Main Project

CUSTOMER SEGMENTATION based on their Buying Behaviour.

Importing the Libraries.

In [1]:

```
import numpy as no
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.cluster import KMeans
```

Loading the dataset from csv file to pandas Dataframe.

In [2]:

```
customers_data = pd.read_csv("customerData.csv")
```

In [3]:

```
print(customers_data.to_string())
```

```
     CustomerID  Gender  Age  Annual Income (k$)  Spending Score (1-10
0)
0             1    Male   19                  15                     3
9
1             2    Male   21                  15                     8
1
2             3  Female   20                  16
6
3             4  Female   23                  16                     7
7
4             5  Female   31                  17                     4
0
5             6  Female   22                  17                     7
6
6             7  Female   35                  18
6
7             8  Female   23                  18                     9
4
8             9    Male   64                  19
```

Inspection of Data

In [4]:

```
customers_data.head()
```

Out[4]:

	CustomerID	Gender	Age	Annual Income (k$)	Spending Score (1-100)
0	1	Male	19	15	39
1	2	Male	21	15	81
2	3	Female	20	16	6
3	4	Female	23	16	77
4	5	Female	31	17	40

Observation : The customer data have five features namely, CustomerID,Gender,Age,AnnualIncome(k$),Spending Score(1-100).

In [5]:

```
customers_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
```

In [6]:

```
customers_data.describe()
```

Out[6]:

	CustomerID	Age	Annual Income (k$)	Spending Score (1-100)
count	200.000000	200.000000	200.000000	200.000000
mean	100.500000	38.850000	60.560000	50.200000
std	57.879185	13.969007	26.264721	25.823522
min	1.000000	18.000000	15.000000	1.000000
25%	50.750000	28.750000	41.500000	34.750000
50%	100.500000	36.000000	61.500000	50.000000
75%	150.250000	49.000000	78.000000	73.000000
max	200.000000	70.000000	137.000000	99.000000

Finding the number of rows and columns.

In [7]:

```
customers_data.shape
```

Out[7]:

```
(200, 5)
```

Observation : The customer data have 200 rows and 5 columns.

Checking for Missing Values.

In [8]:

```
customers_data.isnull().sum()
```

Out[8]:

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

Observation : As all null values count is eqals to Zero there is no requirement of processing the data.

Considering the 'x' variable

In [10]:

```
x = customers_data.iloc[:,[3,4]].values
print(x)
```

```
 [ 30  73]
 [ 33   4]
 [ 33  92]
 [ 33  14]
 [ 33  81]
 [ 34  17]
 [ 34  73]
 [ 37  26]
 [ 37  75]
 [ 38  35]
 [ 38  92]
 [ 39  36]
 [ 39  61]
 [ 39  28]
 [ 39  65]
 [ 40  55]
 [ 40  47]
 [ 40  42]
 [ 40  42]
 [ 42  52]
```

Finding wcss value for different number of clusters.

Explination : WCSS stands for the sum of the squares of distances of the data points in each and every cluster from its centroid

