Name: _____ Class: _____ Date: _____ ID: A

Lesson #7 C: Understanding Inverses and Finding the Inverse of Relations, Functions and Applications (Reference: Lesson #50 in book)

Problem

1. **For each of the following relations (r), determine the inverse of the relation (r^{-1}), determine whether each of the relations are functions and if the have an inverse relation, and explain how you arrived at your answer.**

   1. Relation r:

x	y	(x,y)
5	-3	(5,-3)
11	10	(11,10)
-6	-1	(-6,-1)
-9	1	(-9,1)
-4	-9	(-4,-9)
3	-6	(-3,-6)

2. Relation r:

x	y	(x,y)
-5	3	(-5,3)
9	-8	(9,-8)
12	-5	(12,-5)
7	-3	(7,-3)
8	8	(8,8)
-13	-4	(-13,-4)

3. **Find the algebraic inverse of each of the following algebraic relations.**

   3. $f(x) = -3x^4 - 5$

4. $f(x) = \sqrt[3]{3x-3} + 9$

5. $f(x) = \dfrac{3x+12}{9}$

6. $f(x) = \dfrac{5}{x-7} + 2$

7. **Find the inverse of each of the following relations and determine whether each relation is a function. If any inverse is not a function determine what restrictions can be placed on the domain of the original relation to make the inverse a function. (Graphing calculators can be used to help you graph the relations and determine whether or not they are functions.)**

   7. $f(x) = -\dfrac{5}{3}x - 15$

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

9. $f(x) = (2x-4)^2 - 12$

10. $f(x) = \frac{11}{x+2} + 8$

11. **Use what you have learned about inverses to help you solve each of the following inverse application problems.**

    11. The Sears Tower in Chicago is 1451 feet tall. The distance travled by a free-falling object is given by $d = 16t^2$, where d is the distance in feet and t is time in seconds. How long would it take an object to reach the ground if dropped from the top of the Sears Tower?

12. The distance traveled by a boat over a period of time is modeled through the function $25d = 5t^2 + 25$, where d is the distance traveled in miles and t is the time in hours. First find the inverse of the formula, then determine long it would take for the boar to travel 501 miles?