



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



Bookmarks

- ▶ Unit 0: Overview
- ▶ Entrance Survey
- ▼ **Unit 1: Probability models and axioms**

Lec. 1: Probability models and axioms

Exercises 1 due Feb 10, 2016 at 23:59 UTC

Mathematical background: Sets; sequences, limits, and series; (un)countable sets.

Solved problems**Problem Set 1**

Problem Set 1 due Feb 10, 2016 at 23:59 UTC

- ▶ Unit 2: Conditioning

Unit 1: Probability models and axioms > Problem Set 1 > Problem 3 Vertical: Three tosses of a fair coin

Bookmark

Problem 3: Three tosses of a fair coin

(4/4 points)

You flip a fair coin (i.e., the probability of obtaining Heads is $1/2$) three times. Assume that all sequences of coin flip results, of length 3, are equally likely. Determine the probability of each of the following events.

1. $\{HHH\}$: 3 Heads

✓ Answer: 0.125

2. $\{HTH\}$: the sequence Heads, Tails, Heads

✓ Answer: 0.125

3. Any sequence with 2 Heads and 1 Tails (in any order):

✓ Answer: 0.375

and independence

- ▶ Unit 3: Counting
- ▶ Unit 4: Discrete random variables
- ▶ Exam 1
- ▶ Unit 5: Continuous random variables
- ▶ Unit 6: Further topics on random variables
- ▶ Unit 7: Bayesian inference
- ▶ Exam 2
- ▶ Unit 8: Limit theorems and classical statistics
- ▶ Unit 9: Bernoulli and Poisson processes

4. Any sequence in which the number of Heads is greater than or equal to the number of Tails:

✓ Answer: 0.5

Answer:

Since all outcomes are equally likely, we are dealing with a discrete uniform probability law. To obtain the probability of an event, we simply count the number of elements in the event and divide by the total number of elements in the sample space.

There are 3 flips, with 2 possible results for each flip. Thus there are $2^3 = 8$ elements (distinct sequences) in the sample space.

1. Any particular sequence has probability $1/8$. Therefore, $\mathbf{P}(\{HHH\}) = \boxed{1/8}$.

2. This event again consists of a single sequence, and so $\mathbf{P}(\{HTH\}) = \boxed{1/8}$.

3. The event of interest is $\{HHT, HTH, THH\}$. Since it consists of 3 elements, its probability is $\boxed{3/8}$.

4. The set of sequences that have at least as many Heads as Tails is $\{HHH, HHT, HTH, THH\}$. Its probability is $\boxed{4/8}$.

- ▶ Unit 10: Markov chains
- ▶ Exit Survey
- ▶ Final Exam

You have used 1 of 2 submissions

DISCUSSION

Click "Show Discussion" below to see discussions on this problem.

© All Rights Reserved



© edX Inc. All rights reserved except where noted. EdX, Open edX and the edX and Open EdX logos are registered trademarks or trademarks of edX Inc.

POWERED BY
OPENedX

