

*Test Bank for Probability and Statistics
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Chapter 01 - Overview and Descriptive Statistics

1. A What type of study is described when an experiment is conducted to analyze how the flow rate through a solenoid valve in an automobile's pollution-control system depends on three factors: armature lengths, spring load, and bobbin depth, with two different levels (low and high) for each factor?

- a. Descriptive Study
- b. Experimental Study
- c. Qualitative Study
- d. Analytic Study

ANSWER: d

2. A sample of $n = 10$ automobiles was selected, and each was subjected to a 5-mph crash test. Denoting a car with no visible damage by S (for success) and a car with such damage by F, results were as follows: S S S F F S S F S S. What is the value of the sample proportion of successes x/n ?

- a. $5/10 = .50$
- b. $6/10 = .60$
- c. $7/10 = .70$
- d. $8/10 = .80$

ANSWER: c

3. True/False: A population includes every member of a defined group, while a sample consists of only a portion of that group.

- a. True
- b. False

ANSWER: True

4. Which statement correctly defines a sample in the context of research studies?

- a. Only groups of individuals being studied
- b. A subset of the population
- c. All of the subsets in a given population
- d. Selected individuals in a study

ANSWER: b

5. What is the primary purpose of using a sample instead of a population in research?

- a. To minimize the time and resources needed for data collection
- b. To gather data from every individual
- c. To make studying more manageable and cost-effective
- d. To ensure complete accuracy in the findings

ANSWER: c

6. True/False: A hypothetical population refers to a group that cannot be directly observed or measured.

- a. True
- b. False

ANSWER: True

7. Which is an example of a concrete population?

- a. All the students currently enrolled in a school

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- b. All potential voters in an upcoming election
- c. All possible outcomes of a dice roll
- d. All the people who have ever lived

ANSWER: a

8. In research, which statement is true regarding a hypothetical population?

- a. It is always measurable.
- b. It exists only in theory.
- c. It includes all known individuals.
- d. It can be accurately sampled.

ANSWER: b

9. True/False: A convenience sample is one of the best ways to ensure a representative sample of a population.

- a. True
- b. False

ANSWER: False

10. Which is a recognized type of sampling method?

- a. Random sampling
- b. Stratified sampling
- c. Purposive sampling
- d. Randomized control trial

ANSWER: a

11. What is the main advantage of using stratified sampling?

- a. It ignores the population's diversity.
- b. It ensures every subgroup is represented.
- c. It is the quickest method available.
- d. It relies on convenience.

ANSWER: b

12. True/False: True or False: Inferential statistics allow researchers to draw conclusions about a population based on the analysis of sample data.

- a. True
- b. False

ANSWER: True

13. What is the relationship between probability and inferential statistics?

- a. Probability has no role in inferential statistics.
- b. Inferential statistics relies on probability to make predictions.
- c. Inferential statistics is not applicable to sample data.
- d. Probability is primarily utilized in descriptive statistics.

ANSWER: b

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14. If a sample is randomly selected, what can be inferred about the population?
- a. It may contain biases that affect the results.
 - b. It provides a reliable estimate of the population parameters.
 - c. It is less useful for drawing conclusions about the population than a non-random sample.
 - d. It can give insights into the characteristics of the population.

ANSWER: b

15. True/False: An analytical study focuses on understanding relationships and causal effects between variables, while an enumerative study primarily counts and describes characteristics of a population.

- a. True
- b. False

ANSWER: True

16. Which describes an enumerative study?
- a. Evaluates the cause-and-effect relationship
 - b. Provides a count or description of a population
 - c. Tests a hypothesis
 - d. Involves manipulating variables

ANSWER: b

17. Which type of study would likely examine the factors influencing student performance?
- a. Enumerative
 - b. Analytical
 - c. Descriptive
 - d. Experimental

ANSWER: b

18. True/False: When analyzing a population, using stratified sampling can lead to more accurate representations of subgroups compared to simple random sampling, as it ensures that each subgroup is adequately represented in the sample.

