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

The Bayesian interpretation of probability views probability as a subjective measure of belief or uncertainty, incorporating prior knowledge and observed evidence to update probabilities through Bayes' theorem. It emphasizes the incorporation of prior beliefs into probabilistic calculations, allowing for a more flexible and subjective assessment of uncertainty.

1. **Define probability of a union of two events with equation.**

The probability of the union of two events A and B, denoted as P(A ∪ B), can be calculated using the equation P(A ∪ B) = P(A) + P(B) - P(A ∩ B). This equation accounts for the possibility of overlap between the two events and ensures that the shared probability is not counted twice when calculating the overall probability of their union.

1. **What is joint probability? What is its formula?**

Joint probability refers to the probability of two or more events occurring simultaneously. Its formula is P(A ∩ B) = P(A) \* P(B|A), where P(A) represents the probability of event A and P(B|A) represents the probability of event B given that event A has occurred.

1. **What is chain rule of probability?**

The chain rule of probability states that the joint probability of multiple events can be calculated by multiplying the conditional probabilities of each event given the previous events. It is expressed as P(A ∩ B ∩ C) = P(A) \* P(B|A) \* P(C|A ∩ B).

1. **What is conditional probability means? What is the formula of it?**

Conditional probability refers to the probability of an event occurring given that another event has already occurred. The formula for conditional probability is P(A|B) = P(A ∩ B) / P(B), where P(A|B) represents the probability of event A given event B.

1. **What are continuous random variables?**

Continuous random variables are variables that can take any value within a specific range or interval. They are associated with probability density functions (PDFs) rather than probability mass functions (PMFs) and are typically measured on a continuous scale, such as time or distance.

1. **What are Bernoulli distributions? What is the formula of it?**

Bernoulli distributions model the probability of a binary outcome (success or failure) in a single trial. It has two possible outcomes with probabilities p and 1-p. The formula for the Bernoulli distribution is P(X=k) = p^k \* (1-p)^(1-k), where k is the outcome (0 or 1).

1. **What is binomial distribution? What is the formula?**

Binomial distribution describes the probability of a specific number of successes in a fixed number of independent Bernoulli trials. It is characterized by parameters n (number of trials) and p (probability of success in a single trial). The formula for the binomial distribution is P(X=k) = C(n, k) \* p^k \* (1-p)^(n-k), where C(n, k) is the binomial coefficient.

1. **What is Poisson distribution? What is the formula?**

Poisson distribution models the probability of a certain number of events occurring within a fixed interval of time or space, given a known average rate of occurrence. It is characterized by the parameter λ (average rate). The formula for the Poisson distribution is P(X=k) = (e^-λ \* λ^k) / k!, where e is the base of the natural logarithm.

1. **Define covariance.**

Covariance measures the degree and direction of the linear relationship between two random variables. It indicates how changes in one variable correspond to changes in the other. The formula for covariance is Cov(X, Y) = E[(X - μX) \* (Y - μY)], where X and Y are random variables, E represents the expectation operator, and μX and μY are the means of X and Y, respectively.

1. **Define correlation**

Correlation measures the strength and direction of the linear relationship between two random variables. It is a standardized measure that ranges from -1 to 1, with positive values indicating a positive linear relationship, negative values indicating a negative linear relationship, and values close to zero indicating a weak or no linear relationship.

1. **Define sampling with replacement. Give example.**

Sampling with replacement refers to a sampling method where each selected item is returned to the population before the next item is selected. For example, if we draw a card from a deck and then place it back before drawing another card, it is sampling with replacement.

1. **What is sampling without replacement? Give example.**

Sampling without replacement refers to a sampling method where each selected item is not returned to the population before the next item is selected. For example, if we draw a card from a deck and do not place it back before drawing another card, it is sampling without replacement.

1. **What is a hypothesis? Give example.**

A hypothesis is a proposed explanation or prediction about a phenomenon or relationship that can be tested through observation or experimentation. For example, a researcher