

## Answer on Question #83855 – Math – Statistics and Probability

### Question

Two regression lines are given as below.

$$15X + 17Y = 395$$

$$20X + 14Y = 440$$

Find

i) The mean of  $X$  and  $Y$

ii) Both the regression coefficients

### Solution

i) The mean of  $X$  and  $Y$

On solving the two equations, we can obtain the mean values for  $X$  and  $Y$

$$15X + 17Y = 395$$

$$20X + 14Y = 440$$

$$60X + 68Y = 1580$$

$$60X + 42Y = 1320$$

$$26Y = 260$$

$$20X + 14Y = 440$$

$$Y = 10$$

$$20X + 140 = 440$$

$$X = 15$$

$$Y = 10$$

Hence, the mean of  $X$  is 15, and the mean of  $Y$  is 10.

ii) Both the regression coefficients

$$15X + 17Y = 395$$

$$X = -\frac{17}{15}Y + \frac{79}{3}$$

$$b_{XY} = -\frac{17}{15} < 0$$

$$20X + 14Y = 440$$

$$Y = -\frac{10}{7}X + \frac{220}{7}$$

$$b_{YX} = -\frac{10}{7} < 0$$

Coefficient of correlation

$$r^2 = b_{XY} \times b_{YX}$$

$$r = -\sqrt{\left(-\frac{17}{15}\right) \times \left(-\frac{10}{7}\right)} = -\sqrt{\frac{34}{21}} < 0$$

$$15X + 17Y = 395$$

$$Y = -\frac{15}{17}X + \frac{395}{17}$$

$$b_{YX} = -\frac{15}{17} < 0$$

$$20X + 14Y = 440$$

$$X = -0.7Y + 22$$

$$b_{YX} = -0.7 < 0$$

Coefficient of correlation

$$r^2 = b_{XY} \times b_{XY}$$

$$r = -\sqrt{\left(-\frac{15}{17}\right) \times \left(-\frac{7}{10}\right)} = -\sqrt{\frac{21}{34}} < 0.$$