**Question 1: Cloud Computing for Deep Learning**

**(a) Define Elasticity and Scalability in Cloud Computing**

**Elasticity**: Elasticity refers to a system's ability to automatically scale resources up or down in response to workload changes. It ensures that the allocated resources match real-time demand, optimizing cost and performance.

**Scalability**: Scalability is the capability of a system to handle increased workload by adding resources. It can be achieved through vertical scaling (adding more power to existing machines) or horizontal scaling (adding more machines).

**(b) Compare AWS SageMaker, Google Vertex AI, and Microsoft Azure Machine Learning Studio**

| **Feature** | **AWS SageMaker** | **Google Vertex AI** | **Microsoft Azure ML Studio** |
| --- | --- | --- | --- |
| **Strengths** | High scalability, integration with AWS ecosystem. | User-friendly AutoML, BigQuery integration. | Strong governance, seamless Microsoft integration. |
| **Use Cases** | Large-scale applications, generative A1. | Data-heavy operations, multimodal AI. | Regulated industries, hybrid deployments. |
| **Learning Curve** | Steep for beginners. | Easier for non-experts. | Moderate; requires familiarity with Azure tools. |