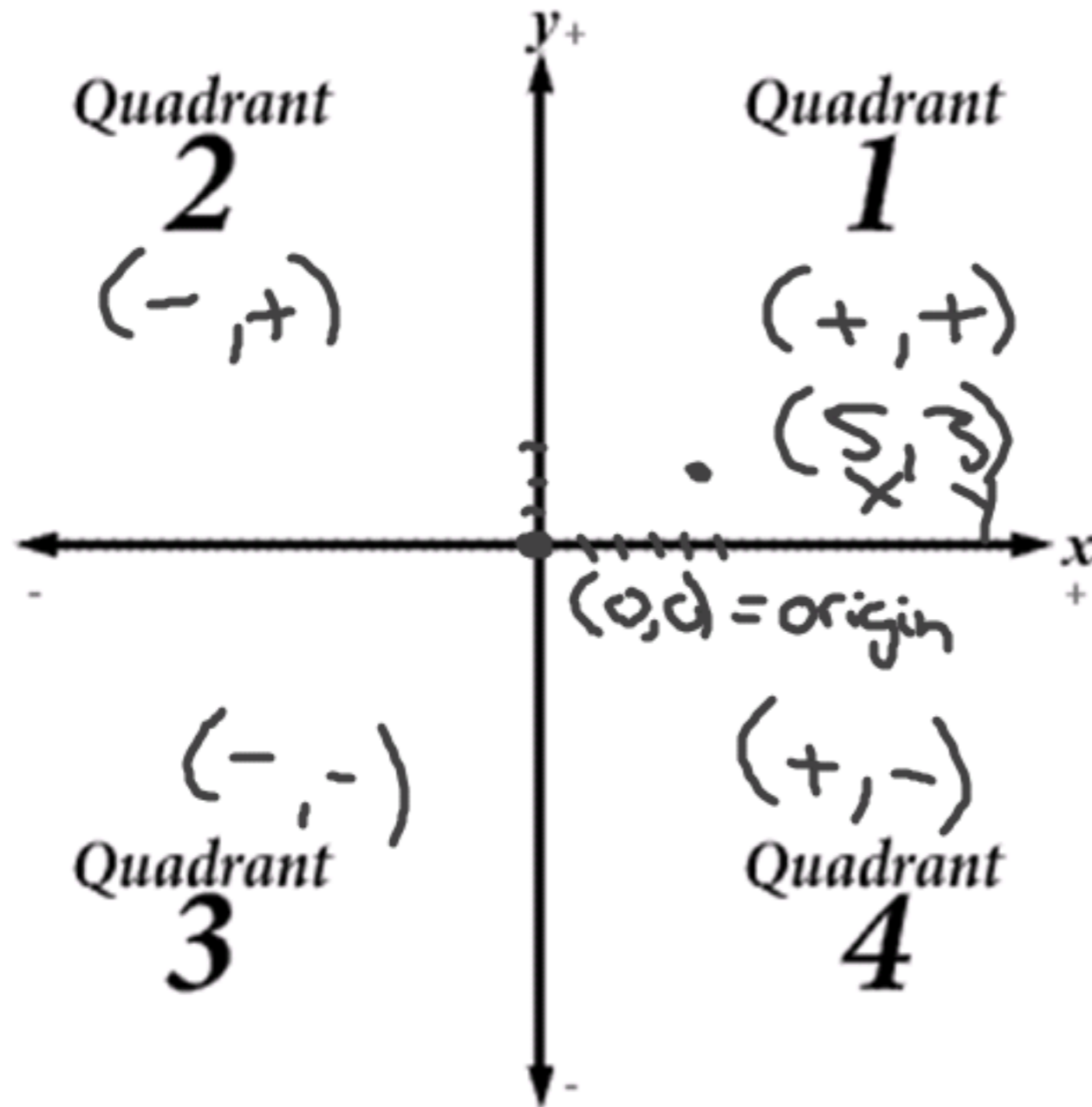


CARTESIAN PLANE:

- x-axis goes horizontally (left to right)
- y-axis goes vertically (down to up)
- Any point can be plotted on the plane using an ORDERED PAIR
- The point where the two axes meet at (0,0) is called the origin.



