AP Statistics   Name _____
Review Ch. 4

1. A study of which candidate city residents planned a vote for in an upcoming election would be
considered biased if
  a. individuals were selected randomly to participate from a list of city registered voters
  b. every 50th person on a registered voters list was contacted and asked to identify who
  they would vote for in the upcoming election.
  c. individuals selected to participate from the city list of registered voters were first
  separated by gender and a percentage of males and females, based on their percentage in
  the voter pool, were randomly selected
  d. the participants selected from a list of registered voters were contacted via telephone
  e. two clusters of registered voters from neighborhoods were chosen and the entire cluster
  was surveyed where one cluster was of an urban section and the other suburban section of
  the voter base.

2. Which principle is not a necessary component of a well-designed experiment?
  a. Imposing a treatment
  b. Randomization
  c. Replication
  d. Control
  e. Stratification

3. A study is considered biased when which of the following occurs?
  a. No placebo is used in the study
  b. Systematic sampling is used instead of random sampling
  c. An outcome is systematically favored
  d. No control group is used
  e. The researcher has an interest in the study

4. A garden club wants to use a new fertilizer on their prize petunia patch in hopes of increasing
the number of petunias produced per patch. A club member suggests they set up an experiment to
see if this fertilizer is better than the fertilizer they have used in the previous years. The patch can
be divided into four sections in order to run this experiment. Two of the sections receive more
sun while the other two sections receive more shade. Which would be the best way to assign
fertilizers to the sections for this study?
  a. Number the patches 1-4 and randomly pick two numbers from a hat to receive the new
  fertilizer and the remaining two would get the old fertilizer.
  b. Number the two sections in the sun 1 and 2 and randomly assign the new fertilizer to
  one section and the old fertilizer to the other section. Repeat this process with the shady
  sections.
  c. Randomly assign one fertilizer to the sunny sections and the other fertilizer to the shady
  sections.
  d. Put the new fertilizer down in all four sections then grow a patch of petunias. Once
  these are harvested, repeat the process in all four sections but now with the old fertilizer
  e. Choose either the shady or the sunny section to experiment with and randomly assign
  one fertilizer to the first section and one to the second section.

5. When would the use of a placebo be recommended in an experiment?
    a. When there are sufficient resources to warrant the use of a placebo
    b. If the existing treatment is one that the researcher doesn't want to be included in the study.
    c. If the placebo can be used with animals for the appearance of an alternate treatment.
    d. When there isn't an existing treatment and you want to be sure the subjects feel they are being treated
    e. To make sure the placebo works before using it on other studies

6. Variables are considered to be confounded if
    a. they are both studied as part of the experiment
    b. their effects on the response variable cannot be separated
    c. more than one additional treatment group is included in the experiment
    d. the response variable is controlled by a placebo
    e. randomization wasn't used in setting up the initial experimental study

7. The key difference between an observational study and an experiment is
    a. the number of variables that are being studied
    b. the use of a randomized selection for participation
    c. the ability to replicate the study
    d. the creation of groups of homogenous subjects to study
    e. the application of a treatment to manipulate a variable

8. Which of the following doesn't reflect some form of bias?
    a. Choosing AP students to survey regarding their GPA in determining the average GPS in a school
    b. Polling a group of potential voters outside a Republican campaign office regarding their choice of candidates
    c. Surveying a group of factory workers regarding the fairness of management policies throughout a company
    d. Choosing a stratified random sample of juniors and senior to see which universities they intend to pursue
    e. Asking shoppers leaving a grocery store if they think groceries should cost less

9. A church board wants to survey the members to see which times they prefer to have services. The board wants to insure that members who have families attending as well as members who are single adults are represented in the survey. Which method will yield the best representative sample of their members' opinions?
    a. Send a survey to a random list of 50 members and ask them to return it in a self-addressed envelope that was sent with the survey.
    b. Separate church membership into two lists: families and singles. Randomly chose 25 names form each of the two groups and contact these 50 member for their opinion via phone, email, or interview after a service.
    c. After a service, have a designated person survey every kth person as they leave the service.
    d. Call a meeting of members and survey those who show up.
    e. Go to one of the adult classes and survey the participants of the class.

