

Section 5.2 Inverse Functions and Relations

I can explain what an inverse function is

I can find the inverse function to a set of ordered pairs.

I can find the inverse function when given a function $f(x)$

I can determine whether a pair of functions are inverses of each other.

Just Remember This:

Every (x, y) has a (y, x) partner

Find the inverse of each relation.

13- $\{(1, -5), (2, 6), (3, -7), (4, 8), (5, -9)\}$

$(-5, 1) (6, 2) (-7, 3) (8, 4) (-9, 5)$

How to find the Inverse of a Function:

1- stick "y" in for $f(x)$

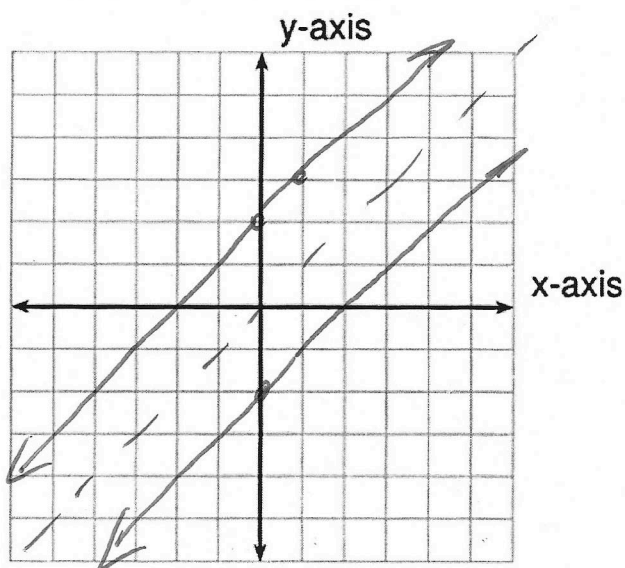
2- Switch the x and y

3- Solve for y

4- stick $f^{-1}(x)$ in for "y"
Check it!

Find the inverse of:

15. $y = x + 2$ and graph it.

