1. What is prior probability? Give an example.

Prior probability is the initial probability of an event before new evidence is considered.

Example: If it rains 30 out of 100 days in a city, the prior probability of rain on any given day is 0.3.

2. What is posterior probability? Give an example.

Posterior probability is the revised probability of an event after considering new evidence.

Example: If the prior probability of rain is 0.3 and the weather forecast predicts a 70% chance of rain, the posterior probability incorporates this new information.

3. What is likelihood probability? Give an example.

Likelihood probability measures the probability of observing the given evidence given that a hypothesis is true.

Example: If it rains, the likelihood that the ground is wet is very high, say 0.9.

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

Naïve Bayes classifier is a probabilistic classifier that assumes independence among predictors. It's named "naïve" because it assumes that features are independent.

5. What is optimal Bayes classifier?

Optimal Bayes classifier is a theoretical model that makes predictions based on the exact probability distribution of the data, achieving the lowest possible error rate.

6. Write any two features of Bayesian learning methods.

1. Probabilistic Interpretation: Provides a probabilistic approach to classification.

2. Prior Knowledge Incorporation: Allows integration of prior knowledge into the model.

7. Define the concept of consistent learners.

Consistent learners are models that, given enough training data, will produce hypotheses that perfectly fit the training data.

8. Write any two strengths of Bayes classifier.

1. Efficiency: Simple and fast to implement.

2. Scalability: Performs well with large datasets.

9. Write any two weaknesses of Bayes classifier.

1. Independence Assumption: Assumes feature independence, which is often unrealistic.

2. Data Scarcity: Requires a large amount of data to estimate probabilities accurately.

10. Explain how Naïve Bayes classifier is used for

1. Text classification

Text classification: Naïve Bayes assigns class labels to text documents by calculating the posterior probability for each class based on word frequencies.

2. Spam filtering

Spam filtering: It identifies spam emails by evaluating the likelihood of words in the email being associated with spam or non-spam categories.

3. Market sentiment analysis

Market sentiment analysis: Analyzes customer reviews or social media posts to classify sentiments (positive, negative, neutral) using word probabilities.