10. Which of the following are true statements?
- I. Convenience samples are rarely beneficial.
- II. Blocking should be used if race gender or some other factor may affect our results
- III. All experiments should be double blind if possible.

    a. I only
    b. II only
    c. I and II
    d. I and III
    e. I, II and III

11. Why is a double-blind procedure used in an experiment?
- a. To avoid interfering with results by contaminating subjects with information
- b. To insure that the treatments are randomly given to all subjects each time
- c. To keep all subjects unaware of which treatment they are receiving
- d. To avoid talking to the subjects at any time
- e. To easily replicate an experiment in other environment

12. A car manufacturer is concerned about the time it is taking for batteries to be installed on the assembly line. The use of a new tool has been suggested to reduce time spent on this part of the assemble process. Which of the following would be the best way to establish if this new tool works better than the old tool?
- a. Randomly assign pairs of two workers to perform the task. One would be assigned to use the old toll and the other worker to use the new tool.
- b. Randomly assign a few workers from various shifts (day and night) to perform one of the assemble processes.
- c. Randomly assign workers to perform both assemble tasks. each worker would be randomly assigned to begin with one of the two methods and then after a set time, change to the other method. Results would be measured by pairing old versus new method for each worker.
- d. Randomly assign four workers one task to be performed for a month and then change to the other assembly task for a month.
- e. Assign two different assemble lines of workers to use one of the tools and then compare the two lines.

13. A psychological study is to be performed that has 5,000 menopausal women participate in a biofeedback regimen to see if this will help calm emotional bounces typical for women at this stage in life. In actuality 2500 of the women receive a biofeedback regimen while the other 2500 women would be a control group and given no additional treatments. Women agreeing to participate will first be classified according the amount of emotional distress they experienced as either mild, moderate or excessive. This trial will be best if it is conducted as
- a. an observational study
- b. a simple randomized comparison experiment
- c. a single –blind randomized comparison experiment
- d. a double blind randomized comparison experiment
- e. a matched-pairs double blind randomized comparison experiment.

14. The mathematics department wants to see if the use of a software program will improve scores in their Geometry course. The department has decide to set up a small experiment with 10 sections of Geometry. They have two teachers who have volunteered to participate and use their sections of Geometry. Ms. Smith is going to use the software alongside existing classroom materials while Mr. Jones is going to use the current classroom tools only. Each teacher will use 5 sections of Geometry taught in blocks 1 through 5. The student will be given a pretest as well as a post test at the end of the course. What treatment is being studied?
    a. Students taking the course
    b. The time of day of the course
    c. The teacher
    d. Software effectiveness
    e. Post test results

15. A large university English department wants to survey students regarding satisfaction with their English courses. Twenty percent of the students are graduate students and the remaining 80% are undergraduates. The department has learned of a new polling tool they can use with text messaging so they plan to have students that are selected take a cell phone text poll during their next English class. The following would be the best strategy for getting a fair representative sample of the student body.
    a. Randomly select 10 English classes from a list and have all students in these 10 classes
    b. Randomly select 2 graduate English classes as well as 2 each from the freshman, sophomore, junior and senior courses. All students in these classes would participate in the texting poll.
    c. Using a computer generated list of students in English classes, randomly select the participants to take the poll during a designated time that week.
    d. From an alphabetical listing of students in the English classes, choose every kth student to participate in the poll during a designated time that week.
    e. Randomly select 5 undergraduate and 5 graduate classes from a list and have all students in these 10 classes participate in the texting poll during their next scheduled class.

