Answers to Compostion of functions and ops of functions

1) -60
2) 2
3) $2a^2 - 3a + 9$
4) $n^2 - 3n - 3$
5) $-3x^3 + 14x^2 + 5x$
6) $\frac{3x+2}{3x+5}$
7) 10
8) -3
9) 21
10) 104
11) $-9t^2 + 18t - 12$
12) $2t^3 + 8t + 3$
13) $16x^2 - 44x + 24$
14) $-18n^2 + 72n - 70$

Feb 8-9:40 AM

Do now: Applying Compositions

In the mail, you receive a coupon for $5 off of a pair of jeans. When you arrive at the store, you find that all jeans are 25% off.

Let x represent the original cost of the jeans.

1. Write a function, f(x), that represents the effect of your original coupon.

2. Write a function, g(x), that represents the effect of the 25% discount at the store.

3. Write a function, h(x), that represents how much you would pay if you use the mail coupon first followed by applying the discount from the store.

4. Write a function, j(x), that represents how much you would pay if you use the store discount first, followed by the mail coupon.

Inverse Functions

What are they and what do they do?

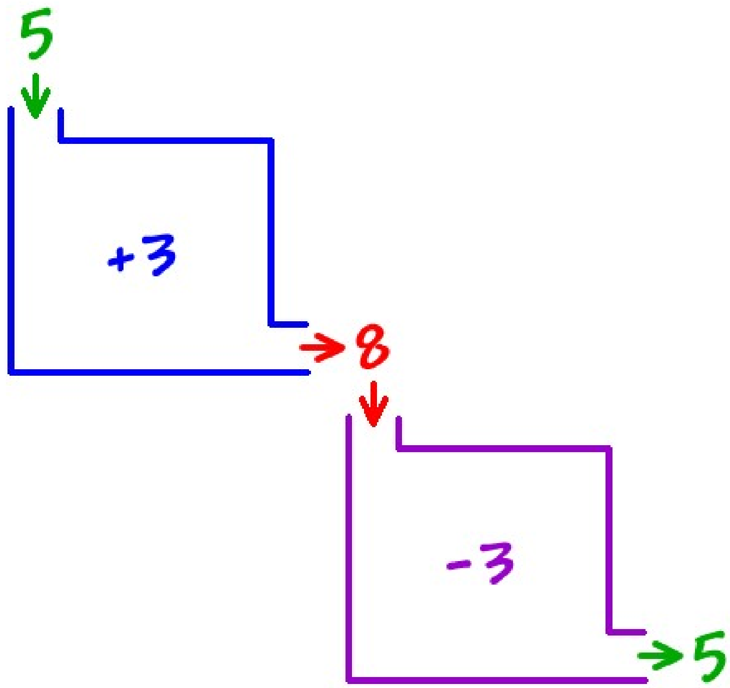
Inverse functions undo each other!

Think of a number... I'll wait.

OK, now add 3 to it... Now, subtract 3 from that. What do you get?

Feb 8-9:54 AM

Check it out:



So, these guys are inverse functions:

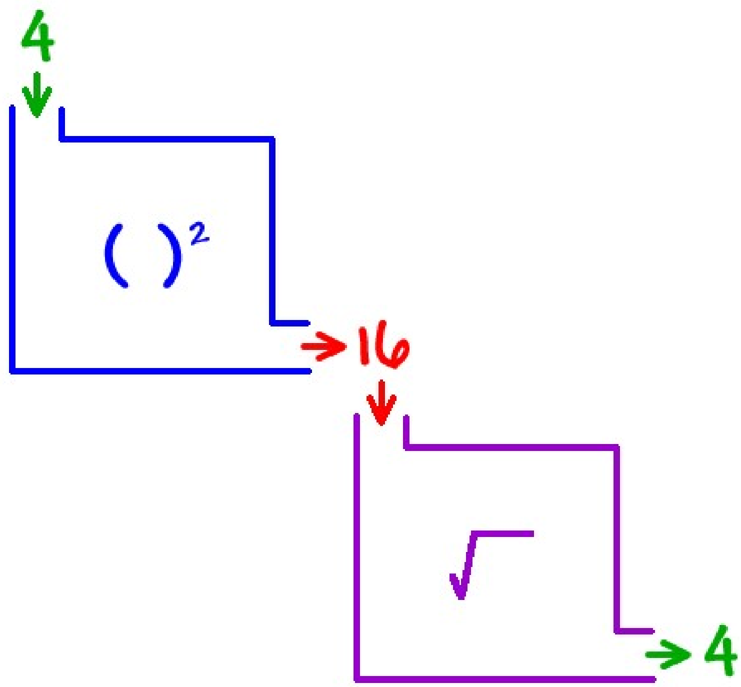
$f(x) = x + 3$ $g(x) = x - 3$

add the **3** on... takes the **3** off

Think of a number -- make it positive...

Now, square it... Then, take the square root of that. What do you get?

