1. What is the concept of human learning? Please give two examples.

Learning is **acquiring new understanding, knowledge, behaviors, skills, values, attitudes, and preferences**. The ability to learn is possessed by humans, animals, and some machines; there is also evidence for some kind of learning in certain plants.

2. What different forms of human learning are there? Are there any machine learning equivalents?

There are three main types of learning: classical conditioning, operant conditioning, and observational learning

3. What is machine learning, and how does it work? What are the key responsibilities of machine learning?

4. Define the terms "penalty" and "reward" in the context of reinforcement learning.

The penalty is the sum of the absolute values of weights. p is the tuning parameter that decides how much we want to penalize the model.

The Reward Function is **an incentive mechanism that tells the agent what is correct and what is wrong using reward and punishment**. The goal of agents in RL is to maximize the total rewards.

5. Explain the term "learning as a search"?

Learning can be viewed as a search through the space of all sentences in a concept description language for a sentence that best describes the data. Alternatively, it can be viewed as a search through all hypotheses in hypothesis space.

6. What are the various goals of machine learning? What is the relationship between these and human learning?

The goal of ML, in simple words, is to understand the nature of (human and other forms of) learn- ing, and to build learning capability in computers. To be more specific, there are three aspects of the goals of ML. (1) To make the computers smarter, more intelligent.

Humans acquire knowledge through experience either directly or shared by others. Machines acquire knowledge through experience shared in the form of past data. We have the terms, Knowledge, Skill, and Memory being used to define intelligence. Just because you have good memory, that does not mean you are intelligent

7. Illustrate the various elements of machine learning using a real-life illustration.

8. Provide an example of the abstraction method.

Abstraction is a technique of hiding unnecessary details from the user. The user is only given access to the details that are relevant. Vehicle operations or ATM operations are classic examples of abstractions in the real world

9. What is the concept of generalization? What function does it play in the machine learning process?

1: the act or process of generalizing. 2: a general statement, law, principle, or proposition made broad generalizations about women. 3: the act or process whereby a learned response is made to a stimulus similar to but not identical to the conditioned stimulus.

Generalization refers to your model's ability to adapt properly to new, previously unseen data, drawn from the same distribution as the one used to create the model. Develop intuition about overfitting.

10. What is classification, exactly? What are the primary distinctions between classification and regression?

Classification is the process of identifying and grouping objects or ideas into predetermined categories. In data management, classification enables the separation and sorting of data according to set requirements for various business or personal objectives.

The main difference between Regression and Classification algorithms is that Regression algorithms are used to predict the continuous values such as price, salary, age, etc., and Classification algorithms are used to predict/Classify the discrete values such as Male or Female, True or False, Spam or Not Spam, etc.

11. What is regression, and how does it work? Give an example of a real-world problem that was solved using regression.

Regression is a statistical method used in finance, investing, and other disciplines that attempt to determine the strength and character of the relationship between one dependent variable (usually denoted by Y) and a series of other variables (known as independent variables).

Medical researchers often use linear regression to understand the relationship between drug dosage and the blood pressure of patients. For example, **researchers might administer various dosages of a certain drug to patients and observe how their blood pressure responds**.

12. Describe the clustering mechanism in detail.

Clustering is the task of dividing the population or data points into a number of groups such that data points in the same groups are more similar to other data points in the same group than those in other groups. In simple words, the aim is to segregate groups with similar traits and assign them into clusters.

Hard Clustering: In hard clustering, each data point either belongs to a cluster completely or not. For example, in the above example, each customer is put into one group out of the 10 groups.

Soft Clustering: In soft clustering, instead of putting each data point into a separate cluster, a probability or likelihood of that data point to be in those clusters is assigned. For example, from the above scenario, each customer is assigned a probability to be in either of 10 clusters of the retail store.

13. Make brief observations on two of the following topics:

i. Machine learning algorithms are used

ii. Studying under supervision

iii. Studying without supervision

iv. Reinforcement learning is a form of learning based on positive reinforcement.