MATH 3307

Homework 8 (Lessons 23 - 25)

Instructions: Answer all questions through the EMCF tab of casa under the assignment named "Homework 8" before the deadline.

There is no "Submit" button. Your answers will be automatically submitted once the deadline arrives.

Assignments will be graded out of 20 points.

For Questions 1 - 5, indicate Choice A: True or Choice B: False.

1. Voluntary response sampling often lead to under representing people with strong opinions.

2. Convenience sampling often lead to under coverage bias.

3. Questionnaires with non-neutral wording are likely to have a response bias.

4. In an observational study, we impose a treatment on the subjects.

5. The entire group of individuals we want information about is called the sample.

Base Questions 6 - 7 on the following: A machinery manufacturer purchases voltage regulators from 10 different suppliers. There are reports that variation in the output of voltage of the regulators is affecting the performance of the finished products. To assess the quality of the suppliers' production, the manufacturer sends a sample of 5 regulators from each of his suppliers' last shipment to a lab for study.

6. Identify Population and Sample.

   A. Population: All regulators; Sample: 5 selected regulators.

   B. Population: 10 manufacturers; Sample: 5 selected regulators.

   C. Population: All regulators; Sample: 10 manufacturers.

   D. Population: All regulators; Sample: 50 selected regulators.

   E. Population: 50 selected regulators; Sample: 10 manufacturers.

7. Identify Sampling Technique:

A. Simple Random Sample B. Convenience Sample

C. Multi-stage Sampling D. Stratified Sampling

E. Probability Sampling

8. Is the following an observational study or an experiment? Give a reason.
A medical researcher is interested in testing a new medicine for migraine headaches. She selects a SRS of 100 adults who get migraines at a rate of one or more per week. Half of the selected adults will receive the new medicine while half will receive a placebo. The results will be compared.

A. Observational Study, because data collection was performed.

B. Observational Study, because the sampling was done randomly.

C. Experiment, because the sample was divided into two groups.

D. Experiment, because the researcher actively imposed control on the sample.

E. Survey Study, because participants would need to fill out their contact information.

Use the following scenario in your answering of Questions 9 and 10. (Use the same answer choices for each question.)

From a sampling frame of 1000 individuals (500 men and 500 women), a sample of 100 is to be selected, with the desired sample consisting of 40 men and 60 women.

9. Which of the following methods describes probability sampling?

10. Which of the following methods describes stratified sampling?

A. Each person is assigned a three digit number (from 000 to 999). On a Random Digit Table, numbers are read, three at a time. The first hundred three-digit numbers read will represent the people in the sample.

B. To make the sampling frame a more manageable size, only people with birthdays from June 1 to December 31 will be considered. From that reduced sampling frame, the method described in Answer Choice A will be used.

C. Every man in the sampling frame will be assigned 8 sequential 4-digit numbers (from 0000 to 3999; example: 0000, 0001, 0002, 0003, 0004, 0005, 0006, 0007), and every woman in the sampling frame will be assigned 12 sequential 4-digit numbers (from 4000 to 9999; example: 4000, 4001, 4002, 4003, 4004, 4005, 4006, 4007, 4008, 4009, 4010, 4011). From a Random Digit Table, groupings of 4 numbers will be read and the first 100 subjects with their number read will be in the sample (duplicate selections will be ignored).

D. From an alphabetized list of people in the sampling frame, the first hundred are selected.

E. Each man in the sampling frame is assigned two sequential three-digit numbers (from 000 to 999; example: 000, 001). From a Random Digit Table, groupings of three numbers at a time are read. The first 40 three-digit numbers will represent the men selected (duplicate selections will be ignored). Then, each woman in the sampling frame will be assigned two sequential three-digit numbers (from 000 to 999; example: 000, 001). From a Random Digit Table, groupings of three numbers at a time are read. The first 60 three-digit numbers will represent the women selected (duplicate selections are ignored). These 40 men and 60 women will together form the sample of 100 people.

