Unit 1 Day 13 - Guided Notes: Inverse Functions

Recall: What is a function?

- In a function, each ______________________ can have only one ______________________
  - In other words, each ________ can only have one _______
- Decide whether or not the relations below represent functions:

Input	Output
-1	5
0	3
1	4
2	7
3	4

Input	Output
3	0
4	7
5	10
4	14
10	25

a) (Table 1) YES or NO

b) (Table 2) YES or NO

c) $\{(0,1),(2,2),(0,3),(4,5)\}$ YES or NO

d) $\{(2,-9),(1,-4),(8,-8),(-4,-4)\}$ YES or NO

e) $\{(1,2),(2,2),(3,5),(4,52)\}$ YES or NO

Inverse Functions

- Inverse functions are ______________________ or functions that ______________each other
  - Think of the function $f(x) = x^2$. How do you "undo" squaring x? ______________________
    - x^2 and __________ are inverse functions
- In inverse functions, the ______ and ______ values are switched from the original function
  - When x and y values switch places can you think of something else we have been learning about that might also switch? ____
  - When the x and y values switch, this results in a reflection over _________
- The inverse of the function f is labeled ________________. We read this as "f inverse."

For each table below create a table that represents the inverse. Label the inverse correctly using function notation.

f(x)	y
−4	0
−2	−3
0	−7
5	4

	y

a) Does $f(x)$ represent a function? _________

b) Does $f^{-1}(x)$ represent a function? _______

c) Find $f(0)$: ______________________

d) What is $f^{-1}(-3)$? ________________

e) What is $f^{-1}(4)$? ________________

h(x)	y
−3	9
−1	1
0	0
1	1

	y

f) Does $h(x)$ represent a function? _________

g) Does $h^{-1}(x)$ represent a function? _______

h) Find $h(0)$: ______________________

i) What is $h^{-1}(9)$? ________________

j) What is $h^{-1}(0)$? ________________

- In the examples above, you were asked to evaluate the inverse function for a given input. Is there a pattern that you could use to evaluate the inverse of a function without creating an inverse table?

  ____

  - If the point $(-5, 3)$ is a point on $f(x)$, what point would be on $f^{-1}(x)$? ___________
  - If the point $(8, 1)$ is a point on $g(x)$, what point would be on $g^{-1}(x)$? ___________

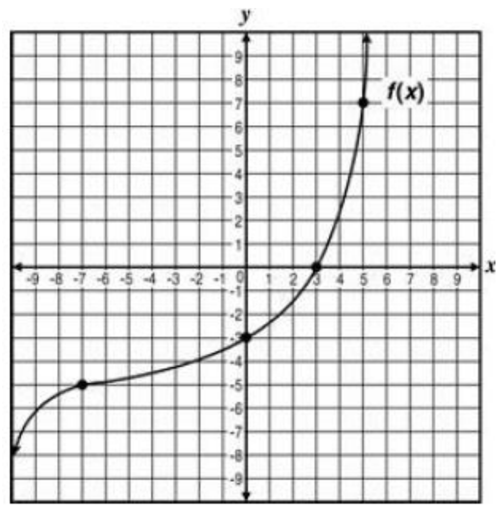
Use the table of $f(x)$ below to answer the following questions:

a) $f^{-1}(9) =$ ________

b) $f^{-1}(-2) =$ ______

x	-5	-2	$-\frac{1}{2}$	$\frac{1}{2}$	2	5
$f(x)$	2	9	4	-4	-9	-2

The function $f(x)$ is shown on the graph below. Using the same approach, you used with the tables, find the inverse values requested below:



a) $f^{-1}(7) =$ ______

b) $f(7) =$ ________

c) $f^{-1}(0) =$ ______

d) $f(3) =$ ________

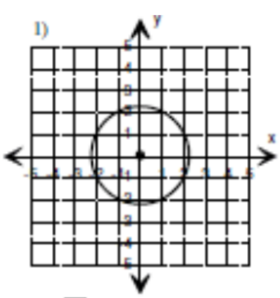
e) $f^{-1}(-3) =$ ______

f) $f^{-1}(-5) =$ ______

Vertical Line Test

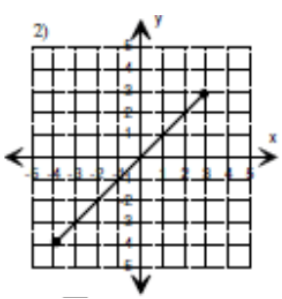
- To determine whether or not a graph represents a function we use the ______________________________
  - If any vertical line touches the graph more than once, the graph is ___________________________
  - If any possible vertical line touches the graph only once, the graph is _________________________