- a. True
- b. False

ANSWER: True

19. Which represents a sampling method used in research?
- a. Stratified sampling
 - b. Quota sampling
 - c. Observational study
 - d. Randomized control trial

ANSWER: b

20. What is the main disadvantage of convenience sampling?
- a. It is time-consuming.
 - b. It may not be representative of the population.
 - c. It is overly complex.

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d. It is the most expensive method.

ANSWER: b

21. True/False: Analyzing a stem-and-leaf plot allows you to determine not only the shape of the data distribution but also to identify patterns such as outliers, gaps, and the overall spread of the data.

- a. True
- b. False

ANSWER: True

22. In a stem-and-leaf plot, what does the "stem" represent?

- a. The last digit of the data values
- b. The leading digits of the data values
- c. The frequency of the data values
- d. The total number of data values

ANSWER: b

23. What can you determine from a stem-and-leaf plot?

- a. The mode of the dataset
- b. The individual data points of the dataset
- c. The total number of data points in the dataset
- d. The mean of the dataset

ANSWER: a

24. True/False: A stem-and-leaf plot can be used to display both the shape and the frequency of a dataset.

- a. True
- b. False

ANSWER: True

25. Which of the following datasets can be represented using a stem-and-leaf plot?

- a. {10, 12, 13, 15}
- b. {1.5, 2.5, 3.5, 4.5}
- c. {5, 8, 10, 12.5}
- d. {-5, 8, 1.10, 12.5}

ANSWER: a

26. When constructing a stem-and-leaf plot for the data {22, 23, 25, 30, 31}, the "stem" for the number 22 would be _____.

- a. 2
- b. 22
- c. 3
- d. 25

ANSWER: a

27. True/False: A dotplot displays individual data points as dots above a number line.

- a. True

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b. False

ANSWER: True

28. In a dotplot, multiple dots stacked above a number indicate what?

- a. The number appears once in the dataset
- b. The number appears multiple times in the dataset
- c. The number is the highest value
- d. The number is the lowest value

ANSWER: b

29. What does a dotplot help you visualize?

- a. The mean of the data
- b. The distribution of the data
- c. The median of the data
- d. The total sum of the data

ANSWER: b

30. True/False: The number of students in a classroom is an example of continuous data.

- a. True
- b. False

ANSWER: False

31. Which is an example of discrete data?

- a. Height of students
- b. Distance traveled
- c. Number of cars in a parking lot
- d. Weight of a person

ANSWER: c

32. Which statement best describes continuous data?

- a. It can only take on specific values.
- b. It can take on any value within a range.
- c. It is always a whole number.
- d. It cannot be measured.

ANSWER: b

33. True/False: A histogram displays the frequency of data within specified intervals.

- a. True
- b. False

ANSWER: True

34. In a histogram, what does the height of each bar represent?

- a. The total number of data points
- b. The frequency of data points within that interval

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- c. The average of the data
- d. The minimum value of the data

ANSWER: b

35. What does a histogram allow you to visualize?
- a. The relationship between two variables
 - b. The distribution of data across different intervals
 - c. The exact values of each data point
 - d. The mode of the dataset

ANSWER: b

36. True/False: A histogram can be used to represent categorical data.
- a. True
 - b. False

ANSWER: False

37. When constructing a histogram for continuous data, what should you do?
- a. Use individual data points as bars
 - b. Group data into intervals
 - c. Use letters instead of numbers
 - d. Display only the highest value

ANSWER: b

38. Which type of data is best represented by a histogram?
- a. Continuous
 - b. Categorical
 - c. Nominal
 - d. Discrete

ANSWER: a

39. True/False: A distribution with two peaks is classified as unimodal.
- a. True
 - b. False

ANSWER: False

40. Which describes a bimodal distribution?
- a. A distribution with one peak
 - b. A distribution with two peaks
 - c. A distribution with no peaks
 - d. A distribution with more than two peaks

