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8. Exercise: Counting committees

Exercises due Feb 19, 2020 05:29 IST Completed

Exercise: Counting committees

2.0/2.0 points (graded)

We start with a pool of n people. A chaired committee consists of $k \geq 1$ members, out of whom one member is designated as the chairperson. The expression $k \binom{n}{k}$ can be interpreted as the number of possible chaired committees with k members. This is because we have $\binom{n}{k}$ choices for the k members, and once the members are chosen, there are then k choices for the chairperson. Thus,

$$c = \sum_{k=1}^n k \binom{n}{k}$$

is the total number of possible chaired committees of any size.

Find the value of c (as a function of n) by thinking about a different way of forming a chaired committee: first choose the chairperson, then choose the other members of the committee. The answer is of the form

$$c = (lpha + n^eta) \, 2^{\gamma n + \delta}.$$

What are the values of α , β , γ , and δ ?





Solution:

We first choose the chairperson, for which there are n choices, and then choose an arbitrary subset of the remaining n-1 people, who will be the remaining committee members. For example, this arbitrary subset could be the empty set, which would mean that the committee is of size 1: only the chairperson. There are 2^{n-1} possible subsets of a set with n-1 elements, and so there are 2^{n-1} ways of choosing the remaining committee members. Thus, an alternative expression for the number of possible chaired committees of any size is $n2^{n-1}$, from which we can extract the values of α , β , γ , and δ .

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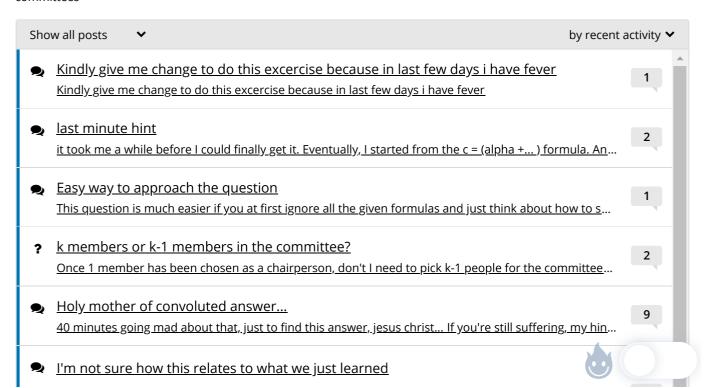
You have used 3 of 3 attempts

1 Answers are displayed within the problem

Discussion

Hide Discussion

Topic: Unit 3: Counting:Lec. 4: Counting / 8. Exercise: Counting committees



	This is the algebra related to what we just did, but does not really relate to what we were actually disc	3
Q	This question would have been much simpler, if it is worded this way **Different ways to form a committee:** **one way:** We start with a pool of n people. A chaired co	1
Q	It's simple, don't be stressed, but be careful In the last minute of the previous video you can understand how to proceed in this equality. But you	1
Q	It is easier than you think At first I thought it was really difficult, but then I start to took the first person who is the chairman. Hi	1
∀	got the first part but how to calculate values of alpha, beta, gamma Lgot the value of c as a function of n. fairly simple with the help of revisiting the lecture still i'm lost at	1 new_
2	If you are stuck, refer to Example 1.31 of the textbook If you are stuck, refer to Example 1.31 of the textbook. You will know what I mean when you see it.	7
2	Don't get intimidated This is kind of an "uh, duh!" once you get it.	2
2	<u>Key observation</u>	2

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