Lecture 2

Wednesday, October 5, 2022 8:13 PM

Last time : sets & representation of sets

- roster $\{1,2,3,4,5\}$
- set-builder $\{x \mid 1 \le x \le 5\}$
- interval notation $[0,7]$, $(2,5]$

Set of points → Cartesian coordinate system

Relation : between two quantities

Examples:

height vs weight

housing price vs interest rate

age vs income

time vs temperature

semester vs tuition

- - - - -

⇝ correlation / trend

Representation of relation
- table of values
- roster
- equation
- graph

Ex

1)

y	Height	5'1"	5'2"	5'3"	5'4"	5'5"	5'5"	5'5"
x	weight	100	110	120	135	145	135	142

2) $R = \{(200000, 3), (250000, 3.5), (275000, 4), (270000, 3.8)\}$

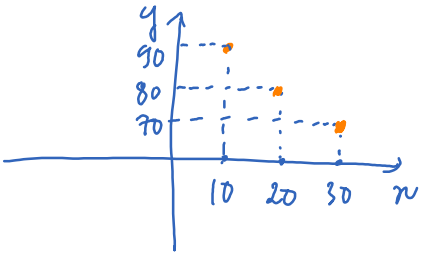
3) $x + y = 100$

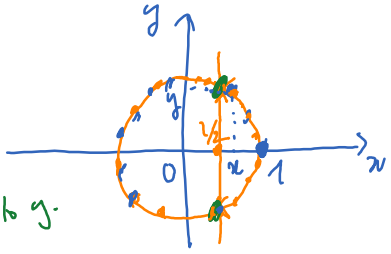
↑ year lived ↑ year remaining

$\{(0, 100), (1, 99), (2, 98), \ldots, (100, 0)\}$

x	0	1	2	. . .
y	100	99	98	.

4)





$x^2 + y^2 = 1$ equation that relates x & y.

(x, y)

x-coord vs y-coord

relation betw x & y?

(x, y) is 1 unit away from $(0, 0)$.

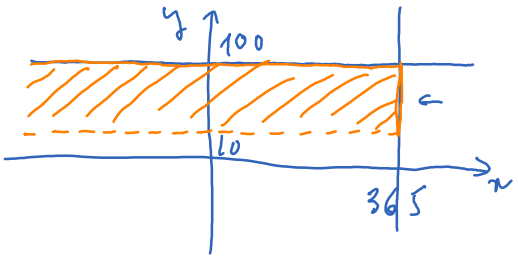
$$1 = d = \sqrt{(x-0)^2 + (y-0)^2} = \sqrt{x^2 + y^2}$$

$$1 = 1^2 = \sqrt{x^2 + y^2}^2 = x^2 + y^2$$

$\left(\frac{1}{2}\right)^2 + y^2 = 1 \rightarrow y^2 = 1 - \frac{1}{4} = \frac{3}{4}$

$y = \pm\sqrt{\frac{3}{4}}$

Ex $\{(x,y) \mid x \le 365,\ 10 < y \le 100\}$ – this is a relation represented as a set of pairs (x,y)



x = time

y = humidity

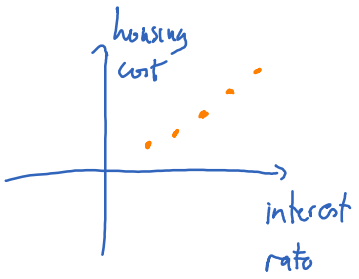
Function – special type of relation

y is a function of x if each x corresponds to only one y.

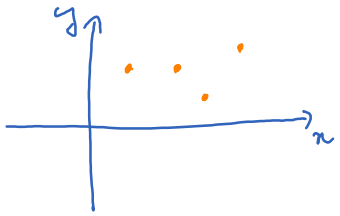
In other words, y is completely determined by x.

Ex height is not a function of weight.

temperature is a function of time

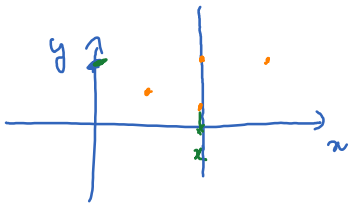


housing cost is a func. of mtg. rate



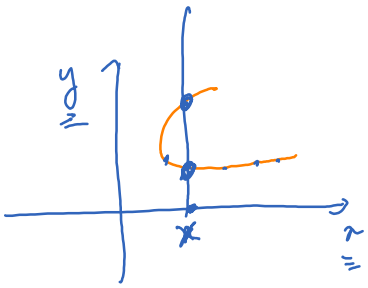
y is a function of x

x is not a function of y



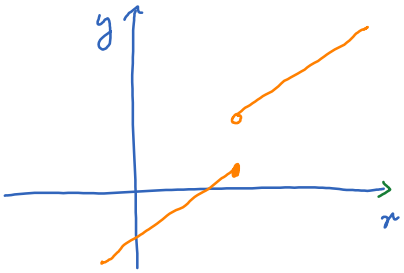
y is not a function of x

x is a not function of y



y is not a function of x

Vertical line test For y to be a func x, each vertical line intersects the graph at most 1 pt.



y is a function of x