**1.What is Machine Learning ?  
A**.Machine Learning (ML) is a branch of artificial intelligence (AI) that focuses on developing algorithms and statistical models that enable computers to learn from data and make decisions or predictions without being explicitly programmed.

**Key Concepts:**

1. **Learning from Data**: ML systems improve their performance by analyzing large amounts of data and identifying patterns.
2. **Types of Learning**:
   * **Supervised Learning**: The model learns from labeled data (e.g., predicting house prices based on previous data).
   * **Unsupervised Learning**: The model finds patterns in unlabeled data (e.g., grouping customers based on behavior).
   * **Reinforcement Learning**: The model learns by interacting with an environment and receiving feedback (e.g., self-driving cars learning from success/failure).
3. **Common Applications**:
   * Image and speech recognition
   * Email spam filtering
   * Product recommendations
   * Fraud detection
   * Autonomous vehicles

**Example:**

If you want a computer to recognize pictures of cats, you give it thousands of images labeled as "cat" or "not cat." The machine learns the features that define a cat and uses them to classify new images.

2. What is supervised machine learning algorithm ?

* A. **Definition**:  
  A supervised machine learning algorithm is one that learns from labeled data, meaning the dataset includes both input features and the correct output.

**How it Works:**

* The algorithm is trained using a dataset with known input-output pairs.
* It learns the relationship between the inputs (X) and outputs (Y).
* Once trained, it can predict the output for new, unseen inputs.

**Types:**

1. **Regression** – Predicts continuous values.  
   *Example*: Predicting a person’s salary based on experience.
2. **Classification** – Predicts categories or labels.  
   *Example*: Classifying emails as spam or not spam.

**3.** **What is regression and classification?**

**A . Regression**

* **Definition**:  
  Regression is used when the output (target variable) is a **continuous value**.
* **Goal**:  
  To predict numerical values based on input data.
* **Examples**:
  + Predicting house prices
  + Estimating a person's weight from their height
  + Forecasting sales or temperatures
* **Common Algorithms**:
  + Linear Regression
  + Decision Tree Regression
  + Support Vector Regression (SVR)

**2. Classification**

* **Definition**:  
  Classification is used when the output is a category or class.
* **Goal**:  
  To assign input data to discrete labels or groups.
* **Examples**:
  + Detecting whether an email is spam or not spam
  + Identifying whether a tumor is benign or malignant
  + Classifying types of fruits based on features
* **Common Algorithms**:
  + Logistic Regression
  + Decision Trees
  + K-Nearest Neighbors (KNN)
  + Support Vector Machine (SVM)