Answer on Question #78886 – Math – Statistics and Probability

Question

1. Given the data,

x
1
2
3
4
5
6
7
8
9

y
9
8
10
12
11
13
14
16
15

(a) Calculate the coefficient of correlation?

(**b)** Obtain the line of regression.

(c) Estimate the value of y which should correspond to x = 6.2

Solution

N	1	2	3	4	5	6	7	8	9
X	1	2	3	4	5	6	7	8	9
Y	8	9	10	11	12	13	14	15	16
X^2	1	4	9	16	25	36	49	64	81
Y^2	64	81	100	121	144	169	196	225	256
XY	8	18	30	44	60	78	98	120	144

a)

$$\bar{x} = \frac{\sum_{i=1}^{9} x_i}{9} = \frac{45}{9} = 5$$

$$\bar{y} = \frac{\sum_{i=1}^{9} y_i}{9} = \frac{108}{9} = 12$$

$$\overline{xy} = \frac{\sum_{i=1}^{9} x_i y_i}{9} = \frac{600}{9} = 66.67$$

$$S_x^2 = \frac{\sum_{i=1}^{9}(x_i - \bar{x})^2}{9} = \frac{60}{9} = 6.67$$

$$S_y^2 = \frac{\sum_{i=1}^{9}(y_i - \bar{y})^2}{9} = \frac{60}{9} = 6.67$$

$$S_x = \sqrt{S_x^2} = 2.58$$

$$S_y = \sqrt{S_y^2} = 2.58$$

$$r_{xy} = \frac{\overline{xy} - \bar{x}\bar{y}}{S_x S_y} = \frac{66.67 - 5 * 12}{2.58 * 2.58} = 1$$

b) $b = \frac{\overline{xy} - \bar{x}\bar{y}}{S_x S_x} = \frac{66.67 - 5 * 12}{2.58 * 2.58} = 1$

$a = \bar{y} - b * \bar{x} = 12 - 1 * 5 = 7$

Line of regression:

$$y_x = bx + a$$

$$y_x = 1x + 7$$

c) X=6.2

Y=6.2 + 7 = 13.2