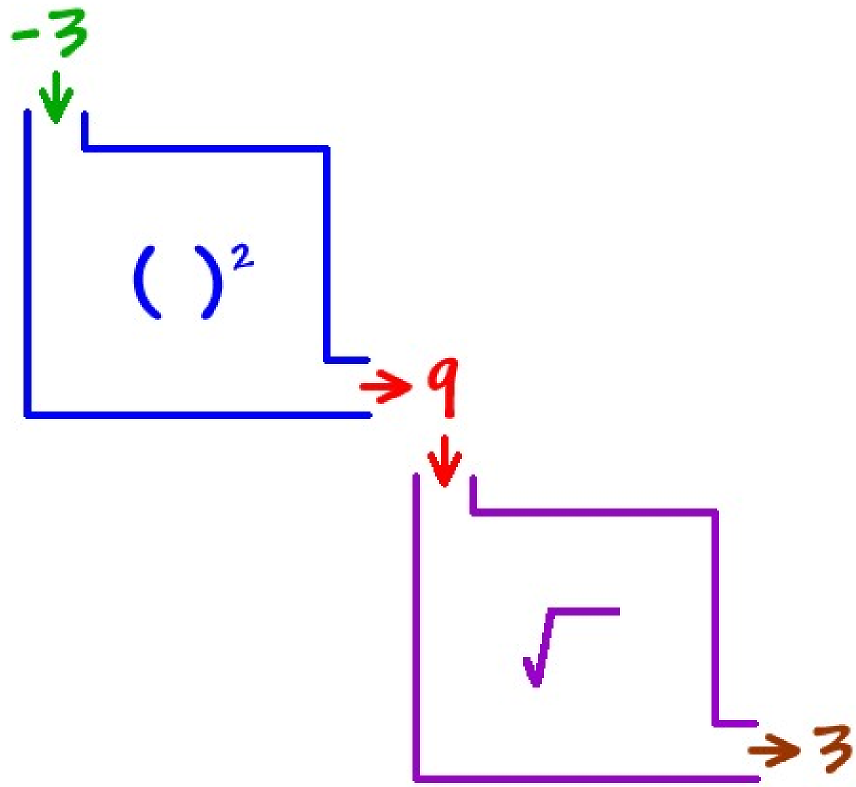
Check it out:



So, these guys are inverse functions:

$f(x) = x^2$ $g(x) = \sqrt{x}$

What if we try sticking a negative number in?



A -3 went in... but, a 3 came out! These don't work for negative numbers. So, for this one, we have to say

These are inverse functions only when $x \geq 0$:

$$f(x) = x^2 \qquad g(x) = \sqrt{x}$$

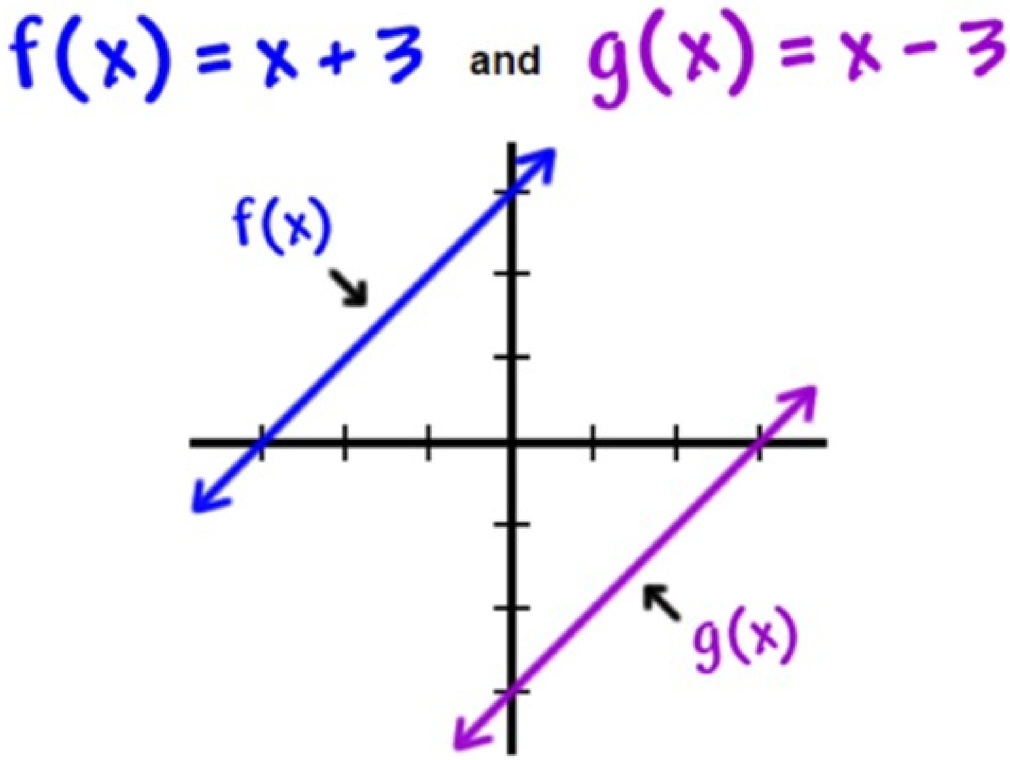
The official notation for the inverse function of a guy named $f(x)$ is

