Remember that in a function, every input value corresponds to exactly one output value.

Consider the table below that represents the conversion of temperatures from degrees Fahrenheit to degrees Celsius.

Degrees Fahrenheit (Input)	−49	−22	14	122	167	212
Degrees Celsius (Output)	−45	−30	−10	50	75	100

This table defines a function since every input value corresponds to exactly one output value.

This table defines a function since every input value corresponds to exactly one output value.

Notice that every output value corresponds to exactly one input value.

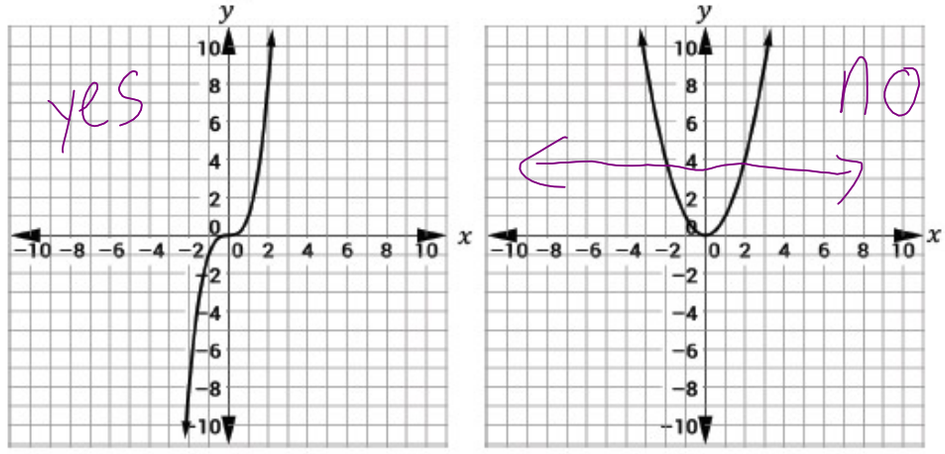
This is a special kind of function we call a(n) one-to-one function.

Are the following functions one-to-one? focus on y-values

$f: \{(-1,6), (0,5), (3,2), (7,10)\}$ yes

$g: \{(-5,4), (2,6), (3,5), (10,4)\}$ no

Are the following functions one-to-one?



We can use the vertical line test to determine if a graph represents a function. What

horizontal line test

.

We can find the inverse of a one-to-one function by switching the coordinates of the ordered pairs of the function.

Find the inverse of the following one-to-one function.

}

$f^{-1}: \{(3,-1)(4,0)(-6,2)(6,3)(-8,7)\}$

When given a function $f(x)$, we can find the inverse, $f^{-1}(x)$, by interchanging x and y and solving for y.

Find the inverse of $f(x) = 5x + 2$. (function)

(equation)

