**Machine Learning Assignment 10**

1. Define the Bayesian interpretation of probability.

Ans-) The Bayesian interpretation of probability is a way of assigning probabilities to events based on prior knowledge or beliefs, and updating those probabilities as new evidence or information becomes available.

2. Define probability of a union of two events with equation.

Ans-) The probability of the union of two events A and B is given by the equation:

P(A ∪ B) = P(A) + P(B) - P(A ∩ B)

3. What is joint probability? What is its formula?

Ans-) Joint probability is the probability of two or more events occurring together. The formula for joint probability is:

P(A ∩ B) = P(A) \* P(B | A)

4. What is chain rule of probability?

Ans-) The chain rule of probability is a way to calculate the probability of a series of events occurring together. It states that:

P(A1 ∩ A2 ∩ ... ∩ An) = P(A1) \* P(A2 | A1) \* P(A3 | A1 ∩ A2) \* ... \* P(An | A1 ∩ A2 ∩ ... ∩ An-1)

5. What is conditional probability means? What is the formula of it?

Ans-) Conditional probability is the probability of an event A occurring given that another event B has already occurred. The formula for conditional probability is:

P(A | B) = P(A ∩ B) / P(B)

6. What are continuous random variables?

Ans-) Continuous random variables are variables that can take on any value within a certain range or interval, as opposed to discrete random variables, which can only take on specific, separate values.

7. What are Bernoulli distributions? What is the formula of it?

Ans-) Bernoulli distributions are a type of discrete probability distribution that model the probability of a binary outcome (i.e., success or failure) in a single trial. The formula for Bernoulli distribution is:

P(X = k) = p^k \* (1 - p)^(1-k) for k = 0, 1

8. What is binomial distribution? What is the formula?

Ans-) Binomial distribution is a type of discrete probability distribution that models the number of successes in a fixed number of independent trials with a binary outcome. The formula for binomial distribution is:

P(X = k) = (n choose k) \* p^k \* (1 - p)^(n-k) for k = 0, 1, 2, ..., n

9. What is Poisson distribution? What is the formula?

Ans-) Poisson distribution is a type of discrete probability distribution that models the probability of a certain number of events occurring in a fixed time or space interval, given the average rate of occurrence. The formula for Poisson distribution is:

P(X = k) = (lambda^k / k!) \* e^(-lambda) for k = 0, 1, 2, ...

10. Define covariance.

Ans-) Covariance is a measure of the linear relationship between two variables. It is calculated as the average of the product of the deviations of each variable from their respective means.

11. Define correlation

Ans-) Correlation is a measure of the strength and direction of the linear relationship between two variables. It is calculated as the covariance between the variables divided by the product of their standard deviations.

12. Define sampling with replacement. Give example.

Ans-) Sampling with replacement is a method of selecting a sample from a population in which each member of the population has an equal chance of being selected, and each member is replaced before the next selection. For example, rolling a die repeatedly and recording the results each time.

13. What is sampling without replacement? Give example.

Ans-) Sampling without replacement is a method of selecting a sample from a population in which each member of the population has an equal chance of being selected, but once a member is selected, it is not replaced before the next selection. For example, drawing cards from a deck without replacing the cards.

14. What is hypothesis? Give example.

Ans-) A hypothesis is a statement or proposition that can be tested and potentially proven or disproven through observation or experimentation. For example, a hypothesis could be that a new drug is effective at treating a certain disease, and this hypothesis can be tested through a clinical trial.