

Daily Quiz

Solve each equation.

A  $-n + 4n = -3$

B  $-6 - 3x = 2(2 - 2x) - 4x$

$-6 - 3x = 4 - 4x - 4x$

$-6 - 3x = 4 - 8x$

$+6 + 8x + 6 + 8x$

$5x = 10$

$x = 2$

Mod 1: L 1.3 Inverse of Functions

Objective: I will be able to identify what is a function, and identify if its inverse is a function.

$f(x) = \underline{\hspace{2cm}}$   
 $f^{-1}(x) = \underline{\hspace{2cm}}$

Vocabulary

Inverse relation - reverse the input x with the output y.

Inverse function - is written  $f^{-1}(x)$ . If the inverse of a function is not a function, then it is simply an inverse relation.

x	y
3	1
5	3
2	6

1 Example The mapping diagrams show a function and its inverse. Complete the diagram for the inverse of the function.

Input  $x$     Output  $y$

Function		Inverse of Function	
Domain	Range	Domain	Range
-4	-2	-2	-4
0	-3	-3	0
1	2	2	1
4	1	1	4

Is the function one-to-one or many-to-one? Explain.  
 yes, it's a function  
 b/c no #'s repeat in the domain.

Is the inverse of the function also a function? Explain.  
 yes, it's a function  
 b/c no #'s repeat in the domain.

1 Example The mapping diagrams show a function and its inverse. Complete the diagram for the inverse of the function.

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Is the function one-to-one or many-to-one? Explain.  
 Yes.

Is the inverse of the function also a function? Explain.  
 No, the inverse is NOT a function b/c the Domain has two Range values.  $2 \rightarrow 1$  and  $2 \rightarrow 4$ .

2 Example The graph of the original function in Step A is shown. Note that the graph shows the dashed line  $y = x$ . Write the inverse of the function as a set of ordered pairs and graph them.

Function:  $\{(-4, -2), (0, -3), (1, 2), (4, 1)\}$

Inverse of function:  
 $\{(-2, -4), (-3, 0), (2, 1), (1, 4)\}$

What do you observe about the graphs of the function and its inverse in relationship to the line  $y = x$ ? Why does this make sense?

3 Example

Find the inverse function  $f^{-1}(x)$  for the given function  $f(x)$ .  
 Use composition to verify that the functions are inverses.  
 Then graph the function and its inverse.

$f(x) = 2x - 2$

Change  $f(x)$  to  $y$ .

①  $y = 2x - 2$

② Switch  $x$  &  $y$ .

$x = 2y - 2$

③ Solve for  $y$ .

$x = 2y - 2$

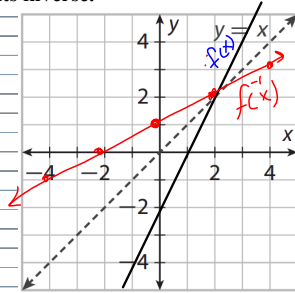
$+2 \quad +2$

$\frac{x+2}{2} = \frac{2y}{2}$

④ Replace  $y$  with  $f^{-1}(x)$

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

$\rightarrow f^{-1}(x) = \frac{1}{2}x + 1$



4 Example

Find the inverse function  $f^{-1}(x)$  for the given function  $f(x)$ .  
 Use composition to verify that the functions are inverses.  
 Then graph the function and its inverse.

$f(x) = -2x + 3$

①  $y = -2x + 3$

②  $x = -2y + 3$

$x - 3 = -2y$

$\frac{x-3}{-2} = \frac{-2y}{-2}$

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

