(1) Two new drugs are tested to see if either significantly improves cholesterol levels in patients. The null hypothesis for each drug states that the drug has no effect on cholesterol levels. A researcher performs a hypothesis test for the first drug and finds that the P-value is 0.03. He performs a hypothesis test for the second drug and finds that the P-value is 0.002. He concludes that the second drug will have a larger effect on cholesterol levels of individual patients. Is this a valid way to interpret the two P-values?

(2) Chapter 21, question 21 (testing cars), p. 522  [#13 in 2nd edition, p. 523]

(3) Chapter 21, question 23 (testing cars), p. 523  [#15 in 2nd edition, p. 523]

(4) Chapter 21, question 16 (spam email), p. 522  [not in 2nd edition]

(5) Chapter 21, question 18 (spam email), p. 522  [not in 2nd edition]

(6) A psychic researcher, Geri Uller, tests 50 student volunteers for psychic ability. Each student performs 300 trials; in each trial, the student is asked to guess which of five symbols Geri is psychically transmitting to him or her. Geri will declare a student to have psychic ability if the student can guess the symbols at a rate significantly higher than would be expected by chance (i.e., the student has to be right significantly more than 1/5 of the time). To determine whether the student has guessed significantly better than chance, Geri uses a hypothesis test using an alpha level of .05.

Suppose Geri finds that two of the 50 students guess significantly better than chance and declares that they have true psychic ability. Is this convincing evidence that some students have psychic ability?

(7) You suspect that a particular coin is loaded—that is, it is not equally likely to land heads or tails. You decide to test this hypothesis by flipping the coin 100 times and counting the number of heads and tails.

(a) Let $p$ denote the probability that the coin lands heads. State the null and alternative hypotheses in terms of $p$.

(b) What constitutes a Type I error in this situation? What constitutes a Type II error in this situation?

(c) You decide that you will conclude that the coin is loaded if you observe 55 or more, or 45 or fewer heads out of the 100 flips. Using this rule, what would your probability of a Type I error be?

(d) This test corresponds to using an alpha level that is different from .05. What is the alpha level corresponding to this test?

(e) Suppose the coin is in fact loaded so that its probability of landing heads is .60. What is the power of this test? (Hint: calculate the probability of rejecting $H_0$ when $p = .60$.)

(f) What is your probability of making a Type II error?

(g) If you want to reduce your chances of making both a Type I and Type II error, what would you need to do?