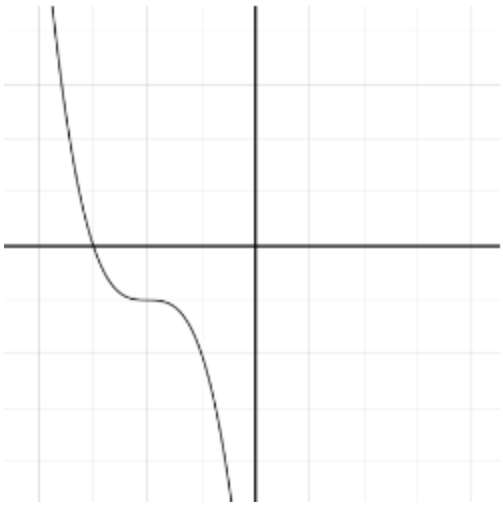
~~~Classwork U1L13~~~

For the following graphs, (a) describe the transformation performed on the parent function, and (b) write the equation.

4.

a.

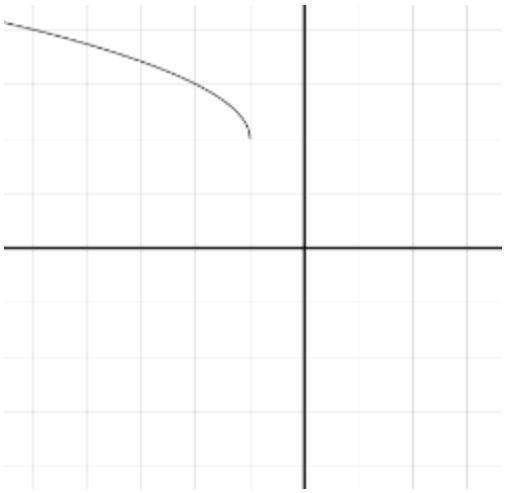
b.



5.

a.

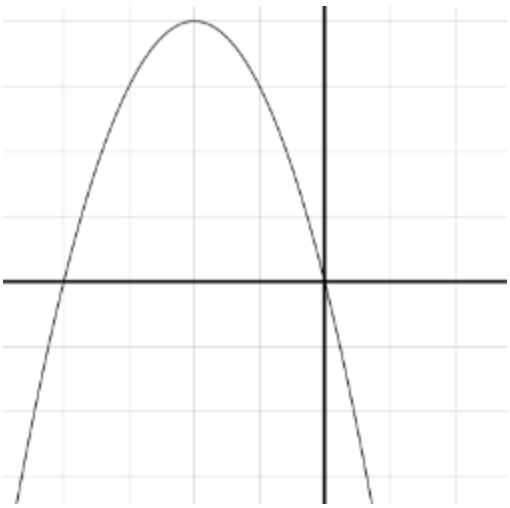
b.



6.

a.

b.



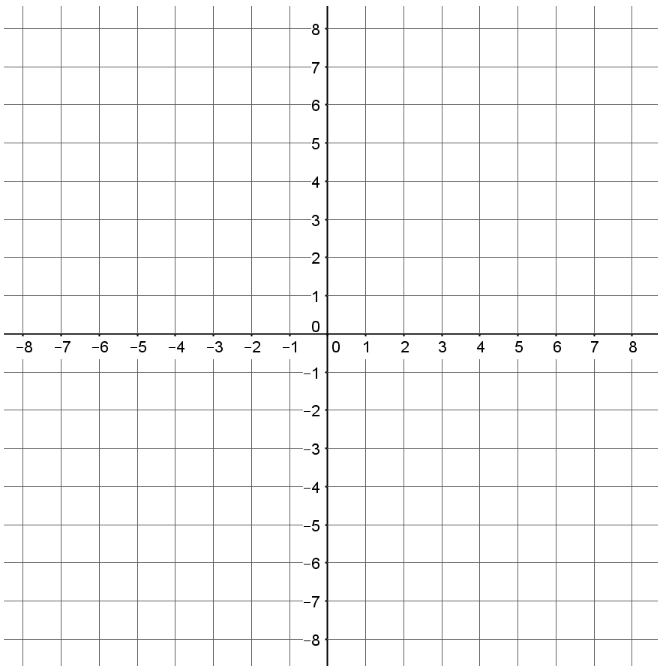
Graph the following functions, and (b) describe the transformation performed on a common function.

