CS206 **June 21,1994**

TEST 1

Instructions: Do all your work in the blue examination booklets. Answer the questions IN THE GIVEN ORDER. You may use books and notes, but all work must be your own. Show *ALL* your work. You will get *little* or *no* credit for an unexplained answer - I am interested in how you think about the problems. The value of each question appears in parentheses. Use this as a guide in allocating your time. An asterisk (*) denotes a more challenging one.

1. There are 10 Freshmen, 8 Sophmores, 7 Juniors, and 5 Seniors in a club. A committee of 6 people is chosen at random.
   (a) (5 pts) Carefully describe the sample space S, and find $|S|$, its size.
   (b) (5 pts) Find the probability (using equally likely probability measure P) of $A = \{$every senior is on the committee$\}$.
   (c) (5 pts) Find the probability of $B = \{$no sophmores are chosen$\}$.
   (d) (5 pts) Find the probability of $C = \{$at least one junior is chosen$\}$.
   (e) (5 pts) Are B and C independent?
2. A fair die is tossed 5 times.
   (a) (5 pts) Carefully describe the sample space, S, find $|S|$, and state what probability measure you will use on S. Explain your choice of P.
   (b) (5 pts) Find the probability of $A = \{$all tosses are different values$\}$.
   (c) (5 pts) Find the probability of $B = \{$all tosses are even numbers$\}$.
   (d) (5 pts) Find the probability of $C = \{$a full house; i.e., you get three tosses with one value and two tosses with another value$\}$.
   (e) (5 pts) Now suppose the die was tossed 7 times. Find the probability of $D = \{ALL$ values appear$\}$.
3. We have the hatcheck experiment with $n = 6$ people.
   (a) (5 pts) Find the probability that persons 1 and 2 get their own hats.
   (b) *(5 pts) Find the probability that exactly 4 people get their own hats.
   (c) *(5 pts) Find the probability that exactly 3 people get their own hats.