Question

Which of the following statements are true and which are false? Justify. (10)
a) The area under the curve of a standard normal distribution between $-\infty$ and 0 is 0.45.
b) If the probability of being left-handed is 0.1, the probability that none of the 3 persons selected randomly is left-handed is 0.729.
c) If the correlation coefficient is zero, then the relationship between Y and X is positively linear.

Solution

a) False.

The normal distribution with parameter values $\mu = 0$ and $\sigma = 1$ is called the standard normal distribution.

The area under the curve is always 1.

The area under the curve to the right of the mean is 0.5 and the area under the curve to the left of the mean is 0.5.

Therefore, The area under the curve of a standard normal distribution between $-\infty$ and 0 is 0.5.

b) True.

Probability of left-handed p=0.1.

Probability of right-handed 1-p=1-0.1=0.9.

The probability that none of the 3 persons selected randomly is left-handed is

$$(1\text{-}p)^3 = 0.9^3 = 0.729$$

c) False.

The correlation coefficient is a measure that determines the degree to which two variables' movements are associated.

The most common correlation coefficient, generated by the Pearson product-moment correlation, may be used to measure

the linear relationship between two variables.

If the correlation coefficient of two variables is zero, it means that there is no linear relationship between the variables. However, this is only for a linear relationship; it is possible that the variables have a strong curvilinear relationship.