In [11]:

```
wcss = []
for i in range(1,11):
    kmeans = KMeans(n_clusters=i, init='k-means++', random_state=42)
    kmeans.fit(x)
    wcss.append(kmeans.inertia_)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' i
n 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' i
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/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: Fu
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tureWarning: The default value of `n_init` will change from 10 to 'auto' i
n 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
```
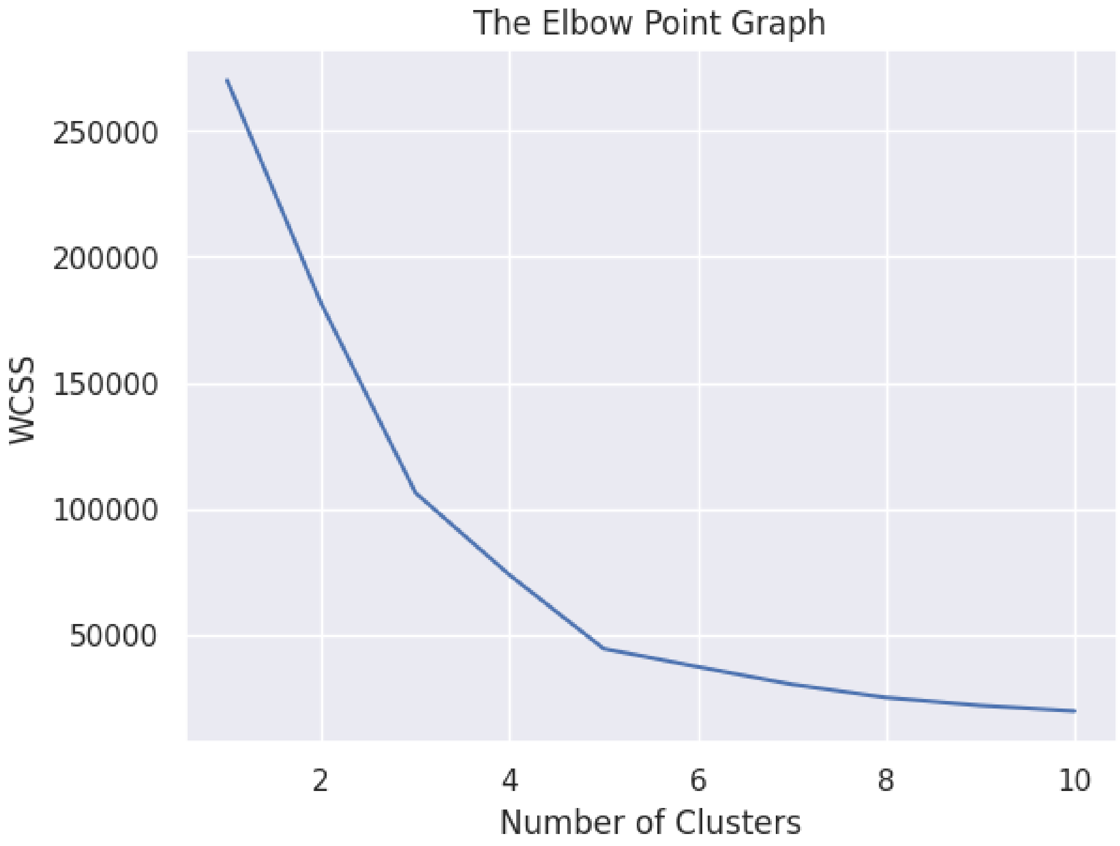

Plot an elbow graph

In [12]:

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



In [13]:

```
y = kmeans.fit_predict(x)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: Fu
tureWarning: The default value of `n_init` will change from 10 to 'auto' i
n 1.4. Set the value of `n_init` explicitly to suppress the warning
  warnings.warn(
```

