**1.What is the fundamental difference between linear regression and logistic regression?**

**2.Explain the concept of support vectors in Support Vector Machines (SVM).**

A support vector machine (SVM) is a supervised machine learning algorithm that classifies data by finding an optimal line or hyperplane

Support vectors are data points that are closer to the hyperplane and influence the position and orientation of the hyperplane. Thus they are the elements of the training set that would change the position of the dividing hyperplane if removed.

**3.How is the decision boundary determined in logistic regression?**

In logistic regression decision boundary, the probability of an instance belonging to the 'positive' class is modeled as a logistic function of a linear combination of its features. Therefore, the decision boundary in a logistic regression model is the set of points where this probability is 0.5.

**4.What are the key assumptions of linear regression?**

Assumptions associated with a linear regression model:

* Linearity: The relationship between X and the mean of Y is linear.
* Homoscedasticity: The variance of residual is the same for any value of X.
* Independence: Observations are independent of each other.

**5.Explain the difference between SVC and SVR in Support Vector Machines (SVM).**

The main difference between SVM (Support Vector Machine) and SVR (Support Vector Regression) lies in their objectives.

SVM is a supervised learning algorithm used for classification, where the goal is to separate data points into different classes. SVR, on the other hand, is used for regression, where the goal is to predict a continuous output variable based on input features.

**6.What are the advantages and disadvantages of using decision trees for classification?**

The Decision Tree Method comes with certain advantages like interpretability, ability to handle unbalanced data, variable selection, handling missing values, and its non-parametric nature. However, it also has its drawbacks such as overfitting, sensitivity to small variations, and biased learning.

**7.Discuss the concept of regularization in the context of linear regression.**

Regularization is a way to prevent overfitting and allows the model to generalize better. Regularization decreases model variance at the cost of increased bias. By increasing bias and decreasing variance, regularization resolves model overfitting. Overfitting occurs when error on training data decreases while error on testing data ceases decreasing or begins increasing.

**8.How does the kernel trick work in SVM? Provide an example.**

**9.Explain the term 'entropy' and its role in decision tree algorithms.**

**10.What is overfitting in the context of support vector machines? How can it be prevented?**

Overfitting is an undesirable machine learning behaviour that occurs when the machine learning model gives accurate predictions for training data but not for new data.

some methods to avoid overfitting in SVM:

* Regularization
* Feature Selection
* Feature Scaling
* Kernel Choice