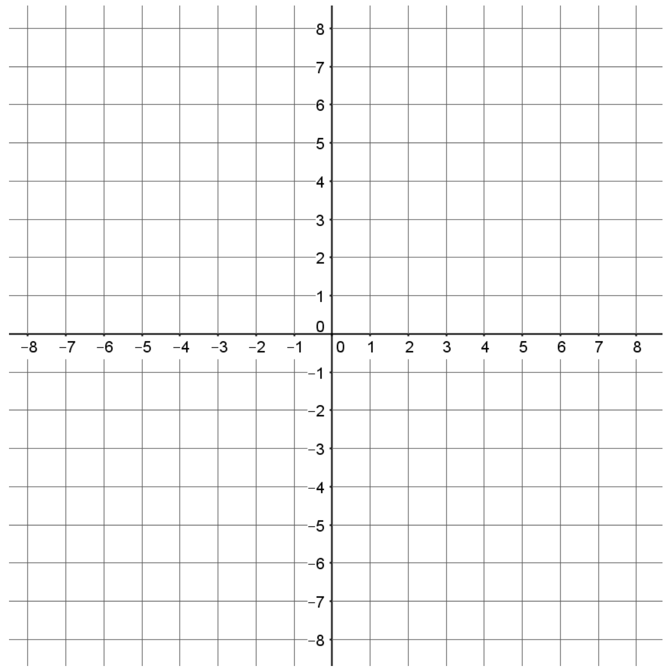
4. $y = -|x-4|-2$ 5. $f(x) = |-x-4|-2$ 6. $g(x) = -(x+2)^2+3$ 7. ex cred: $h(x) = x^2 - 8x + 13$

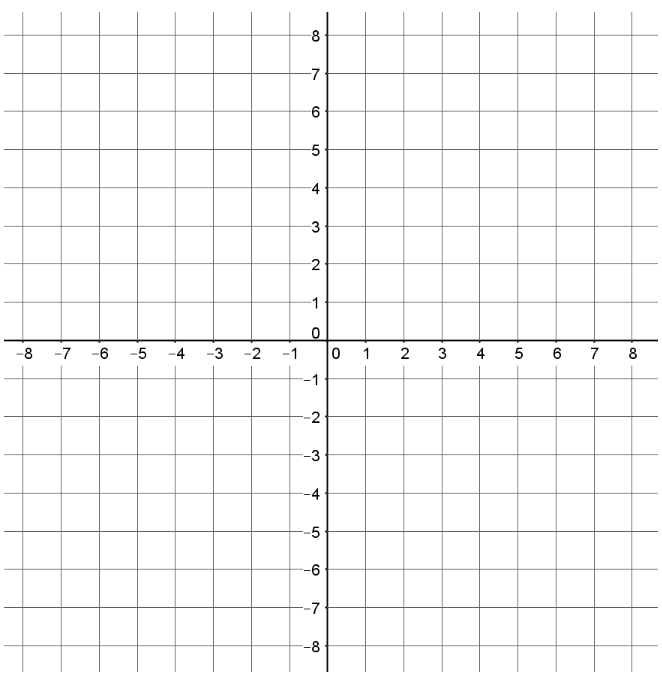
Unit 1 Lesson 14: Stretch or Shrink Graphs

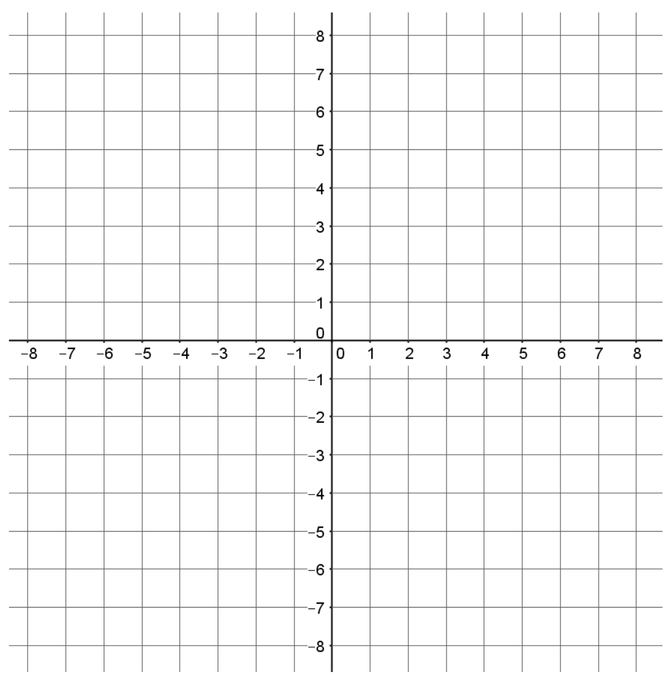
Lesson Objectives

- Memorize important non-critical points of the 6 foundational graphs
- Convert between stretched/shrunk graphs, instructions of how to stretch/shrink a foundational graph, and equations of stretched/shrunk graphs
- Combine stretches, reflections, and translations (Advice: stretch first, reflect second, translate last)









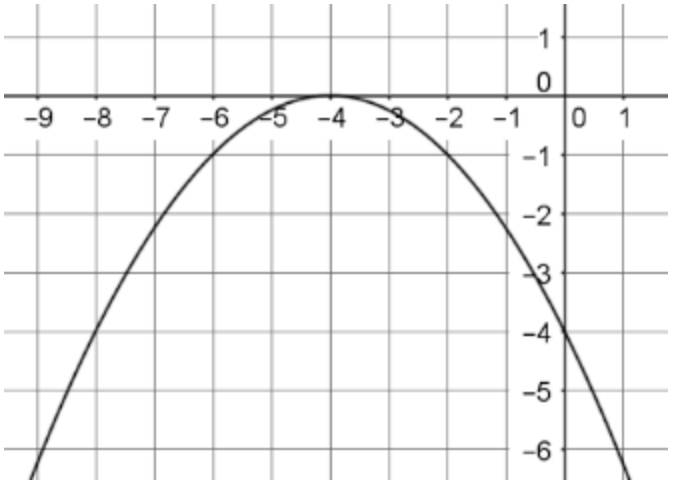
Examples

For the following graphs, (a) describe the transformation performed on the parent function, and (b) write the equation.

1.

a.

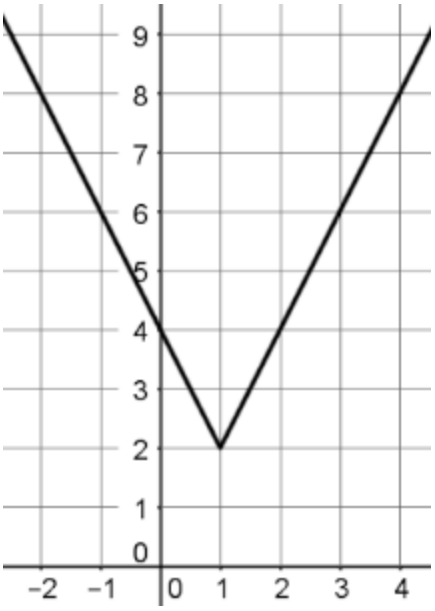
b.



2.

a.

