# ****Week 1 Assessment****

## ****1. What is ML?****

**Machine Learning (ML)** is a subfield of Artificial Intelligence (AI) that focuses on enabling machines to learn from data and improve over time without being explicitly programmed. ML allows systems to automatically identify patterns in data, make decisions, and adapt when exposed to new data.

Unlike traditional programming, where a developer provides explicit instructions, ML systems use mathematical models that learn from historical data to make future predictions or classifications. It is widely used in real-life applications such as:

* Email spam filtering
* Recommendation systems (like Netflix or Amazon)
* Voice recognition (like Siri or Alexa)
* Self-driving cars
* Fraud detection in banking

ML is broadly divided into supervised, unsupervised, and reinforcement learning.

## ****2. What is Supervised ML Algorithm?****

A **supervised machine learning algorithm** is a type of ML algorithm that learns from labeled training data. This means that for every input in the dataset, the correct output (label) is already known. The algorithm uses this data to learn the relationship between inputs and outputs, and once trained, it can predict the output for new, unseen data.

For example, if you're building a model to classify emails as spam or not spam, you would provide a dataset of emails that are already labeled. The algorithm will learn patterns associated with spam and non-spam emails and then classify new emails accordingly.

Supervised learning is commonly used for:

* **Classification**: Predicting a category (e.g., yes/no, spam/not spam, cat/dog)
* **Regression**: Predicting a continuous value (e.g., price, age, temperature)

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

These are two primary types of supervised learning problems:

### ****Regression:****

Regression is used when the output variable is a continuous numerical value. The goal is to find the relationship between input variables and a continuous output.  
**Examples**:

* Predicting house prices based on size, location, and number of rooms
* Forecasting stock prices
* Estimating fuel consumption

**Common Regression Algorithms**:

* Linear Regression
* Support Vector Regression
* Decision Tree Regression

### ****Classification:****

Classification is used when the output variable is categorical. The goal is to assign inputs to one of several predefined categories.

**Examples**:

* Identifying whether an email is spam or not
* Classifying types of tumors as benign or malignant
* Recognizing handwritten digits

**Common Classification Algorithms**:

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