```
# Import the Dependencies

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.cluster import KMeans

# Load the Data
from google.colab import files
uploaded = files.upload()
```

```
<IPython.core.display.HTML object>
```

```
Saving Mall_Customers.csv to Mall_Customers.csv
```

```
# Data Collection and Analysis
customer_data =pd.read_csv('Mall_Customers.csv')
customer_data.head()
```

```
{"summary":"{\n  \"name\": \"customer_data\",\n  \"rows\": 200,\n
\"fields\": [\n    {\n      \"column\": \"CustomerID\",\n
\"properties\": {\n        \"dtype\": \"number\",\n        \"std\":
57,\n        \"min\": 1,\n        \"max\": 200,\n
\"num_unique_values\": 200,\n        \"samples\": [\n          96,\n
16,\n          31\n        ],\n        \"semantic_type\": \"\",\n
\"description\": \"\"\n      }\n    },\n    {\n      \"column\":
\"Gender\",\n      \"properties\": {\n        \"dtype\":
\"category\",\n        \"num_unique_values\": 2,\n        \"samples\":
[\n          \"Female\",\n          \"Male\"\n        ],\n
\"semantic_type\": \"\",\n        \"description\": \"\"\n      }\
n    },\n    {\n      \"column\": \"Age\",\n      \"properties\": {\n
\"dtype\": \"number\",\n        \"std\": 13,\n        \"min\": 18,\n
\"max\": 70,\n        \"num_unique_values\": 51,\n        \"samples\":
[\n          55,\n          26\n        ],\n        \"semantic_type\":
\"\",\n        \"description\": \"\"\n      }\n    },\n    {\n
\"column\": \"Annual Income (k$)\",\n      \"properties\": {\n
\"dtype\": \"number\",\n        \"std\": 26,\n        \"min\": 15,\n
\"max\": 137,\n        \"num_unique_values\": 64,\n
\"samples\": [\n          87,\n          101\n        ],\n
\"semantic_type\": \"\",\n        \"description\": \"\"\n      }\
n    },\n    {\n      \"column\": \"Spending Score (1-100)\",\n
\"properties\": {\n        \"dtype\": \"number\",\n        \"std\":
