

# 11.1

Date: 4/24/24

Objective: I can find the inverse of a function in a table, equation or graph.

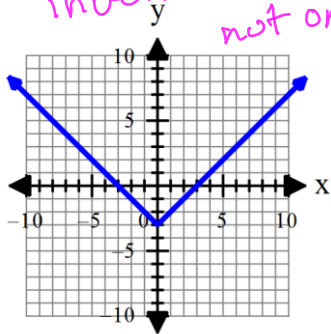
A. Function

B. One-to-one functions

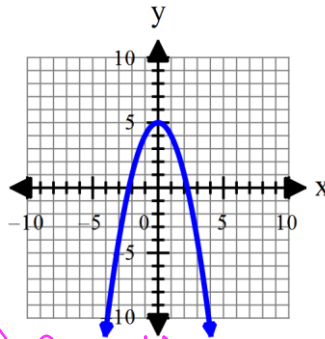
- Determine if the graphs below are:

- a) a function
- b) the inverse of the graph is a function — use horizontal line test
- c) a one-to-one function

#1 orig = function  
inverse = not function  
not one-to-one



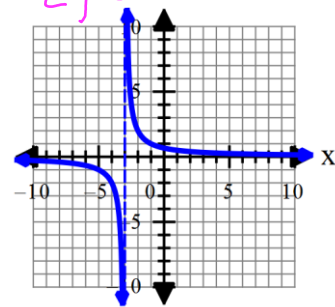
#2



a) function  
b) not function  
c) no

#3

a) function  
b) function  
c) yes



C. Graphing inverses: To find the inverse if given a table, flip - flop the x- and y-values.

Examples: Use the table of the relation to create the table of the relation's inverse.

1.

x	$f(x)$
0	1
5	2
10	-3
15	-10
20	-16

x	$f^{-1}(x)$
1	0
2	5
-3	10
-10	15
-16	20

2.

x	$f(x)$
-8	0.6
-6	0.8
-4	1
-2	1.2
0	1.4

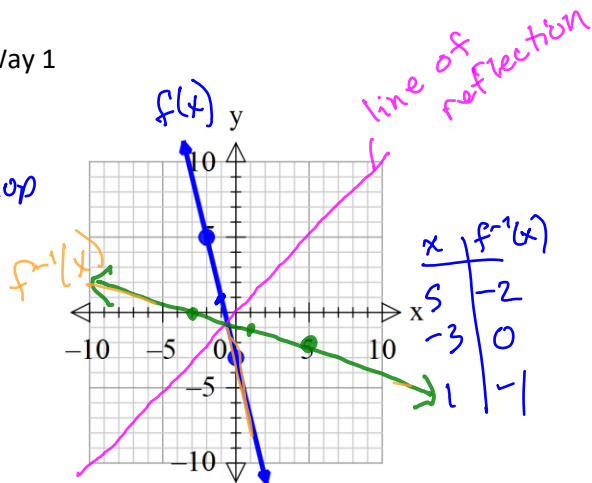
x	$f^{-1}(x)$
0.6	-8
0.8	-6
1	-4
1.2	-2
1.4	0

**Examples:** Label each given point. Then graph the inverse of the point and label it. Draw the line of reflection and label it  $y = x$ . Draw the inverse of the graph. Be sure to label the new graph  $f^{-1}(x)$ .

1. Way 1

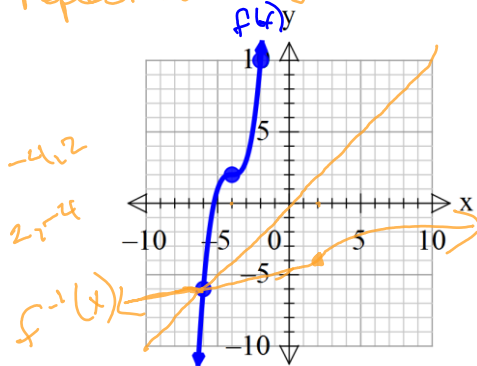
make table  
& flip-flop

$x$	$y$
-2	5
0	-3
-1	1



2. Way 2

reflect over  $y=x$



D. Finding the inverse of an equation.

**STEPS for finding the inverse of an equation:**

1. flip-flop  $x$  &  $y$
2. solve for  $y$

**Examples:** Find  $f^{-1}(x)$

<p>1. <math>f(x) = 1 - 3x</math> <math>y = 1 - 3x</math></p> $\begin{array}{r} x = 1 - 3y \\ -1 \quad -1 \\ \hline x - 1 = -3y \\ \frac{x-1}{-3} = \frac{-3y}{-3} \\ \frac{x-1}{-3} + \frac{1}{3} = \frac{x-1}{-3} = f^{-1}(x) \end{array}$	<p>2. <math>f(x) = x^3 - 1</math></p> $\begin{array}{l} x = y^3 - 1 \\ x + 1 = y^3 \\ \sqrt[3]{x+1} = f^{-1}(x) \end{array}$	<p>3. <math>f(x) = 4x^2 - 5</math></p> $\begin{array}{l} x = 4y^2 - 5 \\ x + 5 = 4y^2 \\ \frac{x+5}{4} = y^2 \\ \sqrt{\frac{x+5}{4}} = f^{-1}(x) \end{array}$
<p>4. <math>f(x) = \frac{1}{4}\sqrt{x+3}</math></p> $\begin{array}{l} x = \frac{1}{4}\sqrt{y+3} \\ (4x)^2 = \sqrt{y+3}^2 \\ 16x^2 = y+3 \\ f^{-1}(x) = 16x^2 - 3 \end{array}$	<p>5. <math>f(x) = 2\sqrt[3]{x-2} - 4</math></p>	<p>6. <math>f(x) = (2x-7)^3 + 1</math></p>
<p>7. <math>f(x) = \frac{2x+3}{5x-4}</math></p> $\begin{array}{l} x = \frac{2y+3}{5y-4} \\ 5xy - 4x = 2y+3 \\ -5xy \quad -5xy \\ \hline -4x = 2y - 5xy + 3 \\ -4x - 3 = 2y - 5xy \\ -4x - 3 = y(2 - 5x) \\ \frac{-4x-3}{2-5x} = f^{-1}(x) \end{array}$	<p>8. <math>f(x) = \frac{x-2}{4x+3}</math></p>	<p>9. <math>f(x) = \frac{2x+1}{3x+5}</math></p> $\begin{array}{l} x = \frac{2y+1}{3y+5} \\ 3xy + 5x = 2y + 1 \\ 3xy - 2y = -5x + 1 \\ y(3x-2) = -5x+1 \\ f^{-1}(x) = \frac{-5x+1}{3x-2} \text{ or } \frac{+5x-1}{-3x+2} \end{array}$

1. flip-flop  $x$  &  $y$
2. times by denom
3. put  $y$  on same side
4. move not  $y$  to same side
5. FACTOR  $y$  out
6. divide ( )