Base Questions 11 - 13 from the following: Researchers investigated the effect of listening to music by Mozart before taking an IQ test. Subjects were randomly assigned to one of three groups: listening to Mozart, being told to relax, given no instructions.

11. Is this an experiment or observational study? A. Experiment B. Observational Study

12. Is this randomized or block design? A. Randomized B. Block Design

13. Identify explanatory and response variables:

A. Explanatory: IQ Score; Response: Music/Relax/No Instructions Groups

B. Explanatory: Music/Relax/No Instructions Groups; Response: Subject Age

C. Explanatory: Music/Relax/No Instructions Groups; Response: IQ Score

D. Explanatory: Subject Age; Response: IQ Score

E. Explanatory: Subject Age; Response: Music/Relax/No Instructions Groups

For Questions 14 - 16, refer to the following: Assume that the percentage of women in the workforce of a large metropolitan area is 40%. A company hired 10 workers, two of whom are women. We want to see if this is likely.

14. Assign digits 0 to 9 to represent women and men in this situation.

A. Single Digits Assigned: Women: 0, 1, 2, 3; Men: 4, 5, 6, 7, 8, 9

B. Single Digits Assigned: Women: 0, 1, 2, 3, 4; Men: 5, 6, 7, 8, 9

C. Two Digits Assigned: Women: 00 to 49; Men: 50 to 99

D. Single Digits Assigned: Women: 0; Men: (all other numbers ignored)

E. Single Digits Assigned: Women: 0, 2, 4, 6, 8; Men: 1, 3, 5, 7, 9

15. Using the line from the random digit table provided, carry out three runs of this experiment.

86051 45094 20021 98648 23900 49375 97737 67837

A. First Run: 3; Second Run: 5; Third Run: 6

B. First Run: 6; Second Run: 2; Third Run: 4

C. First Run: 5; Second Run: 5; Third Run: 4

D. First Run: 3; Second Run: 5; Third Run: 5

E. First Run: 3; Second Run: 3; Third Run: 2

16. What is the expected number of women that should be hired, based on this simulation.

A. Expected Value: 6.67 (Assume 7)

B. Expected Value: 5

C. Expected Value: 4.33 (Assume 4)

D. Expected Value: 7.33 (Assume 7)

E. None of the above choices.

Use the following information to answer Questions 17 - 19.

A personnel director at a large company studied the eating habits of employees by watching the movements of a selected group of employees at lunchtime. The purpose of the study was to determine the proportion of employees who buy lunch in the cafeteria, bring their own lunches, or go out to lunch.

17. The study could best be categorized as:

A. a census

B. a survey sample

C. an observational study

D. a designed experiment

E. none of these

18. If the director includes only the employees in one department in her study, she is performing a

A. simple random sample

B. quota sample

C. convenience sample

D. multi-stage sample

E. census

19. If the director selects 50 employees at random from throughout the company and categorizes their lunchtime practices by gender, she is:

A. blocking for gender

B. testing for a lurking variable

C. promoting sexual harassment

D. testing for bias

E. none of these

20. In a class, grades fall into the following distribution:

A: 25%; B: 35%; C: 20%; D: 15%, F: 5%.

Assign these values to a random digit table and run (using line 135) for a sample of 10 students.

Proposed Solution:

Assignments (since the question is referring to grades):

A: 90 to 00; B: 80 to 89; C: 70 to 79; D: 60 to 69; F: 01 to 59

Line 135: 71435 51648 89675 97778

becomes: 71 43 55 16 48 89 67 59 77 78

so C F F F F B D D C C

A: 0; B: 1; C: 2; D: 2; F: 4

What is wrong with the proposed solution?

A. The tallying of letter grades was miscounted.

B. The assignment of letter grades to digits was not based on the percentage distribution.

C. Line 135 of the Random Digit Table was not used.

D. The two digit numbers were mistranslated into their letter equivalents (careless mistake).

E. There is nothing wrong with the proposed solution.