Ordered Pair:

The location of any point on a Cartesian plane can be given with an ordered pair. The first number tells you where the point lies in the horizontal direction and the second number tells you where it lies in the vertical direction.

x always goes first. y always goes after

(x, y)

$(5, -2)$

RELATION:

A relation is a set of ordered pairs that tells you what y each x is assigned to.
For example:

$$\{(-4,8), (1,3), (3,-2), (5,7), (6,9)\}$$

Domain:

x 's that ^{are} used
 $\{-4, 1, 3, 5, 6\}$

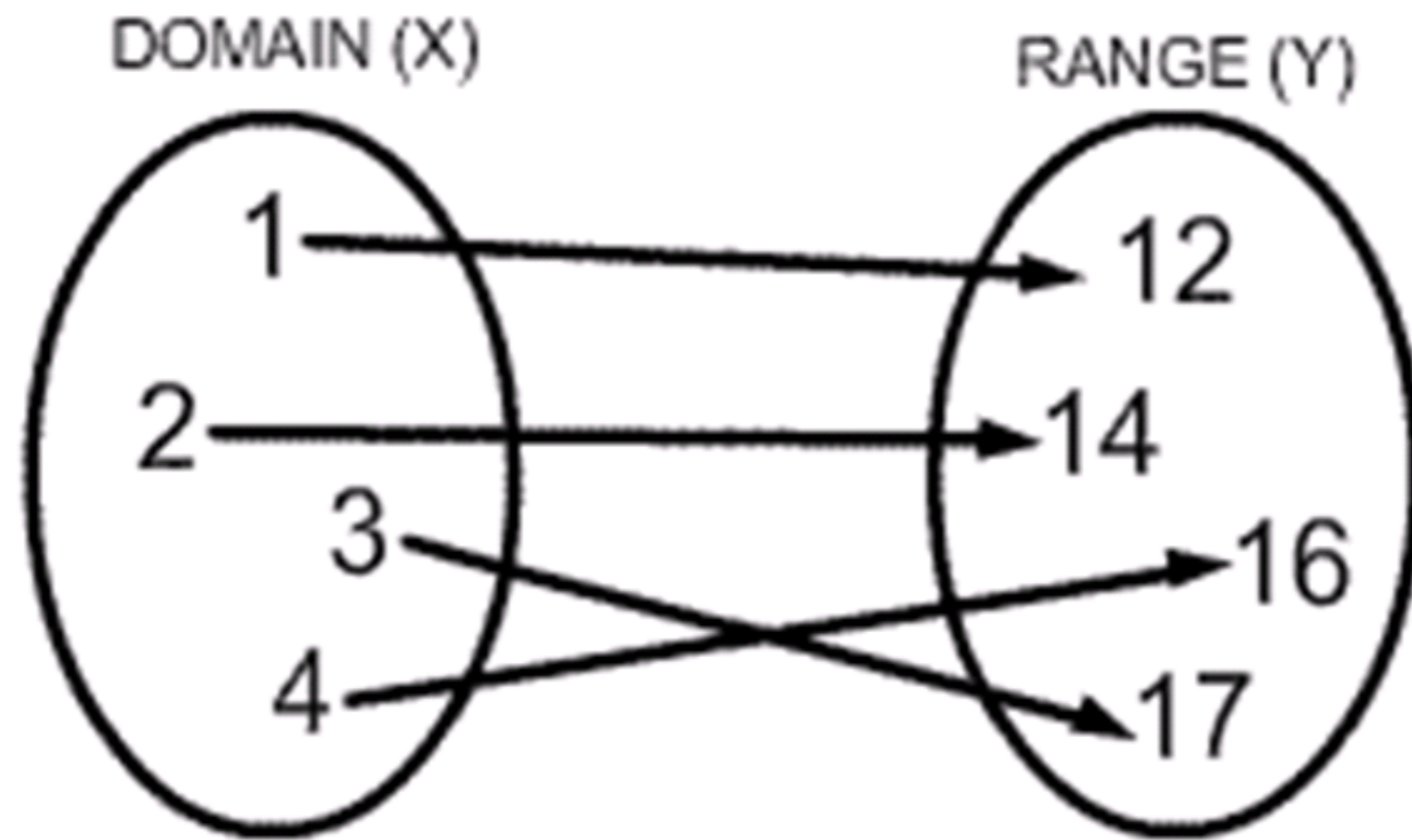
Range:

y 's that are used
 $\{8, 3, -2, 7, 9\}$

: TABLE

X	Y
1	4
-2	.2
.4	12
5	8

Relation = $\{(1, 4), (-2, .2), (.4, 12), (5, 8)\}$



Relation = $\{(1, 12), (2, 14), (3, 17), (4, 16)\}$

FUNCTIONS (THIS IS IMPORTANT!)

