

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

```
customer_data = pd.read_csv('/content/Mall_Customers.csv')
```

```
customer_data.head(10)
```

	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
5	6	Female	22	17	76
6	7	Female	35	18	6
7	8	Female	23	18	94
8	9	Male	64	19	3
9	10	Female	30	19	72

```
customer_data.shape
```

```
(200, 5)
```

```
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
```

```
customer_data.isnull().sum()
```

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

```
x = customer_data.iloc[:,[3,4]].values
```

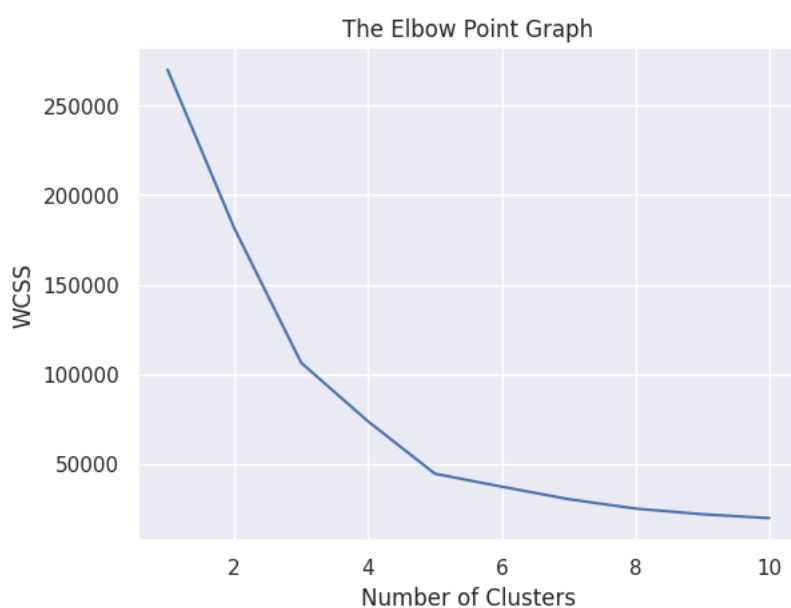
```
wcss = []
```

```
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: FutureWarning: The default value of `n_init` will change from 1
warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 1
warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 1
```

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

[illegible]

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 1
warnings.warn(
```

2/3

