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20181CSE0621
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6-CSE-10

Part-B

Q.2] Given data,

	X	Y
	3	30
	8	57
	9	64
	13	72
	3	36
	6	43
	11	59
	21	90
	1	20
	16	83
$x =$	91	$y = 554$

- Calculating mean, $\bar{x} = \frac{91}{10} = 9.1$

$$\bar{y} = \frac{554}{10} = 55.4$$

- We know that, $w_1 = \sum_{i=1}^{|D|} \frac{(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{|D|} (x_i - \bar{x})^2}$

- Let us substitute & evaluate the x_i, y_i values in w_1

$$w_1 = \frac{(3-9.1)(30-55.4) + (8-9.1)(57-55.4) + (9-9.1)(64-55.4) + (13-9.1)(72-55.4) + (3-9.1)(36-55.4) + (6-9.1)(43-55.4) + (11-9.1)(59-55.4) + (21-9.1)(90-55.4) + (1-9.1)(20-55.4) + (16-9.1)(83-55.4)}{(3-9.1)^2 + (8-9.1)^2 + (9-9.1)^2 + (13-9.1)^2 + (3-9.1)^2 + (6-9.1)^2 + (11-9.1)^2 + (21-9.1)^2 + (1-9.1)^2 + (16-9.1)^2}$$

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- On evaluating, $\boxed{w_1 = 3.5}$
- We know, $w_0 = \bar{y} - w_1 \bar{x}$

$$\Rightarrow w_0 = 55.4 - 3.5(9.1)$$

$$\boxed{w_0 = 23.60}$$

→ Eqn of least square line,

$$y = w_0 + w_1 x$$

$$\Rightarrow \boxed{y = 23.6 + 3.5x}$$

Given that $x = 10$, substituting in above eqn we get,

$$y = 23.6 + 3.5(10)$$

$$\boxed{y = 58.6} \quad \text{when } x = 10.$$