1. Import Necessary Libraries

In [2]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

2. Import Dataset

In [3]:
```
data=pd.read_csv("Mall_Customers.csv")
```

In [4]:
```
data.head()
```

Out[4]:

	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

In [5]:
```
data.tail()
```

Out[5]:

	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

In [6]:
```
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
```

In [7]:
```
data.describe()
```

Out[7]:

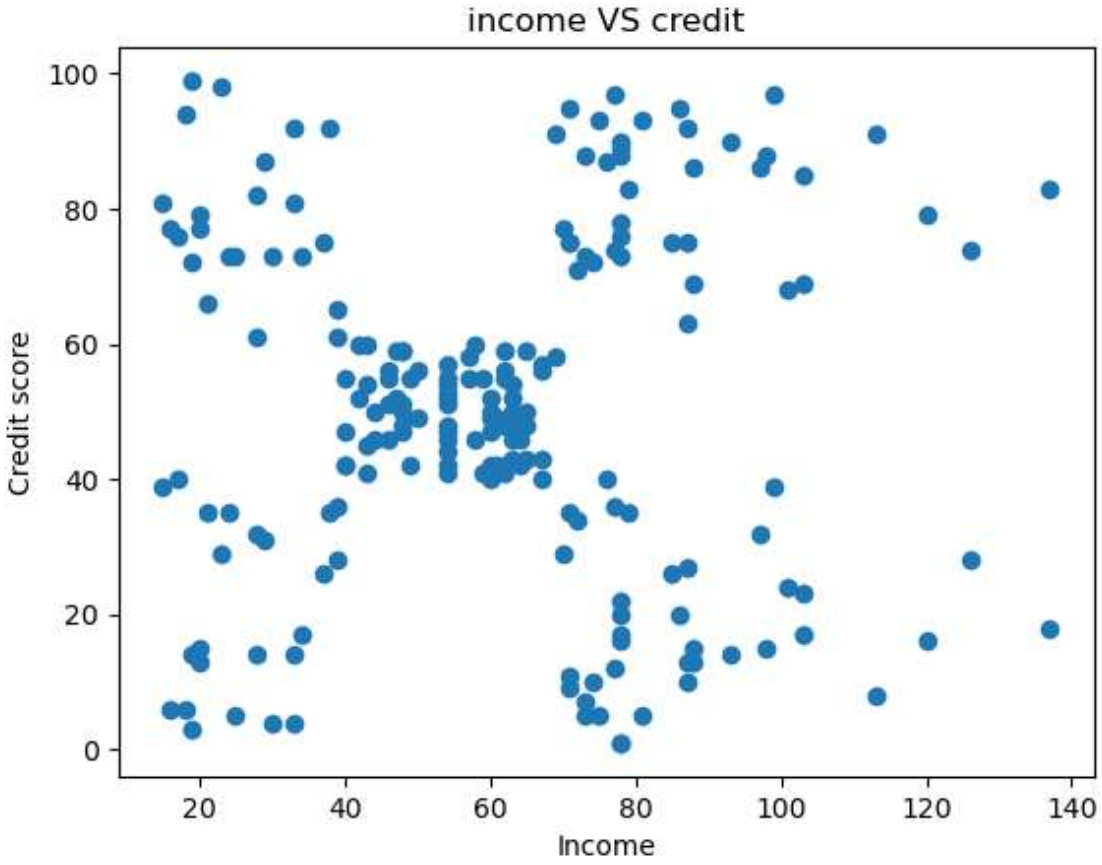
	CustomerID	Age	Annual Income (k$)	Spending Score (1-100)
count	200.000000	200.000000	200.000000	200.000000
mean	100.500000	38.850000	60.560000	50.200000
std	57.879185	13.969007	26.264721	25.823522
min	1.000000	18.000000	15.000000	1.000000
25%	50.750000	28.750000	41.500000	34.750000
50%	100.500000	36.000000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

In [29]:
```
needed_features=data.iloc[:,3:]
needed_features.head()
```

Out[29]:

	Annual Income (k$)	Spending Score (1-100)
0	15	39
1	15	81
2	16	6
3	16	77
4	17	40

In [30]:
```
x=needed_features.values
plt.scatter(x[:,0],x[:,1])
plt.title("income VS credit")
plt.xlabel("Income")
plt.ylabel("Credit score")
plt.show()
```



