**Test** **CSci 154** **13 March 2002**

All questions are equally weighted.

1. You are rolling a pair of dice and counting the totals. So far, you have rolled 7 three times in a row. What is the probability you will roll 7 next time?

2. You are rolling 5 dice, as in our Yahtzee examples. You have 5,6,6 and you have one more roll of 2 dice to get a total of 25 or more. What is the probability that you will make it?

3. On four flips of a fair coin, what is the probability of getting exactly two heads?

4. Let X be the number of successes on 16 Bernoulli trials, with probability 0.25 of success on each trial. Find the mean and variance.

5. Given the probability function p(0) = 0.4, p(1) = 0.3, p(2) = 0.2, p(3)= 0.1, p(x) = 0.0 otherwise, find the mean and the variance.

6. For a certain statistical random sample of size 100, the sample mean was 143.6 and the sample standard deviation was 100. Find a 95% confidence interval.

7. For the data of problem 7, find a 99% confidence interval.

8. With the data of problem 7, suppose you have a null hypothesis $H_0$:m=150.0. Test this hypothesis at 95%. What is $\alpha$ (probability of type I error)?

9. With the data of problem 7, suppose I want the 95% confidence interval to be sample mean ± 10. Assuming the same standard deviation, how big a sample do I need? (Don't be fanatic; round up.)

10. You are running a successful company selling candy bars. A consultant claims to have data showing that you could increase your sales by wrapping them in a neon lime green package. You are interested in gathering some data to study this possibility. Discuss briefly (but clearly!) type I and type II error in this context. Which seems more important to you?