

# AI1110: Assignment 2

SADINENI ABHINAY - CS21BTECH11055

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## I. QUESTION 20(A)

Find the line of regression of  $y$  on  $x$  from the following table.

x	1	2	3	4	5
y	7	6	5	4	3

Hence, estimate the  $y$  value when  $x=6$ .

**Solution.**

Given the observations

$$\begin{pmatrix} x \\ y \end{pmatrix} : \mathbf{A} \begin{pmatrix} 1 \\ 7 \end{pmatrix}, \mathbf{B} \begin{pmatrix} 2 \\ 6 \end{pmatrix}, \mathbf{C} \begin{pmatrix} 3 \\ 5 \end{pmatrix}, \mathbf{D} \begin{pmatrix} 4 \\ 4 \end{pmatrix}, \mathbf{E} \begin{pmatrix} 5 \\ 3 \end{pmatrix} \quad (1)$$

x	y	xy	$x^2$
1	7	7	1
2	6	12	4
3	5	15	9
4	4	16	16
5	3	15	25
$\sum x = 15$	$\sum y = 25$	$\sum xy = 65$	$\sum x^2 = 55$

Mean values and coefficient  $b_{yx}$  :

$$\bar{x} = \frac{15}{5} = 3 \quad (2)$$

$$\bar{y} = \frac{25}{5} = 5 \quad (3)$$

$$b_{yx} = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}} \quad (4)$$

$$= \frac{65 - \frac{15 \cdot 25}{5}}{55 - \frac{225}{5}} \quad (5)$$

$$= -1 \quad (6)$$

The line of regression can be know from the form:

$$y - \bar{y} = b_{yx}(x - \bar{x}) \quad (7)$$

so the line of regression in this problem:

$$y - 5 = -1(x - 3) \quad (8)$$

$$y - 5 = 3 - x \quad (9)$$

$$x + y = 8 \quad (10)$$

When  $x = 6$  then  $y$  must be 2 from the line of regression.

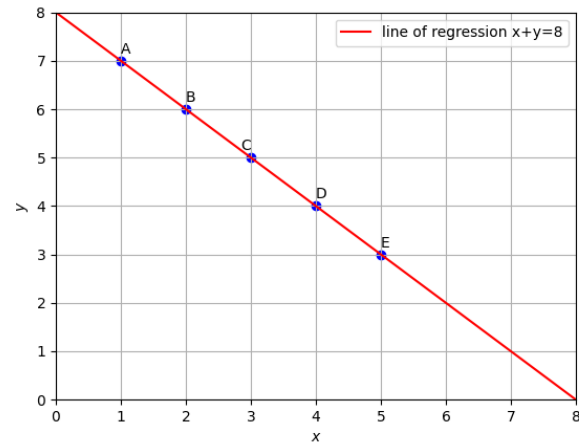


Fig. 0: plot of all points