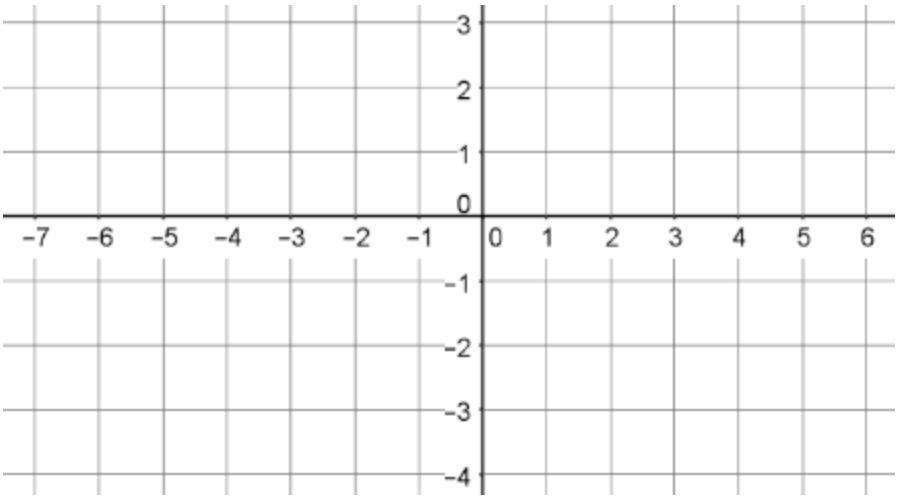
b.



3. (a) Graph f(x) = $-\sqrt{-2x+4}+1$ (b) describe the transformation performed on a common function.

a.

b.



~~~Homework U1L14~~~ 1.4: 1, 2, 7

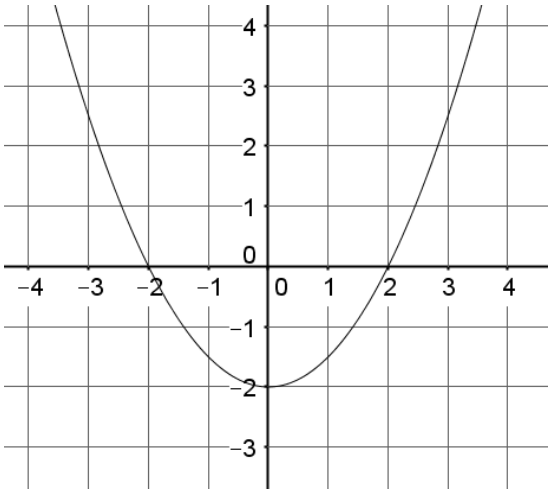
~~~Classwork U1L14~~~

For the following graphs, (a) describe the transformation performed on the parent function, and (b) write the equation.

7.

a.

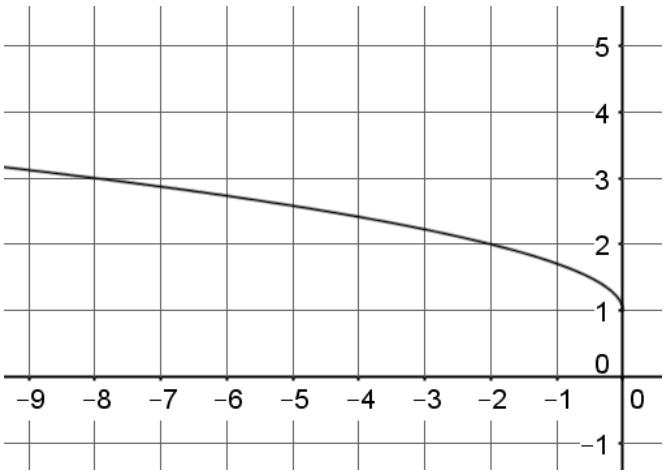
b.



8.

a.

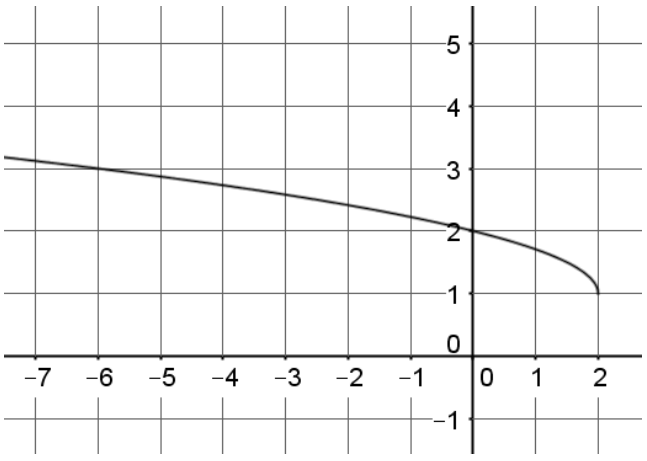
b.



9.

a.

b.



Graph the following functions, and (b) describe the transformation performed on a common function.

4. $y = -|2x+2|$ 5. $f(x) = -0.5|x|-2$ 6. $g(x) = (\frac{1}{2}x)^3+3$ 7. ex cred: $h(x) = 2x^2 - 8x + 4$

Unit 1 Lesson 15: Compose Functions

Lesson Objectives

- Solve for given compositions

For the following questions, solve for (a) f(g(x)) (b) f(g(1)) (c) solve for g(f(1))

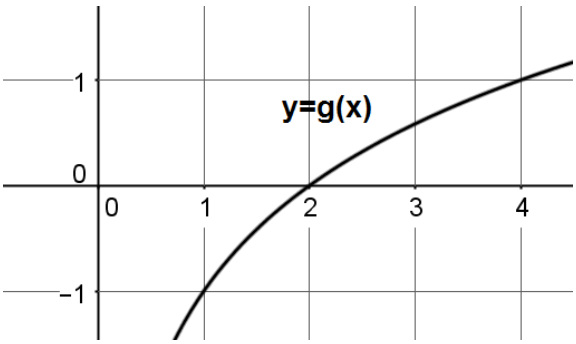
1. $f(x) = x^2 g(x) = 2x + 3$

   a. b. c.

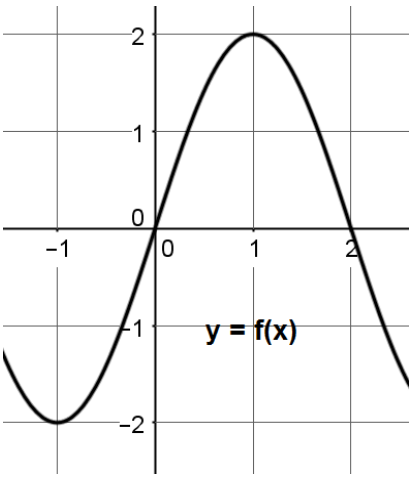
2. $f(x) = \sqrt{x-1}$ $g(x) = x^2 + 2x + 2$

   a. b. c.

