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

Bayesian probability is an interpretation of the concept of probability, in which, instead of frequency or propensity of some phenomenon, probability is interpreted as reasonable expectation representing a state of knowledge or as quantification of a personal belief.

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

The probability of the union of two events E and F (written E∪F E ∪ F ) equals the sum of the probability of E and the probability of F minus the probability of E and F occurring together ( which is called the intersection of E and F and is written as E∩F E ∩ F ).

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

Probabilities are combined using multiplication, therefore the joint probability of independent events is calculated as the probability of event A multiplied by the probability of event B. This can be stated formally as follows: Joint Probability:

 P(A and B) = P(A) x P(B)

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

In probability theory, the chain rule (also called the general product rule) permits the calculation of any member of the joint distribution of a set of random variables using only conditional probabilities.

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

Conditional probability is defined as the likelihood of an event or outcome occurring, based on the occurrence of a previous event or outcome.

If A and B are two events in a sample space S, then the conditional probability of A given B is defined as P(A|B)=P(A∩B)P(B), when P(B)>0.

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

A continuous random variable is a random variable that has only continuous values. Continuous values are uncountable and are related to real numbers. Examples of continuous random variables. The time it takes to complete an exam for a 60 minute test Possible values = all real numbers on the interval [0,60]

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

Bernoulli distribution is a discrete probability distribution where the Bernoulli random variable can have only 0 or 1 as the outcome. It formula is :

P for x =1

P(X=x) =

1-p for x =0

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

The binomial distribution is calculated by multiplying the probability of success raised to the power of the number of successes and the probability of failure raised to the power of the difference between the number of successes and the number of trials.

P(x) = nCx · px (1 − p)n−x

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

A Poisson distribution is a discrete probability distribution. It gives the probability of an event happening a certain number of times (k) within a given interval of time or space. The Poisson distribution has only one parameter, λ (lambda), which is the mean number of events.

The formula for Poisson distribution is f(x) = P(X=x) = (e-λ λx )/x!. For the Poisson distribution, λ is always greater than 0.

1. **Define covariance.**

Covariance is a statistical tool that is used to determine the relationship between the movements of two random variables. When two stocks tend to move together, they are seen as having a positive covariance; when they move inversely, the covariance is negative.

1. **Define correlation**

Correlation is a statistical term describing the degree to which two variables move in coordination with one another. If the two variables move in the same direction, then those variables are said to have a positive correlation. If they move in opposite directions, then they have a negative correlation.

1. **Define sampling with replacement. Give example.**
2. Sampling is called with replacement when a unit selected at random from the population is returned to the population and then a second element is selected at random. Whenever a unit is selected, the population contains all the same units, so a unit may be selected more than once.
3. **What is sampling without replacement? Give example.**

In sampling without replacement, each sample unit of the population has only one chance to be selected in the sample. For example, if one draws a simple random sample such that no unit occurs more than one time in the sample, the sample is drawn without replacement.

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

A simple hypothesis is a hypothesis that reflects a relationship between two variables independent and dependent variable. Examples: Higher the unemployment, higher would be the rate of crime in society. Lower the use of fertilizers, lower would be agricultural productivity.