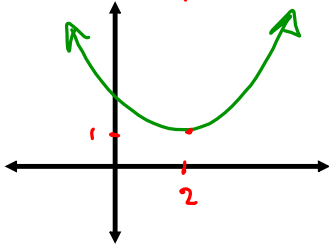


Meet the function...

* ways to represent a function

→ graph



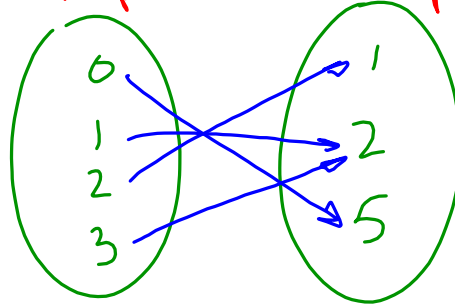
→ equation

$$y = (x - 2)^2 + 1$$

→ T O V

x	y
0	5
1	2
2	1
3	2

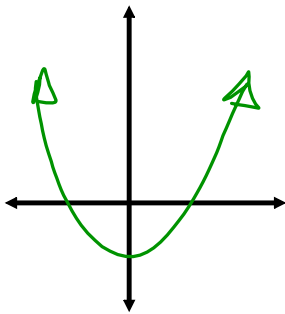
→ mapping
input output



Functions

What is a function? \rightarrow a rule to turn inputs (x) into outputs (y)

Graphically



Numerically

\rightarrow TOU
 \rightarrow map

Algebraically

\rightarrow symbolically

$y = 2x + 8$
 \hookrightarrow linear

$y = 5x^2 + 3x - 1$
 \hookrightarrow quadratic

$y = \frac{1}{x+2}$ $x \neq -2$

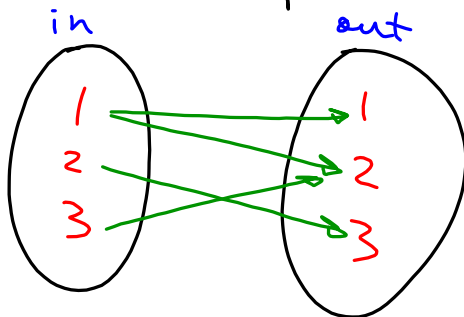
\therefore vertical asymptote @

$x = -2$

and H.A @ $y = 0$

Is every relation a function?

NO, a function must have only one output (y) for each input (x) value.

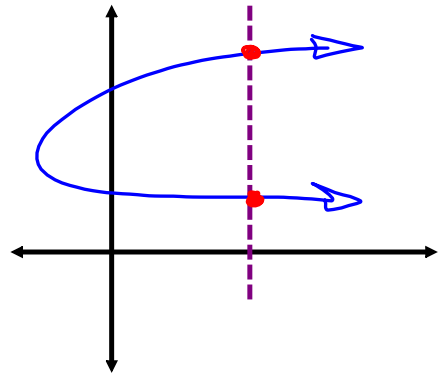


Not a function!

How can we test if a relation is a function?

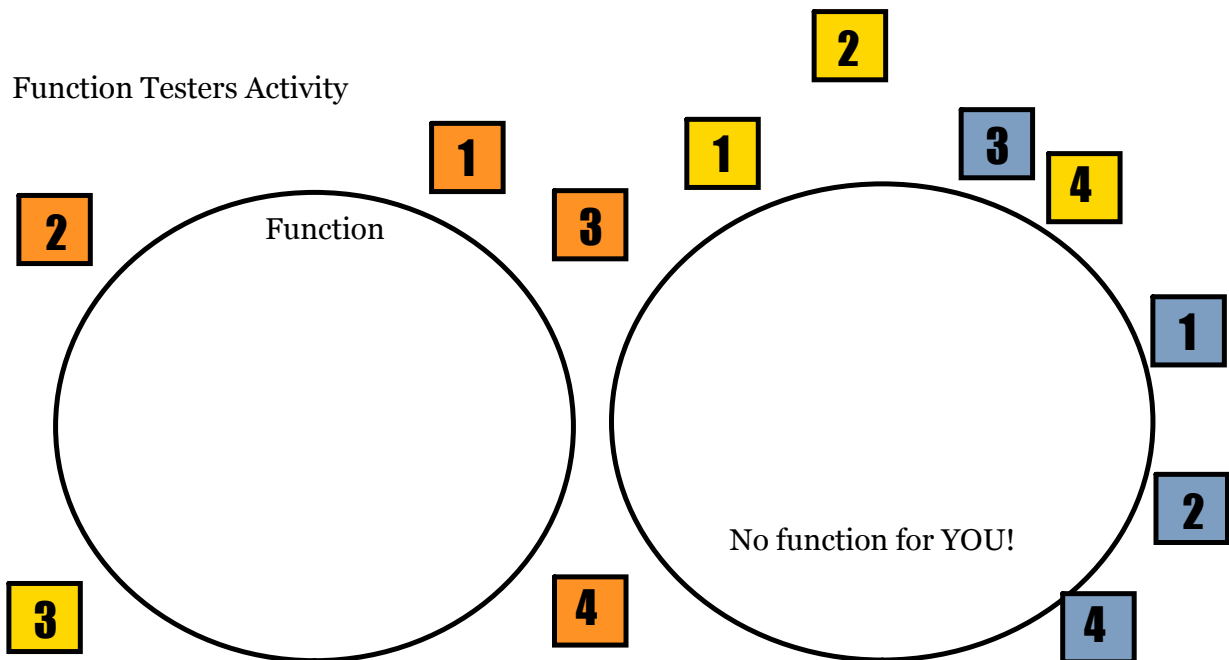
The vertical line test (VLT)

If a vertical line touches the relation more than once, (anywhere!!!) it is not a function



* with a tool or mapping, look for an x with 2 or more y values associated with it.

