15B11CI212 – Theoretical Foundations of Computer Science

Tutorial 10

Counting and Combinatorics

Q1. Find the number m of ways that 7 people can arrange themselves:

(a) In a row of chairs;

(b) Around a circular table.

Q2. Find n if P (n, 2) = 72. , where P stands for permutation.

Q3. A class contains 10 students with 6 men and 4 women. Find the number n of ways to:

(a) Select a 4-member committee from the students.

(b) Select a 4-member committee with 2 men and 2 women.

(c) Elect a male president, vice president, and treasurer.

Q4. A box contains 8 blue socks and 6 red socks. Find the number of ways two socks can be drawn from the box if:

(a) They can be any color.

(b) They must be the same color.

Q5. Teams A and B play in a tournament. The first team to win three games wins the tournament. Find the number n of possible ways the tournament can occur.

Q6. There are 22 female students and 18 male students in a classroom. Find the total number t of students.

Q7. Suppose among 32 people who save paper or bottles (or both) for recycling, there are 30 who save paper and 14 who save bottles. Find the number m of people who:

(a) save both;

(b) save only paper;

(c) save only bottles.

Q8. Find the minimum number n of integers to be selected from S = {1, 2,..., 9} so that:

(a) The sum of two of the n integers is even.

(b) The difference of two of the n integers is 5.

Q9. Find the minimum number of students needed to guarantee that five of them belong to the same class (Freshman, Sophomore, Junior, Senior).

Q10. Let L be a list (not necessarily in alphabetical order) of the 26 letters in the English alphabet (which consists of 5 vowels, A, E, I, O, U, and 21 consonants).

(a) Show that L has a sublist consisting of four or more consecutive consonants.

(b) Assuming L begins with a vowel, say A, show that L has a sublist consisting of five or more consecutive consonants.