In [31]:

```
from sklearn.cluster import KMeans
#intialise the list to store wcss values
wcss=[]
# Try different values of K (from 1 to 10) and calculate WCSS for each K
#K-Means++ to Choose Initial Cluster Centroids for K-Means Clustering
for k in range(1,11): #k= 1 to 10
    kmeans=KMeans(n_clusters=k,init="k-means++",random_state=0)
    kmeans.fit(x)
    wcss.append(kmeans.inertia_)
```

```
C:\Users\dines\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:141
2: FutureWarning: The default value of `n_init` will change from 10 to 'a
uto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
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L, when there are less chunks than available threads. You can avoid it by
setting the environment variable OMP_NUM_THREADS=1.
  warnings.warn(
```
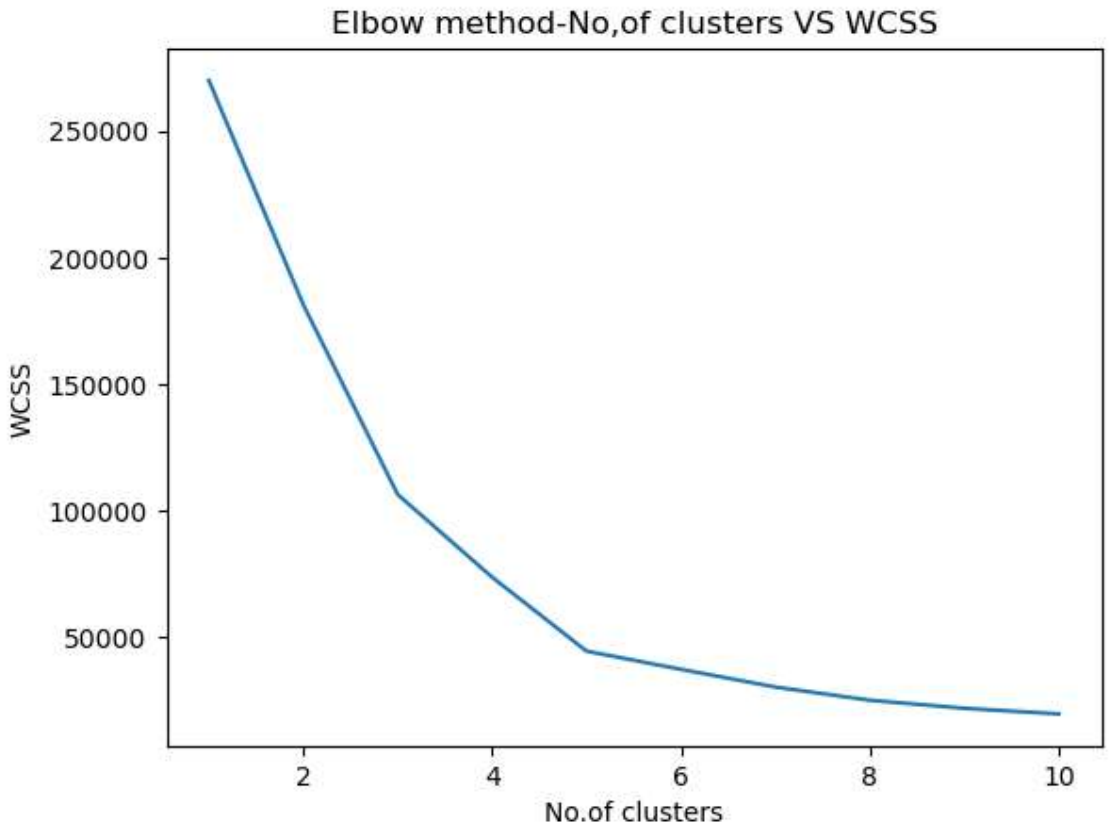

In [32]:
```
plt.plot(range(1,11),wcss)
plt.title("Elbow method-No,of clusters VS WCSS")
plt.xlabel("No.of clusters")
plt.ylabel("WCSS")
plt.show()
```



In [33]:
```
kmeans=KMeans(n_clusters=5,init="k-means++",random_state=0)
result=kmeans.fit_predict(x)
```

```
C:\Users\dines\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:141
2: FutureWarning: The default value of `n_init` will change from 10 to 'a
uto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  super()._check_params_vs_input(X, default_n_init=10)
C:\Users\dines\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:143
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L, when there are less chunks than available threads. You can avoid it by
setting the environment variable OMP_NUM_THREADS=1.
  warnings.warn(
```

