```
import pandas as pd

data = pd.read_csv('/content/Mall_Customers.csv')

data.head()
```

	CustomerID	Genre	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

Next steps: Generate code with `data` View recommended plots

```
data.tail()
```

	CustomerID	Genre	Age	Annual Income (k$)	Spending Score (1-100)
195	196	Female	35	120	79
196	197	Female	45	126	28
197	198	Male	32	126	74
198	199	Male	32	137	18
199	200	Male	30	137	83

```
data.shape
```

```
(200, 5)
```

Generate 10 random numbers using numpy Close

```
print("number of rows", data.shape[0])
print("number of columns", data.shape[1])
```

```
number of rows 200
number of columns 5
```

```
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   Genre                   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
```

```
data.isnull().sum()
```

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

```
data.describe()
```

	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

```
data.columns
```

```
Index(['CustomerID', 'Genre', 'Age', 'Annual Income (k$)',
       'Spending Score (1-100)'],
      dtype='object')
```

```
x=data[['Annual Income (k$)','Spending Score (1-100)']]
```

```
from sklearn.cluster import KMeans
```

```
k_means=KMeans()
k_means.fit(x)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
▾ KMeans
KMeans()
```

```
k_means=KMeans(n_clusters=5)
k_means.fit_predict(x)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
array([0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3,
       0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 0, 3, 7, 3, 7, 7,
       0, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7,
       7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 2, 7, 7, 2, 7, 7, 7, 7, 7,
       7, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 1, 2, 1, 2, 1, 5, 1, 5, 1,
       2, 1, 5, 1, 5, 1, 5, 1, 5, 1, 2, 1, 5, 1, 2, 1, 5, 1, 5, 1, 5, 1,
       5, 1, 5, 1, 5, 1, 2, 1, 5, 1, 5, 1, 5, 1, 5, 1, 5, 1, 5, 1, 5, 1,
       5, 1, 5, 1, 4, 6, 4, 6, 4, 6, 4, 6, 4, 6, 4, 6, 4, 6, 4, 6, 4, 6,
       4, 6], dtype=int32)
```

```
wcss=[]
for i in range(1,11):
 k_means= KMeans(n_clusters=i)
 k_means.fit_predict(x)
 wcss.append(k_means.inertia_)
```

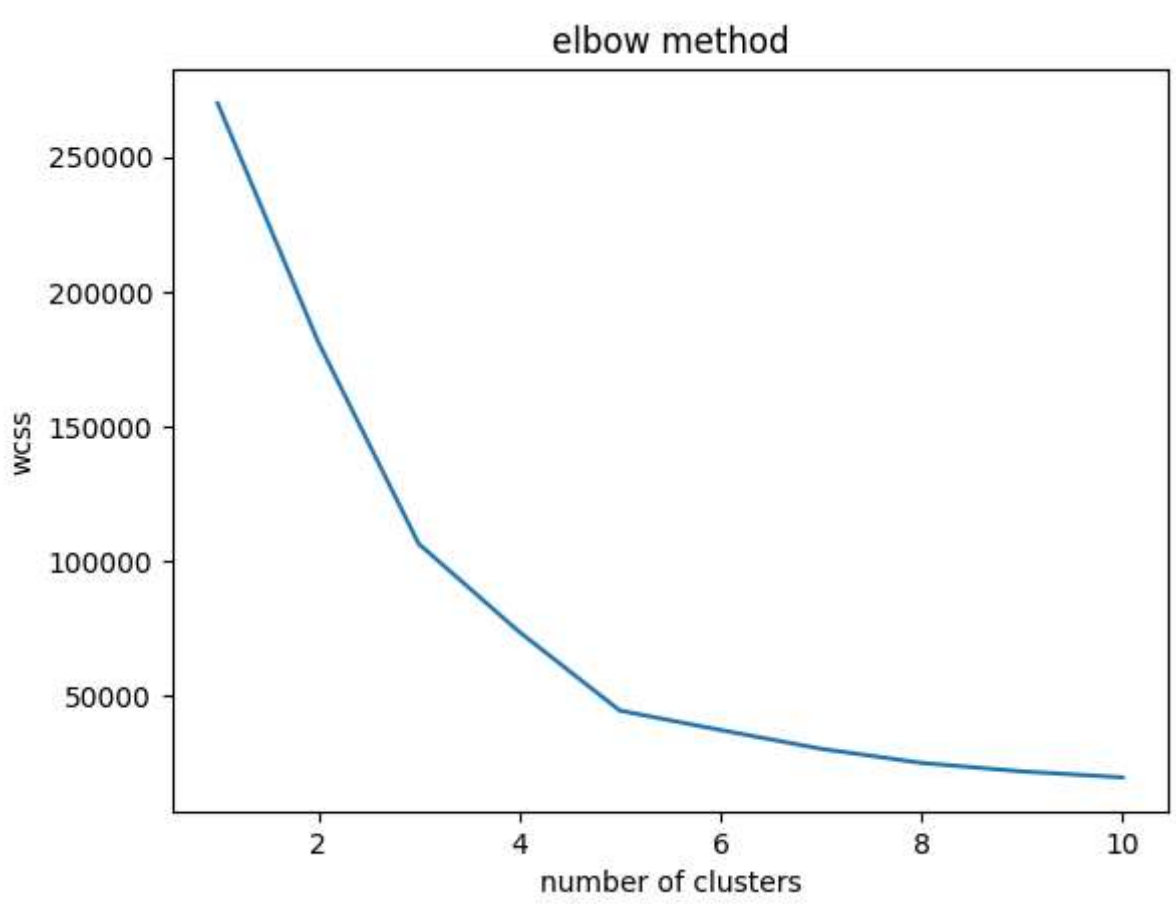
```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
```

```
wcss
```

```
[269981.28,
 181363.59595959593,
 106348.37306211122,
 73679.78903948836,
 44448.4554479337,
 37233.814510710006,
 30259.65720728547,
 25018.781613414067,
 21862.092672182895,
 19641.456216651564]
```

```
import matplotlib.pyplot as plt
```

```
plt.plot(range(1,11),wcss)
plt.title("elbow method")
plt.xlabel("number of clusters")
plt.ylabel("wcss")
plt.show()
```




```
x=data[['Annual Income (k$)','Spending Score (1-100)']]
```

