

## Answer on Question#65582 – Math – Statistics and Probability

**Question.** Which of the following statements are true or false? Give reason for your answers.

iv) If correlation coefficient between  $x$  and  $y$  is 0.62, then correlation coefficient between  $u$  and  $v$  will be 0.62, where  $u = 5 + 6x$  and  $v = 7 - 3y$ .

**Solution.** We shall use the following formulas:

$$\rho_{x,y} = \frac{\text{cov}(x,y)}{\sigma_x\sigma_y} = \frac{E(xy) - E(x)E(y)}{\sigma_x\sigma_y}$$

(see [https://en.wikipedia.org/wiki/Pearson\\_correlation\\_coefficient](https://en.wikipedia.org/wiki/Pearson_correlation_coefficient)). Then

$\rho_{u,v} = \frac{E(uv) - E(u)E(v)}{\sigma_u\sigma_v}$ . During computation  $\rho_{u,v}$  we shall use the properties of mathematical expectation and standard deviation

(see [https://en.wikipedia.org/wiki/Expected\\_value#Linearity](https://en.wikipedia.org/wiki/Expected_value#Linearity)

and

[https://en.wikipedia.org/wiki/Standard\\_deviation#Identities\\_and\\_mathematical\\_properties](https://en.wikipedia.org/wiki/Standard_deviation#Identities_and_mathematical_properties)).

So

$$\rho_{u,v} = \frac{E(uv) - E(u)E(v)}{\sigma_u\sigma_v} = \frac{E[(5+6x)(7-3y)] - E(5+6x) \cdot E(7-3y)}{\sigma(5+6x) \cdot \sigma(7-3y)} =$$

$$\frac{E(35 - 15y + 42x - 18xy) - (5 + 6E(x))(7 - 3E(y))}{6\sigma_x \cdot 3\sigma_y}$$

$$= \frac{35 - 15E(y) + 42E(x) - 18E(xy) - 35 + 15E(y) - 42E(x) + 18E(x)E(y)}{18\sigma_x\sigma_y} = \frac{-18(E(xy) - E(x)E(y))}{18\sigma_x\sigma_y} = -\frac{E(xy) - E(x)E(y)}{\sigma_x\sigma_y}$$

$= -\rho_{x,y} = -0.62 \neq 0.62$ , and we conclude that the statement is false.

**Answer.** False.

Answer provided by <https://www.AssignmentExpert.com>