3. Use the graphs below



b.



C.

~~~Homework U1L15~~~ 1.5: 45, 46, 53, 54

Note that $(f \circ g)(x) = f(g(x))$ and $(g \circ f)(x) = g(f(x))$

~~~Classwork U1L15~~~

For the following questions, solve for (a) f(g(x)) (b) f(g(-1)) (c) solve for g(f(1))

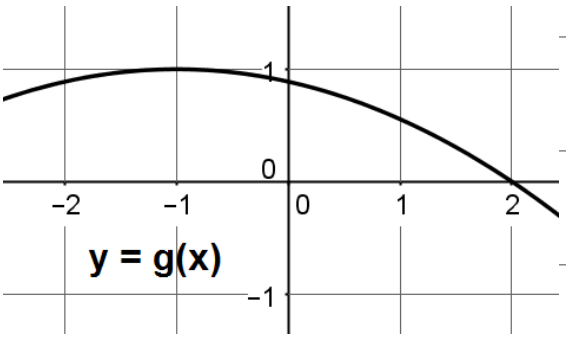
4. f(x) = 2x - 1 g(x) = -3x + 2

   a. b. c.

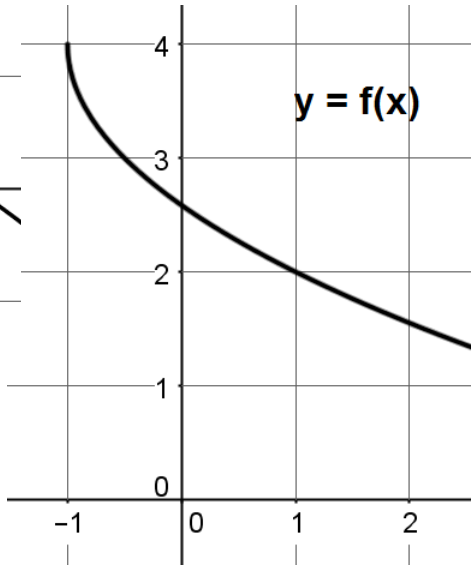
5. f(x) = $-\frac{4}{x}$ g(x) = |x|

   a. b. c.

6. Use the graphs below



b.



C.

Unit 1 Lesson 16: Identify Compositions

Lesson Objectives

- Find a way to express a function as a composition of two functions

Identify f(x) and g(x) such that h(x) = f(g(x)).

1. $h(x) = (4 - 3x)^3$

2. $h(x) = (x^2 - 2x)^2$

3. $h(x) = \sqrt{2x - 1}$

4. $h(x) = \left|\frac{x}{3}\right|$

5. $h(x) = \dfrac{2}{x - 1}$

6. $h(x) = (x+2)^3 - (x+2)^2 + 2(x+2) - 5$

~~~Homework U1L16~~~ 1.5: 56-62

~~~Classwork U1L16~~~

Identify f(x) and g(x) such that h(x) = f(g(x)).

1. h(x) = $\sqrt{2x - 1}$

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

3. h(x) = (-4 + sin(x))^2

4. $h(x) = ln(\frac{3}{x})$

5. (x-3)^2 - (x-3) + $\sqrt{x - 3}$

6. h(x) = |x^4 - x|

Unit 1 Lesson 17: Identify Inverse Functions Using Tables and Graphs

Lesson Objectives

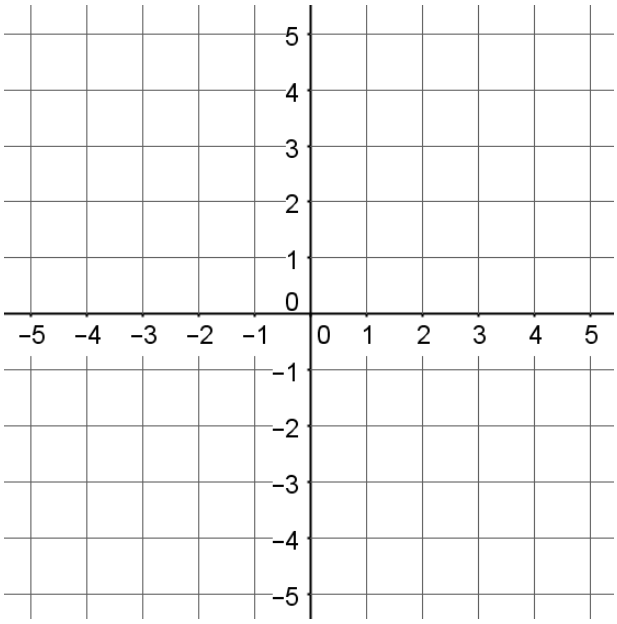
- Use tables to determine if functions are inverses
- Discover how to graphically determine if functions are inverses

Inverse Functions

