

Answer 1: Machine Learning (ML) is a branch of artificial intelligence (AI) that enables computers to learn from data, improve their performance over time without being explicitly programmed, and make predictions or decisions based on patterns in the data.

Answer 2: **Supervised Learning:** The model is trained on labeled data (input-output pairs) to predict outputs for new, unseen data. Examples: Linear Regression, Classification.

**Unsupervised Learning:** The model learns from unlabeled data to find hidden patterns or structures. Examples: Clustering (e.g., K-means), Dimensionality reduction (e.g., PCA).

**Semi-Supervised Learning:** A mix of labeled and unlabeled data is used to train the model.

**Reinforcement Learning:** The model learns by interacting with an environment and receiving feedback through rewards or penalties.

Answer 3: Gradient Descent is an optimization algorithm used to minimize a loss function (or cost function). It adjusts the model's parameters iteratively by moving in the direction of the negative gradient of the function, which leads to a local minimum or optimal solution.

Answer 4: Regression is a type of supervised learning where the model predicts a continuous output value based on input variables. The goal is to find the relationship between the independent (input) and dependent (output) variables. Example: Predicting house prices based on features like size and location.

Answer 5: Classification is a supervised learning task where the model predicts discrete labels or categories. The goal is to assign new data points to one of the predefined classes. Example: Email spam detection, where emails are classified as "spam" or "not spam."

Answer 6: XGBoost (Extreme Gradient Boosting) is an advanced, efficient implementation of gradient boosting, a technique used for supervised learning. It builds an ensemble of decision trees, where each tree corrects the errors of the previous ones. It is known for its speed, accuracy, and scalability in handling large datasets. XGBoost is widely used in machine learning competitions for its high performance.