Statistics Name _____

Sampling/Exp. Review #2

1. We wish to draw a sample of 5 without replacement from a population of 50 households. Suppose the households are numbered 01, 02, . . . , 50, and suppose that the relevant line of the random number table is 11362 35692 96237 90842 46843 62719 64049 17823.
Then the households selected are

(a) households 11 13 36 62 73
(b) households 11 36 23 08 42
(c) households 11 36 23 23 08
(d) households 11 36 23 56 92
(e) households 11 35 96 90 46

2. A maple sugar manufacturer wants to estimate the average trunk diameter of Sugar Maples trees in a large forest. There are too many trees to list them all and take a SRS, so he divids the forest into several hundred 10 meter by 10 meter plots, selects 25 plots at random, and measures the diameter of every Sugar Maple in each one. This is an example of a

(a) multistage sample.
(b) stratified sample.
(c) simple random sample.
(d) cluster sample.
(e) convenience sample.

3. A researcher for a consumer products company is field testing a new formula for laundry detergent. He has contracted with 60 families, each with two children, who have agreed to test the product. He randomly assigns 30 families to the group that will use the new formula and 30 to the group that will use the company's current detergent formula. The most important reason for this random assignment is that

(a) randomization makes the analysis easier since the data can be collected and entered into the computer in any order.
(b) randomization eliminates the impact of any confounding variables.
(c) randomization is a good way to create two groups of 30 families that are as similar aspossible, so that comparisons can be made between the two groups.
(d) randomization ensures that the study is double-blind.
(e) randomization reduces the impact of outliers.

4. To test the effect of music on productivity, a group of assembly line workers are given portable mp3 players to play whatever music they choose while working for one month. For another month, they work without music. The order of the two treatments for each worker is determined randomly. This is

(a) an observational study.
(b) a matched pairs experiment.
(c) a completely randomized experiment.
(d) a block design, but not a matched pairs experiment.
(e) impossible to classify unless more details of the study are provided.

5. A nutritionist wants to study the effect of storage time (6, 12, and 18 months) on the amount of vitamin C present in freeze dried fruit when stored for these lengths of time. Vitamin C is measured in milligrams per 100 milligrams of fruit. Six fruit packs were randomly assigned to each of the three storage times. The treatment, experimental unit, and response are respectively:

(a) A specific storage time, amount of vitamin C, a fruit pack
(b) A fruit pack, amount of vitamin C, a specific storage time
(c) Random assignment, a fruit pack, amount of vitamin C
(d) A specific storage time, a fruit pack, amount of vitamin C
(e) A specific storage time, the nutritionist, amount of vitamin C

6. A researcher observes that, on average, the number of divorces in cities with Major League Baseball teams is larger than in cities without Major League Baseball teams. The most plausible explanation for this observed association is that the

(a) presence of a Major League Baseball team causes the number of divorces to rise (perhaps husbands are spending too much time at the ballpark).
(b) high number of divorces is responsible for the presence of Major League Baseball teams (more single men means potentially more fans at the ballpark, making it attractive for an owner to relocate to such cities).
(c) association is due to the presence of a lurking variable (Major League teams tend to be in large cities with more people, hence a greater number of divorces).
(d) association makes no sense, since many married couples go to the ballpark together.
(e) observed association is purely coincidental. It is implausible to believe the observed association could be anything other than accidental.

7. Control groups are used in experiments in order to

(a) control the effects of outside variables on the outcome.
(b) control the subjects of a study to ensure that all participate equally.
(c) guarantee that someone other than the investigators, who have a vested interest in the outcome, controls how the experiment is conducted.
(d) achieve a proper and uniform level of randomization.
(e) reduce the variability in results.

8. Which principle is not a necessary component of a well-designed experiment?

a. Imposing a treatment
b. Randomization
c. Replication
d. Control
e. Stratification

9. 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

10. 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.

11. 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

12. 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.

13. 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

14. Bias is present in each of the following sampling designs. In each case, identify the type of bias involved and state whether you think the sample result obtained is lower or higher than the actual value for the population.

(a) A political pollster seeks information about the proportion of American adults who oppose gun controls. He asks an SRS of 1000 American adults: "Do you agree or disagree with the following statement: Americans should preserve their constitutional right to keep and bear arms." A total of 910, or 91%, said, "Agree" (that is, 910 out of the 1000 oppose gun controls).

(b) A flour company in Minneapolis wants to know what percent of local households bake at least twice a week. A company representative calls 500 randomly-selected households during the daytime and finds that 50% of those who responded bake at least twice a week.

15. High blood pressure adds to the workload of the heart and arteries and may increase the risk of heart attacks. If not treated, this condition can also lead to heart failure, kidney failure, or stroke. We wish to test the effectiveness of Angiotensin-converting enzyme (ACE) inhibitors as a treatment for high blood pressure.

(a) It is well known that men and women may react differently to common cardiovascular drug treatments. What sort of experimental design would you choose for this study?

(b) Assume that 600 men and 500 women suffering from high blood pressure are available for the study. Describe a design for this experiment. Be sure to include a description of how you assign individuals to the treatment groups.

16. 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?