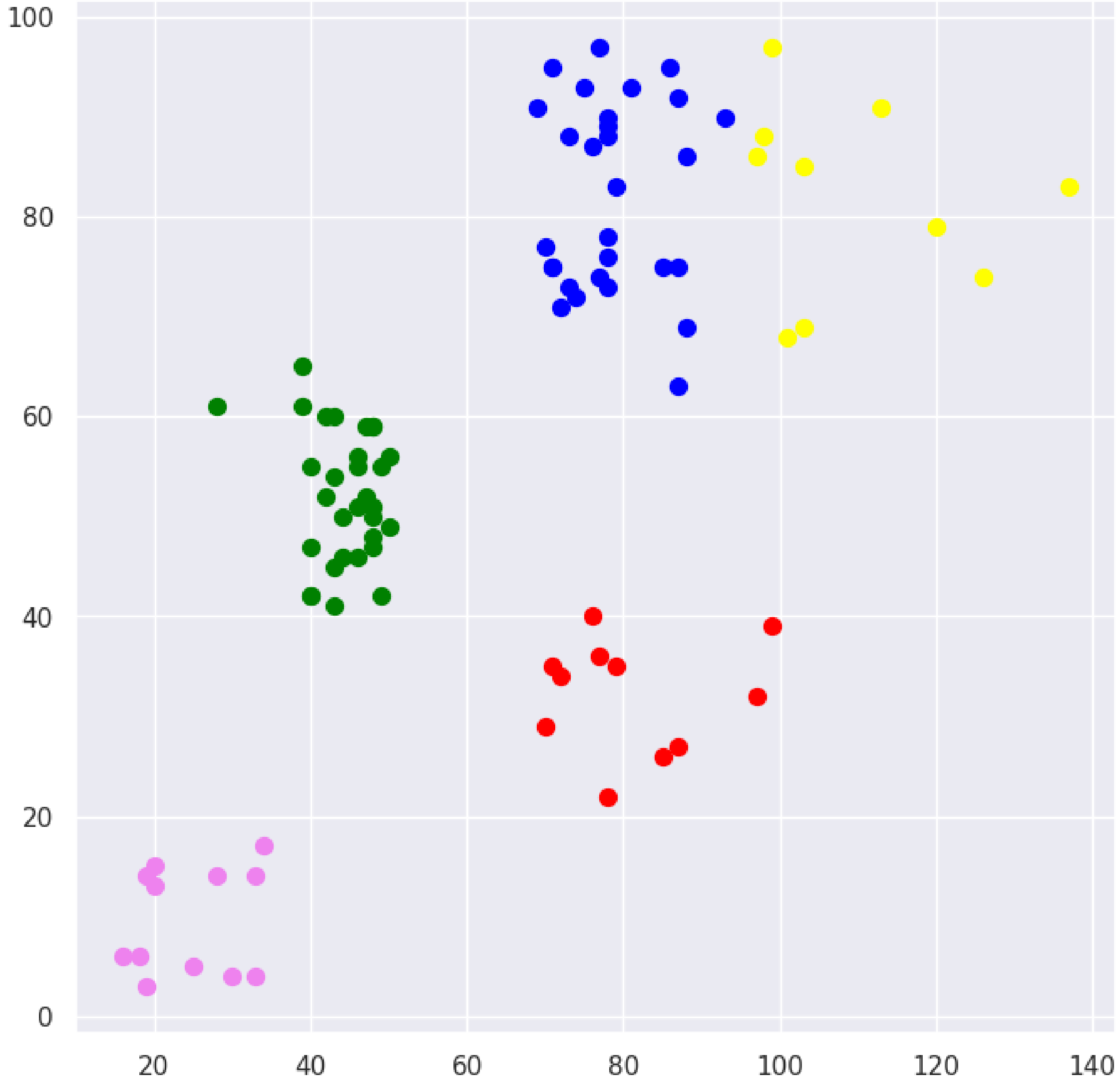
plotting all the clusters and their Centroids

In [15]:

```
plt.figure(figsize=(8,8))
plt.scatter(x[y==0,0], x[y==0,1], s=50, c='green', label='Cluster 1')
plt.scatter(x[y==1,0], x[y==1,1], s=50, c='red', label='Cluster 2')
plt.scatter(x[y==2,0], x[y==2,1], s=50, c='yellow', label='Cluster 3')
plt.scatter(x[y==3,0], x[y==3,1], s=50, c='violet', label='Cluster 4')
plt.scatter(x[y==4,0], x[y==4,1], s=50, c='blue', label='Cluster 5')
```

Out[15]:

