Write a program to predict the class of user.

In [1]:

```
import numpy as np
import pandas as pd
df=pd.read_csv("Mall_Customers.csv")
print(df)
```

```
     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
..          ...     ...  ...                 ...                     ...
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

[200 rows x 5 columns]
```

In [2]:

```
df.isna().sum()
```

Out[2]:

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

In [3]:

```
df.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 [4]:

```
df.describe()
```

Out[4]:

	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 [5]:

```
df.drop(['CustomerID'], axis=1,inplace=True)
print(df.columns)
```

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

In [6]:

```
df['Genre'].replace('Male',0, inplace=True)
df['Genre'].replace('Female',1,inplace=True)
```

In [7]:

```
print(df['Genre'])
```

```
0      0
1      0
2      1
3      1
4      1
      ..
195    1
196    1
197    0
198    0
199    0
Name: Genre, Length: 200, dtype: int64
```

In [ ]:

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In [ ]:

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In [9]:

```
df['Age']=df['Age']/max(df['Age'])
df['Annual Income (k$)']=df['Annual Income (k$)']/max(df['Annual Income (k$)'])
df['Spending Score (1-100)']=df['Spending Score (1-100)']/max(df['Spending Score (1-100)'])
```

In [10]:

```
from sklearn.cluster import KMeans
kmeans=KMeans(n_clusters=10)
kmeans.fit(df)
```

Out[10]:

```
KMeans(n_clusters=10)
```

In [11]:

```
kmeans.inertia_
```

Out[11]:

```
6.9806300229226315
```

In [12]:

```
kmeans.cluster_centers_
```

Out[12]:

```
array([[ 1.00000000e+00,  3.63736264e-01,  1.87535093e-01,
         8.13519814e-01],
       [-2.22044605e-16,  8.44047619e-01,  3.53406326e-01,
         4.29713805e-01],
       [ 1.00000000e+00,  3.99428571e-01,  4.18686131e-01,
         4.75959596e-01],
       [-2.22044605e-16,  3.60714286e-01,  3.01094891e-01,
         6.15319865e-01],
       [-3.33066907e-16,  5.71428571e-01,  5.82614466e-01,
         1.36822773e-01],
       [ 1.00000000e+00,  4.59863946e-01,  6.28084811e-01,
         8.24915825e-01],
       [ 1.00000000e+00,  7.73626374e-01,  3.95845031e-01,
         4.94560995e-01],
       [-2.22044605e-16,  4.75396825e-01,  6.35847526e-01,
         8.35016835e-01],
       [ 1.00000000e+00,  6.25510204e-01,  6.80917623e-01,
         2.08513709e-01],
       [ 1.00000000e+00,  5.93406593e-01,  1.93711398e-01,
         2.09013209e-01]])
```

In [13]:

```
#The elbow method
#To perform the elbow method, run several k-means, increment k with each iteration, and rec
sse = []
for k in range(1, 11):
    kmeans = KMeans(n_clusters=k)
    kmeans.fit(df)
    sse.append(kmeans.inertia_)
```

In [14]:

```
sse
```

Out[14]:

```
[78.0586821609293,
 28.680329316229322,
 22.666649014081745,
 17.14151578006798,
 14.696510220166788,
 12.867729780852468,
 11.440027722970282,
 9.518709597764156,
 8.125195957579034,
 6.983422247649433]
```

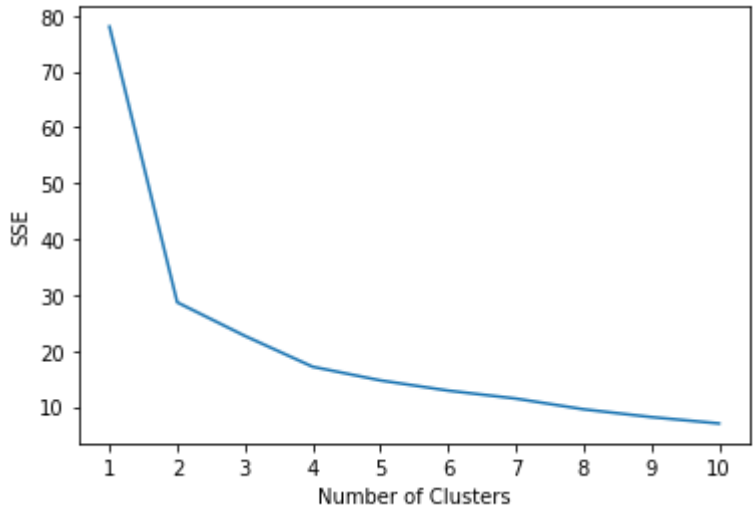
In [ ]:

```

```

In [15]:

```
import matplotlib.pyplot as plt
plt.plot(range(1, 11), sse)
plt.xticks(range(1, 11))
plt.xlabel("Number of Clusters")
plt.ylabel("SSE")
plt.show()
```



In [16]:

```
from sklearn.cluster import KMeans
kmeans=KMeans(n_clusters=8)
kmeans.fit(df)
```

Out[16]:

```
KMeans()
```

In [17]:

```
ypred=kmeans.predict(df)
print(ypred)
```

```
[5 5 0 7 7 7 2 7 6 7 6 7 2 7 3 5 2 5 6 7 5 5 2 5 2 5 2 5 2 7 6 7 3 5 2 7 2
 7 2 7 2 5 6 7 2 7 2 7 7 7 2 5 7 6 2 6 2 6 7 6 6 5 2 2 6 5 2 2 5 7 6 2 2 2
 6 5 2 6 7 2 6 5 6 2 7 6 2 7 7 2 2 5 6 2 0 5 2 7 6 5 7 2 6 5 6 7 2 6 6 6 6
 7 2 5 7 7 2 2 2 2 5 0 2 1 0 4 3 1 3 1 3 1 0 4 3 4 0 1 3 4 0 1 0 4 3 1 3 4
 0 1 3 1 0 4 0 4 3 4 3 4 2 4 3 4 3 4 3 4 0 1 3 1 3 1 0 4 3 1 3 1 0 4 3 4 0
 1 0 1 0 4 0 4 3 4 0 4 0 1 3 1]
```

In [ ]:

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In [ ]:

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```