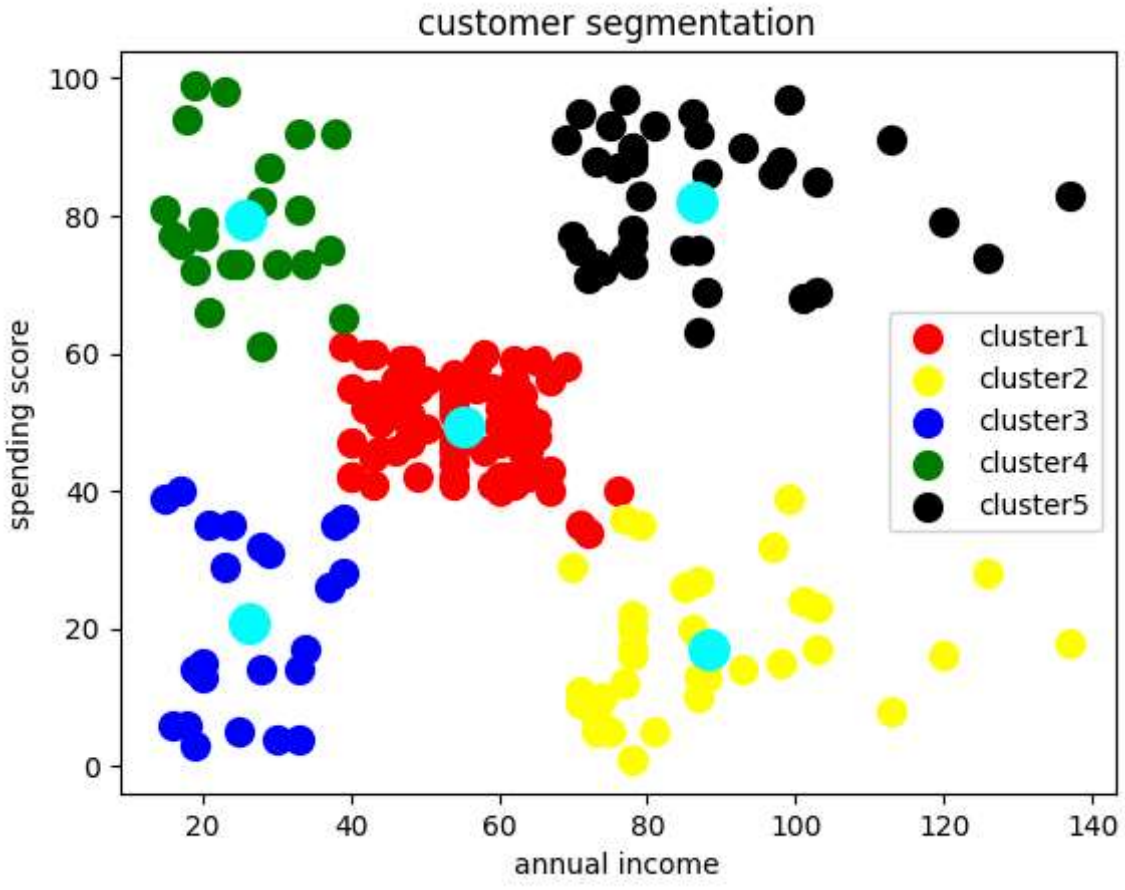
```
k_means = KMeans(n_clusters=5,random_state=42)
Y_means =k_means.fit_predict(x)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning
  warnings.warn(
```

```
Y_means
```

```
array([2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2, 3,
       2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2, 3, 2, 0,
       2, 3, 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, 4, 1, 4, 0, 4, 1, 4, 1, 4,
       0, 4, 1, 4, 1, 4, 1, 4, 1, 4, 0, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4,
       1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4,
       1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4, 1, 4,
       1, 4], dtype=int32)
```

```
plt.scatter(x.iloc[Y_means==0,0],x.iloc[Y_means==0,1],s=100,c='red',label='cluster1
plt.scatter(x.iloc[Y_means==1,0],x.iloc[Y_means==1,1],s=100,c='yellow',label='clust
plt.scatter(x.iloc[Y_means==2,0],x.iloc[Y_means==2,1],s=100,c='blue',label='cluster
plt.scatter(x.iloc[Y_means==3,0],x.iloc[Y_means==3,1],s=100,c='green',label='cluste
plt.scatter(x.iloc[Y_means==4,0],x.iloc[Y_means==4,1],s=100,c='black',label='cluste
plt.scatter(k_means.cluster_centers_[:,0],k_means.cluster_centers_[:,1],s=200,c='cy
plt.title("customer segmentation")
plt.xlabel("annual income")
plt.ylabel("spending score")
plt.legend()
plt.show()
```




```
k_means.predict([[15,39]])
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarning: X does not
  warnings.warn(
array([2], dtype=int32)
```

Start coding or generate with AI.