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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:





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 $\mathbf{E}\left[T_{A}
ight]=1/p=1/\left(1/2
ight)=2.$ Similarly, $\mathbf{E}\left[T_{B}
ight]=3$. The total number of coin tosses is $T_{A}+T_{B}$. Using linearity,

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

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You have used 2 of 3 attempts

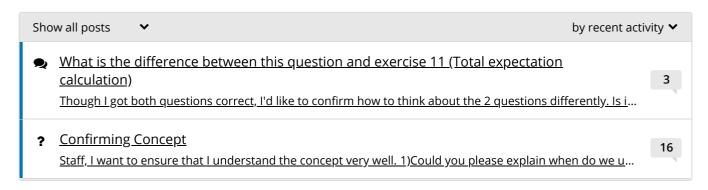
1 Answers are displayed within the problem



Discussion

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



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