AP Stats. Ch.4 Review Problems

1. The Hemlock Woolly Adelgid is an insect that has accidentally been released in Eastern U.S. forests from Asia. Since it has no natural enemies in the U.S., it is spreading rapidly. A forester studying the abundance of the insect in southern Vermont wants to determine if it has spread that far north. He randomly selects 200 hemlock trees in a large Vermont forest and finds that 46 of them show signs of damage from this insect. It would be appropriate to generalize the results of the study to
   (a) all hemlock trees in southern Vermont.
   (b) all trees in southern Vermont.
   (c) the 200 hemlock trees that were randomly selected
   (d) all hemlock trees in the United states.
   (e) all hemlock trees in the forest from which the 200 trees were selected.

2. Which of the following is a method for improving the accuracy of a sample?
   (a) Use no more than 3 or 4 words in any question.
   (b) When possible, avoid the use of human interviewers, relying on computerized dialing instead.
   (c) Use large sample sizes.
   (d) Use smaller sample sizes.
   (e) Ask only questions for which the responses are quantitative variables.

3. We say that the design of a study is biased if which of the following is true?
   (a) A racial or sexual preference is suspected.
   (b) Random placebos have been used.
   (c) Certain outcomes are systematically favored.
   (d) The correlation is greater than 1 or less than −1.
   (e) An observational study was used when an experiment would have been feasible.

4. A sample of student opinion at a Big Ten university selects an SRS of 200 of the 30,000 undergraduate students and a separate SRS of 100 of the 5,000 graduate students. This kind of sample is called a
   (a) simple random sample.
   (b) simple random sample with blocking.
   (c) multistage random sample.
   (d) stratified random sample.
   (e) random cluster sample.

5. A recent survey by a large-circulation Canadian magazine on the contribution of universities to the economy was circulated to 394 people who the magazine decided “are the most likely to know how important universities are to the Canadian economy.” The main problem with using these results to draw conclusions about the general public’s perception is
   (a) insufficient attention to the placebo effect.
   (b) no control group.
   (c) lack of random assignment.
   (d) lack of random selection.
   (e) response bias.

6. For a certain experiment you have 8 subjects, of which 4 are female and 4 are male. The name of the subjects are listed below:
   **Males:** Atwater, Bacon, Chu, Diaz  **Females:** Johnson, King, Liu, Moore
   There are to be two treatment groups, A and B. If a randomized block design is used, with the subjects blocked by their gender, which of the following is not a possible group of subjects for treatment group A?
   (a) Atwater, Chu, King, Liu
   (b) Bacon, Chu, Liu, Moore
   (c) Atwater, Diaz, Liu, King
   (d) Atwater, Bacon, Chu, Johnson
   (e) Atwater, Bacon, Johnson, King
7. A Texas school district wants to compare the effectiveness of a standard AP Statistics curriculum and a new “hands-on” AP Statistics curriculum. Two experienced teachers, Mr. Pryor and Mr. Legacy, each teach one class with the standard curriculum and one with the new approach. Students are assigned at random to these four classes. At the end of the year, all students take the AP Statistics exam. The subjects in this experiment are
(a) Mr. Pryor and Mr. Legacy.
(b) the two AP Statistics curricula.
(c) the students in the four classes.
(d) all students taking AP Statistics in Texas.
(e) only one: AP Statistics.

8. The Texas experiment described in the previous question
(a) has one factor: the type of AP Statistics curriculum a student is assigned to.
(b) has two factors: the type of AP Statistics curriculum and the teacher a student is assigned to.
(c) has two factors: the standard curriculum and one with the hands-on approach.
(d) has three factors: the type of AP Statistics curriculum, the teacher, and the class a student is assigned to.
(e) has three factors: the standard curriculum, the hands-on approach, and the teacher a student is assigned to.