1. Determine if f(x) and g(x) are inverse functions.

x	-3	1	0	-2	3
f(x)	-2	3	1	0	4

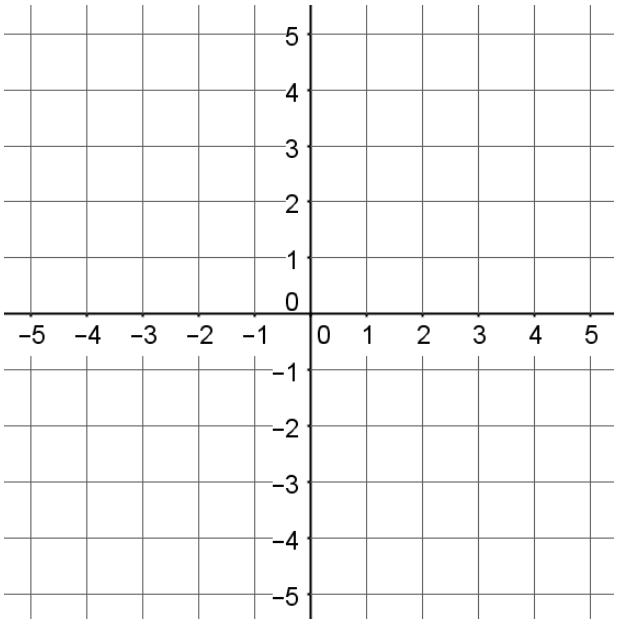
x	-2	1	0	4	3
g(x)	-3	0	-2	3	1



2. Determine if $g(x) = f^{-1}(x)$

x	1	5	-1	-4	0
f(x)	2	3	-4	-5	-1

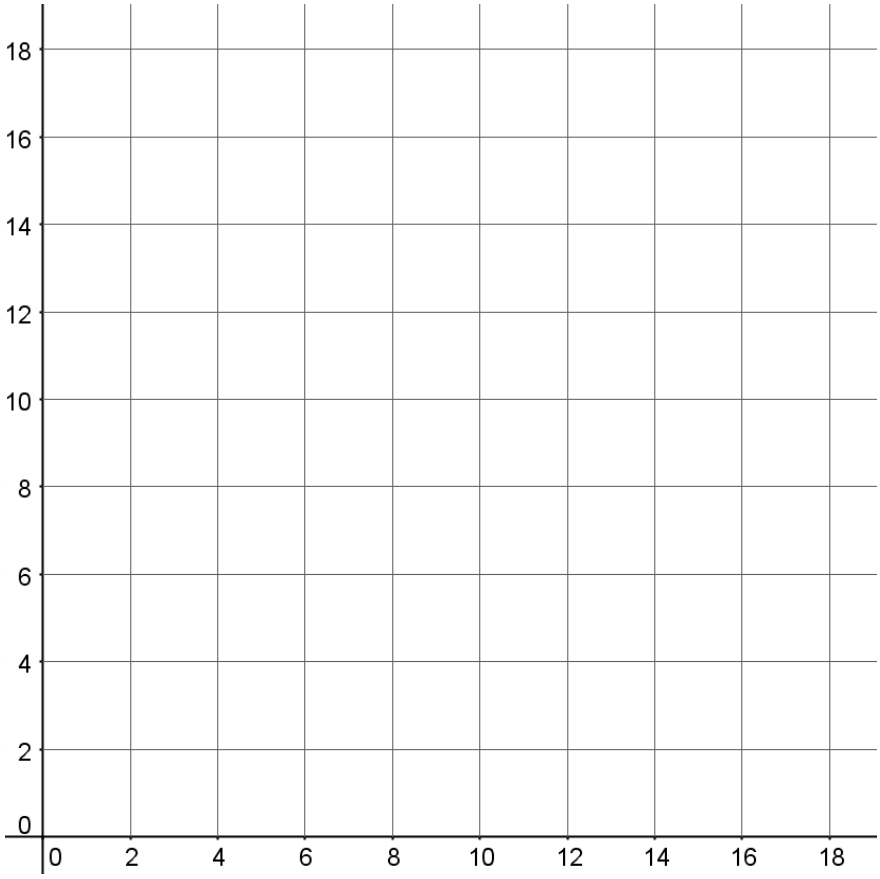
x	-5	-4	2	-1	3
g(x)	-4	-1	1	0	4



3. Determine values of g(x) such that $g(x) = f^{-1}(x)$

x	0	1	2	3	4
f(x)	0	1	4	9	16

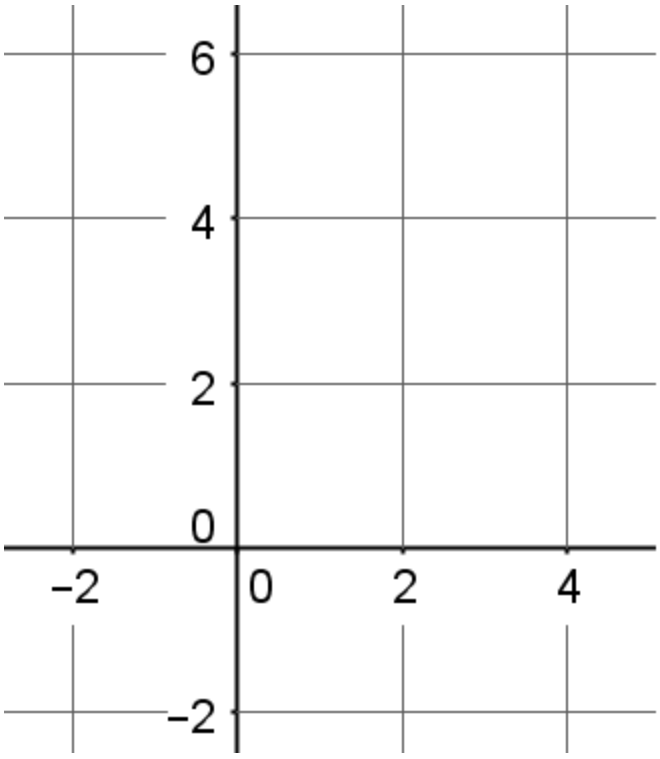
x	9	1	16	0	1
g(x)					



4. Determine values of g(x) such that $g(x) = f^{-1}(x)$

x	0	1	2	-1	-2
f(x)	0	1	4	1	4

x	0	1	4	1
g(x)				

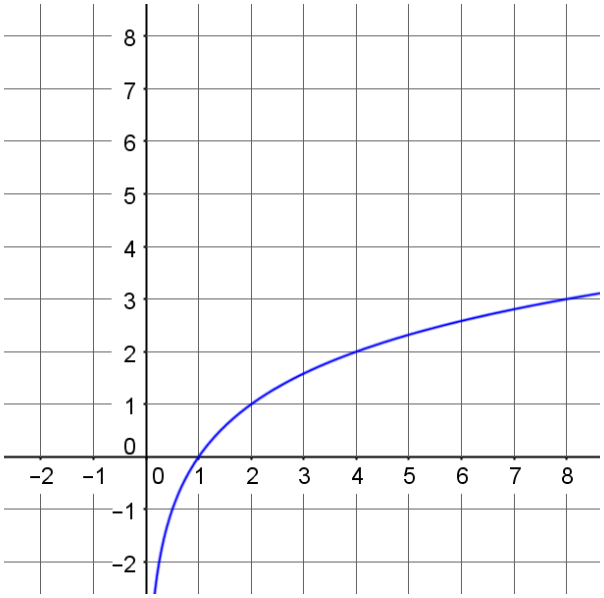


~~~Homework U1L17~~~ 1.6: 21-24

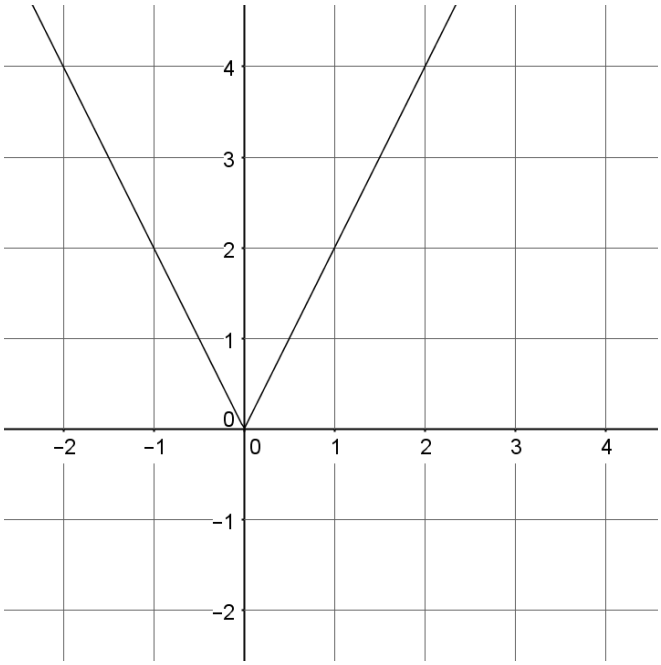
~~~Classwork U1L17~~~

1. Given a graph of f(x), sketch g(x) such that g(x) = $f^{-1}(x)$. If no inverse exists, explain why and give an example justifying your answer.

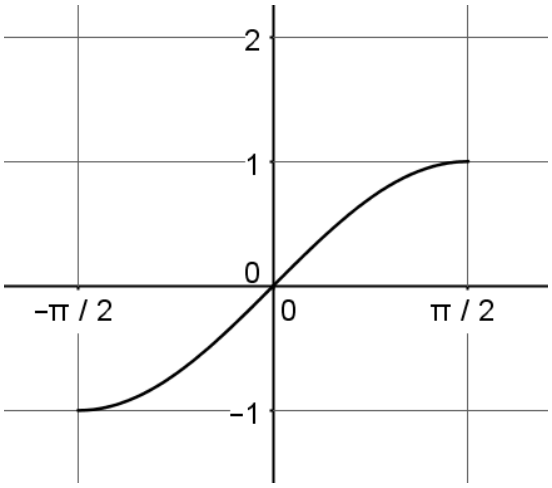
   a. f(x) = $\log_2 x$



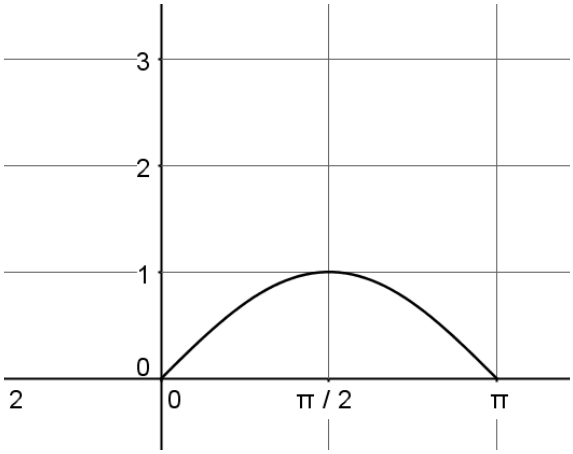
   b. f(x) = 2|x|



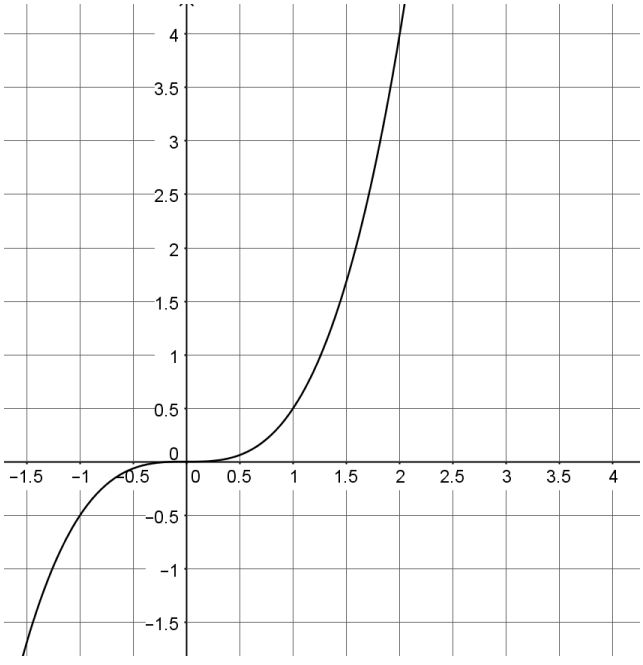
c. f(x) = sin(x) such that $-\ \pi/2 \leq x \leq \pi/2$



d. f(x) = sin(x) such that $0 \leq x \leq \pi$



e. f(x) = ½(x)^3



Unit 1 Lesson 18: Identify Inverse Functions Algebraically

Lesson Objectives

- Verify if two functions are inverses algebraically

Inverse Functions:

Determine if the following functions are inverses

