## Q1

Bayesian Interpretation of Probability:

The Bayesian interpretation of probability views probability as a measure of uncertainty about an event or outcome.

It involves updating beliefs or probabilities based on new evidence or information using Bayes' theorem.

## Q2

Probability of the Union of Two Events:

The probability of the union of two events A and B is denoted as P(A ∪ B) and can be calculated as:

P(A ∪ B) = P(A) + P(B) - P(A ∩ B)

## Q3

Joint Probability:

Joint probability refers to the probability of two or more events occurring simultaneously.

Formula: P(A and B) = P(A ∩ B)

## Q4

Chain Rule of Probability:

The chain rule expresses the joint probability of multiple events in terms of conditional probabilities.

It is particularly useful for decomposing complex joint probabilities.

Example: P(A, B, C) = P(A | B, C) \* P(B | C) \* P(C)

## Q5

Conditional Probability:

Conditional probability is the probability of an event occurring given that another event has already occurred.

Formula: P(A | B) = P(A ∩ B) / P(B)

## Q6

Continuous Random Variables:

Continuous random variables are variables that can take any real value within a specified range.

They are associated with continuous probability distributions.

Examples include height, weight, and time.

## Q7

Bernoulli Distributions:

The Bernoulli distribution models a binary outcome, where an event can have one of two possible outcomes (success or failure).

Formula: P(X = x) = p^x \* (1 - p)^(1 - x), where x = 0 or 1.

## Q8

Binomial Distribution:

The binomial distribution models the number of successes (x) in a fixed number of independent Bernoulli trials (n).

Formula: P(X = x) = (n choose x) \* p^x \* (1 - p)^(n - x), where "n choose x" represents the binomial coefficient.

## Q9

Poisson Distribution:

The Poisson distribution models the number of events occurring in a fixed interval of time or space.

Formula: P(X = x) = (e^(-λ) \* λ^x) / x!, where λ is the average rate of occurrence.

## Q10

Covariance:

Covariance measures the degree to which two random variables change together.

Positive covariance indicates a positive relationship, while negative covariance indicates a negative relationship.

## Q11

Correlation:

Correlation quantifies the strength and direction of a linear relationship between two continuous random variables.

The correlation coefficient ranges from -1 (perfect negative correlation) to 1 (perfect positive correlation).

## Q12

Sampling With Replacement:

Sampling with replacement allows each item in a population to be selected multiple times.

Example: Drawing a card from a deck, then putting it back before drawing another.

## Q13

Sampling Without Replacement:

Sampling without replacement ensures that each item in a population can be selected only once.

Example: Drawing cards from a deck without returning them to the deck.

## Q14

Hypothesis:

A hypothesis is a statement or educated guess about a population or a phenomenon that requires testing.

Example: "The new drug reduces cholesterol levels in patients."