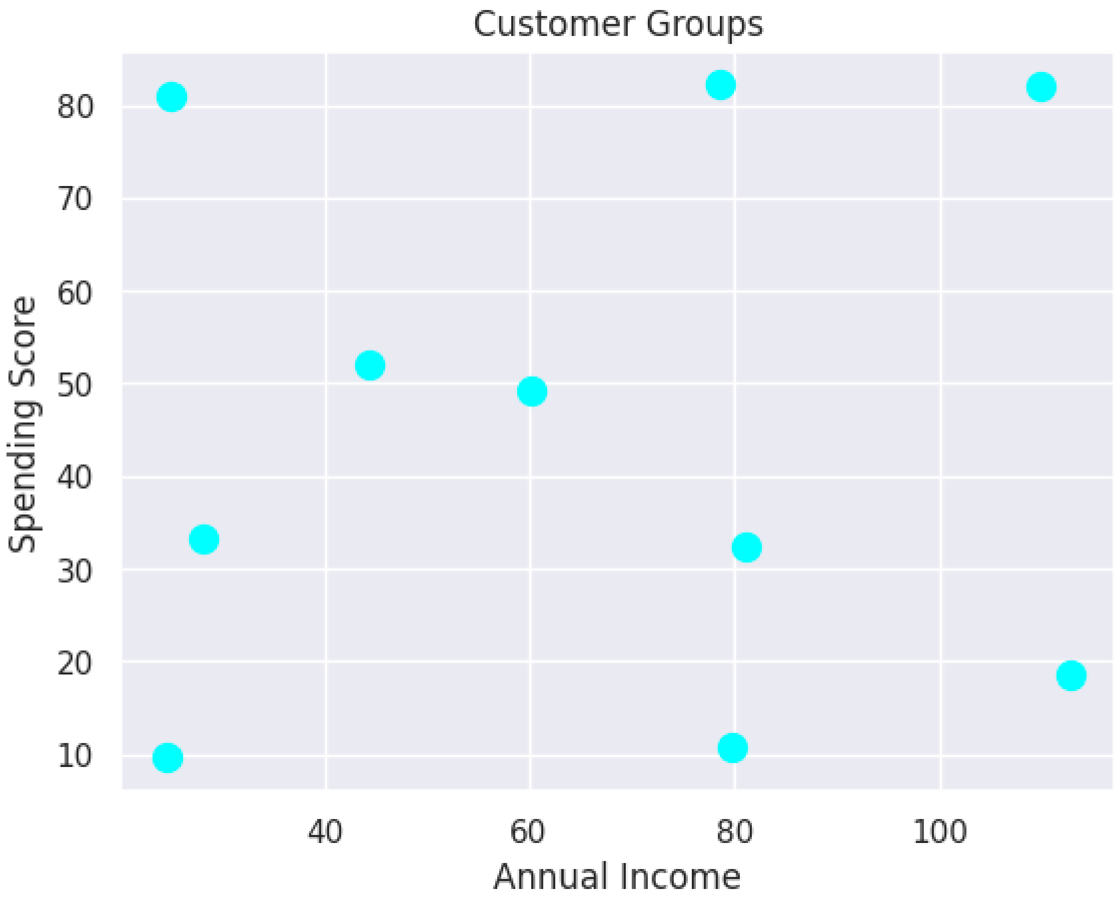
```
<matplotlib.collections.PathCollection at 0x7f6b8098a0e0>
```



