Notes 4-3 Evaluating Functions and Operations on Functions

Reminder: **f(x) = y**

input ↗ ↘ output

Identify the input and the output for each:

a. f(2) = 3 i: 2 o: 3 b. f(-9)=0 i: -9 o: 0 c. f(5) = -1 i: 5 o: -1

For the examples above, what is the domain and what is the range?

D: 2, -9, 5 R: 3, 0, -1

x → i y → o

| x | y |
|---|---|
| domain | range |
| input | output |
| x | f(x) |

List x and y values in a table:

| x | y |
|---|---|
| 2 | 3 |
| -9 | 0 |
| 5 | -1 |

We can evaluate functions both algebraically and graphically.

We can *evaluate* an equation by replacing the variable with a given value and simplifying the equation.

Example: a = 2b – 7 for b = 8

$a = 2(8) - 7$

$a = 16 - 7$

$\boxed{a = 9}$

Just like we can *evaluate* an equation we can *evaluate* a function in *function notation*. We *evaluate* the function by replacing the __x__ with a given __value__ and simplifying.
variable

Example: For f(x) = -4x + 7, find each value

a. f(2) $x=2$

$-4x+7$

$-4\cdot 2+7$

$-8+7$

$\boxed{-1}$

$f(2)=-1$

b. f(-3) $x=-3$

$-4x+7$

$-4(-3)+7$

$12+7$

$\boxed{19}$

$f(-3)=19$

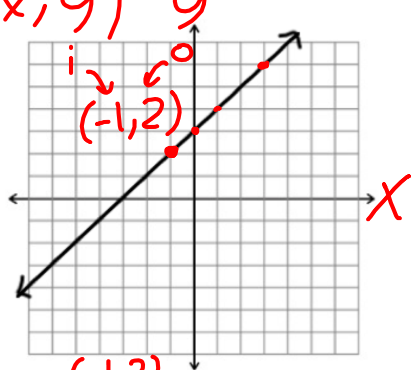
c. f(0)

$f(0)=-4(0)+7$

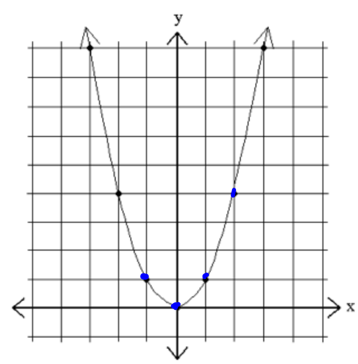
$f(0)=7$

We can evaluate functions __graphically__ by seeing what the y-value is at the given x-value

(x, y)




(-1,2)




a. f(-1) = 2 b. f(1) = 4

x

c. f(0) = 3 d. f(3) = 6

a. f(-1) = 1 b. f(0) = 0

c. f(1) = 1 d. f(2) = 4

To add two functions f and g all we need to do is add f(x) and g(x) then combine like terms. $\boxed{(f + g)(x) = f(x) + g(x)}$ *

Example: Find (f + g)(x) for the following functions

a. $f(x) = 3x - 2$, $g(x) = 4x - 4$

$f(x) + g(x)$

$3x - 2 + 4x - 4$

$3x + 4x - 2 - 4$

$\boxed{7x - 6}$

b. $f(x) = 2x^2 + 3x$, $g(x) = 4x^2$ find $(f+g)(x)$

$f(x) + g(x)$

$2x^2 + 3x + 4x^2$

$2x^2 + 4x^2 + 3x$

$\boxed{6x^2 + 3x}$

To subtract two functions f and g all we need to do is subtract f(x) and g(x) combine like terms. $\boxed{(f - g)(x) = f(x) - g(x)}$ *

**Remember to use parentheses when we subtract so we remember to distribute the negative.**

Example: Find (f - g)(x) for the following functions

a. $f(x) = 3x - 2$, $g(x) = 4x - 4$

$f(x) - g(x)$

$(3x - 2) - (4x - 4)$

$3x - 4x - 2 + 4$

$\boxed{-x + 2}$

b. $f(x) = 2x^2 + 3x$, $g(x) = 4x^2$ find $(f - g)(x)$

$f(x) - g(x)$

$(2x^2 + 3x) - (4x^2)$

$2x^2 - 4x^2 + 3x$

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

To evaluate expressions in the form (f + g)(a), first rewrite as f(a) + g(a). Once in this form, evaluate each piece, then perform the operation.

← value

seperately

Let f(x) = 3x – 5, g(x) = x + 3. Evaluate each of the following:

1. (f + g)(2) = $f(2) + g(2)$
$1 + 5 = \boxed{6}$

$f(2) = 3x-5$
$= 3\cdot 2-5$
$= 6-5 = \boxed{1}$
$g(2) = x+3$
$= 2+3 = \boxed{5}$

2. (f – g)(0) = $f(0) - g(0)$
$-5 - 3 = \boxed{-8}$

$f(0) = 3x-5$
$= 3\cdot 0-5$
$= \boxed{-5}$
$g(0) = x+3$
$= 0+3 = 3$

3. f(1) + f(-2) =
$-2 + -11 = \boxed{-13}$

$f(1) = 3x-5$
$3\cdot 1-5$
$3-5 = -2$

$f(-2) = 3x-5$
$= 3(-2)-5$
$-6-5 = -11$

4. f(3) – g(-5) =
$4 - -2$
$\boxed{6}$

$f(3) = 3x-5$
$3\cdot 3-5$
$9-5 = 4$

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