



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



Bookmarks

- ▶ Unit 0: Overview
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- ▼ **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

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Problem 4: Parking lot problem

(3/3 points)

Mary and Tom park their cars in an empty parking lot with $n \geq 2$ consecutive parking spaces (i.e., n spaces in a row, where only one car fits in each space). Mary and Tom pick parking spaces at random. (All pairs of parking spaces are equally likely.) What is the probability that there is at most one empty parking space between them? (Express your answer using standard notation.)

$(4*n-6) / (n*(n-1))$


Answer: $(4*n-6)/(n*(n-1))$
Answer:

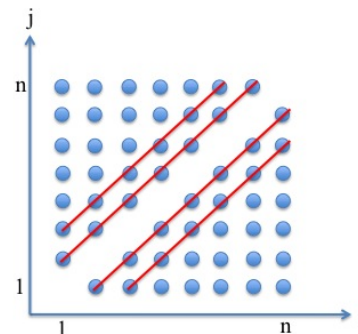
The sample space is $\Omega = \{(i, j) : i \neq j, 1 \leq i, j \leq n\}$, where outcome (i, j) indicates that Mary and Tom parked in slots i and j , respectively. We apply the discrete uniform probability law to find the required probability. We are interested in the probability of the event

$$A = \{(i, j) \in \Omega : |i - j| \leq 2\}.$$

and independence

- ▶ Unit 3: Counting
- ▶ Unit 4: Discrete random variables
- ▶ Exam 1
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- ▶ Unit 9: Bernoulli and Poisson processes

We first find the cardinality of Ω . There are n^2 pairs (i, j) , but since the set Ω excludes outcomes of the form (i, i) , the cardinality of Ω is $n^2 - n = n(n - 1)$.



If $n \geq 3$, event A consists of the four lines indicated in the figure above and contains $2(n - 1) + 2(n - 2) = 4n - 6$ elements. If $n = 2$, event A contains exactly 2 elements, namely, $(1, 2)$ and $(2, 1)$, which agrees with the formula $4(2) - 6 = 2$. Therefore,

$$\mathbf{P}(A) = \frac{4n - 6}{n(n - 1)}.$$

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

You have used 1 of 3 submissions

DISCUSSION

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