**1. What is Machine Learning (ML)?**

Machine Learning (ML) is a subset of Artificial Intelligence (AI) that focuses on building systems that can **learn automatically from data and improve from experience** without being explicitly programmed for every task.

**Example:** A machine learning model can learn to recognize handwriting, translate languages, or recommend products.

**Key steps in ML:**

1. Collect data
2. Prepare the data
3. Train the model
4. Test and evaluate the model
5. Use the model to make predictions

**2. What is a Supervised Machine Learning Algorithm?**

A **supervised machine learning algorithm** is a type of ML algorithm where the system is trained on a **labeled dataset**—meaning each input comes with the correct output (label).

* The algorithm learns to map inputs to outputs by minimizing the error between its predictions and the actual labels. Once trained, it can predict outputs for **new, unseen data**.

**Common examples of supervised ML algorithms:**

* **Linear Regression**
* **Logistic Regression**
* **Decision Trees**
* **Support Vector Machines (SVM)**
* **k-Nearest Neighbors (KNN)**

**Example use cases:**  
 1. Spam detection (label: spam or not spam)  
 2. Predicting house prices (label: house price in dollars)

**3. What is Regression and Classification?**

**→ Regression**

Regression is a **supervised learning task** where the goal is to predict a **continuous, real-valued output** based on input features. It answers **“how much” or “how many”** type questions.

**Examples of regression problems:**  
 1. Predicting house prices based on size and location  
 2. Estimating rainfall amount next month  
 3. Predicting stock prices

**Common regression algorithms:**

* Linear Regression
* Ridge Regression
* Lasso Regression
* Decision Tree Regression

**→ Classification**

Classification is a **supervised learning task** where the goal is to predict a **discrete class label** from input data.It answers **“which category or class”** a data point belongs to.

**Examples of classification problems:**  
1.Classifying email as spam or not spam  
2. Diagnosing disease type based on symptoms  
3. Identifying animals in an image (dog, cat, etc.)

**Common classification algorithms:**

* Logistic Regression
* Decision Trees
* Random Forest
* Support Vector Machines (SVM)
* k-Nearest Neighbors (KNN)

**Key difference between Regression and Classification:**

| **Regression** | **Classification** |
| --- | --- |
| Predicts **continuous values** | Predicts **categorical labels** |
| Example: Predict house price | Example: Predict tumor is malignant or benign |