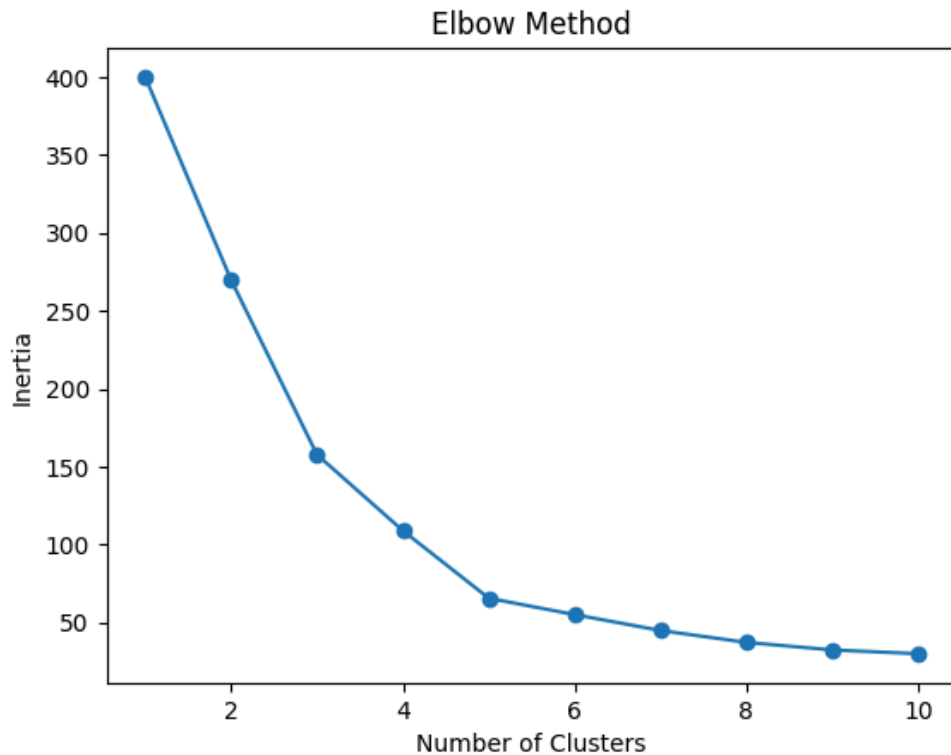


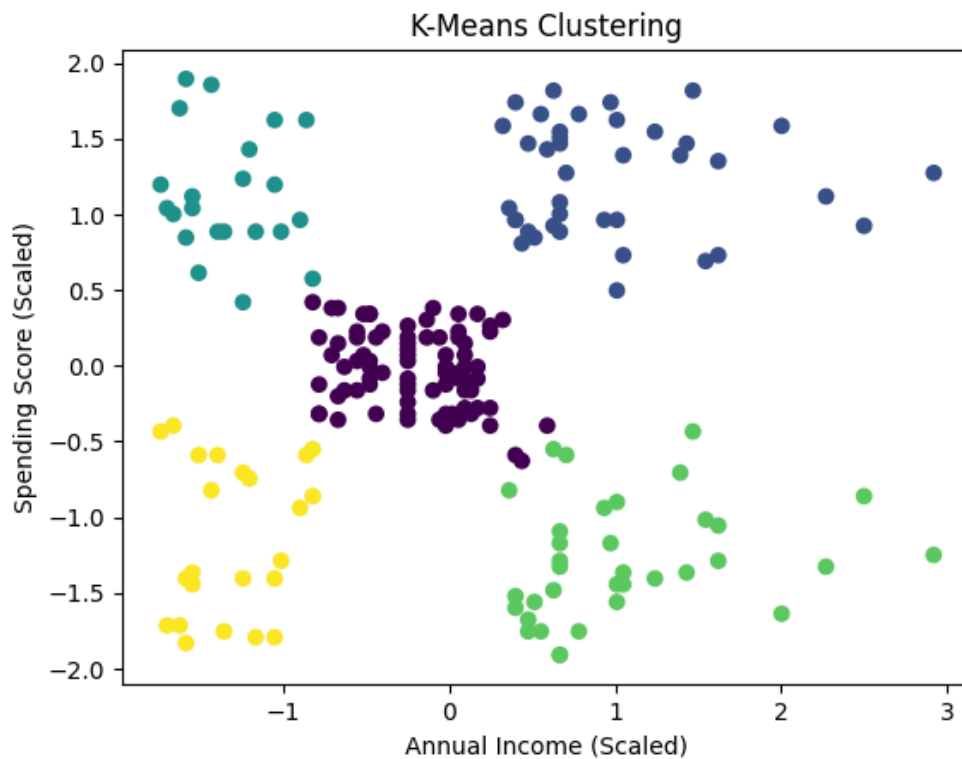
```

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import silhouette_score
df = pd.read_csv("Mall_Customers.csv")
# Select relevant features
X = df[['Annual Income (k$)', 'Spending Score (1-100)']]
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)
inertia = []
for k in range(1, 11):
    kmeans = KMeans(n_clusters=k, random_state=42, n_init=10)
    kmeans.fit(X_scaled)
    inertia.append(kmeans.inertia_)
plt.figure()
plt.plot(range(1, 11), inertia, marker='o')
plt.title("Elbow Method")
plt.xlabel("Number of Clusters")
plt.ylabel("Inertia")
plt.show()
kmeans = KMeans(n_clusters=5, random_state=42, n_init=10)
clusters = kmeans.fit_predict(X_scaled)
# Add clusters to dataset
df['Cluster'] = clusters
score = silhouette_score(X_scaled, clusters)
print("Silhouette Score:", score)
plt.figure()
plt.scatter(X_scaled[:, 0], X_scaled[:, 1], c=clusters)
plt.title("K-Means Clustering")
plt.xlabel("Annual Income (Scaled)")
plt.ylabel("Spending Score (Scaled)")
plt.show()