16. Which of the following can be used to show a cause and effect relationship between two variables?
    a. A census
    b. A controlled experiment
    c. An observational study
    d. A sample survey
    e. A cross-sectional survey

17. To check the effect of cold temperature on the elasticity of two brands of rubber bands, one box of Brand A and one box of Brand B rubber bands are tested. Ten bands from the Brand A box are placed in a freezer for two hours and ten bands from Brand B box are kept at room temperature. The amount of stretch before breakage is measured on each rubber band, and the mean for the cold bands is compared to the mean for the others. Is this good experimental design?
    a. No, because the means are not proper statistics for comparison
    b. No, because more than two brands should be used
    c. No, because more temperatures should be used
    d. No, because temperature is confounded with brand.
    e. Yes

18. The Physicians' Health Study, a large medical experiment involving 22,000 male physicians, attempted to determine whether aspirin could help prevent heart attacks. In this study, one group of about 11,000 physicians took an aspirin every other day, while the control group took a placebo. After several years, it was determined that the physicians in the group that took aspirin had significantly fewer heart attacks than the physicians in the control group. Which of the following statements explains why it would <u>not</u> be appropriate to say that everyone should take an aspirin every other day?

> I. The study included only physicians, and different results may occur in individuals in other occupations.
> II. The study included only males and there may be different results for females.
> III. Although taking aspirin may be helpful in preventing heart attacks, it may be harmful to some other aspects of health.

a. I only
b. II only
c. III only
d. II and III only
e. I, II and III

19. The student government at a high school wants to conduct a survey of student opinion. It wants to begin with a simple random sample of 60 students. Which of the following survey methods will produce a simple random sample?

> a. Survey the first 60 students to arrive at school in the morning
> b. Survey every 10th student entering the school library until 60 students are surveyed
> c. Use random numbers to choose 15 each of first year, second year, third year and fourth year students
> d. Number the cafeteria seats. Use a table of random numbers to choose seats and interview the students until 60 have been interviewed.
> e. Number the students in the official school roster. Use a table of random numbers to choose 60 students from this roster for the survey.

Free Response

20.   A manufacturer of boots plans to conduct an experiment to compare a new method of waterproofing to the current method. The appearance of the boots is not changed by either method. The company recruits 100 volunteers in Seattle, where it rains frequently, to wear the boots as they normally would for 6 months. At the end of the 6 months, the boots will be returned to the company to be evaluated for water damage.

a. Describe a design for this experiment that uses the 100 volunteers. Include a few sentences on how it would be implemented.

b. Could your design be double blind? Explain.

21. There have been many studies recently concerning coffee drinking and cholesterol level. While it is know that several coffee bean components can elevate blood cholesterol level, it is thought that a new type of paper coffee filter may reduce the presence of some of these components in coffee.

The effect of the new filter on cholesterol level will be studied over a 10-week period using 300 nonsmokers who each drink 4 cups of caffeinated coffee per day.   Each of these 300 participants will be assigned to one of two groups: the experimental group who will drink coffee that has been made with the new filter, or the control group, who will only drink coffee that has been made with the standard filter. Each participants cholesterol level will be measured at the beginning and at the end of the study.

    a. Describe an appropriate method for assigning the subjects to the two groups so that each group will have an equal number of subjects.

    b. In this study, the researchers chose to include a group who only drank coffee that was made with the standard filter. Why is it important to include a control group in this study even though cholesterol levels will be measured at the beginning and at the end of the study?

    c. Why would the researcher choose to use only nonsmokers in the study?

22. A Gallup Poll asked, "Do you think the U.S. should take the leading role in world affairs, take a major role but not the leading role, take a minor role, or take no role at all in world affairs?" Gallup's report said "Results are based on telephone interviews with 1,002 adults, aged 18 and older, conducted Feb. 9 – 12, 2004."

    a. What is the population for this sample survey? What was the sample size?

    b. Gallup noted that the order of the four possible responses was rotated when the question was read over the phone. Why was this done?

23. A university's financial aid office wants to know how much it can expect students to earn from summer employment. This information will be used to set the level of financial aid. The population contains 3478 students who have completed at least one year of study but have not yet graduated. A questionnaire will be sent to an SRS of 100 of these students, drawn from an alphabetized list.

    a. Describe how you will select the sample.

    b. Use the portion of the random digits table below to select the first five students in the sample.
    95592   94007   69971   91481   60779   53791   17297   59335
    68417   35013   15529   72765   85089   57067   50211   47487