Importing the required modules

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import scipy.cluster.hierarchy as sch
from sklearn.cluster import AgglomerativeClustering
```

Initiaising the dataset to variable named "data" and storing the values of last two attributes of data

```
dataset = pd.read_csv('Mall_Customers.csv')
X = dataset.iloc[:, [3,4]].values
```
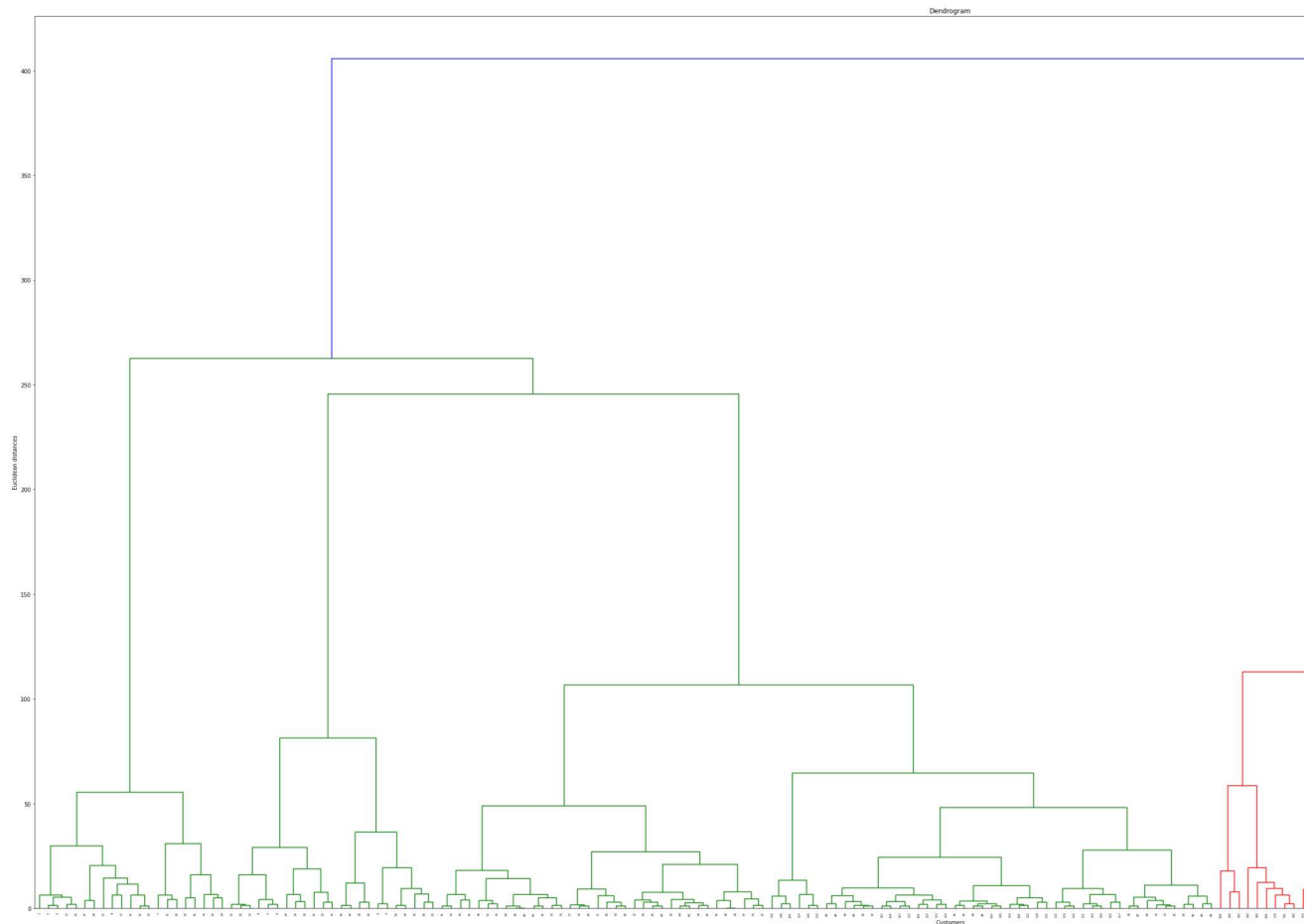
Plotting the initial dataset, with no clustering.

```
dataset.plot.scatter(x='Annual Income (k$)', y = 'Spending Score (1-100)')
plt.show()
```
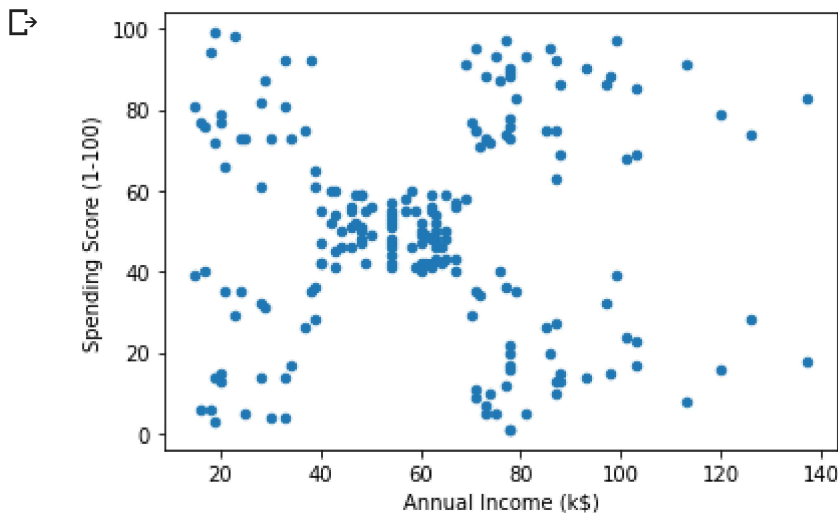

Plotting the dendrogram for the above dataset.

```
fig = plt.figure(figsize=(60,30))
dendrogram = sch.dendrogram(sch.linkage(X, method  = "ward"))
plt.title('Dendrogram')
plt.xlabel('Customers')
plt.ylabel('Euclidean distances')
fig.show()
```

Aliasing the heirarchical clustering (Agglomerative) to hc.

```
hc = AgglomerativeClustering(n_clusters = 5, affinity = 'euclidean', linkage ='ward')
```

Predicting to which cluster each datapoint would belong to and storing it into y_hc.

```
y_hc=hc.fit_predict(X)
```

Plotting the clusters.

```
plt.scatter(X[y_hc==0, 0], X[y_hc==0, 1], s=10, c='red', label ='Cluster 1')
plt.scatter(X[y_hc==1, 0], X[y_hc==1, 1], s=10, c='blue', label ='Cluster 2')
plt.scatter(X[y_hc==2, 0], X[y_hc==2, 1], s=10, c='green', label ='Cluster 3')
plt.scatter(X[y_hc==3, 0], X[y_hc==3, 1], s=10, c='cyan', label ='Cluster 4')
plt.scatter(X[y_hc==4, 0], X[y_hc==4, 1], s=10, c='magenta', label ='Cluster 5')
plt.title('Clusters of Customers (Hierarchical Clustering Model)')
plt.xlabel('Annual Income(k$)')
plt.ylabel('Spending Score(1-100')
plt.legend()
plt.show()
```

Clusters of Customers (Hierarchical Clustering Model)