25,\n        \"min\": 1,\n        \"max\": 99,\n
\"num_unique_values\": 84,\n        \"samples\": [\n          83,\n
39\n        ],\n        \"semantic_type\": \"\",\n
\"description\": \"\"\n      }\n    }\n  ]\
n}","type":"dataframe","variable_name":"customer_data"}
```

```
# Find the number of rows in dataset
customer_data.shape
```

```
(200, 5)
```

```python
# Getting information on the dataset
customer_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 5 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
 0   CustomerID              200 non-null    int64
 1   Gender                  200 non-null    object
 2   Age                     200 non-null    int64
 3   Annual Income (k$)      200 non-null    int64
 4   Spending Score (1-100)  200 non-null    int64
dtypes: int64(4), object(1)
memory usage: 7.9+ KB
```

```python
# Missing values in the dataset
customer_data.isnull().sum()
```

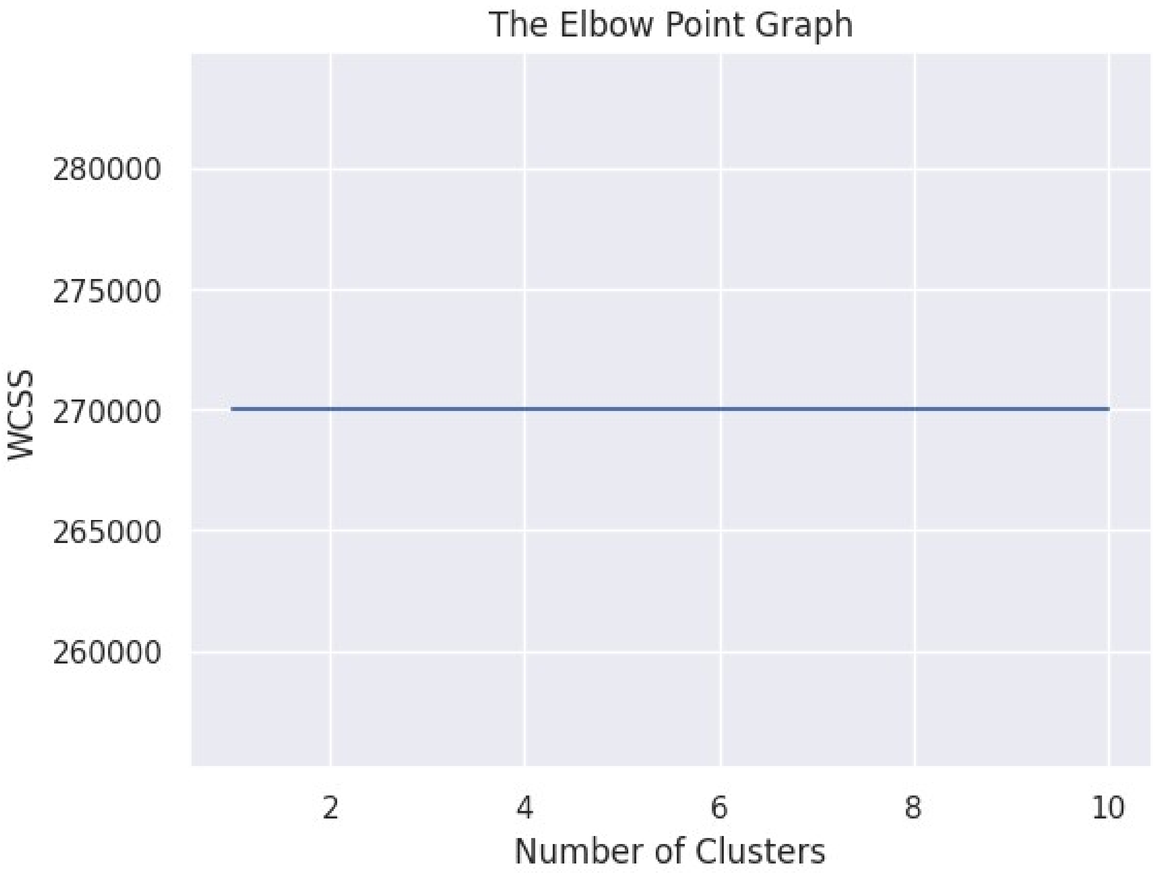
```
CustomerID                0
Gender                    0
Age                       0
Annual Income (k$)        0
Spending Score (1-100)    0
dtype: int64
```

```python
# Choosing the Annual Income Column & Spending Score column
X = customer_data.iloc[:,[3,4]]

# Checking the values we have
print(X)
```

```
     Annual Income (k$)  Spending Score (1-100)
0                    15                      39
1                    15                      81
2                    16                       6
3                    16                      77
4                    17                      40
..                  ...                     ...
195                 120                      79
196                 126                      28
197                 126                      74
198                 137                      18
199                 137                      83

[200 rows x 2 columns]
```

