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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

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EXERCISE: UNIFORM PROBABILITIES ON THE INTEGERS (1/1 point)

Let the sample space be the set of positive integers. Is it possible to have a "uniform" probability law, that is, a probability law that assigns the same probability c to each positive integer?

No

✓

Answer: No

Answer:

Suppose that $c = 0$. Then, by countable additivity,

$$1 = \mathbf{P}(\Omega) = \mathbf{P}(\{1\} \cup \{2\} \cup \{3\} \cdots) = \mathbf{P}(\{1\}) + \mathbf{P}(\{2\}) + \mathbf{P}(\{3\}) + \cdots = 0 + 0 + 0 + \cdots$$

which is a contradiction.

Suppose that $c > 0$. Then, there exists an integer k such that $kc > 1$. By additivity,

$$\mathbf{P}(\{1, 2, \dots, k\}) = kc > 1,$$

which contradicts the normalization axiom.

You have used 1 of 1 submissions

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