MA202:004 Problem set 8

March 25, 1999

Below are some additional problems on probability and related counting problems. I hope that we can work on some of these problems on Thursday and continue next Tuesday. These problems will be due on Tuesday, 6 April.

1. In the last class, the question arose as to whether we should count a 1 on the first dice and a 2 on the second dice as a distinct outcome from a 2 on the first dice and a 1 on the second dice.

   Of course, you can find out the answer to this question by looking at the examples in the textbook.

   One way to look at this question is to ask if the outcome of a 2 on one dice and a 1 on the other dice occurs with the same probability as obtaining a 1 on both of the dice.

   (a) Design and conduct an experiment to see if the outcome of a 2 and a 1 (in any order) when we roll two dice has the same empirical probability as the outcome of obtaining 1's on both dice.

   (b) What does your experiment tell you about the set of outcomes to use in problem 2 on set 7.

2. Suppose we roll a 5 sided dice, a 12 sided dice and a 20 sided dice. How many outcomes are possible?

3. What is GCD($n!$,$(n+1)!$)?

4. List all the permutations of the letters in FACT. Describe a systematic way of constructing this list.

5. Let P be the number of permutations of 15 different letters. What is the number of permutations of 16 different letters? Express your answer in terms of P. Based on the systematic way you found for constructing the list of permuations in the previous problem, explain why your answer is correct.

   By the number of permutations of n letters, I mean the number of arrangements of all n of these letters.

6. (The Monty Hall problem) Suppose that you are on the game show "Let's make a deal". In this show, you are given the opportunity to select one of three doors. Behind one of the doors is a new Chevy Blazer and behind the other two doors are \$50 worth of potato chips. After you make your selection, the host of the show opens one of the doors that you did not select to reveal \$50 worth of potato chips. (Can he always do this?) Then, you are given the opportunity to

switch from the door you originally selected, to the remaining unopened door.

Is it in your best interest to switch? Explain why or why not. Compute the probability of winning with and without the switching strategy in order to explain your answer. Assume that you prefer a new Chevy Blazer to $50 worth of potato chips.