Here’s a clear breakdown of the **difference between supervised and unsupervised machine learning**:

**1. Definition**

* **Supervised Learning:**  
  The model is trained on a labeled dataset, meaning each training example has an input *and* the correct output. The system learns to map inputs to outputs.  
  *Example:* Predicting house prices based on size, location, etc., where past house prices are known.
* **Unsupervised Learning:**  
  The model is trained on an unlabeled dataset, meaning the system only has inputs and must find hidden patterns, structures, or relationships without predefined output labels.  
  *Example:* Grouping customers by purchasing behavior without knowing their categories beforehand.

**2. Training Data**

* **Supervised:** Requires **labeled data** (input-output pairs).
* **Unsupervised:** Uses **unlabeled data** (only inputs).

**3. Goal**

* **Supervised:** Learn a mapping from input → output to make predictions.
* **Unsupervised:** Discover structure, patterns, or groupings in data.

**4. Common Techniques**

* **Supervised:**
  + Regression (predicting continuous values)
  + Classification (predicting discrete classes)
* **Unsupervised:**
  + Clustering (e.g., K-Means, Hierarchical)
  + Dimensionality Reduction (e.g., PCA, t-SNE)
  + Association Rule Learning (e.g., Market Basket Analysis)

**5. Example Applications**

* **Supervised:**
  + Spam email detection (spam vs. not spam)
  + Credit score prediction
  + Speech recognition
* **Unsupervised:**
  + Customer segmentation
  + Fraud detection (finding unusual patterns)
  + Topic modeling in documents

✅ **In short:**

* **Supervised = learns with answers provided (labels).**
* **Unsupervised = explores data without answers, finding hidden patterns.**

Do you want me to also make a **simple diagram/table** comparison so it’s easier to memorize (like for exams)?