1. $f(x) = 3x - 2$ $\quad g(x) = \frac{x+2}{3}$

2. $m(x) = 3e^x$ $\quad n(x) = ln(\frac{x}{3})$

3. $p(x) = \sqrt{\frac{1}{2}x + 2}$ $\quad q(x) = 2x^2 - 4$

4. $r(x) = \frac{8}{x^3}$ $\quad s(x) = \frac{2}{\sqrt[3]{x}}$

~~~Homework U1L18~~~ 1.6: 9-12

~~~Classwork U1L18~~~

Determine if the following functions are inverses

1. $f(x) = 8x - 4$ $\quad g(x) = \frac{1}{4}x + \frac{1}{2}$

2. $f(x) = \frac{12 - 3x}{5}$ $\quad g(x) = 4 - \frac{5}{3}x$

3. $p(x) = 1 - x^3$ $\quad q(x) = \sqrt[3]{1 - x}$

4. $g(x) = 9 - x^2$ $\quad h(x) = \sqrt{9 - x}$

5. $r(x) = \frac{2}{x + 2}$ $\quad s(x) = \frac{1 - x}{\frac{1}{2}x}$

Unit 1 Lesson 19: Create Inverse Functions

Lesson Objectives

- Create an inverse function to a given function

Creating Inverse Functions:

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

1. $f(x) = 2x$

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

3. $f(x) = x^{\frac{3}{2}}$

4. $f(x) = e^{2x}$

5. $f(x) = \dfrac{1 - 3x}{2}$

~~~Homework U1L19~~~ 1.6: 53, 57, 61, 62

~~~Classwork U1L19~~~

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

7. $f(x) = \frac{1}{3}x$

8. $f(x) = e^{\frac{x}{2}}$

9. $f(x) = \frac{2}{4+2x}$

10. $s(x) = \frac{1-x}{\frac{1}{2}x}$

Unit 1 Lesson 20: Review for Test

Lesson Objectives

- Prepare yourself to get a grade that would make Mama proud.

