



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



Bookmarks

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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: CONTINUOUS PROBABILITY CALCULATIONS

(3/3 points)

Consider a sample space that is the rectangular region $[0, 1] \times [0, 2]$, i.e., the set of all pairs (x, y) that satisfy $0 \leq x \leq 1$ and $0 \leq y \leq 2$. Consider a "uniform" probability law, under which the probability of an event is half of the area of the event. Find the probability of the following events:

 a) The two components x and y have the same values.



Answer: 0

 b) The value, x , of the first component is larger than or equal to the value, y , of the second component.



Answer: 0.25

 c) The value of x^2 is larger than or equal to the value of y .



Answer: 0.16667

Answer:

a) This event is a line, and since a line has zero area, the probability is zero.

 b) This event is a triangle with vertices at $(0, 0)$, $(1, 0)$, $(1, 1)$. Its area is $1/2$, and therefore the probability is $1/4$.

 c) This event corresponds to the region below the curve $y = x^2$, where x ranges from 0 to 1. The area of this region is

$$\int_0^1 x^2 dx = \frac{x^3}{3} \Big|_0^1 = \frac{1}{3},$$

 and therefore the corresponding probability is $1/6$.

You have used 1 of 2 submissions

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