Midterm 1A–Stat 100–Spring 2001

You may use calculators, but not books or notes. Different parts of a problem have equal weight unless otherwise indicated. Do not spend too much time on any one problem. Put a box around the final answer to a question.

1. (20 points) Suppose the probability that A occurs is 0.5, the probability that B does not occur is 0.3, and the probability that A or B occurs is 0.9.
(a) What is $P(B)$?
(b) What is $P(A \cap B)$?
(c) What is $P(B \cap \overline{A})$?
(d) What is the probability that A does not occur and B does not occur?

2. (20 points) An urn contains two green balls, three red balls and five white balls. Suppose two balls will be drawn at random, one after the other without replacement. Let A be the event that a green ball appears in the first draw, and let B be the event that a green ball appears in the second draw.
(a) What is $P(A)$?
(b) What is $P(B)$?
(c) What is $P(A|B)$?
(d) Are A and B independent? Briefly justify your answer.

3. (20 points) A group of tourists consists of 13 students and 7 parents. Five people will be selected at random for a side trip.
(a) What is the probability that all five selected are parents?
(b) What is the probability that 3 students and 2 parents are selected?

4.(15 points) At a certain restaurant, the number (X) of persons in a party has the following probability distribution ($f(x)$ denotes the probability that $X = x$).

x	1	2	3	4	5	6
$f(x)$	0.2	0.3	0.1	0.2	0.1	0.1

(a) What is the probability that a party contains at least two people?
(b) Compute E(X), the expected number of people in a party.
(c) Estimate the total number of persons served in the next 100 parties.

5. (15 points) For each case below, write "BERNOULLI" or "NOT BERNOULLI" according to whether repetitions of the stated experiment conform to the model of Bernoulli trials.
(a) Flip a fair coin and record heads or tails.
(b) Roll a fair die and observe the number that comes up.
(c) Roll a loaded die and observe whether or not the number 6 shows up.

6. (10 points) Answer True or False for each part.
(a) $P(A|B) = 1/P(B|A)$.
(b) If $E(X) = 7$ and $Y = X + 3$, then $E(Y) = 21$.