

For #1-6 Name the type of sampling technique used. Then explain why.

1.) The researcher separates the population into a number of **statistical subpopulations** and then takes a random sample **within each subpopulation**.

Stratified Random Sample

2.) The researcher separates the population into evenly sized groups, **randomly selects one participant in the first group**, and then **selects every nth participant**.

Systematic Random Sample

3.) The researcher chooses the sample from the entire population through a **randomization technique**, such as **drawing names out of a hat or using a random number generator**.

Simple Random Sample

4.) The researcher separates the population into groups and then randomly selects **some of these groups** to participate. All people in each group selected will participate.

Cluster Sampling

5.) CNN wants to conduct a political poll to determine who voters support in the upcoming presidential election. Pollsters are aware that opinions can be affected by geographical region, so they plan to divide the country into regions: Southeast, Northeast, Midwest, Rocky Mountain, Pacific, etc. They will randomly choose 50 people **from every region** to be in the polling sample.

Stratified Random Sample

6.) The Council at a local high school wants to conduct a survey concerning the quality of the food in the cafeteria. The president posts a council member at every entrance and tells them to pick the **first 25 students** that came through the door.

Convenience Sample

Open-ended Questions:

7.) Imagine you read or heard about a study about the effects of texting on students' writing skills.

a. Describe an *observational design* to study this issue. Be sure to identify the variable of interest, your sampling technique, and what variables will be measured. (4 points)

Answers will vary.

b. Describe an *experimental design* to study this issue. Be sure to identify your sampling technique, the variable of interest, treatment, treatment group and control group. (6 points)

Answers will vary.

8.) Contrast primary data and secondary data.

Primary data are data that you collect directly through experiments or survey instruments. Secondary data are data that have been collected by someone else and are available to the researcher such as the Internet, books and newspapers or historical documents.

9.) A study was done at Union Grove high school on the shoe size of males in the 12th grade. If the average shoe size was represented by 9 ± 1.5 , what does this mean?

This means we can be confident that the true mean size of male shoes is between 7.5 and 10.5.

10.) The MARS Candy Company claims that every 1.69 oz. bag of Plain M & M's has 54 M & M's in it. To test this claim, you buy 50 packs of 1.69 oz. plain M & M's and found that the average number of M & M's of the sample was 49.

a. State the Null and Alternative Hypotheses, in words, for this problem.

Null: The mean 1.69 oz. bag of plain M&M's has 54 M&M's or greater

Alternative: The mean 1.69 oz. bag of plain M&M's has less than 54 M&M's

b. Now state the Null and Alternative Hypotheses using mathematical symbols.

Ho: $\mu \geq 54$ M&M's per bag

Ha: $\mu < 54$ M&M's per bag

c. State fundamental difference between the Null and Alternative Hypotheses.

The null hypothesis states that there is no difference between the true value and the claimed value. The alternative hypothesis states that something is different or incorrect or that something has changed.

11.) Describe the placebo effect in its entirety? Give an example.

This is when participants in a study show improvement simply because they are in the study and not because they are receiving an effective treatment. Example: Let's say a control group in an experiment gets a sugar pill and the experimental group gets some Tylenol for their headache. If the people in the control group think that the pill helped them alleviate their headache, this is the placebo effect.

12.) Pick **TWO** of the guidelines we studied for research involving human subjects. Describe what they mean and why they are important considerations in research. Respect for Persons, Beneficence, Justice, Informed Consent, Assessments of Risks and Benefits, Selection of Subjects.

Answers will vary.

13a) What is the five-number summary of the following information?

The following table shows the grades of students in Mrs. Prescott's German class.

Mike	Shannon	Chris	Luke	Steven	Tammy	Gwen	Blake	Sarah	Mitch	Ray	Evan	Chloe	Sue	Sam	Pam
66	72	88	90	71	75	82	86	93	79	80	81	94	87	68	83

Min = 66

Q1 = 73.5

Median = 81.5

Q3 = 87.5

Max = 94

13b) Construct a box-and-whisker plot of the data given in 13a.



The grades of students in Mrs. Prescott's German class.

13c) Interpret the meaning of the box portion of the boxplot you created in question 13b.

50% of all students in Mrs. Prescott's German class have an average between 73.5 and 87.5.

14) Describe the difference between categorical and quantitative data.

Categorical data is information about how study subjects fit into different categories like Democrat, Republican or Independent; male or female. Quantitative data is information that is recorded numerically such as age, height and income.

15) Describe the difference between univariate and bivariate data.

Univariate means one variable, so information about one variable is recorded for each participant such as height.

16) Find the average age of the students who drive to school in the given histogram.

$$[14(30)+15(60)+16(320)+17(700)+18(580)]/1690 = 17.03 \text{ years}$$

