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**Course:** Math 101 -Summer 2016-Sec. 953 (Choden) **Assignment:** HW #9 statistics

1. Why is it so important that a statistical study use a representative sample? Briefly describe four common sampling methods.

Why is it so important that a statistical study use a representative sample?

- A. A non-representative sample only provides acceptable results when obtained using convenience sampling.
- B. Representative samples are more accurate than non-representative samples.
- C. Representative samples are necessary because it is important that every sample of a given size has an equal chance of being selected.
- D. If the sample fairly represents the population as a whole, then it is reasonable to make inferences from the sample to the population.

Briefly describe four common sampling methods. Choose the correct answer below.

- A. Grouped sampling; Systematic sampling; Box sampling; Stratified sampling
- B. Simple random sampling; Systematic sampling; Convenience sampling; Stratified sampling
- C. Box sampling; Normal sampling; Systematic sampling; Stratified sampling;
- D. Complex random sampling; Simple random sampling; Standard sampling; Convenience sampling

2. What is bias? How can it affect a statistical study? Give examples of several forms of bias.

What is bias? How can it affect a statistical study?

- A. Bias refers solely to unintentional errors in a sampling techniques that renders the results of the sample irrelevant.
- B. Bias causes representative samples to become non-representative.
- C. Bias refers to sampling techniques that allows the study to be used to make inferences about the population.
- D. Bias refers to any problem in the design or conduct of a statistical study that tends to favor certain results.

Give examples of several forms of bias. Select all that apply.

- A. A non-representative sample
- B. A researcher with a personal stake in the outcome distorts the true meaning of data.
- C. An experiment that is not blinded
- D. Simple random sampling
- E. The placebo effect
- F. A double-blind experiment

3. What is a placebo? Describe the placebo effect and how it can make experiments difficult to interpret. How can making an experiment single-blind or double-blind help?
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What is a placebo?

- A. A placebo refers to a specific member of a sample from which data are collected.
- B. A placebo refers to any problem in the design or conduct of a statistical study that tends to favor certain results.
- C. A placebo lacks the active ingredients of a treatment being tested in a study, but is identical in appearance to the treatment.
- D. A placebo refers to a situation in which a patient improves simply because they believe they are receiving a useful treatment.

Describe the placebo effect and how it can make experiments difficult to interpret. Choose the correct answer below.

- A. The placebo effect refers to when the treatment group is much larger than the control group, which results in much less variation within the treatment group.
- B. The placebo effect refers to an experiment where neither the participants nor the experimenters know who belongs to the treatment group and who belongs to the control group. As a result, it is impossible for the experiments to link certain effects to certain patients, which make the results difficult to interpret.
- C. The placebo effect refers to when patients are placed in incorrect groups, which results in bias in all groups of the experiment.
- D. The placebo effect refers to a situation in which a patient improves simply because they believe they are receiving a useful treatment. It can sometimes be difficult or impossible to distinguish between effects that arise from the actual treatment and those that arise from psychological factors.

How can making an experiment single-blind or double-blind help?

- A. If an experiment is blinded, then differences between the control group and the treatment group are exaggerated.
- B. If an experiment is blinded, then any effect arising from psychological factors should affect all groups equally.
- C. If an experiment is blinded, then the sample can be less representative of the population and the data can still be used to make inferences about the population.
- D. If an experiment is blinded, the sample will be more representative of the population.

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4. Decide whether the following statement makes sense (or is clearly true) or does not make sense (or is clearly false). Explain your reasoning.

I wanted to test the effects of vitamin C on colds, so I gave the treatment group vitamin C and gave the control group vitamin D.

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Choose the correct answer below.

- A. The statement makes sense. The experiment has both a control group and a treatment group.
- B. The statement makes sense. The treatment and control groups are receiving different treatments.
- C. The statement does not make sense. The control group should only receive a placebo, not another treatment.
- D. The statement does not make sense. The vitamin C should be given to the control group, not the treatment group.