- Determine whether or not the graphs below represent functions:



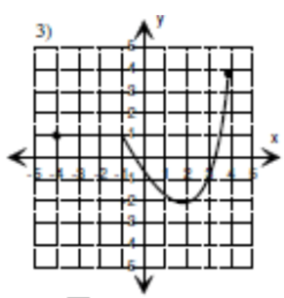
Function

Not a Function



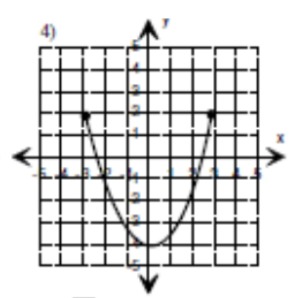
Function

Not a Function



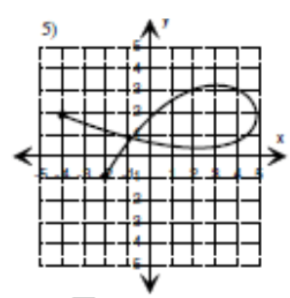
Function

Not a Function



Function

Not a Function



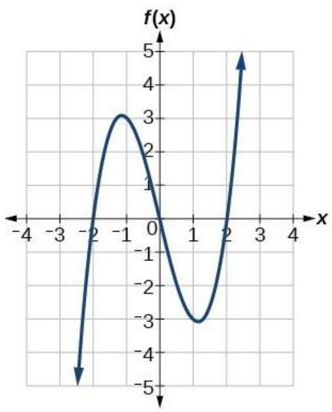
Function

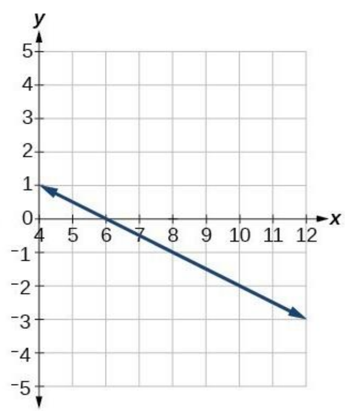
Not a Function

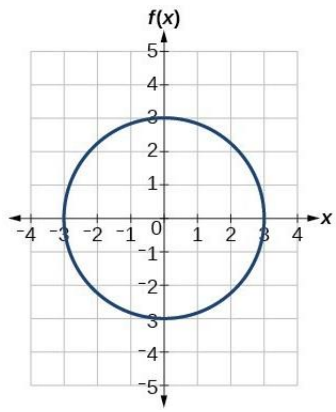
Determining Inverse Functions from Graphs

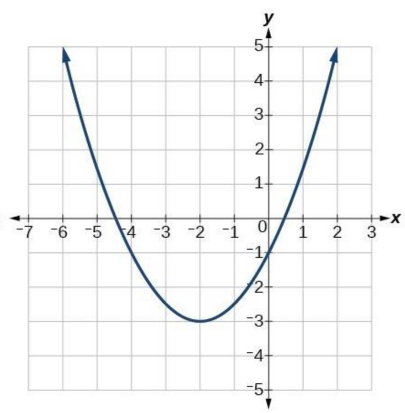
- To determine whether or not a functions inverse will also be a function use the ______________________________ ____
    - The same rules apply for an inverse function with the horizontal line test that apply for a function and the vertical line test
- If a function does not pass the horizontal line test, it will have an inverse on a ______________________________
    - All ____ functions will have an inverse function with a restricted domain along the line of symmetry

For each graph below, determine whether or not the inverse would represent a function. If an inverse does not exist, use vertical lines to create a domain where an inverse would exist.









Inverse Functions

- The inverse of a linear function is always a __________________________________ function
- The inverse of a quadratic function is always a _____________________________ function
- The inverse of a cubic function is always a __________________________________ function

Finding the Inverse from an Equation

1. Change the ________ to a _________
2. Switch the ________ and __________
3. Solve for __________________________
4. Use the notation ________________ to represent your inverse

(1) Find the inverse of $f(x) = 4x - 7$

(2) Find the inverse of $f(x) = -\frac{1}{4}x + 8$

(3) Find the inverse of $f(x) = 8x^2 - 5$

(4) Find the inverse of $f(x) = \frac{\sqrt{x+1}}{5}.\ x \geq -1$

(5) Find the inverse of $f(x) = \sqrt{x} - 4$