CS 311: Discrete Structures  
Spring 2004

Homework 1. Due Tuesday, January 20, 2003

Question 1 Consider the permutations of the letters ”ABCDE”.
(a) How many permutations are there?
(b) How many starting with ”C”? How many starting with ”D”?
(d) List all permutations starting with ”A” and ending with ”B” in lexicographic order.
(e) (hard) How many permutations have ”A” before ”B”?

Question 2 ”License-plate” problems
(a) How many strings of length 4 can you make from the letters ”race”?  
(b) Same as part (a), but do not allow a letter to be repeated.  
(c) How many phone numbers start with 584 or 599?  
(d) How many lunches can you make from 5 possible drinks, 3 possible sandwiches,  
4 possible side dishes, and 6 possible desserts (assuming you order one of each).  
(e) Same as part (d), but what if you are allowed to skip dessert and/or side dish?

Question 3 How many permutations are there of ”aabbc”? List them in lexicographic order.  

Question 4
(a) How many ways can you choose 5 students from 10 to go to a contest?  
(b) How many ways can you choose 5 students from 10 to play distinct parts in  
(c) How many ways can you choose 5 students from 10 students to go to a contest  
   if the smartest student must be chosen?

Question 5
(a) Show that \( \binom{n}{2} = \frac{n(n-1)}{2} \).  
(b) Show that \( \binom{n}{3} \geq \frac{(n-2)^3}{6} \).