Welcome to class.

-Cell phones in holder

Composition of Functions

Ways to show functions are being composed:

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

What does it mean to compose two functions?

Plug 1 function into the other

Always start with the Inside

plug into the outside

Example: **f(x) = 2x+3** and **g(x) = x²**

"x" is just a placeholder, and to avoid confusion let's just call it "input":

f(input) = 2(input)+3

g(input) = (input)²

So, let's start:

1

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

$f(g(x)) = 2(x^2)+3$

$f(g(x)) = 2x^2+3$

2

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

$g(f(x)) = (2x+3)^2$

$(2x+3)(2x+3)$

$\boxed{g(f(x)) = 4x^2+12x+9}$

Examples

f(x) = 2x + 3 g(x) = x^2 –3x

Find g(f(x)) $= (2x+3)^2 - 3(2x+3)$

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

$= 4x^2 + 6x + 6x + 9 - 6x - 9$

$\boxed{g(f(x)) = 4x^2 + 6x}$

Verifying using inverses

Two functions are inverses if

$\sqrt{x^2}$

f(g(x)) = x and g(f(x)) = x

x

Verify that f(x) and h(x) are inverses.

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

$f(h(x)) = (x-3) + 3$
$= x - 3 + 3$
$= x$ ✓

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

♡ :)