Function Testers Activity



Domain and Range

→ allowable y-values

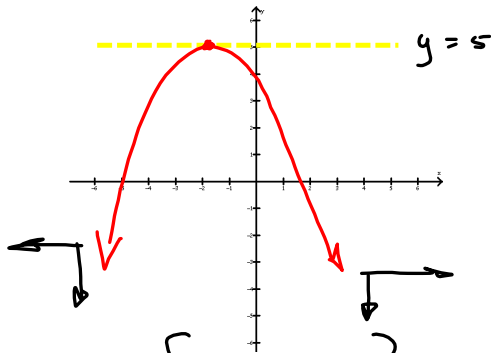
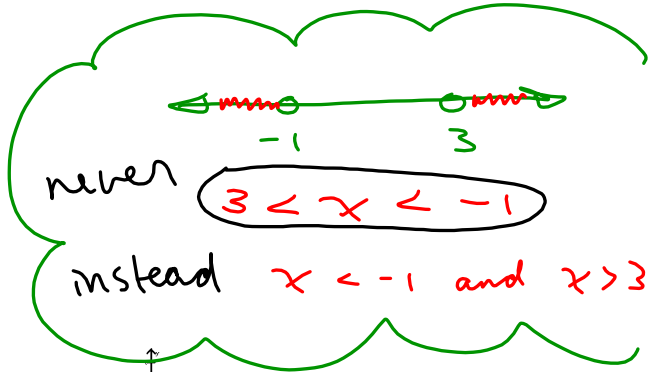
↓
the list of all
allowable
x-values

$$R = \{y \in \mathbb{R} \mid -2 < y \leq 5\}$$

$$D = \{x \in \mathbb{R} \mid x \geq -2\}$$

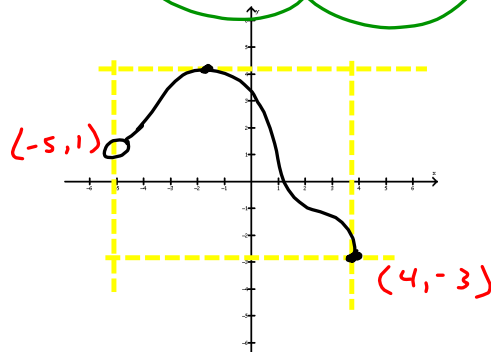
↑
type of numbers

permitted values



$$D = \{x \in \mathbb{R}\}$$

$$R = \{y \in \mathbb{R} \mid y \leq 5\}$$



$$D = \{x \in \mathbb{R} \mid -5 < x \leq 4\}$$

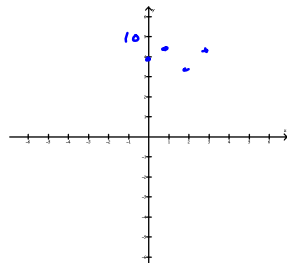
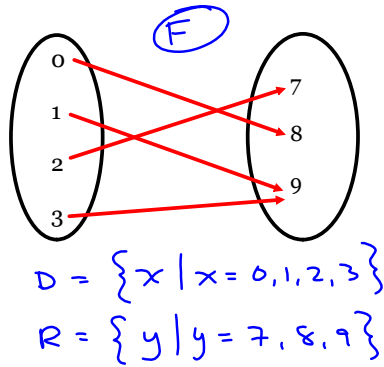
$$R = \{y \in \mathbb{R} \mid -3 \leq y \leq 4\}$$

Practice

For each relation determine:

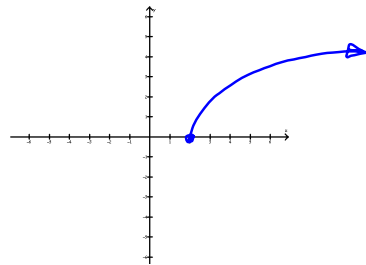
- (a) whether it is a function or not
- (b) the domain and range of the relation
- (c) a sketch of the relation

Example 1

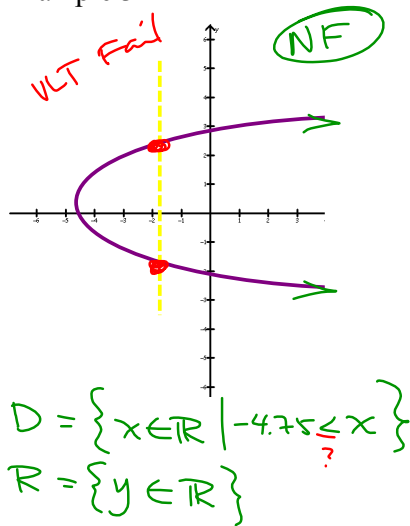


Example 2: $y = \sqrt{x-2} = (x-2)^{1/2}$

$D = \{x \in \mathbb{R} \mid x \geq 2\}$
 $R = \{y \in \mathbb{R} \mid y \geq 0\}$

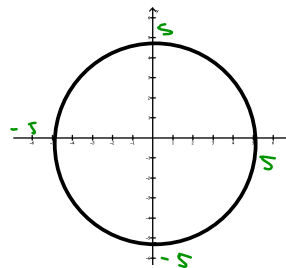


Example 3



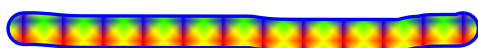
Example 4: $x^2 + y^2 = 25$

$y^2 = 25 - x^2$
 $y = \pm \sqrt{25 - x^2}$
 $D = \{x \in \mathbb{R} \mid -5 \leq x \leq 5\}$
 $R = \{y \in \mathbb{R} \mid -5 \leq y \leq 5\}$





Homefun:



page 11 #1, 2aef, 3cd, 4aef, 7, 8, 12

