Composite Functions: When two functions are combined into one function.

SUBSTITUTION

f(g(x)) is read as "f of g of x"

f(g(x)) means

You are substituting the function **g(x)** into the function **f(x)**.

f(x) $5x + 4y = 12$ and g(x) $y = 2x - 3$

substitution turns these two functions into one composite function:

f(g(x)) → $5x + 4(2x - 3) = 12$

Given these two functions: $f(x) = 3x^2 - 7$ and $g(x) = 2x+4$

1. Find f(3)

$f(3) = 3(3)^2 - 7$

$f(3) = 3(9) - 7$

$f(3) = 27 - 7$

$f(3) = 20$

2. Find g(3)

$g(3) = 2(3) + 4$

$g(3) = 6 + 4$

$g(3) = 10$

Use these two functions: Not on the Notes sheet

$f(x) = x^2 - 5x$ $g(x) = 2x + 1$

What does f(-3) mean?

substitute -3 for x in the function f and simplify.

Find $f(-3) = (-3)^2 - 5(-3) = 9 + 15 = 24$

What does g(f(-3)) mean?

Substitute the value of f(-3) for x in the function g and simplify.

g(f(-3)) becomes $g(24) = 2(24) + 1 = 48 + 1 = 49$

Given these two functions: $f(x) = 3x^2 - 7$ and $g(x) = 2x+4$

From before we found that f(3) = 20 and g(3) = 10

a. Find f(g(3))

$g(3) = 2(3)+4$

$6+4$

$g(3) = 10$

$f(10) = 3(10)^2 - 7$

$= 3(100) - 7 = 300 - 7 = \boxed{293}$

b. find g(f(3))

$f(3) = 3(3)^2 - 7$

$f(3) = 27 - 7$

$f(3) = 20$

$g(20) = 2(20)+4$

$g(20) = 40+4$

$g(20) = 44$

Another way to write a composite is:

$$f(g(x)) \rightarrow \boxed{(f \circ g)(x)}$$

Use these two functions:

f(x) = x + 5 g(x) = 3x - 2

1. Find g(f(-1))

$f(-1) = -1+5 = 4$

$g(4) = 3(4)-2 = 12-2 = 10$

2. Find $(g \circ f)(5) = g(f(5))$

$f(5) = 5+5 = 10$

$g(10) = 3(10)-2 = 28$

Use these two functions:

f(x) = x + 5 g(x) = $3x^2$ - 2

1. Find f(6a)

$f(6a) = (6a)+5$

$= \boxed{6a+5}$

2. Find g(m + 1)

$g(m+1) = 3(m+1)^2 - 2$

$= 3(m^2+2m+1) - 2$

$= 3m^2+6m+3-2$

$= \boxed{3m^2+6m+1}$

Use these two functions:

f(x) = x + 5 g(x) = $3x^2$ - 2

1. Find f(g(x))

$= (3x^2-2)+5$

$= \boxed{3x^2+3}$

2. Find $(g \circ f)(x)$

$= 3(x+5)^2 - 2$

$= 3(x^2+10x+25) - 2$

$= 3x^2+30x+75-2$

$= \boxed{3x^2+30x+73}$

Hwk #8 is due on Monday:

Pages 400-402

Problems: 9-11, 32, 34, 39, 40, 66