**Question 1: Define the Bayesian interpretation of probability.**

Answer: The Bayesian interpretation of probability views probability as a measure of uncertainty that reflects an individual's subjective beliefs about the likelihood of events. It involves updating prior beliefs using new evidence to form posterior beliefs through Bayes' theorem.

**Question 2: Define the probability of a union of two events with an equation.**

Answer: The probability of the union of two events A and B is given by:

P(A∪B)=P(A)+P(B)−P(A∩B)

**Question 3: What is joint probability? What is its formula?**

Answer: Joint probability is the likelihood of two or more events occurring simultaneously. It measures the probability of the intersection of events A and B, denoted as P(A∩B).

**Question 4: What is the chain rule of probability?**

Answer: The chain rule of probability is used to express the joint probability of multiple events in terms of conditional probabilities. For events A, B, and C: P(A∩B∩C)=P(A)⋅P(B∣A)⋅P(C∣A∩B)

**Question 5: What is conditional probability mean? What is the formula for it?**

Answer: Conditional probability measures the likelihood of an event B occurring given that event A has occurred. The formula is: P(B/A)= P(A∩B)/P(A)

**Question 6: What are continuous random variables?**

Answer: Continuous random variables can take any value within a range. They have a continuous probability distribution, often represented by probability density functions (PDFs).

**Question 7: What are Bernoulli distributions? What is the formula for it?**

Answer: Bernoulli distributions model a binary outcome (success or failure) with a parameter p as the probability of success. The formula for the probability of a success is:

P(X=1) = p

P(X=0) = 1-p

**Question 8: What is a binomial distribution? What is the formula for it?**

Answer: The binomial distribution describes the number of successes in a fixed number of independent Bernoulli trials. It has parameters n(number of trials) and p (probability of success in each trial). The formula is:

P(X=k) = nCk p^k (1-p)^n-k

**Question 9: What is Poisson distribution? What is the formula for it?**

Answer: The Poisson distribution models the number of events occurring in a fixed interval of time or space. It has a parameter λ (average rate of events). The formula is:

P(X=k) = (e^- λ) \* (λ^k)/k!

**Question 10: Define covariance.**

Answer: Covariance measures the degree to which two random variables change together. It indicates the direction of the linear relationship between them.

**Question 11: Define correlation.**

Answer: Correlation quantifies the strength and direction of the linear relationship between two variables. It ranges from -1 to 1, with 0 indicating no linear correlation.

**Question 12: Define sampling with replacement. Give an example.**

Answer: Sampling with replacement involves selecting items from a population and returning each item before the next selection. Example: Drawing cards from a deck and putting the card back before drawing again.

**Question 13: What is sampling without replacement? Give an example.**

Answer: Sampling without replacement involves selecting items without returning them to the population. Example: Drawing cards from a deck without putting them back before drawing again.

**Question 14: What is a hypothesis? Give an example.**

Answer: A hypothesis is a statement or assumption about a population or phenomenon that can be tested using data. Example: "The new drug reduces symptoms more effectively than the current treatment."