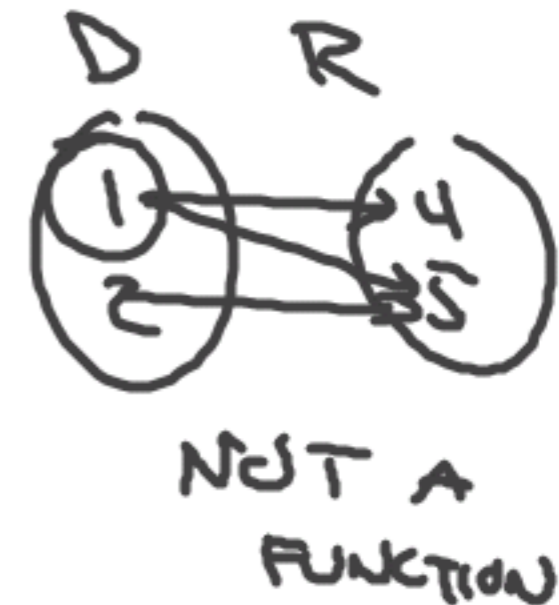
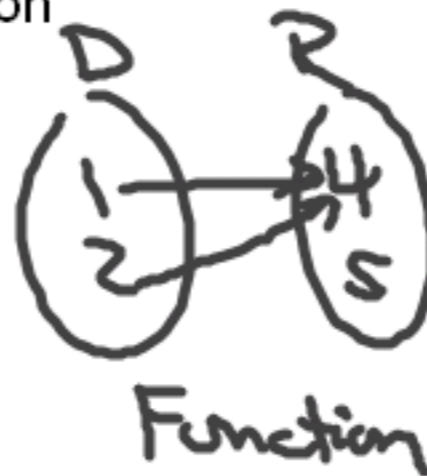
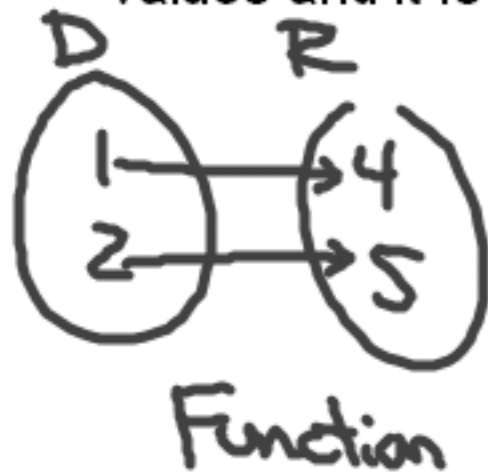
A function is a special type of relation that obeys one simple rule:

A function assigns every element (number) in the domain to EXACTLY ONE element (number) in the range.

In other words, every x is paired up with only one y .

If a relation assigns the same x to more than one y then it can't be called a "function".

The same y can be assigned to many different x values and it is still a function



Determining whether a relation is a function:

Relation Form: if any x-coordinate is used more than once then it's not a function

Table Form: if any value in the x column is used more than once it's not a function

Mapping Form: if any number in the domain has two or more arrows going from it, then it is not a function

Graphs of Functions: if a vertical line placed anywhere on the graph can cross the graph more than once, it is not a function. This is called the "VERTICAL LINE TEST".

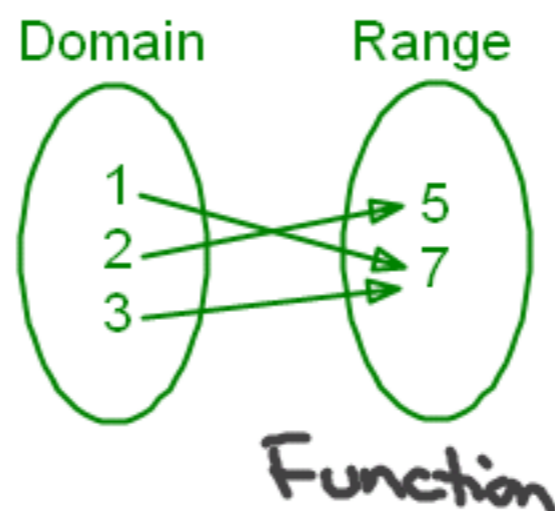
Are the following functions?

