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Properties of Covariance - Quiz

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Question 1

1/1 point (graded)

True or False: If two variables are independent, then their covariance is equal to zero. Similarly, if we know that the covariance between two variables is equal to zero, then it must be the case that the variables are independent.

- a. True
- b. False ✔

Explanation

It is true that if two variables are independent, then their covariance must be equal to zero. However, the relationship does not necessarily run the other way, and it does not hold that if the covariance between two variables is equal to zero, the two variables are independent.

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✔ Correct (1/1 point)

Question 2

1/1 point (graded)

The property that $Cov(aX + b, cY + d) = ac * Cov(X, Y)$ implies which of the following? (Check all that apply.)

- [ ] a. The covariance of a linear transformation of a set of variables is equal to the covariance of the original variables
- [x] b. In a linear transformation between a set of two variables, additive constants do not factor in to any changes in covariance ✔
- [ ] c. Covariance from a linear transformation of two variables is altered by both the coefficient of change and the additive constant
- [x] d. Covariance is unchanged for a linear transformation of a set of two independent variables ✔

✔

Explanation

B and D are correct. The property $Cov(aX + b, cY + d) = ac * Cov(X, Y)$ implies that when you take a linear transformation of variables, the covariance is equal to the original covariance multiplied by the coefficients of the linear transformation, but not considering the additive constants. Since the original covariance is multiplied by the coefficients of the linear transformation, in the case of independent variables with covariance equal to zero, that covariance will remain unchanged (zero) after the linear transformation.

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