Linear Algebra Week-1

(1) System of Sentences

Equations are sentences, sentences give you info.

many sentences are called → System of sentences, combined to provide valuable info.

System of sentences behave a lot more like system of equations

System of Sentences

System 1

- The dog is black
- The cat is orange

→ Each sentence is unique and provide different info

This type of system is called "Complete"

(or)

Non - Singular

System 2

- The dog is black
- The dog is black

→ Both the sentences are the same

This type of system is called "Redundant"

(or)

Singular

System 3

- The dog is black
- The dog is white

→ Both the sentences provide different info of same subject

This type of system is called "contradictory"

(or)

Singular.

The thing is to understand sentences and extract info from them

② System of Equations

System 1

Day 1: One apple & One banana = $10
Day 2: One apple & Two banana = $12

} → Complete

Find price of each fruit:

Day 1: $a+b=10$
Day 2: $a+2b=12$ → On day 2 only the banana quantity has increased

—①

Apple = 8 , Banana = 2

System 2

Day 1: One Apple & One Banana → $10
Day 2: Two Apples & Two Bananas → $20

} → Redundant

Find price of each fruit?

$a+b=\$10$
$2a+2b=\$20$ —②

- The system is redundant, not enough info. is given.
- Has infinitely many solutions.

System 3

Day 1: One apple & One banana = $10
Day 2: Two apple & Two banana = $24

Find price of each fruit?

$a+b=\$10$
$2a+2b=\$24$ —③

} → Contradictory.

- There is No Solution, even if we consider base case $a=8, b=2$ → $2a+2b$ must be 20 not 24, so there is no solution.

(3) System of Linear Equations as lines:

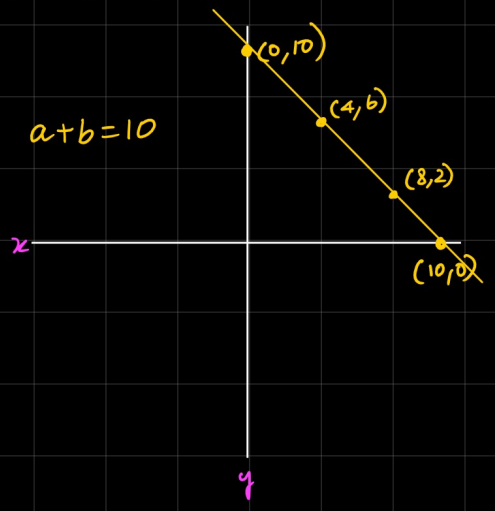
a) All the equations can be represented visually either as line if the equation is two variable and as a plane if ≥ 3 variables.

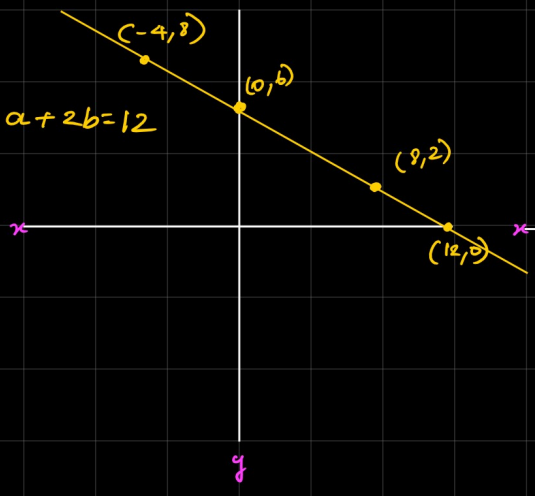
b) y-intercept, point where the line cross y-axis, (value of y when x is 0).

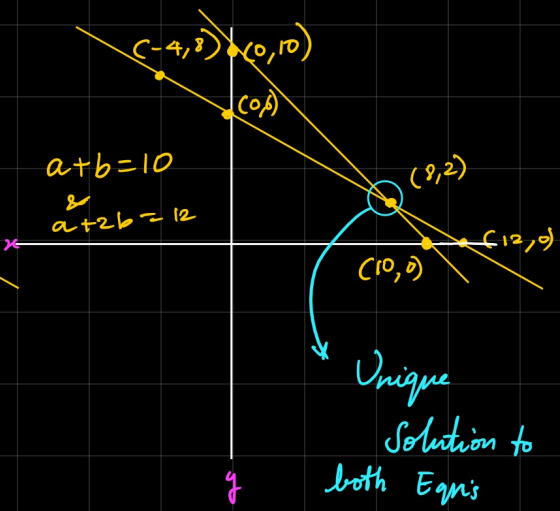
c) Slope → Measure of its steepness, rate at which the line rises or falls as you move along.

Mathematically → Slope is ratio of vertical change to the horizontal change btwn. two points of the line.

