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⇒ Linear Regression: It shows the Relationship b/w the two variables one is dependent and other is independent on the basis of that we have to make predictions.

→ LR equation: $y = mx + c$

- y represents the dependent variable.
- x represents the independent variable.
- m is the slope of the line (how much y changes for a unit change in x)
- b is the intercept (the value of y when x is 0)

→ • m = slope tells us how steep the line is.

examples:

1. m slope

It shows how much y changes when x increases by 1

if $m=2$, then when x increases by 1, y increases by 2.

if $m=-1$, then when x increases by 1, y decreases by 1.

so line goes downwards.

(2) c = intercept

it shows where the line meets the y-axis ($x=0$)

ex

if $c=3$, then when $x=0$, $y=3$ → the line cuts y-axis at point (0, 3)

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in-short

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- $m \rightarrow$ slope (steepness, tilt of line)
- $c \rightarrow$ Intercept (starting point of y-axis).

→ example with dataset.

Diameter (x) in inches	Price (Y) in Dollars	Mean(x)	Mean(Y)
8	10	10	13
10	13		
12	16		

$\frac{30}{3} = 10$ = Mean.

Deviations (x)	Deviations (Y)	Product of Deviations
-2	-3	6
0	0	0
2	3	6

Note: Deviation = ~~y~~ - ~~mean~~ x

= x - mean(x)

= mean(x) - x

~~10 - 8~~ = 8 - 10 = -2

0

2

Sum of product of Deviations	Square of Deviation for x.
12	4
	0
	4

Calculate m = Sum of product of deviations / Sum of square of deviations for x.

$\frac{12}{8} = 1.5$

Calculate b = Mean of Y - (m * Mean of x)

$y = mx + b$

~~$y = (1.5)(1) + b$~~

SOLO

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→ $y = mx + b$

$y - mx = b$ ← Mean of x

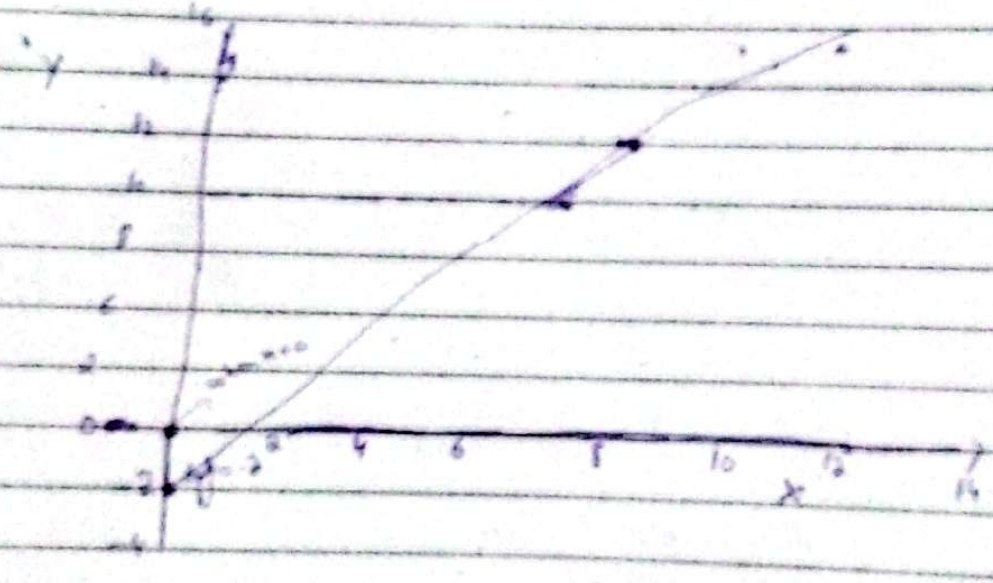
$18 - (1.5) \times (10) = b$

↑ Mean of y.

so

$b = -2$.

→ Visulize.



If $x = 7$

$y = mx + b$

$y = -2 (1.5 \times 7)$

It is the best case because all the values are come in best fit line.

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=> So we have done:-

Project:- Predicting pizza prices.

- step1 Data collection.
- step2 Calculations.
- step3 Predictions.
- step4 Visualization.

→ if data set is large:-

$$m = \frac{\text{sum of product of deviations}}{\text{sum of square of deviations of } x}$$