**1. Explain Supervised vs. Unsupervised Learning**

**Supervised Learning  
Supervised learning is a type of machine learning where the model is trained on a labeled dataset meaning that each input (feature) is paired with the correct output (target). The model learns to map inputs to outputs so it can predict outcomes for new, unseen data.**

* **Goal: Predict an output based on input data.**
* **Examples: Predicting house prices, spam detection, stock price forecasting.**
* **Common algorithms: Linear Regression, Logistic Regression, Decision Trees, Random Forest, Support Vector Machines (SVM).**
* **Use cases: Sales forecasting, email classification, medical diagnosis.**

**Unsupervised Learning  
Unsupervised learning deals with unlabeled data, where the algorithm tries to find hidden patterns, groupings, or structures in the data without knowing the correct output in advance.**

* **Goal: Discover patterns or groupings in data.**
* **Examples: Customer segmentation, market basket analysis, anomaly detection.**
* **Common algorithms: K-Means Clustering, Hierarchical Clustering, Principal Component Analysis (PCA).**
* **Use cases: Targeted marketing, fraud detection, recommendation systems.**

**Key Difference:**

* **Supervised learning needs labeled data, focuses on prediction.**
* **Unsupervised learning works with unlabeled data, focuses on pattern discovery.**