5. In a poll, 1,002 women in a country were asked whether they favor or oppose the use of "federal tax dollars to fund medical research using stem cells obtained from human embryos." Among the respondents, 48% said that they were in favor. Describe the statistical study.
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What is the population in the given problem? Choose the correct answer below.

- A. The 1,002 women selected
- B. 48% of all women in the country
- C. All women in the country
- D. 48% of the 1,002 women selected

Identify the sample for the given problem. Choose the correct answer below.

- A. 48% of the 1,002 women selected
- B. The 1,002 women selected
- C. All women in the country
- D. 48% of all women in the country

What is the population parameter in the given study? Choose the correct answer below.

- A. The percentage of all women in the country who say that they are in favor
- B. The number of women selected
- C. The percentage of the 1,002 women selected who say that they are in favor
- D. The total number of all women in the country

Identify the sample statistic. Choose the correct answer below.

- A. 1,002
  - B. 52%
  - C. The total number of all women in the country
  - D. 48%
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6. Identify the sampling method as simple random sampling, systematic sampling, convenience sampling, or stratified sampling.

A computer randomly selects 900 names from a list of all registered voters. Those selected are surveyed to predict who will win the election for Mayor.

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Choose the correct sampling technique below.

- A. Stratified sampling
  - B. Convenience sampling
  - C. Simple random sampling
  - D. Systematic sampling
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7. What type of statistical study is most likely to lead to an answer to the following question?

Is magnetic therapy a more effective way to treat headaches than Drug A or doing nothing at all?

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What type of statistical study is most likely to lead to an answer to the question?

- A. Observational study
  - B. Experiment
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8. What type of statistical study is most likely to lead to an answer to the following question?

Which team in a football league has the linemen with the greatest average weight?

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What type of statistical study is most likely to lead to an answer to the question?

- Observational study
  - Experiment
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9. What do we mean by variables of interest in a study?

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Choose the correct answer below.

- A. The items or quantities that the study seeks to measure
  - B. Any item or quantity that can vary or take on different values
  - C. Any item or quantity that is not intended to be part of the study
  - D. Any item or quantity that can affect sample selection
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10. Identify any potential sources of bias in the following study.

From a poll of people who recently bought cold medicine at all stores of a large drugstore chain, investigators concluded that the mean time between colds for all Americans is 5.6 months.

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What sources of bias, if any, might this study have?

- A. Participation bias only
  - B. Both selection and participation bias
  - C. Selection bias only
  - D. There is probably no bias in the study.
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11. Identify any potential sources of bias in the following study.

In order to determine the opinions of people in the 22- to 24-year age group on controlling illegal immigration, researchers survey a random sample of 1500 Army recruits in this age group.

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What sources of bias, if any, might this study have?

- A. Selection bias only
  - B. Selection and participation bias
  - C. Participation bias only
  - D. There is probably no bias in the study.
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12. You want to determine the mean amount of credit card debt owed by adult consumers in Florida.

Which sample is most likely to be a representative sample?

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Choose the correct answer below.

- A. The Florida drivers who own and have registered a SUV.
  - B. The first 1,000 Florida residents listed in the Fort Lauderdale phone book.
  - C. The first 1,000 Florida residents in a complete list of all Florida telephone numbers.
  - D. The Florida residents who mail back a survey printed in a newspaper.
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13. Identify the sampling method as simple random sampling, systematic sampling, convenience sampling, or stratified sampling.

An IRS (Internal Revenue Service) auditor randomly selects for audits 60 taxpayers in each of the filing status categories: single, head of household, married filing jointly, and married filing separately.

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Choose the correct sampling technique below.

- A. Simple random sampling
  - B. Stratified sampling
  - C. Convenience sampling
  - D. Systematic sampling
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14. To determine her body temperature, Samantha divides up her day into three parts: morning, afternoon, and evening. She then measures her body temperature at 4 randomly selected times during each part of the day.
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What type of sampling is used?

- A. Systematic sampling
- B. Simple random sampling
- C. Stratified sampling
- D. Convenience sampling