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Lec. 4: Counting

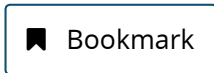
Exercises 4 due Feb 24, 2016 at 23:59 UTC 

Solved problems

Problem Set 3

Problem Set 3 due Feb 24, 2016 at 23:59 UTC 

Unit 3: Counting > Problem Set 3 > Problem 1 Vertical: Alice and Bob's card game




Problem 1: Alice and Bob's card game

(2/2 points)

Alice plays the following game with Bob. First, Alice randomly chooses a set of 4 cards out of a 52-card deck, memorizes them, and places them back into the deck. (Any set of 4 cards is equally likely.) Then, Bob randomly chooses 8 cards out of the same deck. (Any set of 8 cards is equally likely.) Assume that the choice of 4 cards by Alice and the choice of 8 cards by Bob are independent.

What is the probability that all 4 cards Alice chose were also among the 8 cards chosen by Bob?

☒ $\frac{\binom{48}{4}}{\binom{52}{8}}$ 

☐ $\frac{\binom{48}{4}}{\binom{52}{4}}$

- ▶ Unit 4: Discrete random variables
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- ▶ Unit 7: Bayesian inference
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- ▶ Unit 9: Bernoulli and Poisson processes
- ▶ Unit 10: Markov chains

☐
$$\frac{\binom{48}{8}}{\binom{52}{8}}$$

☐
$$\frac{\binom{48}{8}}{\binom{52}{4}}$$

Answer:

Let us fix the 4 cards that Alice gets. Since 4 cards are fixed, Bob must choose 4 more cards out of 48 remaining cards, so the total number of possible hands for Bob that include all of Alice's cards is $\binom{48}{4}$. The total number of possible choices of 8 cards for Bob is $\binom{52}{8}$. Thus, the probability is $\binom{48}{4} / \binom{52}{8}$.

You have used 1 of 2 submissions

Printable problem set available here .

DISCUSSION

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