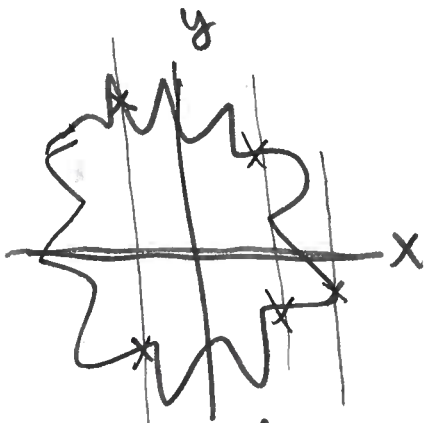


# FUNCTIONS

①

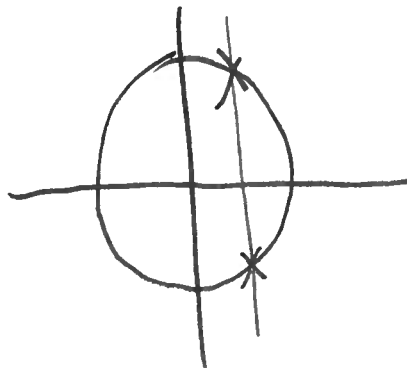
① Vertical line test — if looking at graph of some kind then if any vertical line touches graph at ~~exactly~~ <sup>most</sup> one point, then we say the graph is the graph of a function