ANSWER: b

41. How can you determine if a distribution is multimodal?
- a. Count the number of peaks in the distribution

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- b. Calculate the mean of the data
- c. Measure the range of the data
- d. Analyze the individual data points

ANSWER: a

42. True/False: A symmetric distribution has equal tails on both sides of the mean.

- a. True
- b. False

ANSWER: True

43. If a distribution has a longer tail on the left side, it is classified as what?

- a. Symmetric
- b. Positively skewed
- c. Negatively skewed
- d. Unimodal

ANSWER: c

44. What does it mean if a distribution is positively skewed?

- a. The majority of data points are concentrated on the left side.
- b. The majority of data points are concentrated on the right side.
- c. The distribution has no peaks.
- d. The distribution is perfectly symmetric.

ANSWER: a

45. True/False: The sample mean is always equal to the sample median.

- a. True
- b. False

ANSWER: False

46. What is the primary numerical measure used to describe the center of a dataset?

- a. Mode
- b. Mean
- c. Range
- d. Variance

ANSWER: b

47. Which is a measure that represents variability rather than central tendency?

- a. Mean
- b. Median
- c. Standard Deviation
- d. Mode

ANSWER: c

48. True/False: The sample mean is calculated by adding all the values in a dataset and dividing by the number of values.

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- a. True
- b. False

ANSWER: True

49. If a dataset consists of the values 2, 4, 6, and 8, what is the sample mean?

- a. 4
- b. 5
- c. 6
- d. 7

ANSWER: b

50. Which formula correctly represents the calculation of the sample mean?

- a. $\Sigma x / n$
- b. $n / \Sigma x$
- c. $n \cdot x / \Sigma$
- d. Σn

ANSWER: a

51. True/False: The sample median is the middle value of a dataset when the values are arranged in ascending order.

- a. True
- b. False

ANSWER: True

52. What is the sample median of the dataset: 3, 5, 1, 4, 2?

- a. 2
- b. 3
- c. 4
- d. 5

ANSWER: b

53. Which dataset has a median of 5?

- a. 1, 2, 3, 4, 5
- b. 4, 5, 6, 7, 8
- c. 1, 7, 5, 2, 6
- d. 3, 5, 7, 9

ANSWER: c

54. True/False: The sample mean is less affected by outliers compared to the sample median.

- a. True
- b. False

ANSWER: False

55. Which statement best describes the difference between mean and median?

- a. The mean is typically higher than the median in skewed distributions.

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- b. The mean is the average, while the median is the middle value.
- c. The mean and median can be equal in symmetric distributions.
- d. The median gives more weight to extreme values than the mean.

ANSWER: b

56. In which situation would the sample mean be significantly different from the sample median?

- a. A normal distribution
- b. A skewed distribution
- c. A uniform distribution
- d. A bimodal distribution

ANSWER: b

57. True/False: A trimmed mean is calculated by removing the top and bottom percentages of data points before averaging.

- a. True
- b. False

ANSWER: True

58. If you trim 10% from both ends of a dataset, what is the purpose of this action?

- a. To increase the mean
- b. To reduce the effect of outliers
- c. To simplify the dataset
- d. To find the median

ANSWER: b

59. Which of the following datasets would benefit most from calculating a trimmed mean?

- a. 1, 2, 3, 4, 5
- b. 1, 1, 1, 1, 1
- c. 100, 2, 3, 4, 5
- d. 10, 20, 30, 40, 50

ANSWER: c

60. True/False: The sample proportion is found by dividing the number of successes by the total sample size.

- a. True
- b. False

ANSWER: True

61. A survey of 100 people reveals varying preferences for beverages. If 30 people prefer tea over coffee, which statement accurately describes the sample proportion of tea drinkers?

- a. The sample proportion of tea drinkers is greater than one-third of the total respondents.
- b. The sample proportion of tea drinkers is equal to half of the total respondents.
- c. The sample proportion of tea drinkers is less than a quarter of the total respondents.
- d. The sample proportion of tea drinkers is exactly three-quarters of the total respondents.

