1. (15 pts) You are the president of a student group on campus. You are conducting a survey to improve classroom instruction for your statistics class. To do so, you obtain a list of 1500 students who have taken a statistics class in the last two years.
(a) Describe a procedure to find a simple random sample of 500 students.
(b) Use the table of random numbers to obtain the first five students in your sample. (Start with line 132.)

2. Consider the experiment of tossing two regular dice.
(a) Write the sample space S of all possible outcomes. Is it discrete or continuous?
(b) Give the probability model for this sample space. (That is, assign probabilities to each possible outcome.)
(c) Let A be the event that the sum of the dice is 8. Find P(A).
(d) Find the probability that die 1 is 6 and die 2 is odd.
(e) Find the probability that the sum of the die is even.
(f) Find the probability that the sum of the dice is not seven.

3. Describe the two most important concepts from chapters 8 and 9 about how to design an experiment that will be valid statistically.

4. The number of accidents per week at a hazardous intersection varies with mean 2.2 and standard deviation 1.4. This distribution takes only whole-number values, so it is certainly not Normal. Let \( \bar{x} \) be the mean number of accidents per week at the intersection during a year (52 weeks). What is the approximate distribution of \( \bar{x} \)?

5. The daily study times of students follows a normal distribution with unknown mean \( \mu \) and a standard deviation of 20 minutes. A sample of 60 students is taken and it is found that the sample mean
is 130 minutes.
(a) What conditions need to be met before you can do statistical inference on this data?
(b) Find 80%, 85%, 90%, 95%, 99% confidence intervals for the mean study time $\mu$.

(c) Students claim to study 120 minutes per day. Test the hypothesis $H_0: \mu = 120$ against the two-sided alternative at the 5% significance level and state your conclusion.
(d) Suppose that you want a specified margin of error of 12 minutes in your confidence interval. What must your sample size be to achieve this margin of error?

7. Suppose that you want a specified margin of error of 5.1 in your 95% confidence interval for some measurement. Assume the population standard deviation is 16. What must your sample size be to achieve this margin of error?