

**Answer on Question #80960 – Math – Statistics and Probability
Question**

6 observations on (X, Y) yielded the following data:

$$\sum_i X_i = 30, \sum_i Y_i = 180, \sum_i X_i Y_i = 1000,$$
$$\sum_i X_i^2 = 200, \sum_i Y_i^2 = 5642.2$$

- i) Determine the correlation coefficient between X and Y .
- ii) Given $X = 10$, what will be the predicted value of Y ?
- iii) Given $Y = 15$, predict X .

Solution

i)

$$r = \frac{n \sum_i X_i Y_i - \sum_i X_i \sum_i Y_i}{\sqrt{[n \sum_i X_i^2 - (\sum_i X_i)^2][n \sum_i Y_i^2 - (\sum_i Y_i)^2]}}$$

$$r = \frac{6(1000) - 30(180)}{\sqrt{[6(200) - (30)^2][6(5642.2) - (180)^2]}} \approx 0.90871548437$$

ii)

$$a = \frac{(\sum_i Y_i)(\sum_i X_i^2) - (\sum_i X_i)(\sum_i X_i Y_i)}{n(\sum_i X_i^2) - (\sum_i X_i)^2}$$

$$b = \frac{n(\sum_i X_i Y_i) - (\sum_i X_i)(\sum_i Y_i)}{n(\sum_i X_i^2) - (\sum_i X_i)^2}$$

$$a = \frac{180(200) - 30(1000)}{6(200) - (30)^2} = 20$$

$$b = \frac{6(1000) - 30(180)}{6(200) - (30)^2} = 2$$

$$Y = a + bX$$

$$Y = 20 + 2X$$

$$X = 10: Y = 20 + 2(10) = 40$$

iii)

$$Y = 20 + 2X = 15 \Rightarrow 2X = -5 \Rightarrow X = -2.5$$

Answer: i) 0.90871548437; ii) 40; iii) -2.5.