Overview of ML

a. Machine Learning is developing a program that can learn by looking at data and analyzing it and finding patterns that lead to certain inferences or conclusions.

b. Data is important in machine learning because it is the basis for the learning process. The algorithms and models that are implemented in machine learning would be useless with no data to run it on. Pattern recognition is important because it allows the machine to draw inferences from the data and return results. Accuracy is important because it ensures the validity of the aforementioned results, otherwise, said results would not matter if they were not accurate.

c. Artificial intelligence refers to the ability of a machine to think like a human being, including learning and solving problems; whereas machine learning only refers to the learning aspect.

d. An example of applied machine learning is recommended searches and pages, where it is used to look at the internet history of a user in order to make certain topically relevant ads, products, or videos more prominent to the user. Without machine learning, this process could not be nearly as effective as it would be much less personalized. Another example would be fraud detection on purchases. In this case, machine learning is used to determine what typical spending looks like for a user, so that when transactions appear that are wildly unordinary, they can be caught immediately and put on hold to prevent money loss for a user. The reason why traditional programming would not work, is because typical spending is different for each user, so setting a global limit would not work as some users may typically go over that limit, and some may typically stay far under.

e. In a paragraph, define the terms observation, feature, quantitative data, and qualitative data and discuss their importance in machine learning. In machine learning, an observation is a recorded instance of some event that is to be used as input, these are important as the machine is trying to find patterns between these observations. A feature is an attribute of that recorded instance that helps provide details and context. These are important as they provide specific details that lead to these patterns and can help with future predictions. Quantitative data is data that can be described by numbers and is important as it can be used to help find regression trends in data. Qualitative data is data that can be sorted into some set of categories and is important as it can be used to help find classification trends in data.

f. I am personally interested in machine learning because during my internship last summer, I had to do a lot of work with data. Some of this work included trying to find irregular data points but there was no flat number that we could confidently say was the limit. Knowing the little that I do now, it seems like machine learning may be able to provide a solution to this issue and I am curious to see how it would be designed and implemented. Also, an issue that came up often was that there were irregularities in the data itself, and perhaps machine learning could have provided a quicker solution to finding the root of these irregularities instead of having to manually track from the result back to the source, which could contain up to millions of datapoints.