18. Exercise: Using linearity of expectations

Exercises due Feb 28, 2020 05:29 IST *Completed*

Exercise: Using linearity of expectations

2.0/2.0 points (graded)

We have two coins, A and B. For each toss of coin A, we obtain Heads with probability $1/2$; for each toss of coin B, we obtain Heads with probability $1/3$. All tosses of the same coin are independent.

We toss coin A until Heads is obtained for the first time. We then toss coin B until Heads is obtained for the first time with coin B.

The expected value of the total number of tosses is: 5 ✔

Answer: 5

Solution:

Let T_A and T_B be the number of tosses of coins A and B, respectively. We know that T_A is geometric with parameter $p = 1/2$, so that $\mathbf{E}[T_A] = 1/p = 1/(1/2) = 2$. Similarly, $\mathbf{E}[T_B] = 3$. The total number of coin tosses is $T_A + T_B$. Using linearity,

$$\mathbf{E}[T_A + T_B] = \mathbf{E}[T_A] + \mathbf{E}[T_B] = 2 + 3 = 5.$$

Submit You have used 2 of 3 attempts

Answers are displayed within the problem

Discussion

Hide Discussion

Topic: Unit 4: Discrete random variables:Lec. 6: Variance; Conditioning on an event; Multiple r.v.'s / 18. Exercise: Using linearity of expectations

Show all posts by recent activity

What is the difference between this question and exercise 11 (Total expectation calculation) 3

Though I got both questions correct, I'd like to confirm how to think about the 2 questions differently. Is i...

Confirming Concept 16

Staff, I want to ensure that I understand the concept very well. 1)Could you please explain when do we u...