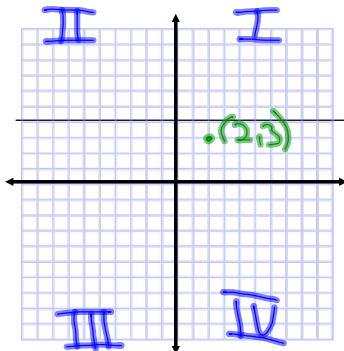


**2-1 Relations and Functions**

**Objective:** Analyze and Graph Relations  
Find Functional Values

**Cartesian Coordinate Plane**



Plot (2,3). (2, 3) is called an ordered pair.  
A **relation** is a set of ordered pairs.

Domain	Range
x	y
2	3
4	5
6	7

$\{(2,3), (4,5), (6,7)\}$

**Mapping:** Shows how each domain is paired with range.

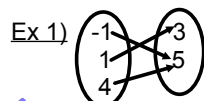


The "x" values cannot repeat  
The "y" values and the "y" values cannot repeat.

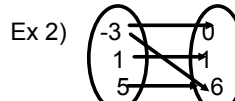
**Function:** A special type of relation in which each element of the domain is paired with exactly one element of the range.

**One-to-One:** This means that each domain is paired with exactly one range AND each range is paired exactly with one domain.

**List the ordered pairs. State whether each is a function and if it is one-to-one.**

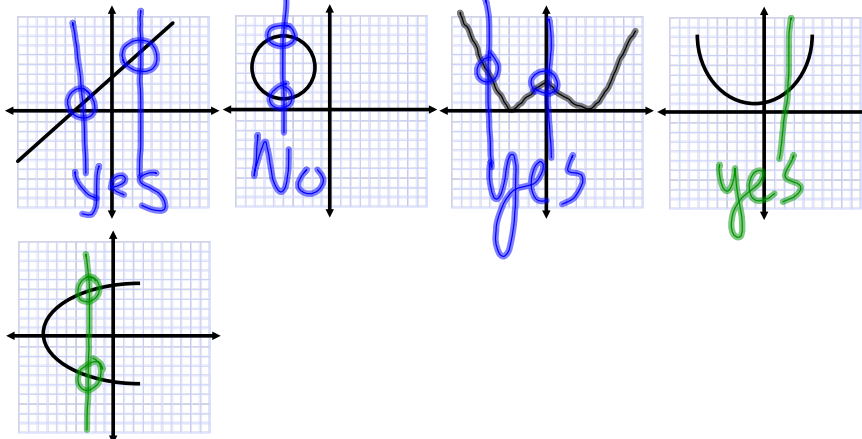


$\{(-1,3), (1,5), (4,5)\}$   
Function: **yes**  
One-to-One: **No** ("5" appears twice)



$\{(-3,0), (1,1), (5,6)\}$   
Function: **No** ("1" repeats)  
One-to-One: **No**

**Vertical Line Test:** Determines whether a graph/relation is a function. If a vertical line intersects the graph/relation in more than one spot, then the graph/relation is not a function.



Ex 3) Graph  $y = 3x - 1$ .

$y = mx + b$   
 $\uparrow$  slope  $\uparrow$  y-int  
 $m = 3$   $\uparrow +$   
 $b = -1$   $\downarrow -$

Domain: All Reals  $(-\infty, \infty)$   
 Range: All Reals  $(-\infty, \infty)$   
 Function: yes

$x$	$y$
0	-1
1	2

$m = \frac{\uparrow \downarrow}{\rightarrow \leftarrow}$

**Independent versus Dependent Variables**. What can you tell me about them??

"x" Domain  $\rightarrow$  "y" Range

Ex 4)  $f(x) = x^3 - 3$  and  $g(x) = .3x^2 - 3x - 2.7$

Find:  $f(-2) = (-2)^3 - 3$   
 $y = -8 - 3$   
 $y = -11$   
 $(-2, -11)$

$g(1.6) = .3(1.6)^2 - 3(1.6) - 2.7$   
 $= -6.732$   
 $(1.6, -6.732)$

$f(2t) = (2t)^3 - 3$   
 $= 8t^3 - 3$   
 $(2t, 8t^3 - 3)$

$\sqrt{0} = 0$

Ex 5)  $y = \sqrt{x}$

(x) Domain:  $x \geq 0$   
 (y) Range:  $y \geq 0$