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

**Ans:** Human learning is a process of acquiring knowledge. Our behavior, skills, values and ethics are acquired when we process information through our minds and learn. Human learning may occur as part of education, personal development or any other informal/formal training. Children learn while they play, experiment, and interact. However, the process of learning is a continuous process. We constantly learn, unlearn and relearn through our experiences.

Examples of human learning are:

1. Motor learning – like walking, running, driving.
2. Verbal learning – like signs, pictures, symbols.

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

**Ans:** Different forms of human learning are Signal learning, Stimulus-response learning, Chaining, Verbal association, Multiple discrimination, Concept learning, Principle learning, Problem solving. Regardless of whether the learner is a human or machine, the basic learning process is similar.

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

**Ans:** Machine learning is the study of computer algorithms that can improve automatically through experience and by the use of data. Machine learning algorithms build a model based on sample data, known as "training data", in order to make predictions or decisions without being explicitly programmed to do so.

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

**Ans:** In reinforcement learning an agent interacts with environment, agent receives a reward on basis how it interacts with its environment, while on other side agent receives a penalty for performing incorrectly.

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

**Ans:** Learning as search is, searching through a large space of hypotheses implicitly defined by the hypothesis representation. The hypothesis representation defines the space of hypotheses the program can ever represent and therefore can ever learn. For example, Sky has 3 possible values and Temp, Humidity, Wind, Water, and Forecast each have 2 possible values.

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

**Ans:** The purpose of machine learning is to discover patterns in your data and then make predictions based on often complex patterns to answer business questions, detect and analyse trends and help solve problems. Machine learning in business and other fields is effectively a method of data analysis that works by automating the process of building data models. Regardless of whether the learner is a human or machine, the basic learning process is similar.

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

**Ans:** Dataset, Feature extraction, Algorithm, Model, Training.

Suppose a machine hast to identify a dog from pictures, Dataset is multiple images, feature extraction is extract features of dog to identify from dataset, algorithm is a program written for identification, model is consisting algorithm and other parameters to identify dog accurately and this model is trained in such a way to identify dog from upcoming pictures as well.

8. Provide an example of the abstraction method.

**Ans:** The Filter, Wrapper and Embedded approaches, used for feature selection, can be types of abstractions.

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

**Ans:** In machine learning, 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.

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

**Ans:** Classification is basically to classify a new item into a group of finite class. Difference between classification and regression is, in classification result is known while in regression result is not known.

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

**Ans:** Regression is used to quantify the relationship between one or more predictor variables and a response variable. Medical researchers often use linear regression to understand the relationship between drug dosage and blood pressure of patients.

12. Describe the clustering mechanism in detail.

**Ans:** Clustering is a way of grouping the data points into different clusters, consisting of similar data points. The objects with the possible similarities remain in a group that has less or no similarities with another group.

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.

**Ans:** Studying under supervision:- Where output is in labelled form.

Studying without supervision:- Where output is not labelled.