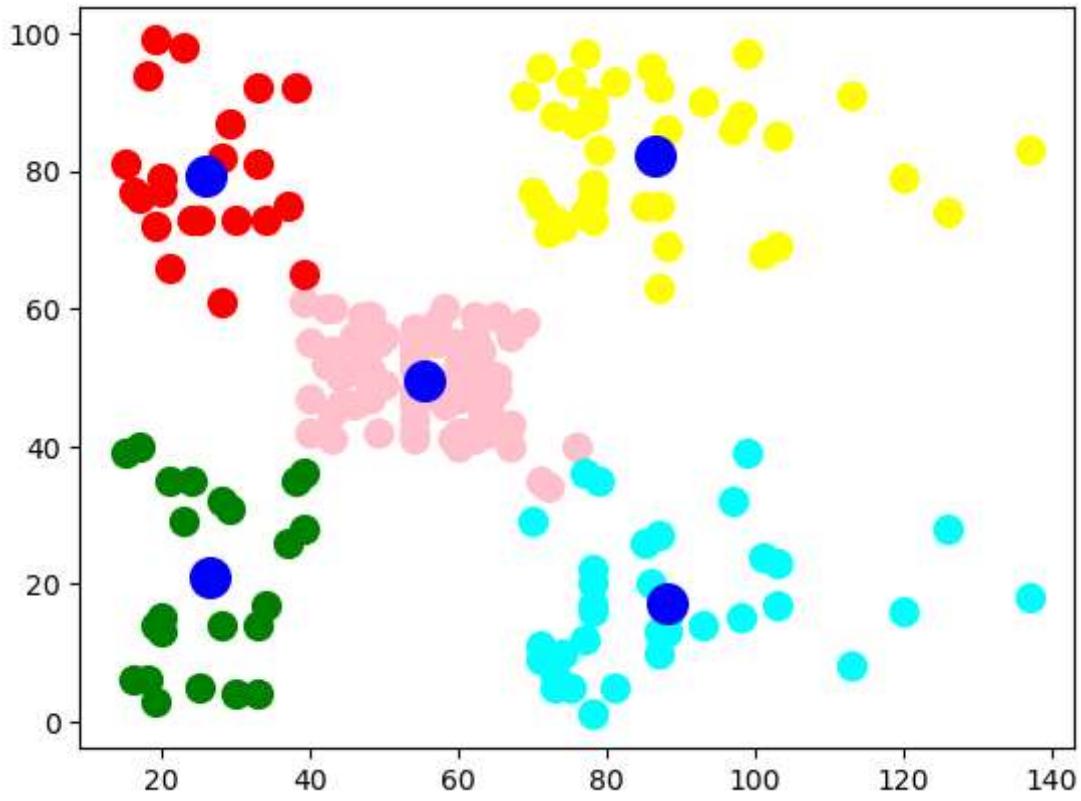
In [34]:
```
kmeans.cluster_centers_
```

Out[34]:
```
array([[55.2962963 , 49.51851852],
       [86.53846154, 82.12820513],
       [88.2       , 17.11428571],
       [26.30434783, 20.91304348],
       [25.72727273, 79.36363636]])
```

In [35]:
```
plt.scatter(x[result==0,0],x[result==0,1],s=100,color='pink',label='cluste
plt.scatter(x[result==1,0],x[result==1,1],s=100,color='yellow',label='clus
plt.scatter(x[result==2,0],x[result==2,1],s=100,color='cyan',label='cluste
plt.scatter(x[result==3,0],x[result==3,1],s=100,color='green',label='clust
plt.scatter(x[result==4,0],x[result==4,1],s=100,color='red',label='cluster


plt.scatter(kmeans.cluster_centers_[:,0],kmeans.cluster_centers_[:,1],s=20
```

Out[35]: <matplotlib.collections.PathCollection at 0x135a9c3bdd0>



In [36]:
```
# Label Encoding Gender
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
x=data.iloc[:,1:]
val=x.iloc[:,0]
le.fit(val)
print("Classes = ",le.classes_)
print("After transformation = ",le.transform(val))
```

```
Classes =  ['Female' 'Male']
After transformation =  [1 1 0 0 0 0 0 0 1 0 1 0 0 0 1 1 0 1 1 0 1 1 0 1
0 1 0 1 0 0 1 0 1 1 0 0 0
 0 0 0 0 1 1 0 0 0 0 0 0 0 0 1 0 1 0 1 0 1 0 1 1 1 0 0 1 1 0 0 1 0 1 0 0
0
 1 1 0 1 0 0 1 1 1 0 0 1 0 0 0 0 0 1 1 0 0 1 0 0 1 1 0 0 1 1 1 0 0 1 1 1
1
 0 0 1 0 0 0 0 0 0 1 0 0 1 0 0 1 1 1 1 1 1 0 0 1 0 0 1 1 0 0 1 0 0 1 1 1
0
 0 1 1 1 0 0 0 0 1 0 1 0 0 0 1 0 1 0 1 0 0 1 1 1 1 1 0 0 1 1 1 1 0 0 1 0
0
 1 0 1 0 0 0 0 1 0 0 0 0 1 1 1]
```

