

CS30 (Discrete Math in CS), Summer 2021

Drill 11

Topic: Combinatorics

Instructions

- Please submit all homework electronically in PDF, ideally typeset using LaTeX. If your handwriting is not legible, you may get 0 points.
 - The drills below are supposed to be quick to do and quick to check. If a grader cannot read and understand your solution to a given drill exercise in **1 minute**, you may get a 0.
 - **Collaboration Policy:** You should be able to and indeed should do the drills on your own. Collaboration is not allowed. You can ask clarification questions on Ed Discussion **privately**; the instruction team may choose to make it public. You can refer to the recommended textbook, your own course notes, posted videos, and the posted lecture notes. **Not** the web. When in doubt, consult the instructor.
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For the following problems give a short reason for your answer. The final numeric value is not important; you can leave your answer as a product of things, and use binomial coefficients. If you are using the Four-Fold Formula, clearly state which case you are using, why that should be the case, and what “ n ” and “ k ” are in your case. Each question has one point for the answer and one for the reason: reason well.

You are free to verify your answers by writing code and checking – but please don’t give that as a reason.

Exercise 1. (2 points)

After the CS 30 finals, all 55 of the students enrolled in the class decide to go on a vacation. There are 5 possible destinations: Aruba, Barbados, Costa Rica, Dominican Republic, and Ecuador. However, each student must tell Dartmouth where they are going, and Dartmouth forms a table with two columns: name and destination. How many such different tables are possible where the rows are ordered alphabetically by name?

Exercise 2. (2 point)

You have a budget of 1000 dollars for your spring break, and you have to decide how to spend all of this on (a) travel, (b) lodging, (c) food, and (d) gifts for your CS 30 instructor. You can spend any *exact* dollar amount on any of these activities. How many such budgets are possible?

Exercise 3. (2 points)

When you return back from your vacation, you realize you didn’t sign up for the Fall Term courses. You notice there are 14 courses that you are interested in, but you can choose only 3 for Fall 2021. What is the number of possibilities on the courses you take in Fall 2021?

Exercise 4. (2 points)

In the Fall, you get called for 10 job interviews, but you realize that realistically you can only go to 5 of them. You want to figure out which ones to go to and schedule them on your calendar one after the other. How many such schedules are possible?