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

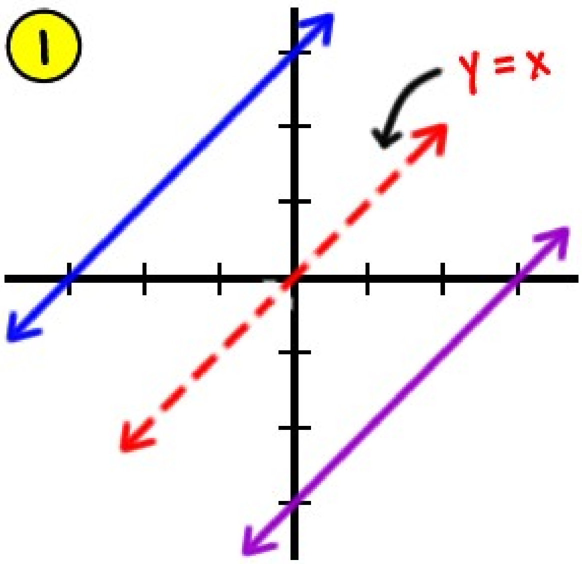
(read as "f inverse of x.")

Try the inverse lab!

Here are the graphs of two inverse functions we mentioned.



There are two big things I want you to notice:

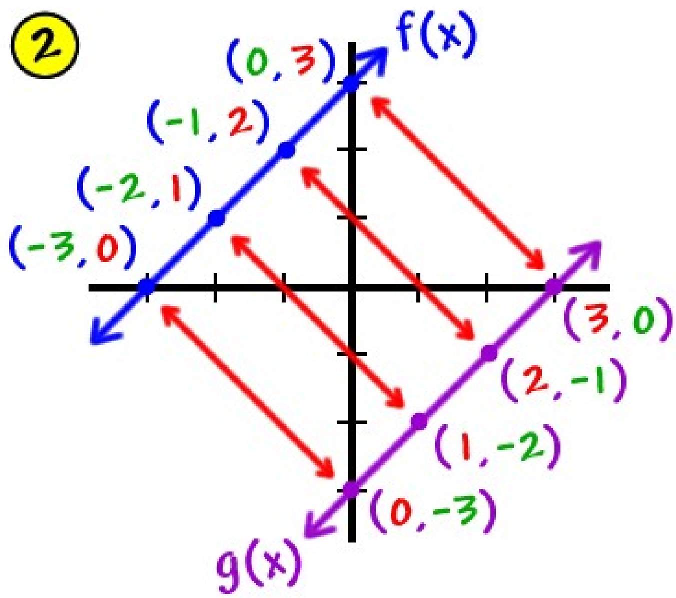


They are mirror images over the line y = x.

(In other words, they are symmetric with respect to the line y = x.)

So, just remember this:

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



Notice that every point on f(x) has a reversed partner on g(x). (0, 3) has (3, 0) as a partner and so on.

How to Find the Inverse of a Function

How to find the inverse of a function:

STEP 1: Stick a "y" in for the "f(x)."

STEP 2: Switch the x and y.

STEP 3: Solve for y.

STEP 4: Stick $f^{-1}(x)$ in for the "y."

THEN, CHECK IT!

Feb 10-9:20 AM

Find the inverse of $f(x) = -\frac{1}{3}x + 1$

STEP 1: Stick a "y" in for the "f(x)" guy:

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

STEP 2: Switch the x and y
(because every (x, y) has a (y, x) partner!):

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

STEP 3: Solve for y:

Feb 10-9:37 AM

STEP 3: Solve for y:

$x = -\frac{1}{3}y + 1$ — multiply by 3 to ditch the fraction

$3x = -y + 3$ — ditch the +3

$-3 \qquad -3$

$3x - 3 = -y$ — multiply by -1

$-3x + 3 = y \longrightarrow y = -3x + 3$

STEP 4: Stick in the inverse notation, $f^{-1}(x)$

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

Feb 10-9:30 AM

Find the inverse of $f(x) = 2x - 1$

STEP 1:

$$y = 2x - 1$$

STEP 2:

$$x = 2y - 1$$

STEP 3:

$$x = 2y - 1$$

$$\underline{+1 \qquad +1}$$

$$x + 1 = 2y$$

$$\frac{x+1}{2} = \frac{2y}{2}$$

$$\frac{1}{2}x + \frac{1}{2} = y$$

STEP 4:

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

Feb 10-9:30 AM

If $f(g(X)) = x$ and $g(f(x)) = x$

Then $f(x)$ and $g(x)$ are inverses!

Feb 10-9:41 AM

Are these inverse functions?

$f(x) = 2x - 5$ and $g(x) = \frac{1}{2}x + \frac{5}{2}$

If you're got two functions, $f(x)$ and $g(x)$, and

$$(f \circ g)(x) = (g \circ f)(x)$$

then $f(x)$ and $g(x)$ are inverse functions.

Feb 10-9:31 AM

Are these inverse functions?

$f(x) = 2x - 5$ and $g(x) = \frac{1}{2}x + \frac{5}{2}$

Feb 10-9:34 AM