



3. Forming a committee

Problem Set due Feb 19, 2020 05:29 IST Completed

Problem 3. Forming a committee

2.0/2.0 points (graded)

Out of five men and five women, we form a committee consisting of four different people. Assuming that each committee of size four is equally likely, find the probabilities of the following events:

1. The committee consists of two men and two women.

✓ Answer: 0.476

2. The committee has more women than men.

✓ Answer: 0.262

3. The committee has at least one man.

✓ Answer: 0.976

For the remainder of the problem, assume that Alice and Bob are among the ten people being considered.

4. Both Alice and Bob are members of the committee.

✓ Answer: 0.133

Solution:



The total number of possible committees is $\binom{10}{4}$, as we are selecting a committee of 4 people out of 10 different people.

1. The number of ways that we can choose 2 out of 5 people is $\binom{5}{2}$. Thus, the number of ways that we can choose two men and two women is

$$\binom{5}{2} \times \binom{5}{2}.$$

Therefore, the desired probability is

$$\frac{\binom{5}{2}^2}{\binom{10}{4}} = 10/21 \approx 0.476.$$

2. The committee can consist of 3 women and 1 man, or all 4 women. The corresponding number of possible committees is $\binom{5}{3}\binom{5}{1}$ and $\binom{5}{4}$, respectively. Therefore, the desired probability is

$$\frac{\binom{5}{3}\binom{5}{1} + \binom{5}{4}}{\binom{10}{4}} = 11/42 \approx 0.262.$$

3. The desired probability is 1 minus the probability of the complementary event. The complementary event, that is, the event that the committee consists entirely of women, happens in 5 different ways (choosing the women not in the committee can be done in $\binom{5}{1} = 5$ different ways), and has probability

$$\frac{\binom{5}{4}}{\binom{10}{4}}.$$

Therefore, the desired probability is



$$1 - \frac{\binom{5}{1}}{\binom{10}{4}} = 41/42 \approx 0.976.$$

4. Having fixed Alice and Bob, in order to form a 4-person committee, there are 2 more members to be selected among the 8 remaining people. The total number of ways of doing so is $\binom{8}{2}$, and therefore, the desired probability is

$$\frac{\binom{8}{2}}{\binom{10}{4}} = 2/15 \approx 0.133.$$

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You have used 3 of 3 attempts

i Answers are displayed within the problem

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Why doesn't this approach work?

For problem 1: I get that we can get to the answer by using number of ways in both numerator and den...

4



Why coin tossing example does not work here?

I tried to apply coin tossing example to this problem, that is, 4 sequential coin tosses represent committ...

4



Submit button disabled

Am I allowed to submit an answer on the problem during the unit is active only?

2



[STAFF] Solution to the 4th question of 3rd problem (Forming a committee) seems odd

The solution given says that "Having fixed Alice and Bob, in order to form a 4-person committee, there a...

2



Not clear on how to extend to more than one event

I was able to get parts 1 and 4, but couldn't get 2 and 3. I think I'm not understanding how to extend the ...

6 new_



2)The committee has more women than men.

Interestingly, the only possible outcome for this particular situation is 3 women and 1 man. But probabili...



💬 Hint

In the last problem, you can forget the distinction between males and females, and make a distinction b...

4

💬 Couldn't get right the 4th

I could not get right the last example although I tried multiples approach. I still struggle a lot to figure ou...

12 new_

? Deadline expires earlier than time displayed in the course!!!!!!!!!!!!!!

4

💬 If I derived my solution for Q2 & Q3 based on answer on Q1

Then how come my answer in Q2 is wrong and Q3 is right? Am I missing something? I understood the sy...

3

💬 Problem 3: 1 and 2

These two have a symmetry relationship that one gives the other and vice versa :D

3

💬 Hint to solve the problem

just watch the video "Hyper-geometric probabilities" in solved problems, then this problem will become...

1

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