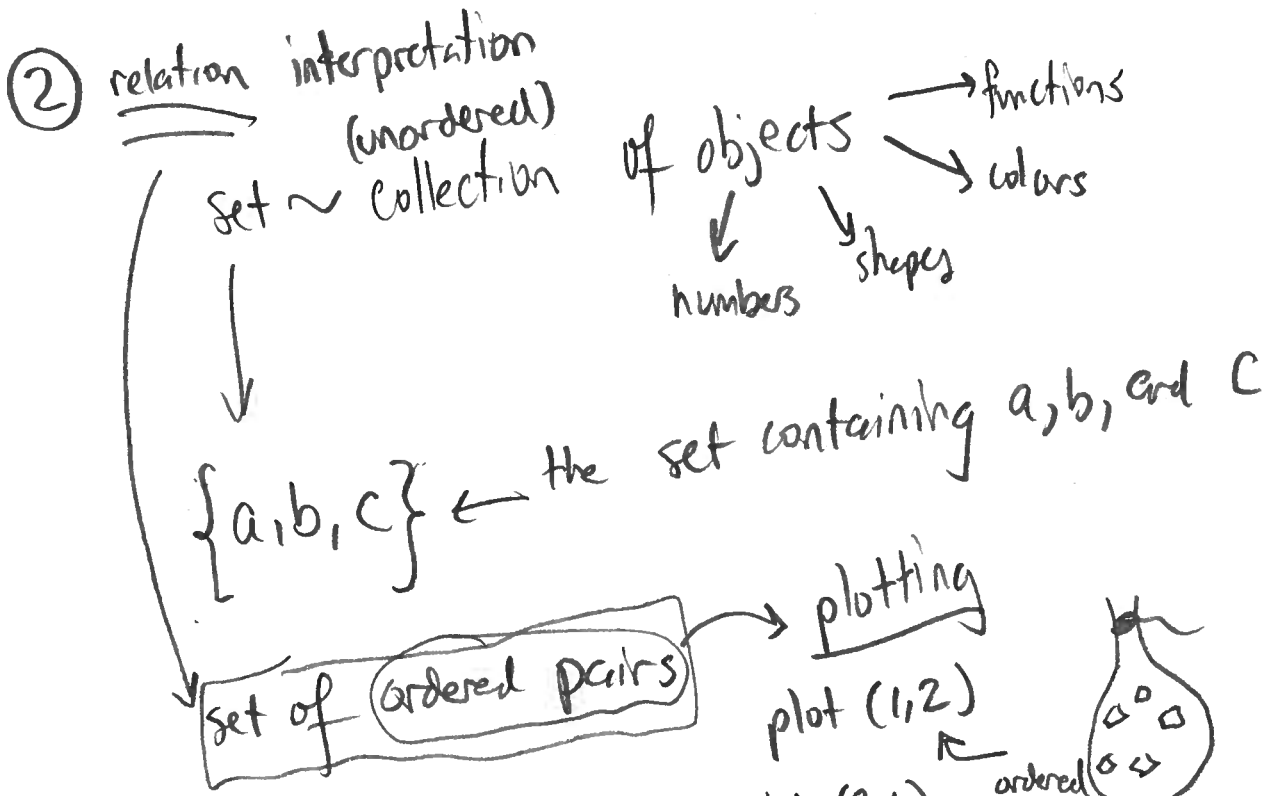
not graph of a  
fnct



is graph of a fnct



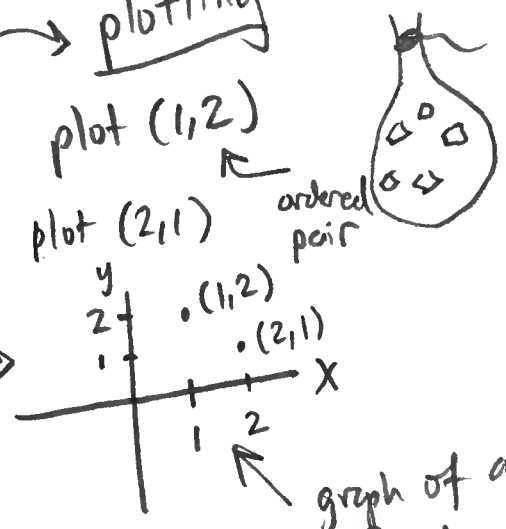
2



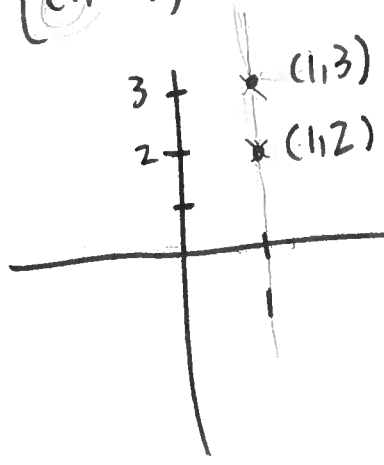
graph of relation

$$f = \{(1, 2), (2, 1)\}$$

$$\text{dom}(f) = \{1, 2\}$$



Ex:  $\{(1, 2), (1, 3)\}$

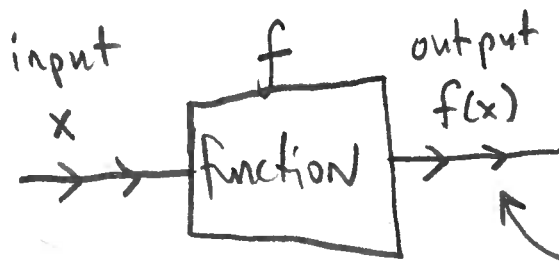


We say a relation whose graph passes the vertical line test is a function.

essentially: if there are 2 or more ordered pairs in relation w/ same 1st coordinate → NOT a function

### ③ input-output machine

③



the same input must always give same output

### ④ A function is 4 things:

① name  $\xrightarrow{f}$  sin etc  
 $\xrightarrow{\quad}$  cos

② domain — set of allowable inputs

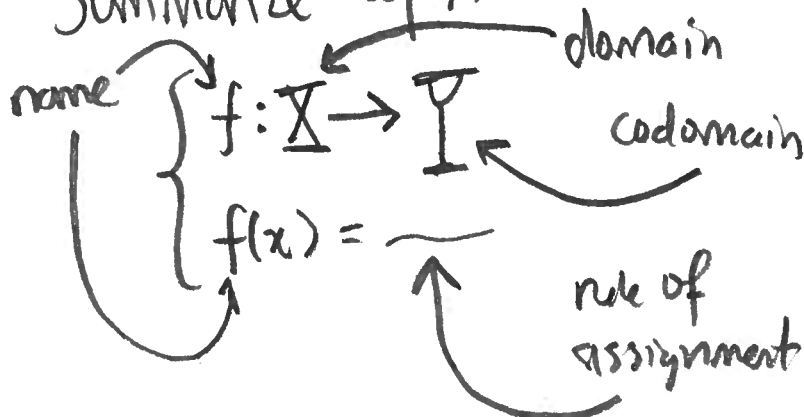
③ codomain — where outputs live  
(a set where outputs MAY take values)

— range lives in the codomain

$\uparrow$  set of actual outputs

④ rule of assignment — associates every domain thing to a codomain thing

Summarize w/ notation:



# Number sets

4

0, 1, 2, 3, ...

(whole numbers)  
(natural numbers)

..., -2, -1, 0, 1, 2, ...

(integers)

$$\mathbb{Z} = \{ \dots, -2, -1, 0, 1, 2, \dots \}$$

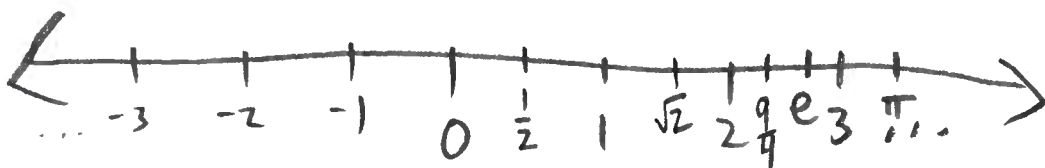
Zahlen - German for

"number"

→  $\frac{1}{2}, -\frac{3}{7}, \frac{86}{41}$

-  $\frac{\text{integer}}{\text{nonzero integer}}$

- FRACTIONS  
rational numbers



3.14159...  $\pi$ ,  $e \approx 2.71$

$\sqrt{7}$

$\sqrt{2}$

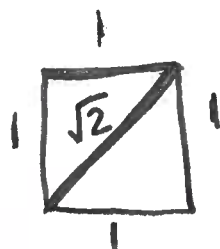
$\sqrt[3]{5}$

$\pi \approx \frac{22}{7}$

- numbers that are not rational numbers are called irrational

entire number line - "set of Real Numbers"

Pythagoras



$\mathbb{R}$

$\mathbb{Q}$

—  
—