9. Exercise: Covariance calculation

Exercises due Mar 25, 2020 05:29 IST *Completed*

Exercise: Covariance calculation

1/1 point (graded)

Suppose that X, Y, and Z are independent random variables with unit variance. Furthermore, $\mathbf{E}[X] = 0$ and $\mathbf{E}[Y] = \mathbf{E}[Z] = 2$. Then,

$\mathrm{Cov}(XY, XZ) = $ [4]   ✔ **Answer:** 4

Solution:

Because of independence and the zero-mean assumption, it follows that $\mathbf{E}[XY] = \mathbf{E}[X] \cdot \mathbf{E}[Y] = 0$ and similarly, $\mathbf{E}[XZ] = 0$. Thus,

$$\mathrm{Cov}(XY, XZ) = \mathbf{E}[XYXZ] = \mathbf{E}[X^2 YZ] = \mathbf{E}[X^2] \cdot \mathbf{E}[Y] \cdot \mathbf{E}[Z] = \mathrm{Var}(X) \cdot \mathbf{E}[Y] \cdot \mathbf{E}[Z] = 4.$$

Submit   You have used 1 of 3 attempts

ⓘ   Answers are displayed within the problem

Discussion

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Topic: Unit 6: Further topics on random variables:Lec. 12: Sums of independent r.v.'s; Covariance and correlation / 9. Exercise: Covariance calculation

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💬   The fact that X, Y and Z are independent implies that X^2, Y and Z are also independent?   2
     At some point one must asume that X^2, Y and Z are independent, but the information give states not exactly that but that X,...

💬   Useful link for this task and the next one   3
     https://en.wikipedia.org/wiki/Covariance#Covariance_of_linear_combinations Maybe obvious, but really helped me out

💬   [STAFF] evidence that XY and YZ are not independent given that X,Y,Z are independent
     Can please someone provide evidence that XY and YZ are not independent given that X, Y, Z are independent ? Can this exerc

☑ **Ex. - Cov. Calculation**

Though I got the answer right by plain algebra, I'd like to know that if two RV's X & Y are independent, then HOW E[(X^n) Y] = E...

`2`

💬 **Unit Variance**

2 new `5`

💬 **expression or number**

I ran algebraic calculations and came up with an expression. Not sure if this can be reduced to a number in this case. Are they...

`2`

💬 **about expectation and independence**

`2`

☑ **What am I missing? My intuition and my calculation are both wrong ...**

I used intuition for my first answer, but that was wrong ... so I calculated from cov (XY, XZ) = E[(XY-E[XY])(XZ-E[XZ])], but that ga...

4 new

? **How to reconcile the two different interpretations leading to different answers?**

We have two different interpretations leading to different answers. How can we reconcile this fact, and be assured that the re...

`2`