9. A materials engineer wishes to compare the durability of two different types of paving material. She has 40 different one-mile stretches of interstate highway that she’s been authorized to repave for this study. She decides to carry out a matched pairs experiment. Which of the following is the best way for her to carry out the randomization for this study?
(a) Use a table of random digits to divide the 40 roadways into 20 pairs and then, for each pair, flip a coin to decide which pavement to use on which member of the pair.
(b) Subjectively divide the 40 roadways into 20 pairs (making the roadways within each pair as different as possible) and then, for each pair, flip a coin to decide which pavement to use on which member of the pair.
(c) Use a table of random digits to divide the 40 roadways into two groups of twenty, and then use the table of random digits a second time to decide which pavement to use on which group.
(d) Let each of the 40 roadways act as its own pair, dividing each roadway into the first half-mile and the second half-mile. Flip a coin for each of the 40 roadways to decide which half-mile gets which pavement.
(e) Let each of the 40 roadways act as its own pair, dividing each roadway into the first half-mile and the second half-mile. Flip a coin once to decide which pavement is put on the first half-mile of all the roadways.

10. An article in the student newspaper of a large university had the headline “A’s swapped for evaluations?” The article included the following:
According to a new study, teachers may be more inclined to give higher grades to students, hoping to gain favor with the university administrators who grant tenure. The study examined the average grade and teaching evaluation in a large number of courses in order to investigate the effects of grade inflation on evaluations. “I am concerned with student evaluations because instruction has become a popularity contest for some teachers,” said Professor Smith, who recently completed the study.
Results showed that higher grades directly corresponded to a more positive evaluation.

Which of the following would be a valid conclusion to draw from the study?
(a) A teacher can improve his or her teaching evaluations by giving good grades.
(b) A good teacher, as measured by teaching evaluations, helps students learn better, resulting in higher grades.
(c) Teachers of courses in which the mean grade is above average apparently tend to have above-average teaching evaluations.
(d) Teaching evaluations should be conducted before grades are awarded.
(e) All of the above.
11. In a 1995 Corporation for Public Broadcasting poll of TV viewership, one question was, “A recent study by a psychology professor at a leading university concluded that the amount of violence children see on television has an effect on their likelihood of being aggressive and committing crimes. From what you have seen or heard about this subject, do you agree strongly with that conclusion, agree somewhat, or disagree strongly?” Is this question appropriate, or is it flawed in some way? Comment briefly.

12. The Student Council has been asked to determine the attitude of the students at your school toward a new dress code policy. Joe, a member of the council who is taking AP Statistics, decides to send a questionnaire to an SRS of 100 students. Eighty-seven students return the completed questionnaire. Joe decides to randomly select 13 additional students to serve as replacement subjects to complete the sample of 100. Is Joe’s sampling method appropriate? Briefly comment on the merits of this method or its pitfalls.

13. Here’s a quick and easy way to randomize. You have 100 subjects, 50 women and 50 men. Toss a coin. If it’s heads, assign the men to the treatment and the women to the control group. If the coin comes up tails, assign the women to the treatment and the men to control. This gives every individual subject a 50-50 chance of being assigned to treatment or control. Is this a reasonable way to randomly assign subjects to treatment groups? Explain your reasoning.

14. Does ginkgo improve memory? The law allows marketers of herbs and other natural substances to make health claims that are not supported by evidence. Brands of ginkgo extract claim to “improve memory and concentration.” A randomized comparative experiment found no statistically significant evidence for such effects. The subjects were 230 healthy volunteers over 60 years old. They were randomly assigned to ginkgo or a placebo pill (a dummy pill that looks and tastes the same). All the subjects took a battery of tests for learning and memory before treatment started and again after six weeks.

(a) The study was double-blind. What does this mean?

(b) Comment briefly on the extent to which results of this study can be generalized to some larger population, and the extent to which cause and effect has been established.

(c) Explain why it is advantageous to use 230 volunteers in this study, rather than, say, 30.

(d) Explain what the expression “no statistically significant evidence” means in the context of this study.

(e) Using the random digits below (starting at line 103), choose the first four members of the ginkgo group. Explain your method.

103 45467 71709 77558 00095 32863 29485 82226 90056
105 52711 38889 93074 60227 40011 85840 48767 52573
106 95952 94007 69971 91841 60779 53791 17297 59335
107 68417 35013 15529 72765 85869 57067 50211 47487