36-220 Lab#2 Probability

Week of September 12, 2005

Please write your name below, tear off this front page and give it to a teaching assistant as you leave the lab. It will be a record of your participation in the lab. Please remember to include your section (A, B or C). Keep the rest of your lab write-up as a reference for doing homework and studying for exams. **Name:**

Section:

- The symbol ***** at the beginning of a question means that, after you answer that question, you should raise your hand and have either the TA or lab assistant review your answer. Once they have reviewed your work they will place a check in the appropriate space in the table below. The purpose of this check is to be sure you have answered the question correctly.
- Try to complete as much of the lab exercise as possible. We understand that students work at different paces and have tried to structure the exercise so that it can be completed in the allotted time. If you work systematically through the handout and still don't complete every question don't worry. The important thing is that you understand what you are doing. Nonetheless, you are encouraged to complete the lab on your own.

Check-Problem 🌲	Instructor's Initials
Question 1a	
Question 2b	
Question 3c	

$\begin{array}{c} \textbf{36-220 Lab \#2} \\ \textbf{Probability} \end{array}$

Today's lab consists only of paper and pencil probability exercises. You will not need to use the computer. You are encouraged to interact with the students around you, as well as ask the TA's any questions you have. For some questions, the answers are provided, but the TA's can check the answers to any of the others.

- 1. Your company prepares to send a shipment of 1,000 widgets. Based on past experience, you know that this customer will be very upset if there are 10 or more defectives in the shipment. Your boss says, "Test 50 of the widgets prior to shipping. If there are no defectives, go ahead with the shipment."
 - (a) (♣) Suppose there are really 10 defectives in the shipment. What is the chance that there will be no defectives in the group of 50 that you test? (.597)
 - (b) Comment on your boss's strategy. What recommendation would you make?

2. I have two standard, six-sided dice, i.e. they have sides numbered from one to six. I also have two six-sided dice that are non-standard in the following way: The sides are not numbered from one to six. Instead the six sides of dice "A" and "B" are as follows:

For these problems, think of listing all of the possible **equally likely outcomes**.

(a) If I tossed the two **standard dice**, what is the probability they come up with a sum of 8?

(b) (**♣**) If I toseed the two **standard dice**, what is the probability at least one will come up "3"?

(c) The two **non-standard dice** are tossed. What is the probability that die "A" comes up with a larger value than die "B"?

- 3. Suppose you have 52 cards of the same size, but 13 of them are blue, 13 are red, 13 are yellow and 13 are brown. Further, the blue cards are numbered from 1 to 13, as are the red, yellow, and brown. You choose five cards at random.
 - (a) What is the probability that three cards are blue, and two cards are brown? (0.00858)

(b) What is the probability that all five cards are the same color? (0.00198)

(c) (♣) What is the probability the five cards all have different numbers?
(0.507)

(d) What is the probability that among the five cards there are **exactly two** different numbers? (i.e. "full house" or "four-of-a-kind") (0.00168)

(e) **Special Challenge:** What is the probability that among the five cards there are **exactly three** different numbers? (i.e. "two pairs" or "three-of-a-kind") (0.0687)