# Unsupervised Learning Exercise: K-Means & GMM

1. Load the digits dataset from scikit-learn.
2. Choose only three classes
3. Perform PCA to reduce the data to 2 dimensions.
4. Run the built-in KMeans algorithm on the PCA-transformed data.
5. Plot the KMeans clusters in the 2D space and compare them to the original digit labels.
6. Use the "elbow" method to find the best value of k: plot inertia vs. k for k in a range (e.g., 1–10).
7. Run GaussianMixture (GMM) with two covariance types: 'full' and 'diag'.
8. Plot the log-likelihood over EM iterations for each covariance type to verify it increases.
9. Note: if you don’t implement your own GMM code, you can still earn up to 90 points by using sklearn’s implementation.
10. Organize each question into its own cell in a Jupyter notebook (.ipynb) and submit both the notebook and this document.