1. Determine the features for the following graph. Identify locations of these features using x-values, except for range.

    a. Domain

    b. Range

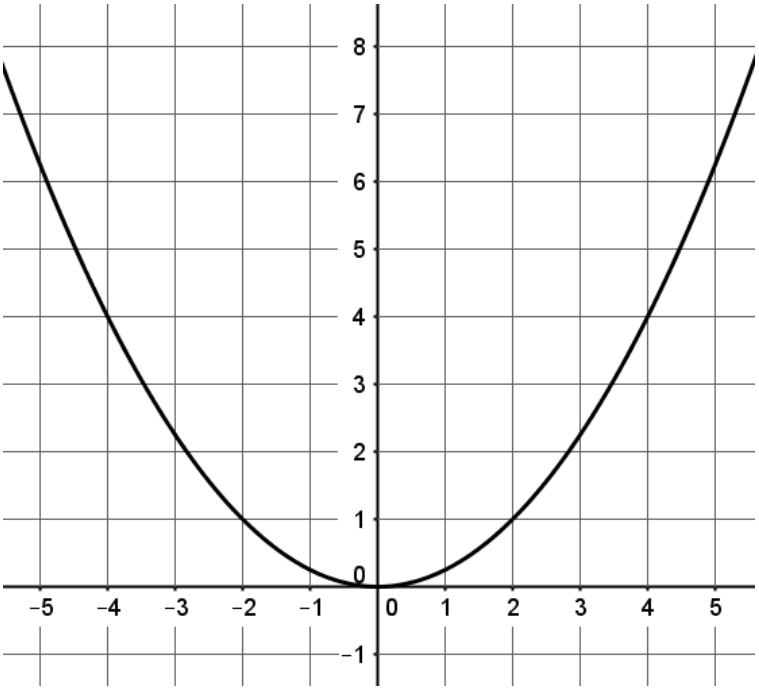
    c. Increasing

    d. Decreasing

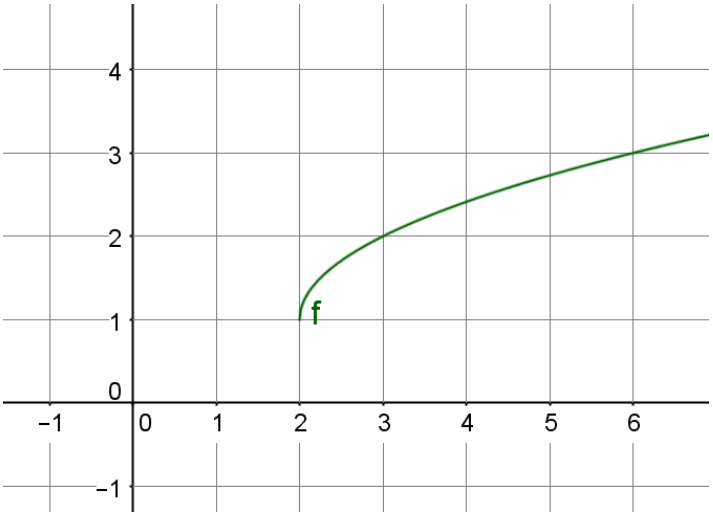
    e. Constant

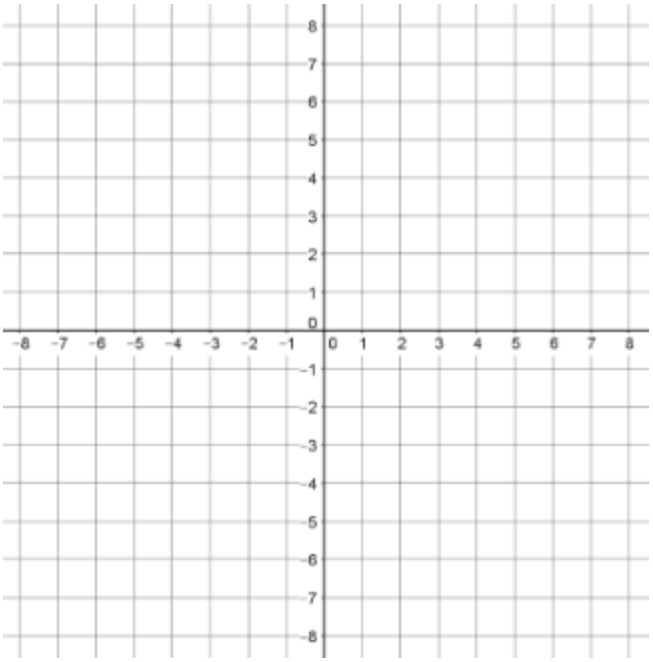
    f. Relative maximums

    g. Relative minimums



