



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 1: Probability models and axioms > Lec. 1: Probability models and axioms > Lec
1 Probability models and axioms vertical9



Bookmark

EXERCISE: ON COUNTABLE ADDITIVITY (2/2 points)

Let the sample space be the two-dimensional plane. For any real number x , let A_x be the subset of the plane that consists of all points of the vertical line through the point $(x, 0)$ i.e., $A_x = \{(x, y) : y \in \mathbb{R}\}$.

a) Do the axioms of probability theory imply that the probability of the union of the sets A_x (which is the whole plane) is equal to the sum of the probabilities $\mathbf{P}(A_x)$?



Answer: No

b) Do the axioms of probability theory imply that

$$\mathbf{P}(A_1 \cup A_2 \cup \dots) = \sum_{x=1}^{\infty} \mathbf{P}(A_x)?$$

(In other words, we consider only those lines for which the x -coordinate is a positive integer.)



Answer: Yes

Answer:

a) The collection of sets A_x is not countable because the set of real numbers is not countable (i.e., cannot be arranged in a sequence), and so the additivity axiom does not apply.

b) The countable additivity axiom applies because we are dealing with a sequence (in particular, a countable collection) of disjoint events.

You have used 1 of 1 submissions

© 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.

