

Lesson #7: Understanding Inverses and Finding the Inverses of Relations and Functions
(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 they have an inverse relation, and explain how you arrived at your answer.

1. Relation r :

x	y	(x,y)
3	8	(3,8)
2	4	(2,4)
7	11	(7,11)

2. Relation r :

x	y	(x,y)
1	2	(1,2)
1	4	(1,4)
4	6	(4,6)

3. Relation r :

x	y	(x,y)
1	-3	(1,-3)
-2	3	(-2,3)
5	1	(5,1)
6	4	(6,4)

4. Relation r :

x	y	(x,y)
-5	7	(-5,7)
-6	-8	(-6,-8)
1	-2	(1,-2)
10	3	(10,3)
-5	-9	(-5,9)

5. Relation r :

x	y	(x,y)
-2	4	(-2,4)
4	7	(4,7)
0	11	(0,11)
-5	7	(-5,7)
3	-6	(3,-6)
-1	-4	(-1,-4)

6. Find the algebraic inverse of each of the following algebraic relations.

6. $f(x) = 15x - 1$

7. $f(x) = -5x + 11$

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

9. $f(x) = \frac{7x + 18}{2}$

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

11. $f(x) = (x-2)^2$

12. $f(x) = \sqrt{x-4}$

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

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

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

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

17. $f(x) = -\frac{2}{3}x^3 - 4$

18. $f(x) = (2x-4)^2 - 1$

19. **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.)**

19. $f(x) = -\frac{3}{5}x - 3$

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

21. $f(x) = x^2 - 6$

22. $f(x) = \sqrt[3]{2x+4}$

23. $f(x) = -2x^2 - 8$

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