Exercise: Total expectation calculation

(2/2 points)

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

Answer:
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.

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

You have used 1 of 2 submissions

Exercises 7 due Mar 02, 2016 at 23:59 UTC

Solved problems

Additional theoretical material

Problem Set 4
Problem Set 4 due Mar 02, 2016 at 23:59 UTC

Unit summary