Midterm 1B–Stat 100–Spring 1997

You may use calculators, but not books or notes. Each problem is worth 20 points. 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. (a) (15 pts.) Given is the sample data: $2, 4, 5, -5, -1$. For this data, calculate the sample mean, sample standard deviation, and median.
(b) (5 pts.) Suppose that data $x_1, x_2, \ldots x_n$ has sample standard deviation equal to 6. What is the sample standard deviation of the data $3x_1,\ 3x_2,\ \ldots\ 3x_n$?

2. Suppose A, B, and C are events such that $P(A) = .5, P(B) = .8, P(C) = .7$, and $P(A|B) = .6$.
(a) Find $P(AB)$.
(b) Find $P(A \cup B)$.
(c) Find $P(B|\overline{A})$.
(d) Can A and C be mutually exclusive? Why or why not?

3. Fifty high school students enter a random drawing for two prizes. The first person drawn will win \$500, and the second person drawn will win \$100. Suppose that 10 of the students are freshman, 15 are sophomores, and 20 are juniors.
(a) What is the probability that no freshman wins a prize?
(b) Suppose the first prize is won by a senior. Then what is the probability the second prize will be won by a junior?

4. Let X be the face shown by a loaded die and assume the following probability distribution:

n	1	2	3	4	5	6
$P([X = n])$	0.1	0.2	0.1	0.4	0.1	0.1

a. What is the probability of rolling an even number?
b. What is the mean (expectation) of X?
c. What is the standard deviation of X?
d. Suppose you play the following game: on each roll, you receive 3 dollars, and you pay out the value shown in dollars. How much do you expect to win or lose if you play 15 times?

5. Suppose a jar contains 5 balls labeled 1 through 5. One after another, 20 people pick a ball at random, announce the number on it and put it back into the jar.

Find the probability of the following events.

a. Ball 2 gets drawn no more than 4 times.
b. Ball 2 gets drawn exactly 7 times.
c. Ball 2 gets drawn at least 6 times.
d. Ball 2 gets drawn by the 7th and again by the 8th person.