

NOTES ON INVERSES

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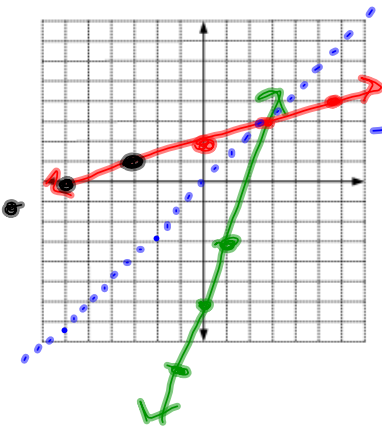
INVERSES – Two functions are inverses, if and only if, when one function contains a point (a, b) , the other function contains the point (b, a) .

Example: $f(x): \{(3, 1), (-2, 4), (5, -1)\}$ Domain of $f(x)$ $\{3, -2, 5\}$ Range of $f(x)$ $\{1, 4, -1\}$

The inverse of $f(x)$ will be $\{(1, 3), (4, -2), (-1, 5)\}$ Domain of inverse $\{1, 4, -1\}$
 Range of inverse $\{3, -2, 5\}$

****The domain of function $f(x)$ has become the Range of the inverse;
 The range of function $f(x)$ has become the Domain of the inverse.

Graphing Inverse Functions



1. Graph $y = 3x - 6$ and list four points that appear on your graph.

x	y	
-1	$3(-1) - 6 = -9$	$(-1, -9)$
0	$3(0) - 6 = -6$	$(0, -6)$
1	$3(1) - 6 = -3$	$(1, -3)$

2. Now graph $y = \frac{1}{3}x + 2$ on the same axes.

$b = 2$ $m = \frac{1}{3}$

3. Switch the x and y coordinates in your original ordered pairs and list the new ordered pairs below. Are your new points on the graph of the second equation?

$(-9, -1)$ $(-6, 0)$ $(-3, 1)$

These two equations are inverses of each other. We can call one of them $f(x)$ and the other $f^{-1}(x)$

Look again at the graphs you drew. Now sketch in the graph of the line $y = x$ on the same graph grid.

What do you notice?

Finding Inverse Functions Algebraically

To find the equation of the inverse of a function algebraically, follow these steps:

1. Swap "x" and "y"
2. Solve for "y"

Examples: Find the equation of the inverse of each of the following functions.

a. ~~f(x)~~ $f(x) = \frac{2}{3}x - 1$

$$x = \frac{2}{3}y - 1$$

$$\frac{3}{2}(x+1) = \left(\frac{2}{3}y\right)\frac{3}{2}$$

$$\boxed{\frac{3}{2}x + \frac{3}{2} = y}$$

D: \mathbb{R}

b. $g(x) = 2x^3 + 1$
 $y = 2x^3 + 1$

① $x = 2y^3 + 1$

② $x - 1 = 2y^3$

$$\sqrt[3]{\frac{x-1}{2}} = \sqrt[3]{2y^3}$$

$$\boxed{\sqrt[3]{\frac{x-1}{2}} = y} \quad D: \mathbb{R}$$