$y = 5x + 2$

$x = 5y + 2$

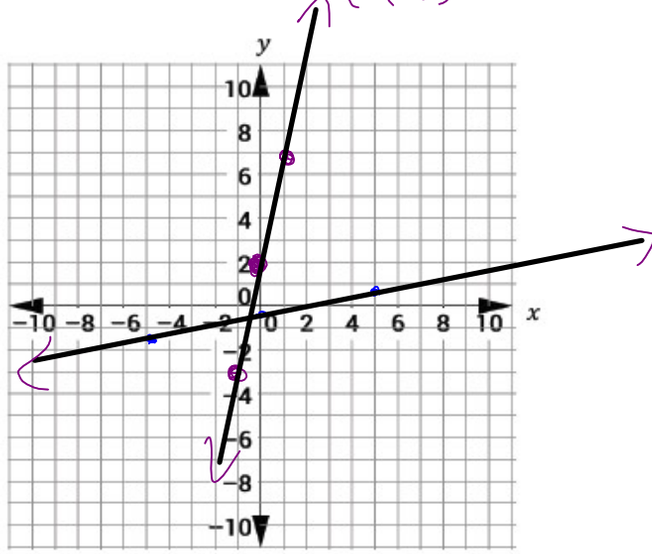
$-2 \quad -2$

$\frac{x-2}{5} = \frac{5y}{5}$

$\frac{x}{5} - \frac{2}{5} = y$

$f^{-1}(x) = \frac{x}{5} - \frac{2}{5}$

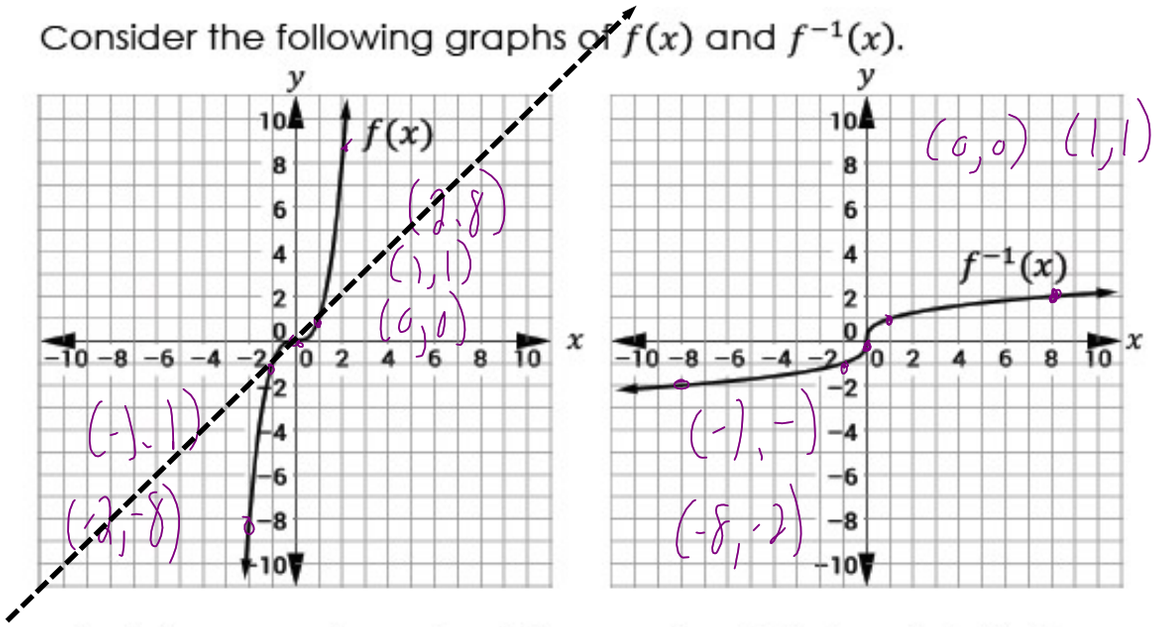
Graph the function and its inverse.



$f(x) = 5x + 2$

$f^{-1}(x) = \frac{x}{5} - \frac{2}{5}$

Consider the following graphs of $f(x)$ and $f^{-1}(x)$.

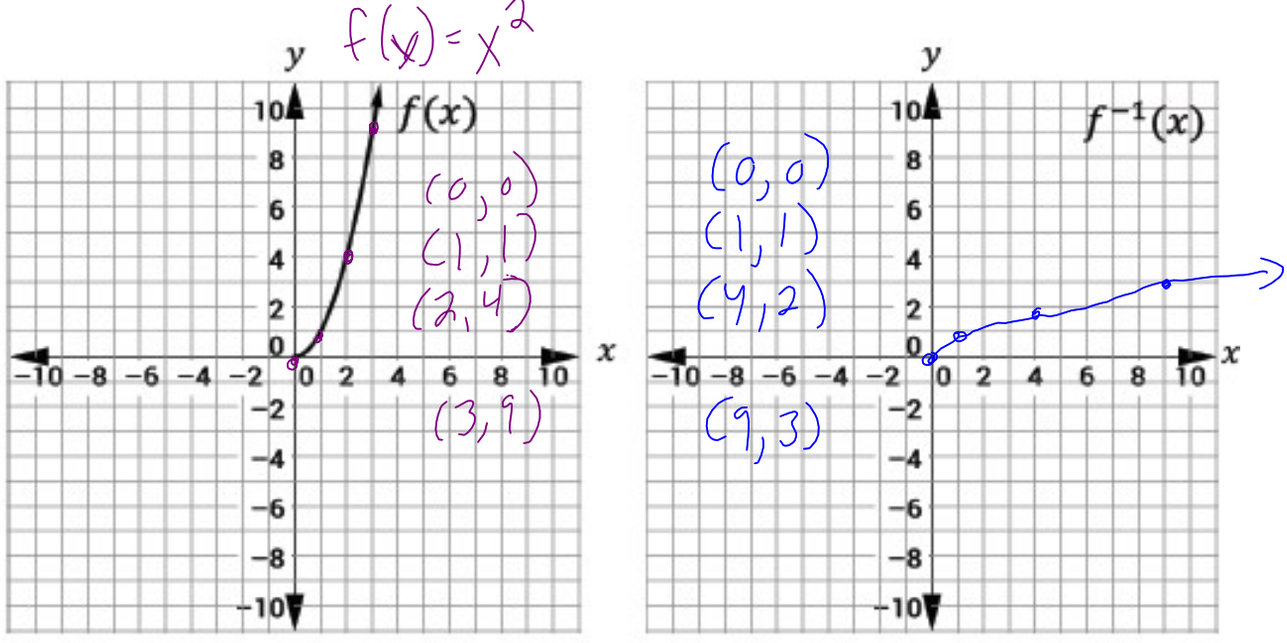


What do you notice about the graphs of $f(x)$ and $f^{-1}(x)$?