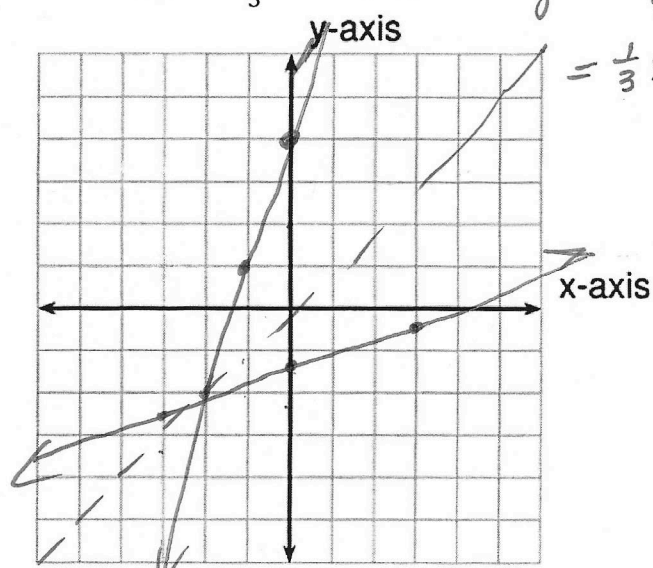


$$x = y + 2$$

$$y = x - 2$$

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

18. $h(x) = \frac{x-4}{3}$ and graph it. $y = \frac{x-4}{3}$



$$y = \frac{x-4}{3}$$

$$x = \frac{y-4}{3}$$

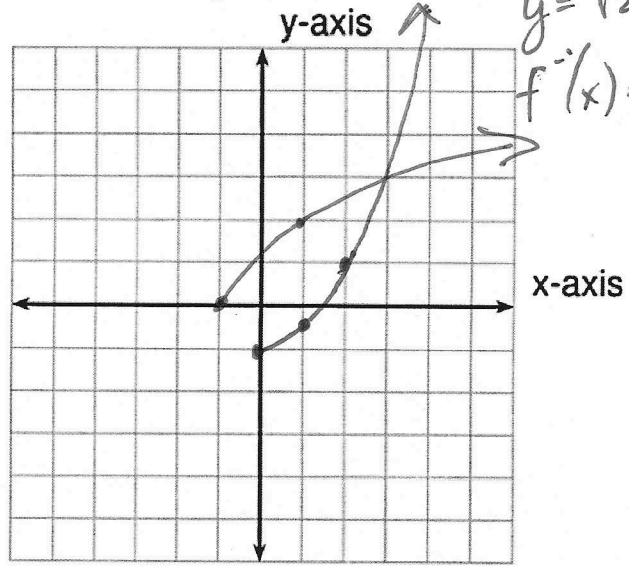
$$3x = y - 4$$

$$h^{-1}(x) = 3x + 4$$

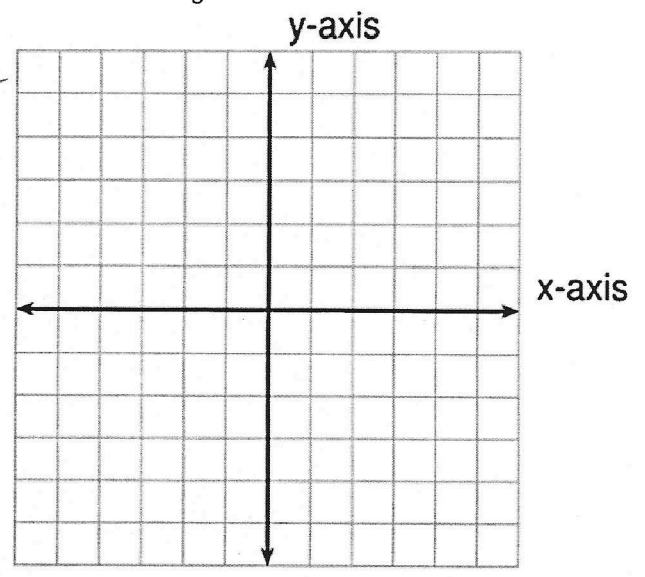
$$y = 3x + 4$$

$y = \frac{1}{2}x^2 - 1$; $x = \frac{1}{2}y^2 - 1$; $x+1 = \frac{1}{2}y^2$
 $2x+2 = y^2$

25. $f(x) = \frac{1}{2}x^2 - 1$ and graph it.



*19. $y = -\frac{5}{3}x - 8$ and graph it.



you try

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

Proving that two functions are inverses:

$f(g(x)) = g(f(x)) = x$

Are these inverse functions?

28. $f(x) = 4x + 6$ and $g(x) = \frac{x-6}{4}$

$f(g(x)) = f\left(\frac{x-6}{4}\right)$
 $= 4\left(\frac{x-6}{4}\right) + 6 =$
 $x - 6 + 6 = x$

33. $f(x) = 4x^2$ and $g(x) = \frac{1}{2}\sqrt{x}$

$f(g(x)) = f\left(\frac{1}{2}\sqrt{x}\right)$
 $= 4\left(\frac{1}{2}\sqrt{x}\right)^2 = 4 \cdot \frac{1}{4}x$
 $= x$

*29. $f(x) = -\frac{1}{3}x + 3$ and $g(x) = -3x + 9$

you try!

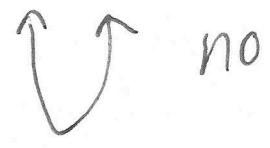
A function, $f(x)$, has an inverse function
 If $f(x)$ is one-to-one

The Horizontal line test:

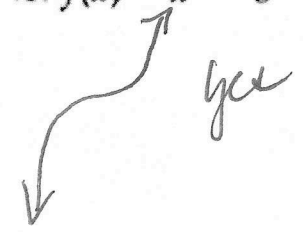
If you can draw a horizontal line so that it hits the graph in more than one spot, then it is not one-to-one

Use the horizontal line test to determine whether the inverse of each function is also a function.

42. $f(x) = 2x^2$



43. $f(x) = x^3 - 8$



you try!

44. $g(x) = x^4 - 6x^2 + 1$