```python
# Choosing the number of clusters
wcss = []
```

```
#  Finding WCSS -Within Clusters Sum of Squares for different values
of clusters

wcss = []

for i in range(1,11):
  kmeans = KMeans(n_clusters=1, init='k-means++', random_state=42)
  kmeans.fit(X)

  wcss.append(kmeans.inertia_)

# Plot an elbow graph

sns.set()
plt.plot(range(1,11), wcss)
plt.title("The Elbow Point Graph")
plt.xlabel('Number of Clusters')
plt.ylabel('WCSS')
plt.show()
```

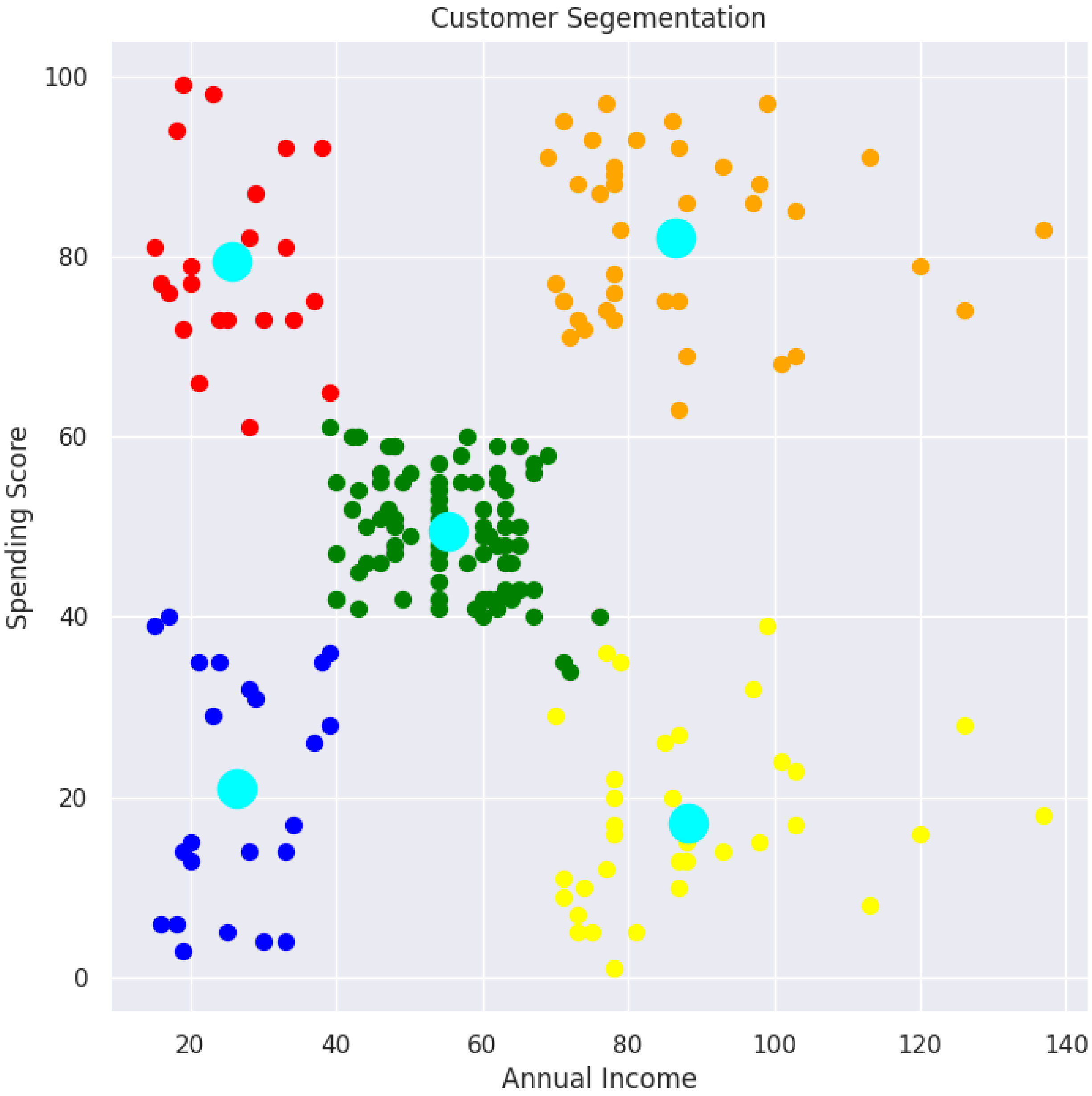


```
# The optimun number of clusters
kmeans = KMeans(n_clusters=5, init='k-means++', random_state = 0)
```

```
# Retrun a label for each data point based on their cluster
Y = kmeans.fit_predict(X)
print(Y)
```

```
[3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3 4 3
4 3
 4 3 4 3 4 3 0 3 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0
 0 0 0 0 0 0 0 0 0 0 0 0 1 2 1 0 1 2 1 2 1 0 1 2 1 2 1 2 1 2 1 0 1 2 1
2 1
 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2
1 2
 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1]
```

```
# @title Default title text
# Visualizing all the clusters & their cenerіods
plt.figure(figsize=(8,8))
plt.scatter(X.iloc[Y==0,0], X.iloc[Y==0,1], s=50, c='green', label
='cluster 1')
plt.scatter(X.iloc[Y==1,0], X.iloc[Y==1,1], s=50, c="orange", label
='cluster 2' )
plt.scatter(X.iloc[Y==2,0], X.iloc[Y==2,1], s=50, c="yellow", label
='cluster 3')
plt.scatter(X.iloc[Y==3,0], X.iloc[Y==3,1], s=50, c="blue", label
='cluster 4')
plt.scatter(X.iloc[Y==4,0], X.iloc[Y==4,1], s=50, c="red", label
='cluster 5')
plt.scatter(kmeans.cluster_centers_[:,0],
kmeans.cluster_centers_[:,1], s=300, c='cyan', label ='Centroids')
plt.title('Customer Segementation')
plt.xlabel('Annual Income')
plt.ylabel("Spending Score")
plt.show()
```


Customer Segementation
Spending Score
Annual Income
0
20
40
60
80
100
20
40
60
80
100
120
140