a. Machine learning is the development of computers to analyze data to accurately find and predict trends in it.

b.   Data is required to do machine learning because it is essential to train algorithms using it to output a model. This model will be used in prediction. Pattern recognition is what will make the model prediction accurate, which is the goal of machine learning. Finding trends and using them for prediction is what machine learning is fundamentally. As mentioned previously, high accuracy is essential for a good machine learning model.

c. Artificial intelligence is the development of computers to successfully complete human tasks. Machine learning is a subset of AI, where computers (as mentioned in answer a) analyze data to accurately find and predict trends in it. Human intervention is not necessary.

d. Examples of modern machine learning applications:

   a. Recommendations in social media – It would be impossible to (somewhat) accurately predict what users might like based on their past interests using traditional programming. With an ever-growing list of topics, it would be highly difficult to manually formulate rules for an algorithm that catered to most users. In addition, the programmer would not be able to accurately obtain the data related to the user's current and past interests without machine learning. The rules might be inaccurate too.

   b. Product recommendations – This is an important feature in websites like Amazon. Like the previous example, the programmer would not be able to accurately obtain the data related to the user's current and past shopping interests without machine learning. Additionally, ML is required to predict what the user might like based on their past orders. This cannot be done using traditional programming.

   c. Language translation – By using translation data, websites are easily able to convert text to the language of the users' choice. If done manually, it would take a lot of manpower and effort, and the instantaneous translation of sites would not be possible. Languages are too complex to be programmed and contain many rules which machine learning might easily extract.

e.   An observation, also known as an example or instance, is a sample data point (usually shown in a row). Without observations, there would be no data and without data machine learning is not possible (as mentioned before). A feature is a column in the table of data, also known as an attribute or predictor. One or more features are used to predict our target/response and form rules to do so in the future. Quantitative data is numeric and qualitative data (also known as factors or categorical data) can only take on one of a finite set of values. Numeric data is useful for linear regression, and qualitative data is useful for categorization.

f.   In the past, I've briefly tried machine learning and enjoyed it. However, I was not sure how to improve myself as I was my own teacher, and courses on the

Internet seemed too advanced. It is satisfying to train a model to predict results accurately, and I'd like to learn how to do that properly (in an academic and practical sense). I would love to explore it further to determine if I want to work in the field of data science and analysis in the future.