Overview of NLP

a. define NLP in your own words
   NLP is the study of how we can use AI to analyze language and develop a variety of useful technologies from it. By using machine learning, we are now able to process vast amounts of text and extract useful information from it. NLP is continuing to grow and its importance is growing evermore in the modern world.
b. describe the relationship between AI and NLP
   NLP is a part of AI itself. NLP is just a form of AI that is concerned with text and human language. NLP deals with the analysis of text and the use of various machine learning models to identify patterns from text data and provide useful information.
c. write a sentence or two comparing and contrasting natural language understanding and natural language generation
   Natural language understanding describes the ability of NLP models to analyze text and derive conclusions from the text, much like how humans comprehend text and learn its meaning. Natural language generation, on the other hand, describes the ability of NLP models to generate completely new text based off training on previous text batches, like how humans write new sentences and stories.
d. list some examples of modern NLP applications
   Firstly, the most hot NLP application out there is ChatGPT, which can do a variety of text-based tasks at an impressive level of accuracy. Another NLP application is Google Search, which analyzes queries using NLP to deliver the most accurate results to the customer. Even Alexa is considered NLP, because after the audio is translated to text, a complex system of models analyzes the question and responds back with an answer to the device.
e. write 3 paragraphs describing each of the 3 main approaches to NLP, and list examples of each approach

   Rule-based NLP – uses basic rules, written manually by a human. The model uses these rules to categorize inputs and determine their classification. These simple rules are still useful when used for certain tasks, but fail to perform for complex tasks. For example, Rule-based NLP is commonly used for preprocessing data in tasks such as tokenization.

   Machine learning-based NLP – uses common machine learning models to analyze data and derive interpretations without direct human action. Data needs to be prepared properly to work with these models. Models also need to undergo thorough training in order to accurately analyze the text-data.

   Deep learning-based NLP – most similar to how a human brain works. Uses multiple layers of "neurons" which analyze data and work with the surrounding layers to understand context and develop a more clear picture of the analysis of the data. Uses word embeddings, and also requires the most amount of computation because of the complicated structure of the neural network models. Does not require preprocessing. Used in many things like ChatGPT.

f. write a paragraph describing your personal interest in NLP and whether/how you would like to learn more about NLP for personal projects and/or professional application
I am really passionate about NLP. I have worked with NLP before in my internships, having had a first hand look on how it works with real-life data. I think NLP is one of the most important branches of AI currently, and it will continue to become more powerful over time. I really want to learn more about this field and develop my skillset so that I can work in jobs related to NLP in the future.