4. Parking lot problem

Problem Set due Feb 5, 2020 05:29 IST *Completed*

Problem 4. Parking lot problem

3.0/3.0 points (graded)

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; of course, they must each choose a different space. (All pairs of distinct parking spaces are equally likely.) What is the probability that there is at most one empty parking space between them?

Your answer should be a function of n, entered using <u>standard notation</u> (also available through the "STANDARD NOTATION" button just above the "Submit" button.)

| (4*n-6)/(n*(n-1)) | ✔ **Answer:** (4*n-6)/(n*(n-1)) |

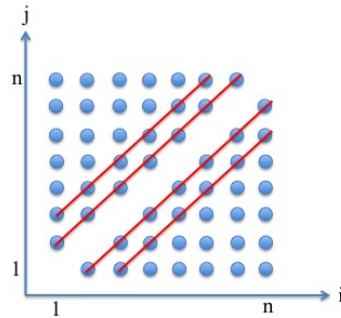$$\frac{4 \cdot n - 6}{n \cdot (n-1)}$$

[STANDARD NOTATION]

Solution:

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

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

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,

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

Submit   You have used 5 of 7 attempts

ⓘ Answers are displayed within the problem

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Please share with me the simplest way to solve this problem!
I spent hours thinking on how to solve this problem but I wasn't able to solve it. I know there is more ...

15

"At most one empty parking space between the parking spaces" should yields |i - j| <= 1 not | i - j| <= 2 in A's definition
"At most one empty parking space between the parking spaces" should yields |i - j| <= 1 not |i - j| <= ...

2

My thought to solve
Given n sequence, if asked to park two side by side(adjacent), without considering order, there has n-...

2

Weird problem specification and weird solution
I am doing this course a bit late so I just started this week. Anyway, in my humble opinion the proble...

2

How many parking spaces?
Are there infinitely many parking spaces available for Tom and Mary to park their cars in with constra...

2

helpful idea-sequencial parking lots
I have solved this in different way. Firstly, I set a sequential parking lots, so this parking space one ro...

1

Did I have to answer P(A) = ...?

2

Is it possible to solve this problem with variable number of people and fixed number of parking spaces?

6

Does the sequence lend itself to some known function?
I've graphically characterized the sample space and manually calculated the probabilities for the sets ...

1 new

How the answer should look like?
I still don't understand how the final answer should look like, any example: is it like this, e.g: n/(n-1)

8

When you think you got it and you mistype it....gar
Yes, wasted time at first using a continuous set assumption. Nice graph, waste of time. Equation work...

2

Can someone explain this combinatorially please?
I approached this problem with the following reasoning: I drew a 2 column table with n rows, one col...

5

To what Solved Problem (TA class) is this problem related to?
Hi, I can't think of a way to relate this problem to the material covered, and as it's really useful to me t...

5