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 Topic- Numerical of Regression
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Q.1 From the following data Obtain the two regression equations:

X	6	2	10	4	8
Y	9	11	5	8	7

The mean

① Regression equations of X on Y

$$x - \bar{x} = \left(\frac{\sum xy}{\sum y^2} \right) (y - \bar{y})$$

$$\frac{\sum xy}{\sum y^2} = \frac{\sum xy}{\sum y^2} \rightarrow \frac{\sum xy}{\sum y^2} = \text{regression Coefficient of X on Y}$$

$$x = X - \bar{x}, y = Y - \bar{y}$$

\bar{x} and \bar{y} are actual means.

∴ Regression eqn. of X on Y,

$$X - \bar{X} = \frac{\sum xy}{\sum y^2} (Y - \bar{Y})$$
 and regression eqn. of Y on X will be

$$Y - \bar{Y} = \frac{\sum xy}{\sum x^2} (X - \bar{X}).$$
 Using the data of Q.1

$$\bar{X} = \frac{30}{5} = 6, \bar{Y} = \frac{40}{5} = 8$$
 Regression equation of X on Y will be

$$X - \bar{X} = \frac{\sum xy}{\sum y^2} (Y - \bar{Y})$$

$$X - 6 = \frac{-26}{20} (Y - 8)$$

$$X - 6 = -1.3 (Y - 8)$$

$$X - 6 = -1.3 Y + 10.4$$

$$X = 16.4 - 1.3Y$$

Regression equation of Y on X will be-

$$Y - \bar{Y} = \frac{\sum xy}{\sum x^2} (X - \bar{X})$$

$$Y - 8 = \frac{-26}{40} (X - 6)$$

$$Y - 8 = -0.65X + 3.9$$

$$Y = 11.9 - 0.65X$$

The two equations are $X = 16.4 - 1.3Y$
and $Y = 11.9 - 0.65X$.