Name:_____ Hour: _____ Date: _____

NOTES: Section 6.4 – Use Inverse Functions

Goals: #1 - I can find the inverse of a linear function.

#2 - I can verify that two functions are inverses of each other.   

#3 - I can find the inverse of a power function.

#4 - I can graph the inverse of a function and determine if the inverse is a function.

Homework: Lesson 6.4 Worksheet

Warm Up:

1. Let $f(x) = 5x^3 - 2x$ and $g(x) = 3x^3$. Perform the indicated operation and state the domain.

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

   b. $\dfrac{f(x)}{g(x)}$

answer: _____ answer: _____

domain: _____ domain: _____

2. Let $f(x) = 4x^{-1}$ and $g(x) = 5x - 2$. Perform the indicated operation and state the domain.

   a. $f(g(x))$

   b. $f(f(x))$

answer: _____ answer: _____

domain: _____ domain: _____

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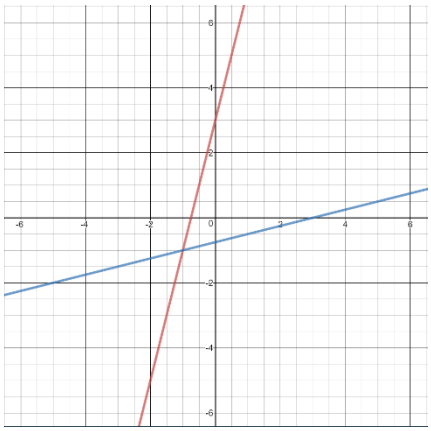
Exploration #1: Work with a partner and answer the following questions.

1. Each pair of function are ***inverses*** of each other. Look at the graphs of the following functions. What do you notice?

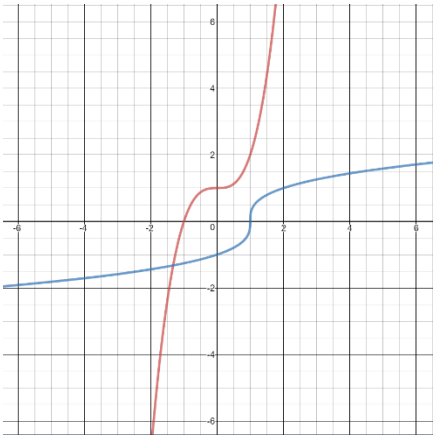
a. $f(x) = 4x + 3$

$g(x) = \frac{x-3}{4}$



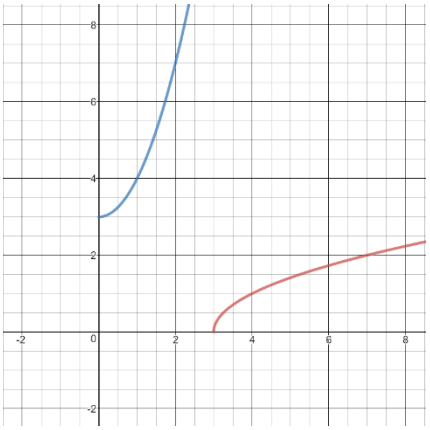
b. $f(x) = x^3 + 1$

$g(x) = \sqrt[3]{x-1}$



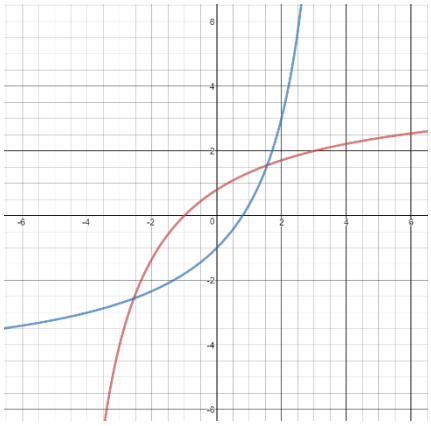
c. $f(x) = \sqrt{x-3}$

$g(x) = x^2 + 3, x \geq 0$



d. $f(x) = \frac{4x+4}{x+5}$

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



Notes:

An _____ is a _____ of the graph of the original relation. It _____ the input and output values.

Meaning, the _____ and _____ are also interchanged.

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Example #1: Find an equation for the inverse of the relation.

1. $y = 3x - 5$
2. $y = -\frac{1}{3}x^3$

You practice: Find an equation for the inverse of the relation.

1. $y = x^2 + 1$
2. $y = 4x + 2$

Notes:

Functions f and g are _____ of each other provided:

$$f\big(g(x)\big) = x \text{ and } g\big(f(x)\big) = x$$

Example #2: Verify that f and g are inverse functions.

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

2. $f(x) = 6x^2 + 1, x \geq 0; g(x) = \left(\frac{x-1}{6}\right)^{1/2}$

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You practice: Verify that f and g are inverse functions.

1. $f(x) = \frac{2}{5}x + \frac{1}{3},\ g(x) = \frac{5}{2}x - \frac{5}{6}$

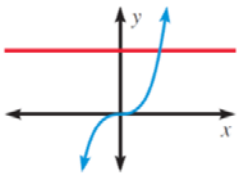
2. $f(x) = 6x^3,\ g(x) = \sqrt[3]{\frac{x}{6}}$

Notes:

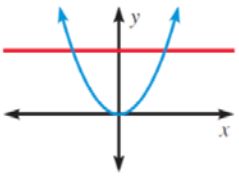
Recall, to determine if a graph is a _____, we use the _____.

To determine whether the _____ of a function is a function, we apply the _____.

Inverse is a function



Inverse is not a function



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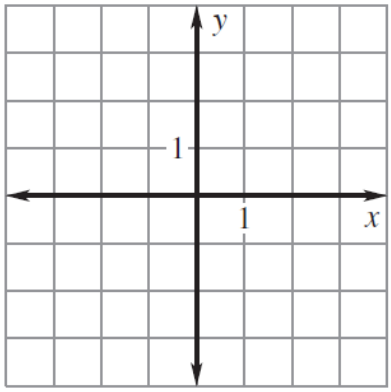
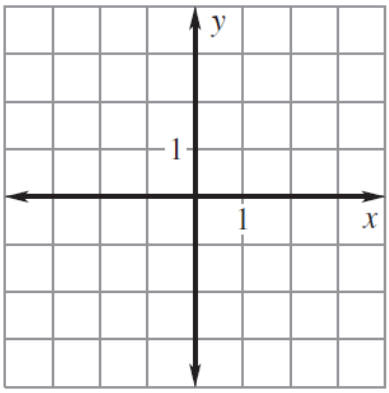
Example #3: Graph the function f. Use the horizontal line test to determine whether the inverse of f is a function. Then graph the inverse of f.

1. $f(x) = 3x + 1$

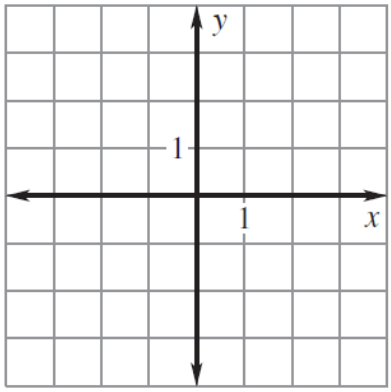


2. $f(x) = \frac{1}{4}x^2 - 1$



You practice: Graph the function f. Use the horizontal line test to determine whether the inverse of f is a function. Then graph the inverse of f.

1. $f(x) = (x - 4)(x + 1)$



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