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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 probability 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.

$$\mathbf{E}\left[T
ight] = \mathbf{P}\left(C_A
ight)\mathbf{E}\left[T\mid C_A
ight] + \mathbf{P}\left(C_B
ight)\mathbf{E}\left[T\mid C_B
ight] = rac{1}{4}\cdot2 + rac{3}{4}\cdot3 = rac{11}{4}.$$

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You have used 2 of 3 attempts

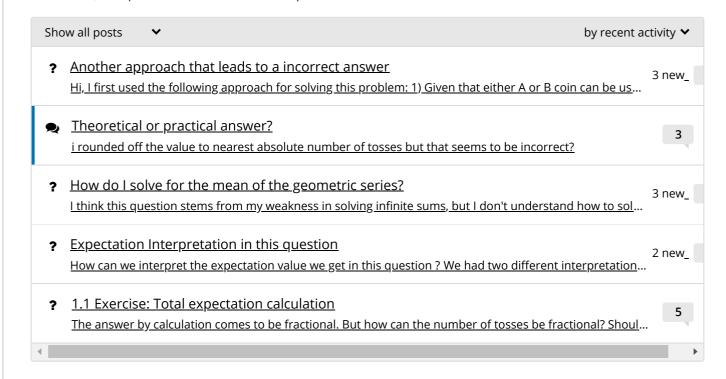
1 Answers are displayed within the problem



Discussion

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Topic: Unit 4: Discrete random variables:Lec. 6: Variance; Conditioning on an event; Multiple r.v.'s / 11. Exercise: Total expectation calculation



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