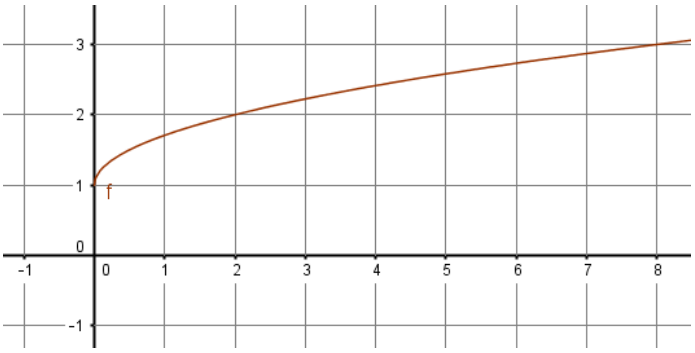
2. Determine the equation of f(x).



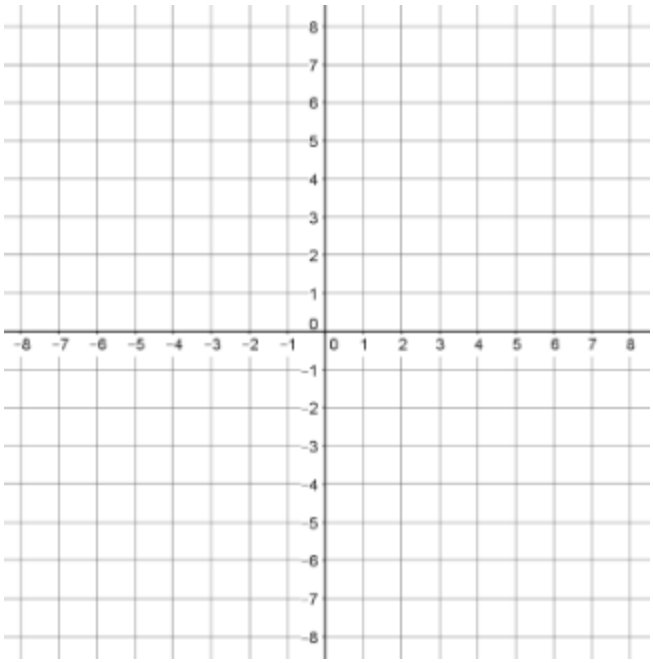


3. Graph the equation $y = -(x-2)^2+4$

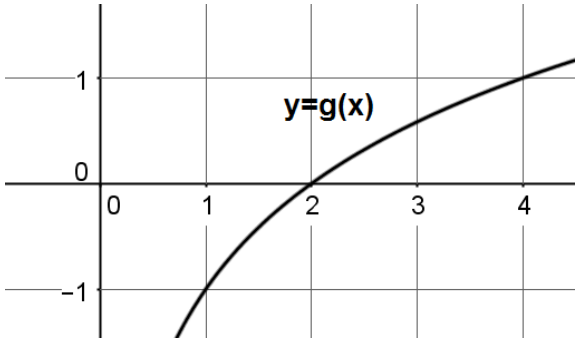
4. Determine the equation of f(x).

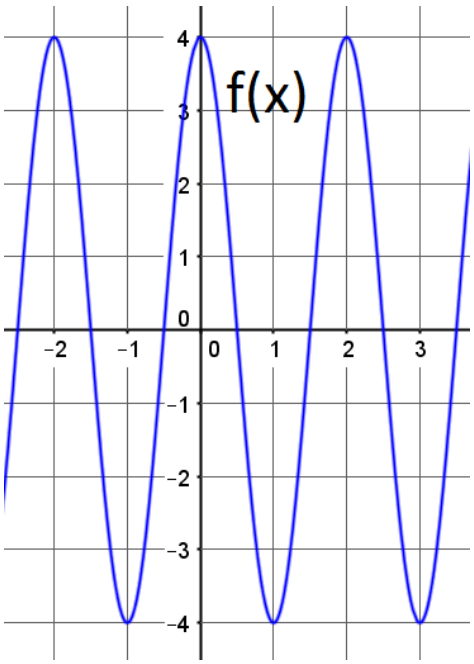


5. Graph the equation $y = \sqrt{-\frac{1}{2}x - 2}$



6. Using the graphs of f(x) and g(x)



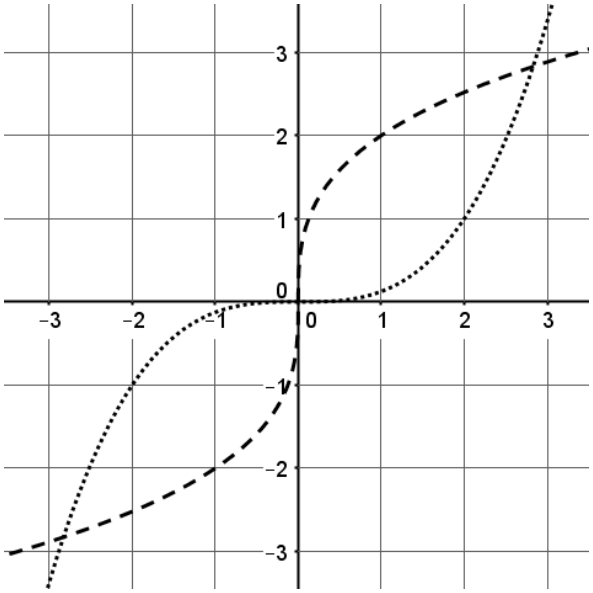


a. f(g(2))

b. g(f(-2))

7. Given $h(x) = 3|x^2 - 2x|$ determine f(x) and g(x) such that f(g(x)) = h(x). Oh, and of course, g(x) should be a nice chunk.

8. Do the two curves below appear to be inverse functions of x? Chose two points that justify your answer.



9. If $f(x) = 5\sqrt{2x + 4}$ and $g(x) = \frac{x^2}{50} - 2$, determine whether or not $g(x) = f^{-1}(x)$. Show all steps. Conclude your answer with a sentence or two.

10. If $f(x) = 5 - \frac{4x}{3}$, determine $f^{-1}(x)$