CSC281: Discrete Math for Computer Science

Computer Science Department — Second Semester 1441/1442

King Saud University — Tutorial 11: The Basics of Counting+ The Pigeonhole Principle

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Question 1. There are 18 mathematics majors and 325 computer science majors at a college.

a) In how many ways can two representatives be picked so that one is a mathematics major and the other is a computer science major?

b) In how many ways can one representative be picked who is either a mathematics major or a computer science major?

Question 2. How many strings of five ASCII characters contain the character @ (at sign) at least once? [Note: There are 128 different ASCII characters.

Question 3. How many positive integers less than 1000*

a) are divisible by 7?

b) are divisible by 7 but not by 11?

c) are divisible by both 7 and 11?

d) are divisible by either 7 or 11?

e) are divisible by exactly one of 7 and 11?

f) are divisible by neither 7 nor 11?

g) have distinct digits?

h) have distinct digits and are even?

Question 4. How many license plates can be made using either three digits followed by three uppercase English letters or three Arabic letters followed by three digits?*

Question 5. How many strings of eight English letters are there

a) that contain no vowels, if letters can be repeated?

b) that contain no vowels, if letters cannot be repeated?

c) that start with a vowel, if letters can be repeated?

d) that start with a vowel, if letters cannot be repeated?

e) that contain at least one vowel, if letters can be repeated?

f) that contain exactly one vowel, if letters can be repeated?

g) that start with X and contain at least one vowel, if letters can be repeated?

h) that start and end with X and contain at least one vowel, if letters can be repeated?

Question 6. Show that if there are 30 students in a class, then at least two have last names that begin with the same letter.*

Question 7. A room contains 10 men and 10 women. A manger selects members of team at random without looking at them.

a) How many member must the manger select to be sure of having at least three members of the same gender?

b) How many member must the manger select to be sure of having at least three women in the team?*

Question 8. Show that among any group of five (not necessarily consecutive) integers, there are two with the same remainder when divided by 4.