In [37]:
```
x.iloc[:,0]=le.transform(val)
```

```
C:\Users\dines\AppData\Local\Temp\ipykernel_11496\657221462.py:1: Depreca
tionWarning: In a future version, `df.iloc[:, i] = newvals` will attempt
to set the values inplace instead of always setting a new array. To retai
n the old behavior, use either `df[df.columns[i]] = newvals` or, if colum
ns are non-unique, `df.isetitem(i, newvals)`
  x.iloc[:,0]=le.transform(val)
```

In [38]:

```
#finding the value of K
wcss=[]
for i in range(1,11):
    kmeans=KMeans(n_clusters=i,init='k-means++',random_state=0)
    kmeans.fit(x)
    wcss.append(kmeans.inertia_)
```

```
C:\Users\dines\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:141
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```
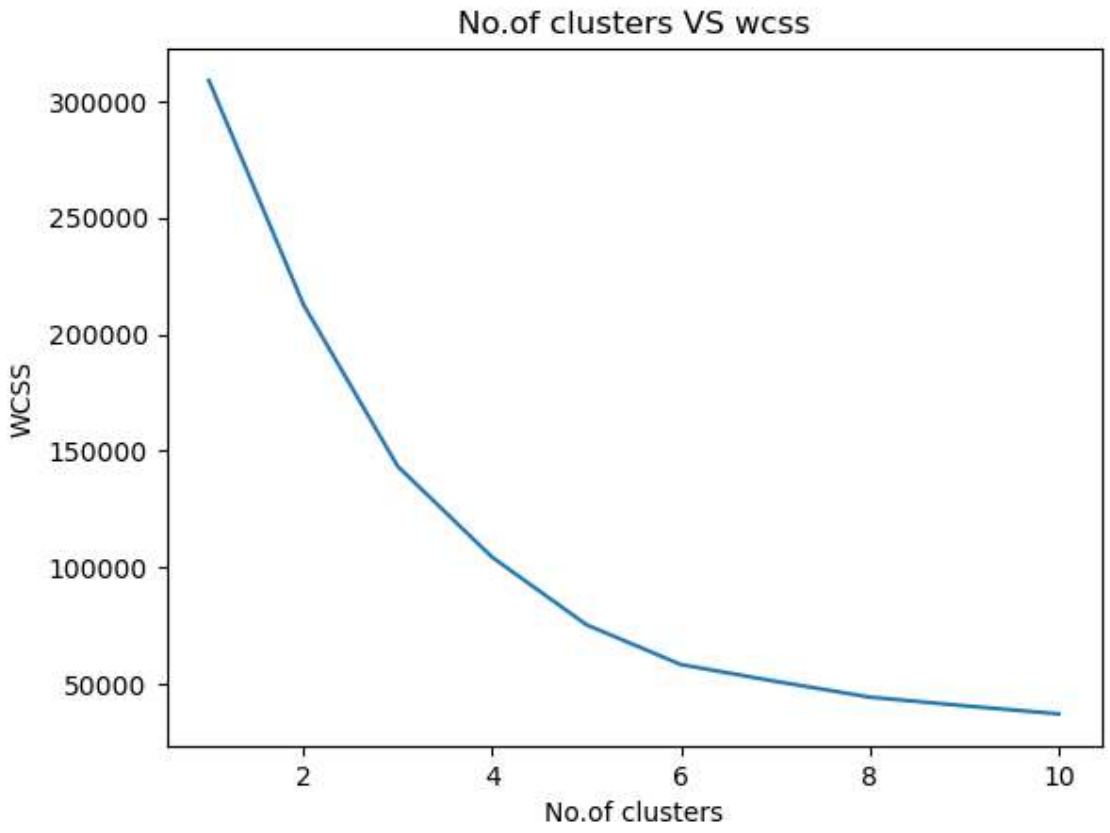

In [39]:
```
plt.plot(range(1,11),wcss)
plt.title("No.of clusters VS wcss")
plt.xlabel("No.of clusters")
plt.ylabel("WCSS")
plt.show()
```



In [40]:
```
kmeans=KMeans(n_clusters=6,init="k-means++",random_state=0)
ymeans=kmeans.fit_predict(x)
```

```
C:\Users\dines\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:141
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  warnings.warn(
```

In [41]:
```
kmeans.cluster_centers_
```

Out[41]:
```
array([[ 0.34210526, 27.        , 56.65789474, 49.13157895],
       [ 0.57142857, 41.68571429, 88.22857143, 17.28571429],
       [ 0.46153846, 32.69230769, 86.53846154, 82.12820513],
       [ 0.44444444, 56.15555556, 53.37777778, 49.08888889],
       [ 0.38095238, 44.14285714, 25.14285714, 19.52380952],
       [ 0.40909091, 25.27272727, 25.72727273, 79.36363636]])
```

In [ ]:

In [ ]:

In [ ]: