11. Exercise: Total expectation calculation

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

Exercise: Total expectation calculation

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 select a coin at random, where the probabilty of selecting coin A is $1/4$, and then toss it until Heads is obtained for the first time.

The expected number of tosses until the first Heads is: 11/4 ✔

Answer: 2.75

Solution:

Let T be the number of tosses until the first Heads. Once a coin is selected, the conditional distribution of T is geometric, with a mean of $1/p$, where p is the probability of Heads for the selected coin. Let C_A and C_B denote the events that coin A or B, respectively, is selected.

$$\mathbf{E}[T] = \mathbf{P}(C_A)\,\mathbf{E}[T \mid C_A] + \mathbf{P}(C_B)\,\mathbf{E}[T \mid C_B] = \frac{1}{4}\cdot 2 + \frac{3}{4}\cdot 3 = \frac{11}{4}.$$

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 / 11. Exercise: Total expectation calculation

Show all posts | by recent activity

? Another approach that leads to a incorrect answer
Hi, I first used the following approach for solving this problem: 1) Given that either A or B coin can be us... 3 new

Theoretical or practical answer?
i rounded off the value to nearest absolute number of tosses but that seems to be incorrect? 3

? How do I solve for the mean of the geometric series?
I think this question stems from my weakness in solving infinite sums, but I don't understand how to sol... 3 new

? Expectation Interpretation in this question
How can we interpret the expectation value we get in this question ? We had two different interpretation... 2 new

? 1.1 Exercise: Total expectation calculation
The answer by calculation comes to be fractional. But how can the number of tosses be fractional? Shoul... 5