Pearson Correlation Coefficient [-1 to +1]

$$\rho_{x,y} = \frac{Cov(x,y)}{\sigma_x \cdot \sigma_y}$$

(-1 to +1)

* More the value towards +1 the more +vely correlated variable x & y is
* More the value towards -1 the more -vely correlated variables x & y is.

Same ex.3)

X	Y
8	6
9	5
10	4
12	2
11	1

$Cov(x,y) = -3$

$\bar{x} = 10$

$\bar{y} = 3.6$

$$\text{Variance} = \frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}$$

$$= \frac{(8-10)^2 + (9-10)^2 + (10-10)^2 + (12-10)^2 + (11-10)^2}{4}$$

$$= \frac{10}{4}$$

$\therefore$ Var $= 2.5 \Rightarrow \sigma_x = \sqrt{2.5} = 1.58$

$$\text{Variance} = \frac{\sum_{i=1}^{n} (y_i - \bar{y})^2}{n-1}$$

$$= \frac{(6-3.6)^2 + (5-3.6)^2 + (4-3.6)^2 + (2-3.6)^2 + (1-3.6)^2}{4}$$

$$= \frac{17.2}{4}$$

$\therefore$ Var $= 4.3 \Rightarrow \sigma_y = \sqrt{4.3} = 2.073$

$$\therefore \rho_{x,y} = \frac{-3}{1.58 \times 2.073} = -0.917$$

Negatively correlated $\Rightarrow$ 91.7%.