Name (PRINTED): ____________________

Student ID #: ____________________

Section # (or TA's: name and time) ____________________

CMSC 250 Quiz #11 ANSWERS Wed., Nov. 10, 2004

Write all answers legibly in the space provided. The number of points possible for each question is indicated in square brackets – the total number of points on the quiz is 30, and you will have exactly 15 minutes to complete this quiz. You may not use calculators, textbooks or any other aids during this quiz. In order to receive any partial credit, you must show your work.

1. [15 pnts.] Assuming you have 2 distinduishable **6-sided** dice - where one is yellow and the other is white, answer the following questions. Give your answers to the questions on this page by giving actual numerical (integer or rational number) answers.

   a. How many different values are possible as sum of the two dice?
   ANSWER: 11 different values $\{2, 3, 4, 5, 6, ..., 12\}$

   b. What is the probability that you will roll a 12 as the sum of the two dice?
   ANSWER: $\frac{1}{36}$

   c. What is the probablility that you will roll a 7 as the sum of the two dice?
   ANSWER: $\frac{6}{36} = \frac{1}{6}$

   d. What is the probability that the value on the yellow die is larger than the value shown on the white die.
   ANSWER: $\frac{15}{36}$

   e. Assuming you throw the yellow die three times sequentially, what is the probability that you will get the same value on all three rolls of that one die?
   ANSWER: $\frac{1}{36} = \frac{6}{6^3}$

↓ TURN OVER ↓

2. [15 pnts.] Assume you are in charge of a field trip for a group of very young children. There are 12 children going on the field trip along with three chaperones (adults). The restrictions from any single item within this question do not affect any of the other parts. [Note: You are not actually attending the field trip, you are just the organizer to a high level of detail.]

   a. How many ways can you arrange all 15 people attending the field trip into a single file line so that they can board the bus?
   ANSWER: 15!

   b. If there must be one chaperone at the beginning of the line and one chaperone at the end of the line, how many ways can you put them into a single file line so that they can board the bus?
   ANSWER: $3! \cdot 13!$

   c. Heather and Joshua are the two most difficult children in your class. These two children can not be together in the line or you will have problems. If you created the line of 15 people completely randomly, what is the probability that they are together?
   ANSWER: $\frac{2 \cdot 14!}{15!}$

   d. Alice, Carol and Mike are frightened about riding the school bus. Each of them needs to stand in line next to their own (individual) chaperone. [By this I mean this one chaperone is taking care of this one child - not two of these frightened children.] With this extra restriction, how many ways can the line be made - remember the chaperones can be anywhere within the line of children, but each chaperone must be next to the frightened child they are taking care of.
   ANSWER: $3! \cdot 12! \cdot 2 \cdot 2 \cdot 2 =$
   3! refers to the number of ways to assign a child to a chaperone.
   12! is the ways to line up the children (assuming the frightened children have their chaperone with them.
   the three 2's are the ways to position the child/chaperone order.

   e. When you stop for lunch, you arrange the children in a circle (the chaperones must help many children so do not get to sit down to eat). How many different circles can you arrange them into if Heather and Joshua can not sit together at lunch time.
   ANSWER: $11! - 2(10!)=$
   11! is the ways to organize the circle with no restriction
   the 10! is the ways to organize them assuming Joshua and Heather are next to each other
   the 2 is because Joshua may be on Heather's right or left

   f. You are finally back from the fieldtrip. The parents are at school to pick up the children. You are so tired that you decide it doesn't matter which child goes with which parent (each parent takes one child and only one child). If there are 12 parents waiting, how many different ways can you assign your 12 children to these 12 parents. [Assume you ignore the objections of the parents.]
   ANSWER: 12!