CS161

Counting, Permutations, and Combinations
Due: Monday, July 11, 3 PM. No late submissions allowed.
Submission: email electronic copy to the CS 161 email
110 points

General Instructions

Answer the questions in the order given below.
Each question is worth 10 points.

Questions

1. How many people are needed to guarantee that at least two were born on the same day of the week and hour of the day?

2. How many ways are there to select 10 countries in the United Nations to serve on a council if 3 are selected from a block of 30, 4 are selected from a block of 55, and the others are selected from the remaining 65 countries?

3. How many license plates can be made using either three digits followed by three letters or three letters followed by three digits?

4. How many subsets of a set with 100 elements have more than one element?

5. How many initials that contain three letters and begin with an M or an N are there? Assume that only capital letters are being used.

6. Let S and T be finite sets such that $|S| > |T|$ and let $f: S \rightarrow T$ be a function. Show that there exist elements s_1, s_2 in S such that $f(s_1) = f(s_2)$. This shows that f cannot be one-to-one.

7. Let n be a positive integer ($n > 1$). How many functions are there from the set {1, ..., n} to the set {0, 1} such that f assigns 0 to both 1 and n.

8. How many permutations of the letters ABCDEFGH contain the string BCD?

9. How many subsets with an odd number of elements does a set with 10 elements have?

10. A department has 7 men and 10 women. How many ways are there to form a committee of five members if it must have more women than men?

11. How many license plates consisting of three letters followed by three digits can you have such that each letter and digit appears at most once?