$\{(1,5), (2,3), (6,5), (12,-2), (15,8)\}$ **Function**

$\{(\underline{6},2), (-2,12), (10,5), (12,-2), (\underline{6},8)\}$ **Not a Function**

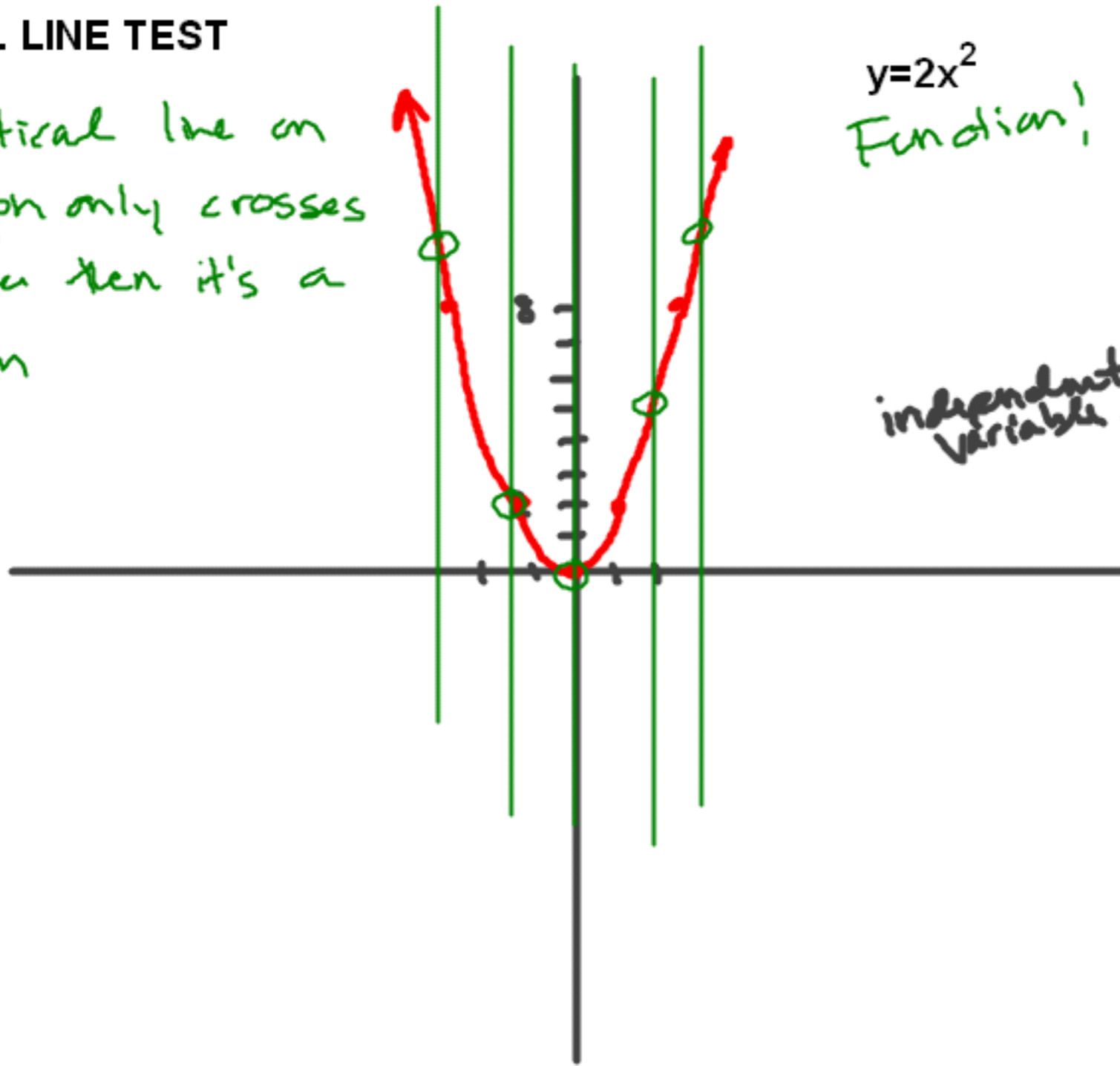
x	y
1	4
→ 2	.5
3	7
5	8
→ 2	1

NOT A FUNCTION



VERTICAL LINE TEST

Any vertical line on the graph only crosses one time then it's a function



$$y = 2x^2$$

Function!

