LESSON

5-1

SECONDARY MATH 3

CORE STANDARDS
F.BF.4

OBJECTIVE

1. I can determine the inverse of a function given in multiple forms.

NOTES

Inverse Functions: functions in which all input and output pairs are reversed. The inverse of $f(x)$ is denoted $f^{-1}(x)$. Inverse functions have the following properties:

- f and f^{-1} are reflections of each other across the line $y = x$.
- For every point (a, b) on f, there is a point (b, a) on f^{-1}.
- The domain of f is the range of f^{-1}; the range of f is the domain of f^{-1}.
- Both functions must be one-to-one*.

*__One-To-One Function:__ a function that, when graphed, passes the horizontal line test.

Note that a function such as $f(x)=x^2$, which is not one-to-one, can be made one-to-one by restricting its domain. For example, $f(x)=x^2,\ x\geq 0$ is now a one-to-one function.

Steps for Finding the Inverse Function

1. Substitute x for $f(x)$, substitute y for x.
2. Solve for y.
3. Substitute $f^{-1}(x)$ for y.
4. Check for necessary domain restrictions.

EXAMPLES

Find the Inverse:

1 $f(x) = 5x + 7$

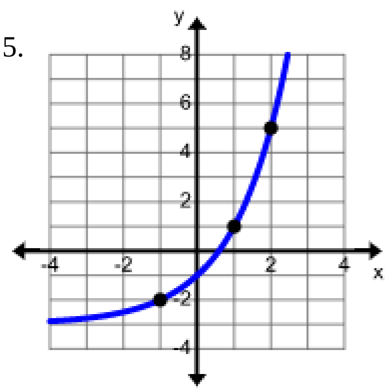
2 $f(x) = x^2 - 6x + 13\ when\ x \leq 3.$

3. $f(x) = \frac{4x+3}{3x-1}$

4.

x	$f(x)=x^3-4x+1$
-7	-314
-6	-191
-5	-104
-4	-47
-3	-14
-2	1
-1	4

5.



6. Find a domain that will make this function invertible.
$f(x) = x^2 - 4x - 1$

PRACTICE 5-1

NAME________________________________

[SHOW YOUR WORK]
[WRITE ALL ANSWERS IN SIMPLIFIED FORM]

Find the inverse of each function.

1. $f(x) = -6x + 8$

2. $f(x) = 3x - 5$

3. $f(x) = x^2 - 4x - 12, x \geq 2$

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

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

6. $f(x) = \frac{7x-6}{3x+2}$

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

8. $f(x) = (x - 2)^3 + 5$

9. $f(x) = -2\sqrt[3]{x - 5} + 7$

10. a.

x	$f(x)$
-2	0.5
-1	1.5
0	4.5
1	13.5
2	40.5

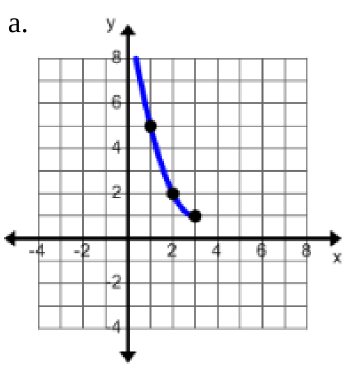
b.

x	$f(x)$
5	1
6	3
9	4
14	5
21	6

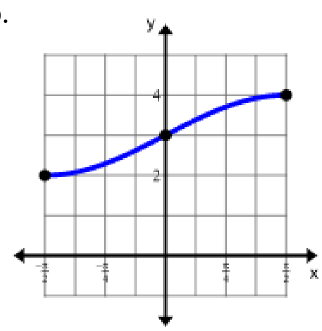
c.

x	$f(x)$
-17	1.7
-12	1.6
-9	1.5
-7	1.4
-3	1

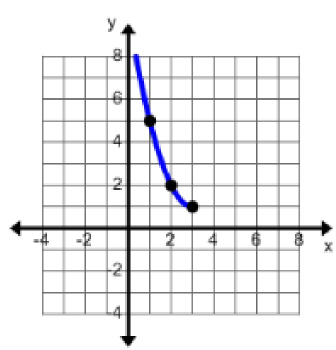
11. a.



b.



c.



For each function find a domain that will make the function invertible.

12. $f(x) = 2x^2 - 3$

13. $f(x) = (x + 5)^2 + 4$

14. $f(x) = x^2 + 12x + 32$