Complete & Non-Singular

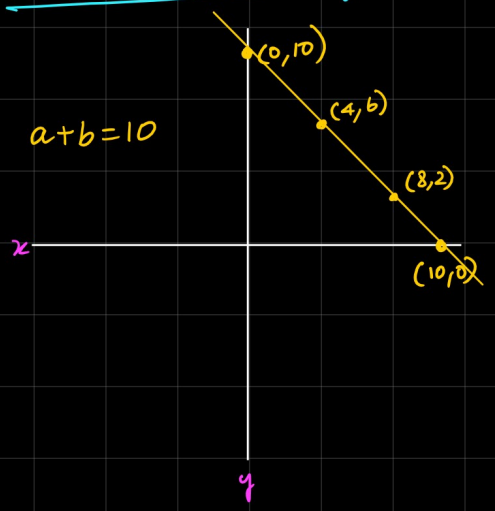


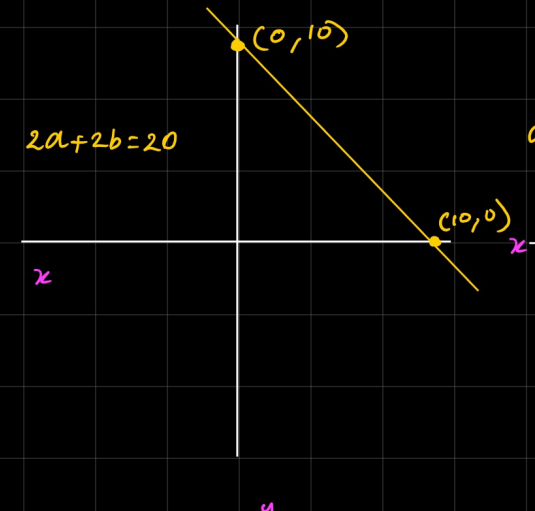


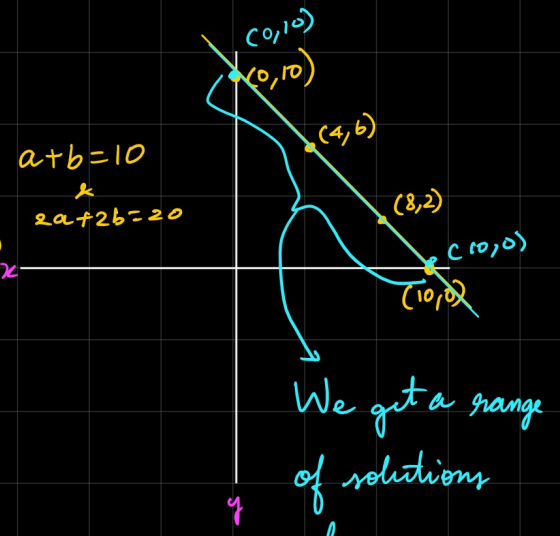


Unique Solution to both Eqns

Redundant & Singular

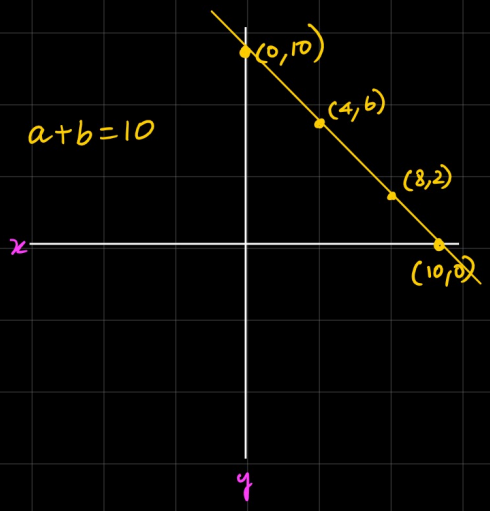


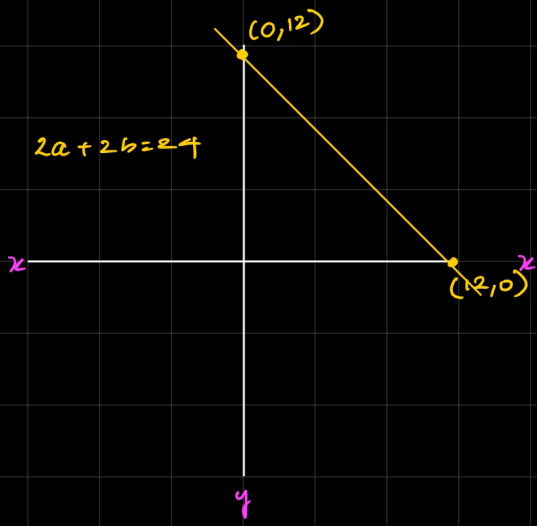


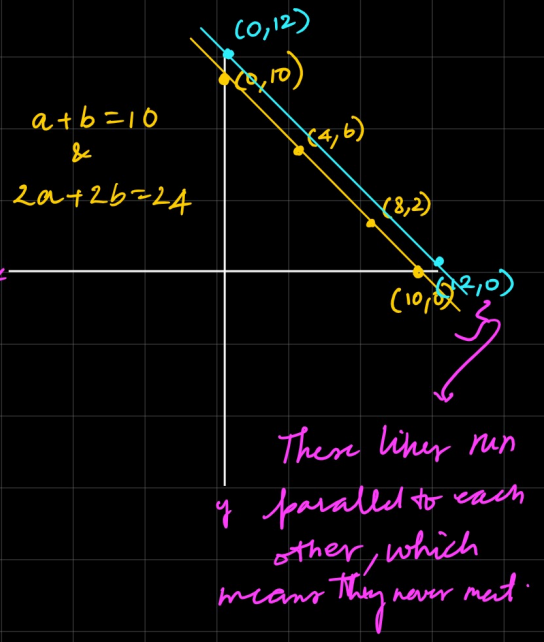


We get a range of solutions here.

Contradicting & Singular







These lines run parallel to each other, which means they never meet.