ANSWER: a

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62. In a dataset where 25 out of 200 responses are positive, what is the sample proportion of positive responses?

- a. 0.125
- b. 0.15
- c. 0.2
- d. 0.25

ANSWER: a

63. True/False: The range is the only measure of variation needed to understand a dataset's variability.

- a. True
- b. False

ANSWER: False

64. Which measure indicates how spread out the values in a dataset are?

- a. Median
- b. Mode
- c. Variance
- d. Frequency

ANSWER: c

65. What is the primary purpose of calculating the standard deviation?

- a. To determine the average value of the dataset
- b. To measure the spread of data points around the mean
- c. To find the minimum value in the dataset
- d. To identify the median

ANSWER: b

66. True/False: A higher standard deviation than variance indicates that the data points are clustered closely around the mean, suggesting low variability within the dataset.

- a. True
- b. False

ANSWER: False

67. Which of the following formulas represents the calculation of variance for a sample?

- a. $\sum (xi - \bar{x}) / n$
- b. $\sum (xi - \bar{x})^2 / n - 1$
- c. $\sum (xi - \bar{x})^2 / n$
- d. $\sum xi - \bar{x}$

ANSWER: b

68. What does a standard deviation of zero signify about a dataset?

- a. All data points are unique.
- b. All data points are the same.
- c. The dataset has a wide range.
- d. The dataset is normally distributed.

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ANSWER: b

69. True/False: Understanding that the range is calculated by subtracting the minimum value from the maximum value helps us interpret the spread of a dataset, indicating how much variability exists between the highest and lowest values.

- a. True
- b. False

ANSWER: True

70. Which best describes how to calculate the interquartile range (IQR) for a dataset?

- a. Subtract the lowest value from the highest value.
- b. Identify the difference between the first quartile (Q1) and the third quartile (Q3).
- c. Calculate the average of the dataset.
- d. Add all the values in the dataset together.

ANSWER: b

71. If a dataset has a range of 20, what does that indicate?

- a. There are 20 data points.
- b. The difference between the maximum and minimum values is 20.
- c. The average value of the dataset is 20.
- d. The dataset is normally distributed.

ANSWER: b

72. True/False: A boxplot displays the mean and mode of a dataset.

- a. True
- b. False

ANSWER: False

73. What do the whiskers in a boxplot represent?

- a. The range of the data
- b. The median of the data
- c. The interquartile range
- d. The maximum and minimum values

ANSWER: d

74. What does the length of the box in a boxplot indicate about a dataset?

- a. The average value of the dataset
- b. The degree of variability within the interquartile range
- c. The total number of data points represented in the boxplot
- d. The presence and number of outliers in the dataset

ANSWER: b

75. True/False: An outlier is defined as a data point that falls within the interquartile range (IQR).

- a. True
- b. False

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ANSWER: False

76. In a boxplot, what indicates a potential outlier?

- a. A data point within the whiskers
- b. A data point outside of the whiskers
- c. The median line
- d. The box itself

ANSWER: b

77. What is the purpose of the five-number summary?

- a. To calculate the mean and mode of a dataset
- b. To provide a quick summary of a dataset's distribution
- c. To display all individual data points
- d. To identify the most frequently occurring value

ANSWER: b

78. True/False: Comparative boxplots can be used to compare multiple datasets.

- a. True
- b. False

ANSWER: True

79. What is a key advantage of using comparative boxplots?

- a. They provide a detailed summary of individual data points for each dataset.
- b. They allow for visual comparison of the spread and central tendency of multiple datasets.
- c. They calculate and display the median of each dataset.
- d. They highlight trends in the data over time for each dataset.

ANSWER: b

80. When comparing two boxplots, what can you infer if one boxplot is significantly higher than the other?

- a. The dataset with the higher boxplot has a greater average value than the other dataset.
- b. The higher boxplot indicates that the distribution of the dataset is more variable.
- c. The dataset with the lower boxplot contains outliers that affect its overall position.
- d. The two datasets have identical ranges despite the difference in central tendency.

ANSWER: a