



MITx: 6.041x Introduction to Probability - The Science of Uncertainty



Bookmarks

- ▶ Unit 0:
Overview
- ▶ Entrance
Survey
- ▶ Unit 1:
Probability
models and
axioms
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and
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Discrete
random
variables

Unit overview

**Lec. 5: Probability
mass functions
and expectations**

Exercises 5 due Mar
02, 2016 at 23:59 UTC

**Lec. 6: Variance;
Conditioning on
an event; Multiple
r.v.'s**

Exercises 6 due Mar
02, 2016 at 23:59 UTC

**Lec. 7:
Conditioning on a
random variable;
Independence of
r.v.'s**

Unit 4: Discrete random variables > Lec. 6: Variance; Conditioning on an event;
Multiple r.v.'s > Lec 6 Variance Conditioning on an event Multiple r v s vertical4



Bookmark

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 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:



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

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