```



Silhouette Score: 0.5546571631111091



```
.import pandas as pd
.import matplotlib.pyplot as plt
.import scipy.cluster.hierarchy as sch
from sklearn.preprocessing import StandardScaler
from sklearn.cluster import AgglomerativeClustering
from sklearn.metrics import silhouette_score
.import os
from google.colab import files # Import files module

file_name = "Wholesale customers data.csv"
```

```

file_name = 'wholesale customers data.csv'

# Check if the file exists, if not, prompt for upload
if not os.path.exists(file_name):
    print(f"File '{file_name}' not found. Please upload the file.")
    uploaded = files.upload()
    if file_name not in uploaded:
        print(f"Error: '{file_name}' was not uploaded. Please upload the correct file.")
        # Optionally, you might want to raise an error or exit if the file isn't uploaded
        # For now, the next line `pd.read_csv` will fail again if the file is truly missing
    else:
        print(f"File '{file_name}' uploaded successfully.")

df = pd.read_csv(file_name)
# Remove categorical columns if present
if 'Channel' in df.columns:
    df = df.drop(['Channel', 'Region'], axis=1)
    X = df.values
    scaler = StandardScaler()
    X_scaled = scaler.fit_transform(X)
    plt.figure()
    dendrogram = sch.dendrogram(sch.linkage(X_scaled, method='ward'))
    plt.title("Dendrogram")
    plt.xlabel("Customers")
    plt.ylabel("Euclidean Distance")
    plt.show()
    hc = AgglomerativeClustering(n_clusters=3, linkage='ward')
    clusters = hc.fit_predict(X_scaled)
    score = silhouette_score(X_scaled, clusters)
    print("Silhouette Score:", score)
    plt.figure()
    plt.scatter(X_scaled[:, 0], X_scaled[:, 1], c=clusters)
    plt.title("Hierarchical Clustering")
    plt.xlabel("Feature 1 (Scaled)")
    plt.ylabel("Feature 2 (Scaled)")
    plt.show()

```

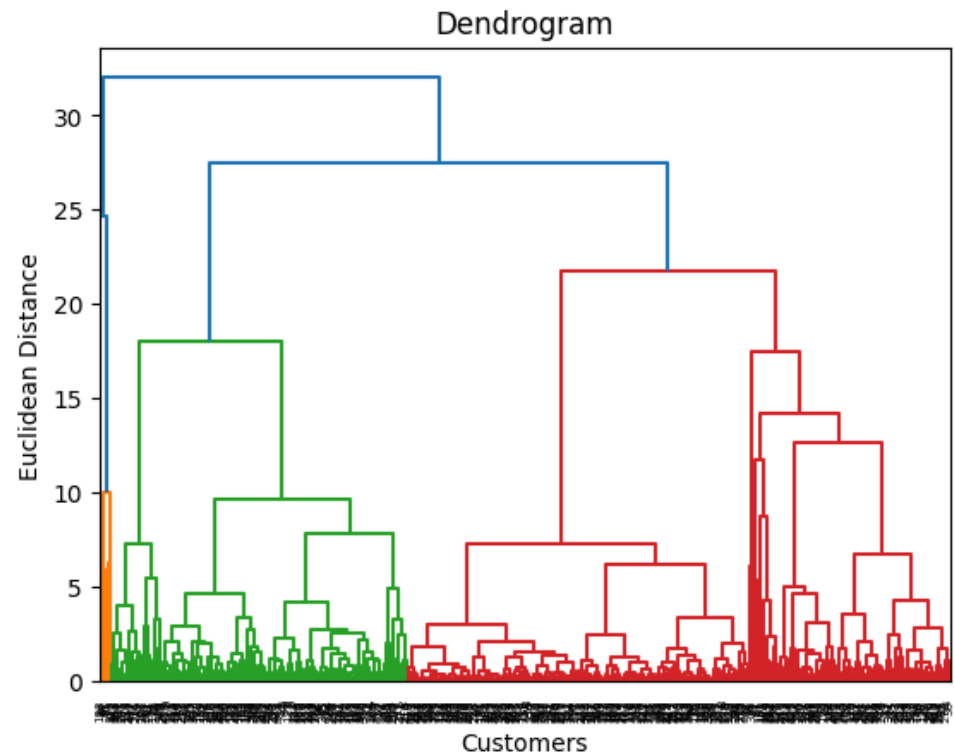
File 'Wholesale customers data.csv' not found. Please upload the file.

[Choose files](#) Wholesale c...ers data.csv

**Wholesale customers data.csv**(text/csv) - 15021 bytes, last modified: 12/02/2026 - 100% done

Saving Wholesale customers data.csv to Wholesale customers data.csv

File 'Wholesale customers data.csv' uploaded successfully.



Silhouette Score: 0.2646091480214908

Hierarchical Clustering