Part 1:

Q1: Which of the following best describes NLP?

Answer: A (Teaching machines to process human language)

Q2: Why are transformer models preferred over traditional rule-based NLP systems?

Answer: B (They are capable of understanding context through self-attention)

Real-world Applications of NLP in Cloud:

1. Virtual assistants are designed to answer prompts given to it based on the data they were trained on. It utilizes NLP to process and interpret the prompt given by its user, which is then used as context for the virtual assistant’s generated answer. This answer is sent back to the user in the form of human language. Virtual assistants can leverage transformer architecture through using the entirety of the given prompts, the previous prompts given by the user, and the previous answers given by the virtual assistant, as context for the virtual assistant’s new answer at the same time. One prominent example of an AI-based virtual assistant is ChatGPT.
2. Translation services take input text from their user, translate it into a different language selected by its user, and output the text translated into a different language. Translation services can take advantage of transformers through using the entirety of the input text to help determine the appropriate translations for every word in the input text. The most prominent translation service is Google Translate, though there is also DeepL.
3. Text Summarization takes input text, determines the most important parts of the text, and outputs a new piece of text with just these important parts. Text summarization takes advantage of transformers through both transformers’ ability to assess the entire input text at once and the self-attention mechanism weighing the importance of certain words in the text. This allows text summarization to accurately determine which parts of the input text to build its summarization around. Microsoft Azure is equipped with a text summarization service.

Part 2:

Google’s NLP API service is a cloud-based service that allows developers to implement natural language understanding to their applications. Some of the services supported by Google NLP API include sentiment analysis, entity analysis, entity sentiment analysis, content classification, and syntax analysis. The list of natural languages supported by Google NLP API are not as extensive as Google Translate’s list of supported languages, but it still includes common languages such as English and Chinese. Google’s NLP API and also be used in tandem with other services provided by Google Cloud. For example, Google’s NLP API can run sentiment, entity, and syntax analysis on provided Google Docs files, and this process is made simple through using Google’s App Script as a bridge for these two services. The introduction and deployment of transformer architecture has greatly benefited the functionalities and abilities of Google NLP API. Using transformer’s’ self-attention mechanism, Google NLP API’s sentiment, entity, and syntax analysis can add weights to certain words in any given text to determine the importance of any singular word in context of the whole input text. Thanks to transformers, Google NLP API can be trained on massive amounts of data, allowing it to better detect more complex nuances within the input text. This ability also paved the way for the existence of Large Language Models.

Part 3:

1. Cloud-based NLP solutions eliminate privacy concerns. False
2. Transformer-based models can produce biased outputs due to their training data. True

I think there are several ethical considerations regarding the deployment of NLP models to Cloud worth thinking about. One major consideration is data privacy security. Once personal information is uploaded onto the cloud, it is at the mercy of the developers and the cloud hosting company, and that data can be compromised if their cybersecurity is breached. One way to address this is to ensure security is up to date and implement security measures into the code itself. Another ethical concern to consider is model bias. Depending on the training data given to the model, it can produce unfair and prejudiced output whose consequences can be severe, harmful, and far-reaching towards the users of the model, the developers of the model, and the organizations hosting the model. One way of addressing this concern is to manually verify whether or no the training data is biased and how, but another way of addressing this is to use diverse sources and populations for the training data. While biases will likely still be present within these diverse sources, the diverse kinds of biases will likely prevent one singular bias from significantly influencing the model’s output.