Lesson 1.2: Functions and Function Notation

Standard Notation	vs.	Function Notation
$y = x + 3$ Solve for y when $x = 1$. $y = 1 + 3$ $y = 4$	$y \Leftrightarrow f(x)$ "f at x"	$f(x) = x + 3$ Find $f(1)$. $f(1) = 1 + 3$ $f(1) = 4$

Note: f is not a variable.
  $f(x)$ does not mean f times x.
  It means: What is the value of the function, f, when x equals a certain value?

Ex. For each function, determine the values indicated.

1. If $f(x) = 3x^2 - 2x + 1$, find $f(-1)$.   2. If $f(x) = -3x + 2$, find x if $f(x) = 0$.

$f(-1) = 3(-1)^2 - 2(-1) + 1$ 　　　　　$0 = -3x + 2$
　　$= 3 + 2 + 1$ 　　　　　　　　　$3x = 2$
　　$= 6$ 　　　　　　　　　　　　$x = \dfrac{2}{3}$

3. If $f(x) = x^2 - 6x$, find x if $f(x) = 16$.

$16 = x^2 - 6x$ 　　　　　M -16
$0 = x^2 - 6x - 16$ 　　　A -6
　　$= (x-8)(x+2)$ 　　N $-8, 2$
$\therefore x = 8, -2$

4. If $f(x) = 2x^2 - 3x$ and $g(x) = 3x - 4$,

a) find $3g(2)$ 　　　　　　　　b) $f(m+1)$

$g(2) = 3(2) - 4$ 　　　　　$f(m+1) = 2(m+1)^2 - 3(m+1)$
　　$= 2$ 　　　　　　　　　　$= 2(m+1)(m+1) - 3m - 3$
$3g(2) = 3 \cdot 2$ 　　　　　　$= 2(m^2 + 2m + 1) - 3m - 3$
　　$= 6$ 　　　　　　　　　　$= 2m^2 + 4m + 2 - 3m - 3$
$3g(2) = 3(3(2)-4)$ 　　　　$= 2m^2 + m - 1$

"f at f at x"
c) $f(f(x))$ $f(x) = 2x^2 - 3x$

$f(f(x)) = 2(2x^2 - 3x)^2 - 3(2x^2 - 3x)$
　　$= 2(2x^2 - 3x)(2x^2 - 3x) - 3(2x^2 - 3x)$
　　$= 2(4x^4 - 6x^3 - 6x^3 + 9x^2) - 3(2x^2 - 3x)$
　　$= 2(4x^4 - 12x^3 + 9x^2) - 3(2x^2 - 3x)$
　　$= 8x^4 - 24x^3 + 18x^2 - 6x^2 + 9x$
　　$= 8x^4 - 24x^3 + 12x^2 + 9x$

d) $g(f(x))$ $f(x) = 2x^2 - 3x$
　　　　　　　$g(x) = 3x - 4$

$g(2x^2 - 3x) = 3(2x^2 - 3x) - 4$
　　　　　　$= 6x^2 - 9x - 4$

THINK: Would f(g(x)) be the same as g(f(x))?
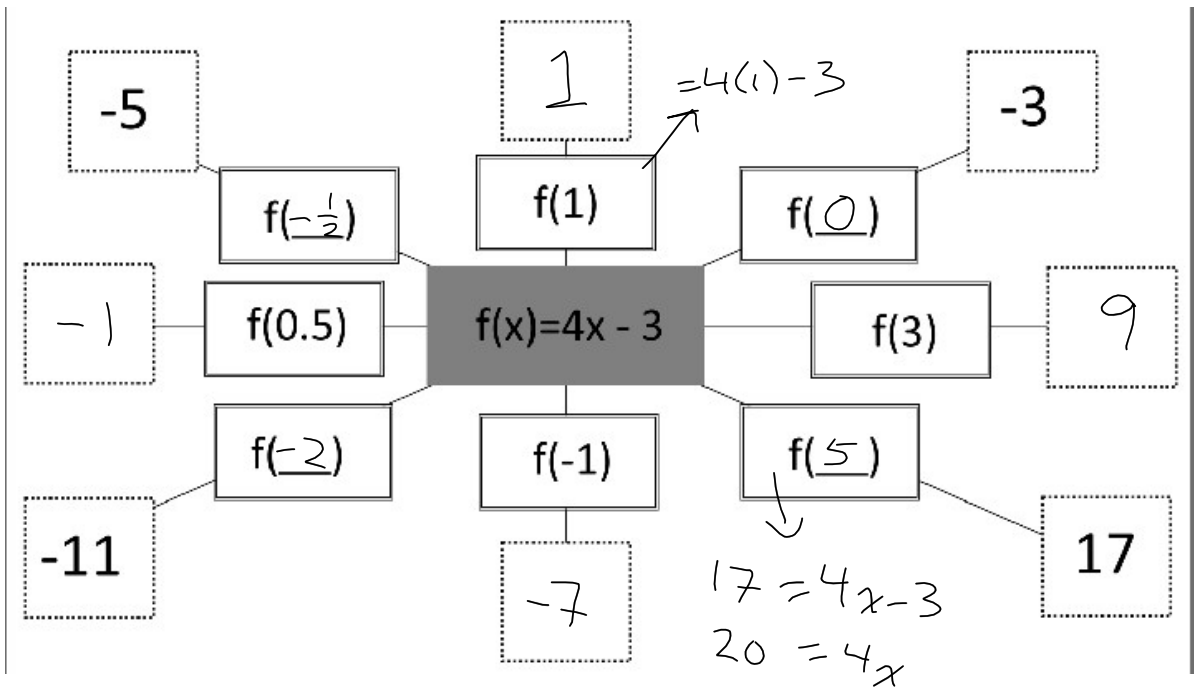
$f(g(x)) = 2(3x-4)^2 - 3(3x-4)$ 　　　$g(f(x)) = 3(2x^2 - 3x) - 4$
　　$= 2(9x^2 - 24x + 16) - 3(3x - 4)$ 　　　$= 6x^2 - 9x - 4$
　　$= 18x^2 - 48x + 32 - 9x + 12$

DIFFERENT!

-5

1

=4(1)-3

-3

f(-½)

f(1)

f(_0_)

-1

f(0.5)

f(x)=4x - 3

f(3)

9

f(-2)

f(-1)

f(_5_)

17 = 4x - 3

20 = 4x

-11

-7

17

HOMEWORK
p. 22 #C1, C2, 1ace, 3a
and Handout

The f is the generic name for the function.

The whole symbol is the output value.

$f(x)$

The x is the generic name for the input value.

This is read:
"f of x equals x-squared"

$f(x) = x^2$

f is not a variable.
This doesn't mean
f times x