**Case Summary**

Perform principal component analysis, perform clustering using the first three principal component scores (both hierarchical and k mean clustering, scree plot or elbow curve), and then determine the optimal number of clusters. Then, compare this number to the original data (class column we ignored at the beginning, which indicates it has three clusters), to see if the results are the same.

Data Description:

This dataset is adapted from the Wine Data Set from

<https://archive.ics.uci.edu/ml/datasets/wine>

by removing the information about the types of wine for unsupervised learning.

The descriptions that follow were taken directly from the UCI website:

These numbers are from a chemical examination of three different cultivars of wine produced in the same Italian region but cultivated in a separate location. Thirteen components that were present in each of the three types of wines were analyzed to determine their relative amounts.

There are 13 numerical, predictive, and class properties in all. Information about the attribute: Alcohol acetic acid Ash Ash alkalinity Magnesium Phenols Flavanoids phenolic nonflavanoids Proanthocyanins color saturation Color Diluting Proline