plot the centroids

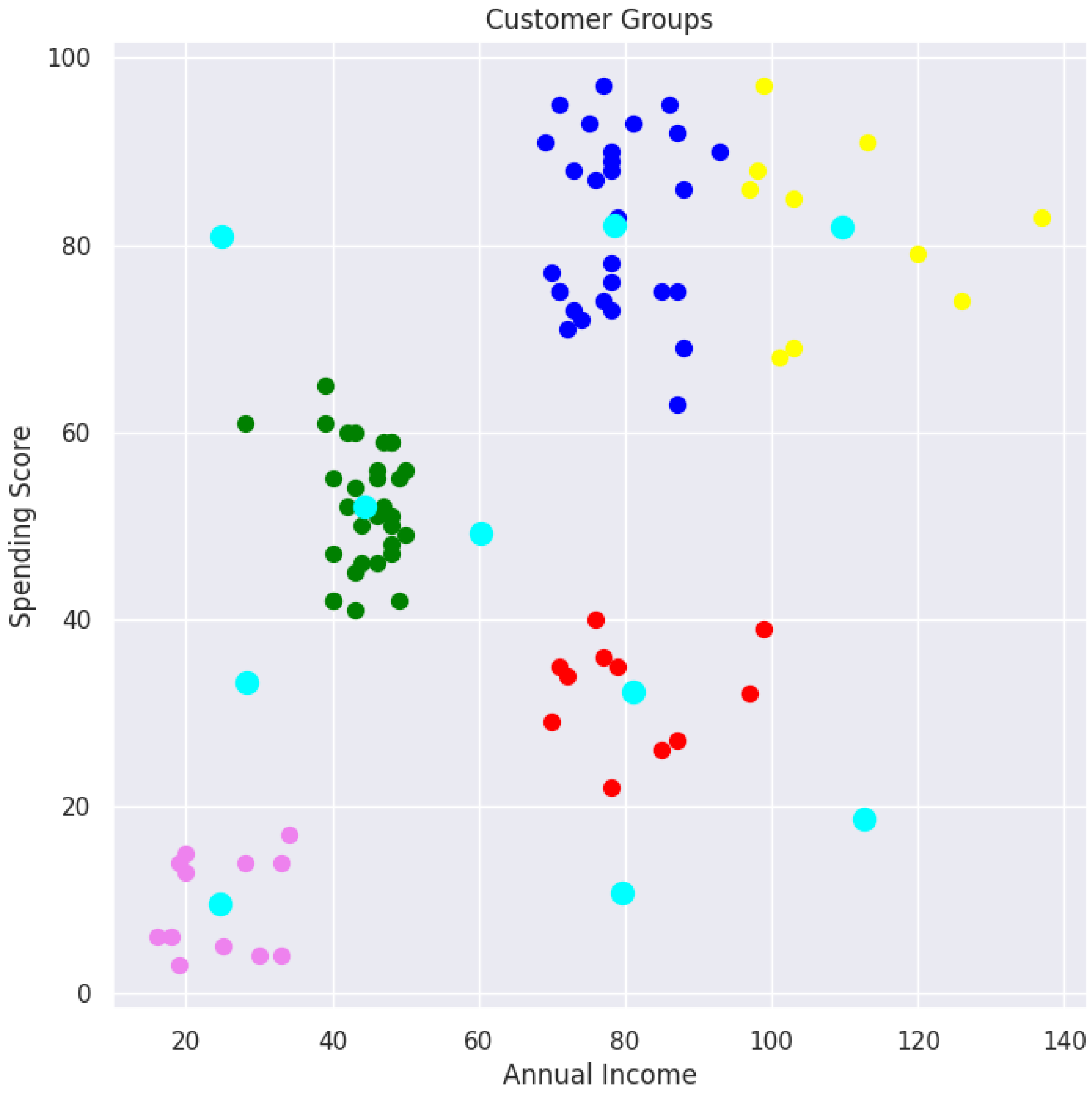
In [16]:

```
plt.scatter(kmeans.cluster_centers_[:,0], kmeans.cluster_centers_[:,1], s=100, c='cyan',
plt.title('Customer Groups')
plt.xlabel('Annual Income')
plt.ylabel('Spending Score')
plt.show()
```



In [17]:

```
plt.figure(figsize=(8,8))
plt.scatter(x[y==0,0], x[y==0,1], s=50, c='green', label='Cluster 1')
plt.scatter(x[y==1,0], x[y==1,1], s=50, c='red', label='Cluster 2')
plt.scatter(x[y==2,0], x[y==2,1], s=50, c='yellow', label='Cluster 3')
plt.scatter(x[y==3,0], x[y==3,1], s=50, c='violet', label='Cluster 4')
plt.scatter(x[y==4,0], x[y==4,1], s=50, c='blue', label='Cluster 5')

plt.scatter(kmeans.cluster_centers_[:,0], kmeans.cluster_centers_[:,1], s=100, c='cyan',
plt.title('Customer Groups')
plt.xlabel('Annual Income')
plt.ylabel('Spending Score')
plt.show()
```



In [ ]: