**Justification for Selecting k= 3**

To decide (k = 3) for K-Means clustering, I used the Elbow Method, which detects the elbow or the point where adding more clusters will no longer significantly improve the quality of the grouping. I graphed inertia (sum of squared distances of points from their cluster centroids) for (k) values from 1 to 9. As expected, inertia fell off as more clusters were added, but the decrease became increasingly less significant after (k = 3), the "elbow point" where diminishing returns set in. I also validated this choice by examining a hierarchical clustering dendrogram, which naturally grouped the data into three clusters. Choosing (k = 3) gives the ideal trade-off, more clusters would be overly complex for the model without adding much more value and less would be too simple for the data. This trades off the accuracy and interpretability of the model.