Advanced Statistics and Probability

Mathematics · Practice Test · 25 Questions

1. In a normal distribution, what percentage of the data falls within three standard deviations of the mean?

A) 68.2%
B) 95.4%
C) 99.7%
D) 99.9%

2. Which measure of central tendency is most sensitive to extreme outliers in a dataset?

A) Median
B) Mode
C) Arithmetic Mean
D) Geometric Mean

3. What is the probability of drawing two consecutive aces from a standard 52-card deck without replacement?

A) 1/13
B) 1/221
C) 4/663
D) 1/169

4. Which statistical term describes the 'spread' of a dataset, calculated as the square root of the variance?

A) Interquartile Range
B) Standard Deviation
C) Coefficient of Variation
D) Mean Absolute Deviation

5. In probability theory, what does the 'Law of Large Numbers' state happens as the number of trials increases?

A) The experimental probability approaches the theoretical probability
B) The variance becomes zero
C) The distribution becomes skewed
D) The sample size becomes irrelevant

6. What is the sum of the probabilities of all mutually exclusive and exhaustive outcomes in a sample space?

A) 0
B) 0.5
C) 1
D) 100

7. Which value represents the median of a dataset?

A) The average of all values
B) The 50th percentile
C) The most frequent value
D) The difference between maximum and minimum

8. In a binomial distribution, what does 'n' represent?

A) Number of successes
B) Probability of failure
C) Number of independent trials
D) The expected value

9. What is the degree of freedom for a sample variance calculated from a dataset of size n?

A) n
B) n+1
C) n-1
D) n/2

10. Which statistical test is used to determine if there is a significant difference between the means of two groups?

A) Chi-squared test
B) T-test
C) ANOVA
D) Regression analysis

11. What is the range of a probability value?

A) -1 to 1
B) 0 to 1
C) 0 to 100
D) Negative infinity to infinity

12. Which term describes the tail of a distribution being longer or fatter on one side?

A) Kurtosis
B) Skewness
C) Standardization
D) Correlation

13. If two events A and B are independent, what is the formula for the probability of both occurring?

A) P(A) + P(B)
B) P(A) * P(B)
C) P(A) / P(B)
D) P(A) - P(B)

14. What does the 'p-value' represent in hypothesis testing?

A) The probability of the null hypothesis being true
B) The significance level
C) The probability of observing results as extreme as the data given the null hypothesis
D) The correlation coefficient

15. Which graph displays the frequency distribution of a continuous variable using bins?

A) Pie chart
B) Histogram
C) Scatter plot
D) Line graph

16. What is the relationship between correlation and causation?

A) Correlation implies causation
B) Causation implies correlation
C) Correlation does not imply causation
D) They are the same concept

17. In a standard normal distribution (Z-distribution), what is the mean?

A) 0
B) 1
C) 0.5
D) 10

18. Which statistical measure identifies the middle 50% of the data?

A) Range
B) Standard Deviation
C) Interquartile Range
D) Variance

19. What is the probability of rolling a sum of 7 with two fair six-sided dice?

A) 1/6
B) 1/12
C) 1/36
D) 1/7

20. What is the complement of event A if the probability of A is 0.35?

A) 0.35
B) 0.65
C) 0.70
D) 0

21. Which coefficient measures the strength and direction of a linear relationship between two variables?

A) R-squared
B) Pearson correlation coefficient
C) Z-score
D) T-statistic

22. How many outcomes are possible when flipping a fair coin 4 times?

A) 4
B) 8
C) 12
D) 16

23. What is the variance of a constant value?

A) 0
B) 1
C) The constant itself
D) Infinite

24. What does the 'Central Limit Theorem' imply about the distribution of sample means?

A) It is always uniform
B) It is always binomial
C) It approaches a normal distribution as sample size increases
D) It is always the same as the population distribution

25. Which distribution describes the probability of a given number of events occurring in a fixed interval of time?

A) Normal
B) Poisson
C) Binomial
D) Geometric