Name (PRINTED): ____________________

Student ID #: ____________________

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

CMSC 250 Quiz #11 ANSWERS Wed., April 14, 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.

1. [15 pnts.] Assuming you have 3 indistinduishable **4-sided** dice, answer the following questions. You may assume each die has a 1, 2, 3, 4 on the four sides. Give your answers to the questions on this page by giving actual numerical answers.

   a. How many differnt values are possible as sum of all 3 dice?
   ANSWER: 10 = 12-3+1

   b. What is the probability that you will roll a 5 as the sum of the three dice?
   ANSWER: $\frac{3}{32} = \frac{6}{64} = \frac{6}{4*4*4}$

   c. What is the probablility that you will roll a 13 as the sum of the three dice?
   ANSWER: 0

   d. What is the probability that all three values (one on each die) will match? (In other words: that all of the dice will land with the same side up.)
   ANSWER: $\frac{1}{16} = \frac{4}{64}$

   e. What is the probability that at least two of the values shown will match? (In other words: when you throw all three dice, two or more will land with the same side up.)
   ANSWER: $\frac{5}{8} = \frac{40}{64}$
   One way of thinking about it:
   Ways that 1st and 2nd match but not third $= 4 * 1 * 3 = 12$
   Ways that 1st and 3rd match but not second $= 4 * 3 * 1 = 12$
   Ways that 2nd and 3rd match but not 1st $= 3 * 4 * 1 = 12$
   Ways all three match $= 4 * 1 * 1 = 4$
   Summing these you get 40 ways to have at least two match
   over the possible dice rolls which is 64 (4*4*4)

↓ TURN OVER ↓

2. [15 pnts.] Assume you are in charge of lining people up to jump from an airplane during a sky diving lesson. You have 5 sky-diving students to schedule where three are female and two are male. You must assume they must jump individually (no two jumping at the same time). Answer the following questions assuming each question is independent of the others. You only have to take the answer to a single algebraic statement that includes fractions, factorials, exponents, addition, subtraction and multiplication.

   a. How many ways can you arrange the five students so that everyone jumps assuming there are no other restrictions?

      ANSWER: $5! = 5 * 4 * 3 * 2 * 1$

   b. If you assume they must alternate, (girl, boy, girl, boy, girl), how many ways can you arrange the five sutdents so that everyone jumps?

      ANSWER: $12 = 3 * 2 * 2 * 1 * 1$

   c. If you assume the boys act silly and try to out perform each other if the two of them jump consecutively, how many ways can you arrange them so that the boys do not jump immediately after one another but all students do jump? (In other words: there must be at least one girl between the two boys.)

      ANSWER:$5! - 2 * 4!$

   d. If you assume the girls want to jump where the three of them are consecutive, how many ways can you arrange them so that the three girls can jump consecutively, and all students jump?

      ANSWER: $3! * 3!$

   e. What is the probability that the three girls will jump consecutively if you make the order completely at random?

      ANSWER: $\frac{3}{10} = \frac{3! * 3!}{5!}$

   f. What is the probability that the two boys will jump consecutively if you make the order completely at random?

      ANSWER: $\frac{2}{5} = \frac{2 * 4!}{5!}$