* **Conceptual Questions**

**1. Feature Engineering:**

In the context of customer segmentation, feature engineering involves selecting and transforming features like Age, Income, Spending Score, and Gender to improve the performance of the clustering algorithm.

**2. Model Interpretability:**

K-means is relatively simple to interpret: the centroids of each cluster represent the average customer profile. We can explain each cluster by analyzing these centroids.

**3. Imbalanced Datasets:**

Imbalanced datasets occur when certain customer segments are under-represented. K-means may be sensitive to such imbalance, potentially resulting in clusters with few data points.

**4. Anomaly Detection:**

Anomalies in this context could be customers whose behavior doesn't fit into any of the identified clusters, possibly indicating outliers or fraud.

**5. Cross-validation:**

Cross-validation in clustering is less common than in supervised learning but can be used to test the stability of clusters by splitting the data and testing on different subsets.

* **Scenario-Based Question:**

**Scenario:** Eazr wants to implement a real-time recommendation system to suggest relevant offers to users based on their transaction history.

**1.** **What type of recommendation system (collaborative filtering, content-based, hybrid) would you choose and why?**

For Eazr, a hybrid recommendation system combining collaborative filtering and content-based filtering would work well. It leverages user behavior and transaction history, as well as content features like product categories.

**2. How would you handle the cold-start problem for new users?**

The cold-start problem for new users can be tackled by using demographic data (e.g., age, income, location) to provide initial recommendations or by asking for preferences upon sign-up.

**3. Which metrics would you use to evaluate the performance of the recommendation system?**

To evaluate the recommendation system, use metrics like precision, recall, F1-score, and mean average precision (MAP) to measure the relevance of recommendations. A/B testing could also be useful to compare different algorithms.