They are inverses. They are reflexive of each other

$f^{-1}(x)$ is a reflection of $f(x)$ over $f(x)=x$

Consider the following graph of $f(x)$. Graph $f^{-1}(x)$.



Try it!

1. Determine whether each function is a one-to-one function. If it is one-to-one, write the inverse function.

   a. $h: \{(11, 13), (4, 3), (3, 4), (8, 8)\}$ yes

   h^{-1} (13, 11) (3, 4) (4, 3) (8, 8)

   b. $s: \{(2, 5), (3, -1), (7, 5), (6, 2)\}$

   no

2. Find the inverse of the following functions.

a. $f(x) = \frac{x-4}{7}$

$y = \frac{x-4}{7}$ → $(7)x = \frac{y-4}{7}(7)$ $7x+4 = y$

$7x = y-4$
$+4 \quad +4$

$f^{-1}(x) = 7x+4$

b. $g(x) = \sqrt[3]{x+1}$

$y = \sqrt[3]{x+1}$

$x = \sqrt[3]{y+1}$

$x^3 = (\sqrt[3]{y+1})^3$

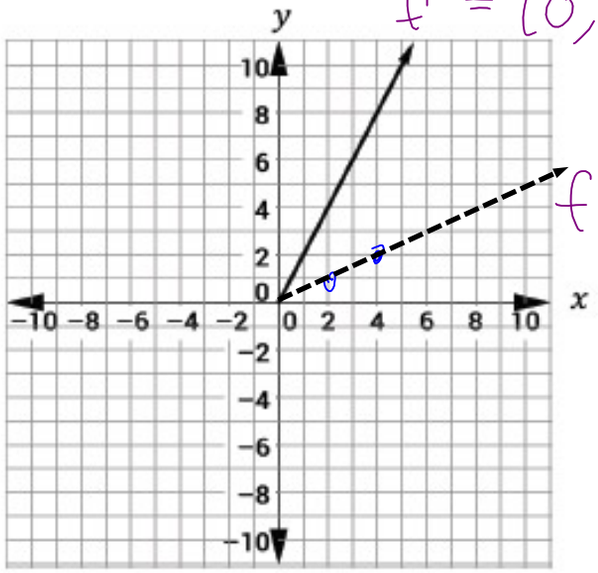
$x^3 = y+1$
$-1 \quad -1$

$x^3 - 1 = y$

$g^{-1}(x) = x^3 - 1$

3. Graph the inverse of each function on the same coordinate plane.

a.



$f = (0,0)\ (1,2)\ (2,4)$

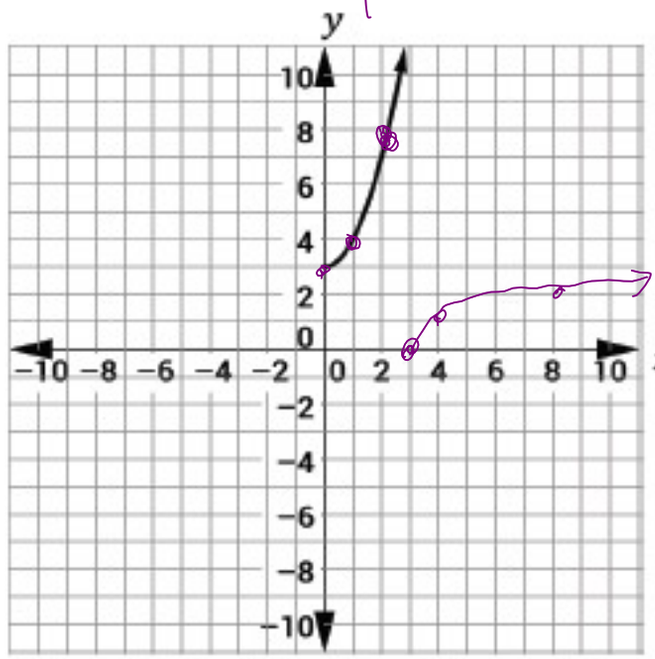
f^{-1} $(0,0)$

$(2,1)$

$(4,2)$

b.

f (0,3) (1,4) (2,8)



f^{-1}

(3,0)

(4,1)

(8,2

Assignment

Section 1 > Practice Workbook

Topic 6