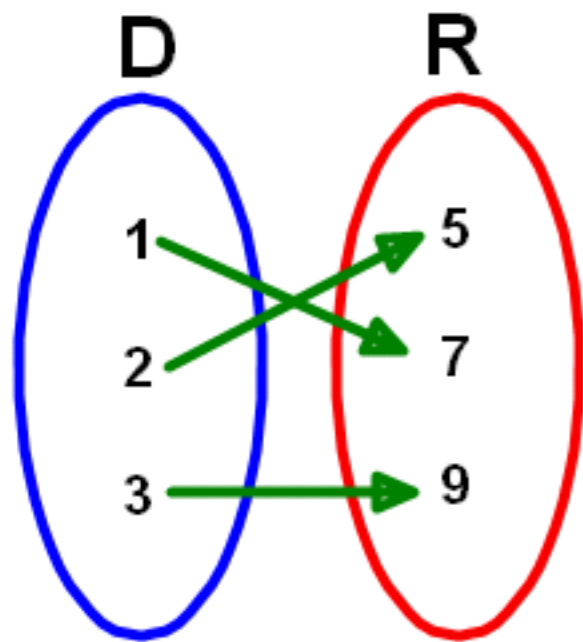
independent variable \rightarrow X

- make a table
- pick 5 x's
- find their y's
- plot the points
- connect the dots
- Vertical Line Test

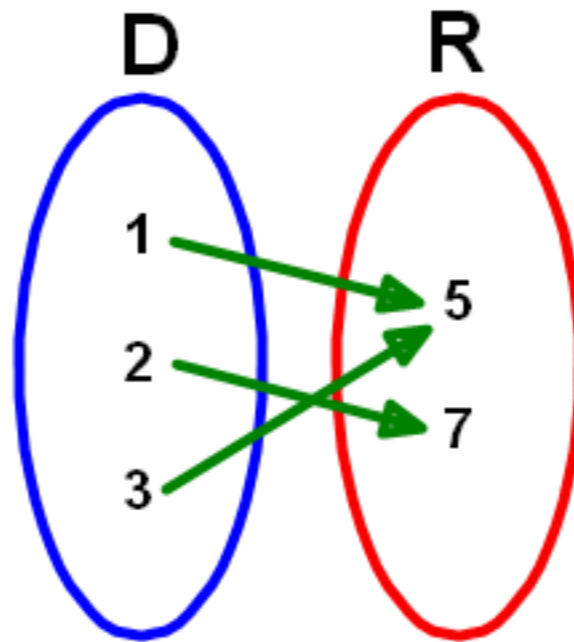
X	Y dependent variable
-2	$2(-2)^2 = 8$
-1	$2(-1)^2 = 2$
0	$2(0)^2 = 0$
1	$2(1)^2 = 2$
2	$2(2)^2 = 8$

One to one functions:

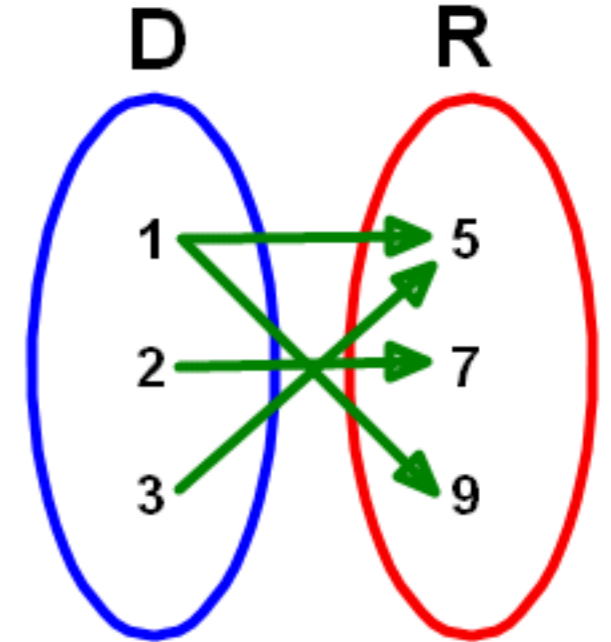
Every x in the domain is only used once and every y in the range is only used once



one to one
function



Function but
not one to one



Not a function.

FUNCTION NOTATION

Equations that represent functions (pass the vertical line test) can be written in function notation:

Equation Form

$$y = 2x + 5$$

Function Notation

$$f(x) = 2x + 5$$

- $f(x)$ replaces the y to tell you that it is a function.
- f is the name of the function, it is **not** a variable multiplying with x . It can be named any letter but f is most common.
- $f(x)$ is pronounced "f of x"

$f(3)$ is asking you to find the y when your x is 3:

$$f(x) = 2x + 5$$

$$f(3) = 2(3) + 5 = 11$$

$$f(3) = 11$$

Homework:
60:18-50 Evens

