1. Bayesian Interpretation of Probability:

- Definition: In the Bayesian interpretation, probability is a measure of belief or confidence in the occurrence of an event based on prior knowledge or information. It involves updating probabilities as new evidence is obtained.

2. Probability of the Union of Two Events:

- Formula: P(A) + P(B) - P(A and B)

- It represents the probability of either event A or event B or both occurring.

3. Joint Probability:

- Definition: Joint probability is the probability of the simultaneous occurrence of two or more events.

- Formula: P(X,Y) = P(X) \* P(Y)

- It measures the likelihood of events A and B occurring together.

4. Chain Rule of Probability:

- The chain rule expresses the joint probability of multiple events as a product of conditional probabilities.

- Formula **P(A,B) = p(A|B) p(B**).

- It extends to more events in a similar manner.

5. Conditional Probability:

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

- Formula: P(A and B) = P(A)P(B|A)

- It quantifies the probability of event A under the condition that event B has occurred.

6. Continuous Random Variables:

- Definition: Continuous random variables can take any value within a range, often associated with measurements or real numbers.

- Examples include height, weight, temperature.

7. Bernoulli Distributions:

- Definition: A Bernoulli distribution models a binary outcome where an event either happens (success) or does not happen (failure).

- Formula: Pr(*X*=*x*)={*p*1−*p*​​*x*=1*x*=0​  
 - It is used for single trials with two possible outcomes.

8. Binomial Distribution:

- Definition: A binomial distribution represents the number of successes in a fixed number of independent Bernoulli trials.

- It is used for multiple independent trials with the same probability of success.

9. Poisson Distribution:

- Definition: A Poisson distribution models the number of events occurring in a fixed interval of time or space.

- It is often used for rare events with a known average rate.

10. Covariance:

- Definition: Covariance measures the degree to which two random variables change together. Positive values indicate a direct relationship, negative values an inverse relationship.

11. Correlation:

- Definition: Correlation is a standardized measure of the strength and direction of a linear relationship between two random variables.

12. Sampling with Replacement:

- Definition: In sampling with replacement, each selected item is returned to the population before the next selection.

- Example: Drawing balls from a bag, putting each ball back before the next draw.

13. Sampling without Replacement:

- Definition: In sampling without replacement, each selected item is not returned to the population before the next selection.

- Example: Drawing cards from a deck without putting them back.

14. Hypothesis:

- Definition: A hypothesis is a testable statement or assumption about a population or phenomenon.

- Example: Hypothesis testing in statistics involves formulating and testing hypotheses, such as testing if the mean of a sample is equal to a specified value.