Task-1A:

We can say that machine learning is a subset of artificial intelligence (AI) focused on creating systems that learn or improve performance based on the data given.Artificial intelligence refers to systems or machines that imitate human intelligence.We can say that all machine learning solutions are artificial intelligence, but it is an important distinction that not all artificial intelligence solutions are machine learning. The example of unsupervised learning is email analytics, spam or not.

Example of supervised learning is estimating a salesperson's annual sales (dependent variable) based on the salesperson's education or relationship to years.

We can say that it is a subset of machine learning for deep learning. Deep learning algorithms are an artificial neural network designed to learn how the human brain learns. For example; driverless vehicles, virtual assistants (iSiri).

Knowledge driven: Using of knowledge or experience in a person. We can say that the knowledge of the expert is transferred to the model.

Data driven: Without relying on people and rules, we can say that the data is directly transferred to the model and the data is taught.

Task-1B:

Supervised learning: The values we are trying to predict are in our dataset. The data is labeled. This facilitates training as the results of the model can be compared with real labeled results.

1. Classification: Based on breast cancer data, trying to determine whether the cancer is benign or malignant according to the tumor size of a new case.
2. Regression: Let's say we have a data set of car sales. We can use the regression model to estimate the price of the car using its features.

Unsupervised learning: The value we want to predict does not exist in the data structure we prepared. The data is unlabeled. It uses algorithms to tag, sort and classify these data without human intervention and to arrive at accurate results.

1. Clustering: Segmentation of patients coming to the hospital's emergency department (triage).
2. Dimensionality reduction: Feature Selection Methods, Matrix Factorization.

Task-1C:

Classfication: Using pre-categorized datasets and machine learning, we can say classifying future datasets according to relevant categories. Example, classification of whether credit card transactions made are fraudulent or not.

Regression: Regression is used to estimate the value of a dependent variable based on the value of an independent variable. Example, Let's say we have a data set of car sales. We can use the regression model to estimate the price of the car using its features. How many of this product will we sell next month?

Task-1D:

Clustering: If we think of clusters as groups, clustering focuses on identifying similar sets of records and labeling records according to the group they belong to. This is done through machine learning without prior knowledge of groups and their properties. Example: clustering according to customers' food orders and developing campaigns for it.

Dimensionality reduction: The number of input variables or features for a dataset is referred to as its dimensionality. Dimensionality reduction refers to techniques that reduce the number of input variables in a dataset.

Example: For PCA method, Suppose we have an email database and want to classify emails as spam or not. to achive this goal, we construct a mathematical representation of each email as a bag-of-words vector.This is a binary vector, where each position corresponds to a specific word from an alphabet. For an email, each entry in the bag-of-words vector is the number of times a corresponding word appears in an email (0 if it does not appear at all).