a. define ML in your own words

Machine learning is a field that is related to multiple other fields containing aspects from artificial intelligence, probability, statistics and computer science. Machine learning is used to train computers to make decisions, make predictions or recognize patterns on a set of data.

b. in a paragraph, summarize the importance of data, pattern recognition, and accuracy in machine learning

Data plays the most important role in Machine learning as data is used to train the computer which based on the training makes predictions or recognizes patterns. Data can be in the form of tables of values. Clustering, supervised and unsupervised are few of the methods that can be used to train computers on sets of data. While using data to train computers is important it is also important that the data used to train computers should be collected through ethical ways. Pattern recognition also plays an important part in machine learning as pattern recognition helps the algorithm to make predictions on whether a certain object is a square or circle, is a human or an animal, is walking or running etcetera. These predictions must be accurate as if they are not accurate then it would not be a prediction but a guess. “A baseline accuracy of 99% is used as a measurement technique to gauge accuracy and evaluate performance of the algorithms” (Machine Learning Handbook, Using R and Python by Dr. Karen Mazidi, pg 23)

c. describe the relationship between AI and ML

Machine learning is a subset of AI (artificial intelligence). A machine learning model can be trained to learn a task for example playing chess and it would be expert in the game however if it were to play checkers (another board game) it would fail miserably because it was not trained on checkers. In contrast to this an Artificial Intelligence would contain multiple machine learning models and would be able to do a wide variety of tasks such as being able to play chess or checkers.

d. list at least 2 examples of modern machine learning applications, and explain why these application could not be built with traditional programming

The difference between traditional programming and machine learning applications is that in traditional programming the rules are encoded into the algorithm while in machine learning applications the algorithm is trained and gives an output model (Machine Learning Handbook, Using R and Python by Dr. Karen Mazidi, pg 25). An example would be google search in which a user puts their query and google predicts and autocomplete before the user has input the complete query and shows the most accurate result based on the query. This cannot be achieved through traditional programming as a programmer cannot enode all the rules or queries into a search engine as a user could use any combination of words so a machine learning model is used that predicts and autocomplete the query. Another example can be the YouTube recommendation/ suggestion system. Programmers cannot encode all the suggested videos as different users have different tastes, some users might watch an educational video

while some users will watch a music video. A machine learning model can suggest a related video based on user's and others who have similar taste to the user's watch history.

e. In a paragraph, define the terms observation, feature, quantitative data, and qualitative data and discuss their importance in machine learning

The table below is taken from book (Machine Learning Handbook, Using R and Python by Dr. Karen Mazidi, pg 26)

GPA	Hours	SAT	Class
3.9	15	1470	Freshman
3.8	30	1450	Sophomore
3.5	45	1400	Junior

Each row in this table is an **observation**. Each column such as GPA, Hours, SAT and Class are its **features**. As GPA, Hours and SAT features are numeric so they are **quantitative** while Class feature is **qualitative** as it would have a limited set of values. These have significance important in machine learning as data is presented as a form of table to computers. And through training a computer can learn patterns and would be able to make accurate predictions.

f. write a paragraph describing your personal interest in ML and whether/how you would like to learn more about ML for personal projects and/or professional application

One of the things that made me interested in machine learning was computer vision. How a computer can see the outside world and make accurate predictions. I also saw a video on how a computer was trained with medical records and it was able to diagnose whether a patient has a genetic disease. If I want to learn more about machine learning I will watch a course on udemy or a tutorial on YouTube or maybe read documentations for framework used for machine learning