**Machine Learning Assignment 12**

1. What is prior probability? Give an example.

Ans-) Prior probability is the initial probability that a certain event or hypothesis is true before taking into account new evidence. An example of prior probability is the probability of a coin toss resulting in heads, which is 0.5 assuming the coin is unbiased.

2. What is posterior probability? Give an example.

Ans-) Posterior probability is the updated probability of a hypothesis being true after taking into account new evidence. For example, after observing that a coin toss has resulted in heads 3 times in a row, the posterior probability of the next toss resulting in heads would be higher than the prior probability.

3. What is likelihood probability? Give an example.

Ans-) Likelihood probability is the probability of observing the evidence given a certain hypothesis. For example, the likelihood probability of observing 3 heads in a row given that the coin is unbiased is (0.5)^3 = 0.125.

4. What is Naïve Bayes classifier? Why is it named so?

Ans-) Naïve Bayes classifier is a probabilistic algorithm used for classification tasks that assumes independence between the features of the input data. It is named so because it applies Bayes' theorem with the "naïve" assumption that the features are independent.

5. What is optimal Bayes classifier?

Ans-) Optimal Bayes classifier is a classifier that assigns each input to the class with the highest posterior probability. It achieves the lowest possible error rate among all classifiers for a given distribution of input data.

6. Write any two features of Bayesian learning methods.

Ans-) Two features of Bayesian learning methods are that they can handle uncertainty and update their knowledge based on new evidence.

7. Define the concept of consistent learners.

Ans-) Consistent learners are learning algorithms that converge to the true hypothesis as the amount of training data increases. In other words, the error rate of the learner approaches zero as the amount of data approaches infinity.

8. Write any two strengths of Bayes classifier.

Ans-) Two strengths of Bayes classifier are that it is simple and efficient to implement, and it can handle high-dimensional input data.

9. Write any two weaknesses of Bayes classifier.

Ans-) Two weaknesses of Bayes classifier are that it assumes independence between the features, which may not hold in real-world data, and it can suffer from the "zero-frequency" problem if a feature has no occurrences in the training data.

10. Explain how Naïve Bayes classifier is used for

1. Text classification

2. Spam filtering

3. Market sentiment analysis

Ans-) Naïve Bayes classifier can be used for text classification by representing each document as a bag of words and calculating the likelihood probability of each class given the occurrence of each word. It can be used for spam filtering by classifying incoming emails as spam or non-spam based on the likelihood probability of certain words or phrases. It can be used for market sentiment analysis by classifying social media posts or news articles as positive, negative, or neutral based on the occurrence of certain words or phrases.