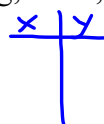
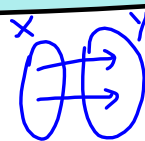


Lesson 2: Functions & Function Notation

- Relation**

- Mapping between a domain and a range
- Can be represented as: list of ordered pairs, mapping, table, graph, equation.

$\{(,) (,)\}$



- Function**

- A relation where each element in the domain maps to a single element in the range
- Given any x value there is only one y value associated with it

- Vertical Line Test (VLT)**

- Used to test if a graph represents a function
- If a vertical line through any portion of the graph touches the graph more than once, the graph does not represent a function

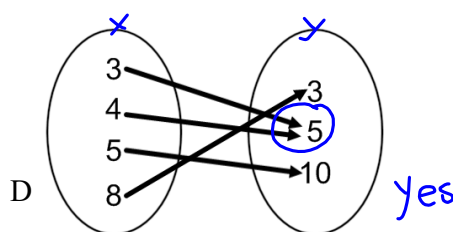
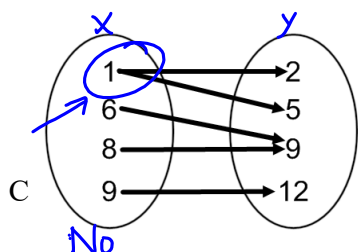
Jan 31-9:35 PM

Example: Classify each relation as a function or a non-function.

A $\{(1,2), (3,4), (4,5)\}$ *Yes*

B $\{(1,2), (1,4), (4,5)\}$ *No*

(x, y)



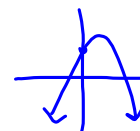
E $x^2 + y^2 = 36$

No, because it's a circle

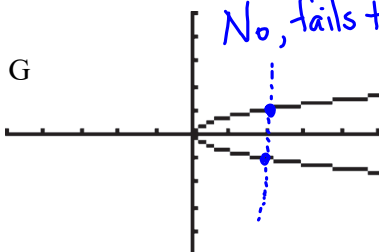
No, fails the VLT

F $y = -3x^2 + 1$

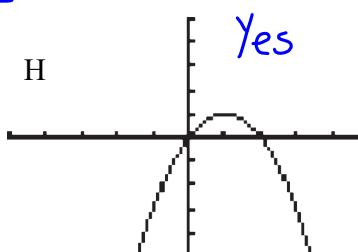
yes, because it's a parabola



G



H



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- **Function Notation**

Functions can be described using function notation. The linear equation $y = -3x + 6$ is a function.

In function notation: $f(x) = -3x + 6$.

output read "f of x" or "f at x"

x is the input of the function

$f(x)$ is the output of the function (**it does not mean f times x**)

f is the name of the function

Example: Let $f(x) = -3x + 6$. Determine the following:

a) $f(0)$ ^{means $x=0$}

$$f(0) = -3(0) + 6$$

$$f(0) = 6$$

b) $f(-4)$

$$f(-4) = -3(-4) + 6$$

$$f(-4) = 12 + 6$$

$$f(-4) = 18$$

c) $f(a-1)$

$$f(a-1) = -3(a-1) + 6$$

$$= -3a + 3 + 6$$

$$f(a-1) = -3a + 9$$

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d) $f(2) - f(1)$

$$\begin{aligned} f(2) &= -3(2) + 6 \\ f(2) &= 0 \end{aligned} \quad \begin{aligned} f(1) &= -3(1) + 6 \\ f(1) &= 3 \end{aligned}$$

$$f(2) - f(1) = 0 - 3$$

$$f(2) - f(1) = -3$$

e) $3f(5)$

$$3f(5) = 3(-3(5) + 6)$$

$$3f(5) = 3(-15 + 6)$$

$$3f(5) = 3(-9)$$

$$3f(5) = -27$$

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Example: Let $g(x) = -2x^2 + 2x - 6$. Determine the following

a) $g(2)$

$$g(2) = -2(2)^2 + 2(2) - 6$$

$$g(2) = -2(4) + 4 - 6$$

$$g(2) = -8 + 4 - 6$$

$$\boxed{g(2) = -10}$$

b) $g(2) + g(-1)$

$$g(-1) = -2(-1)^2 + 2(-1) - 6$$

$$g(-1) = -2(1) - 2 - 6$$

$$g(-1) = -2 - 2 - 6$$

$$g(-1) = -10$$

$$g(2) + g(-1) = -10 + (-10)$$

$$\boxed{g(2) + g(-1) = -20}$$

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c) $g(a+5)$

$$g(a+5) = -2(a+5)^2 + 2(a+5) - 6$$

$$= -2(a+5)(a+5) + 2a + 10 - 6$$

$$= -2(a^2 + 5a + 5a + 25) + 2a + 4$$

$$= -2(a^2 + 10a + 25) + 2a + 4$$

$$= -2a^2 - 20a - 50 + 2a + 4$$

$$\boxed{g(a+5) = -2a^2 - 18a - 46}$$

Example: Using the table of values provided, determine the following:

a) $h(20) = 0$



means $x=20$,
so what is
 y ?

b) $h(-1) = \text{undefined}$

c) $h(8) = 4$

x	$h(x)$
-5	8
-3	2
0	-1
2	9
8	4
9	4
20	0

d) value(s) for x such that $h(x) = 9$

or $\boxed{x=2}$
 $\boxed{h(2)=9}$

means $y=9$, so
figure out x

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Example: Let $f(x) = x^2 + 5x - 14$. Determine value(s) for x such that $f(x) = -20$

$$-20 = x^2 + 5x - 14 \quad \downarrow +20$$

$$y = -20$$

$$0 = x^2 + 5x + 6$$

1. factor it
2. quadratic
formula

$$0 = (x+2)(x+3)$$

$$\downarrow$$

$$\boxed{x = -2}$$

$$\downarrow$$

$$\boxed{x = -3}$$

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Work on the "Identify Functions" handout

Homework for U1L2:

p. 22 # 1 adf, 2. 5ac, 7ac, 10, 11bd,
12, 15c, 16 b, 17

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