1. **Explain how Machine Learning (ML) is related to Internet of Things.**

   An IoT system relies heavily on Machine Learning models because values of real-time collected data vary a lot, which makes it extremely challenging or impossible to explicitly program the system to carry out some tasks or make decisions only based on certain predefined values. ML models can generalize those varied data values and make decisions without being explicitly programmed to do so, which makes it easier to distribute IoT systems on a grand scale and let them tune themselves to fit tightly with their specific individual users or use cases.

   Machine Learning models need a relatively large amount of data to train to achieve the desired accuracy. IoT, with its ability to collect, process and store an endless amount of data, can facilitate the training of these models.

2. **Describe, in general level, an IoT application using uses ML. You don't need to go into technical details, just a brief description of the system.**

   An IoT system with such requirements could be one which involves a "smart" fridge and a software application. The fridge has an internal camera which can recognize what ingredients the user has, find all the recipes which involves those ingredients, then from its data on how busy the user usually is on that day, it will send a suitable recipe to her phone. For example, if it is Sunday and the user has beef and some vegetable, it will recommend beef stew because its user has more free time to cook on Sunday, but it will select beef steak if it is a weekday evening because it takes less time.

3. **What types of ML systems are there (3 categories) ?**

   There are 3 main criteria to classify an ML system:

   - **How much human involvement there is**: There are 4 different levels of human involvement: supervised, semi-supervised, unsupervised and reinforcement learning. They are for dealing with fully labeled, partially labeled or none labeled data respectively. Algorithms belonging to the first and second groups are ones which try to classify or predict the next value of new data based on available labeled data it was trained on. Those of the third group, unsupervised learning, attempt to find different patterns which present in an unlabeled dataset and use those patterns to create new predictive models. The last group includes algorithms which "learns" based on the operant conditioning system, which includes rewards and punishments every time the model (or in this case, agent) makes a decision. The agents learn by finding different ways on its own to maximize the frequency of receiving rewards.
   - **Whether the training progress is continuous:** this refers to the capability of incremental learning of an algorithm, which means that whether when there is new data, the model needs to be trained all over again with the whole batch of both old and new data or only with the newly collected data.

- **Instance-based or model-based learning:** these two types of ML systems slightly differ in a sense that the former learns all the instances by heart, and when there is new data, it attempts to label the class for these new data points by calculating the metrics of similarity between them and the known ones. The latter, on the other hands, generalizes the best-fitting model based on training data, then compares new data points with this model to make predictions instead of with known samples like the former does.