Exercise 6

Given a dataset that contains customer information (such as Age, Income, and Spending Score), perform K-means clustering to group customers into clusters. Use visualization chart, plot the data before and after grouping. Also, use the Elbow Method to determine the optimal number of clusters.

In [86]:

```python
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
from sklearn.preprocessing import StandardScaler
import pandas as pd
```

In [87]:

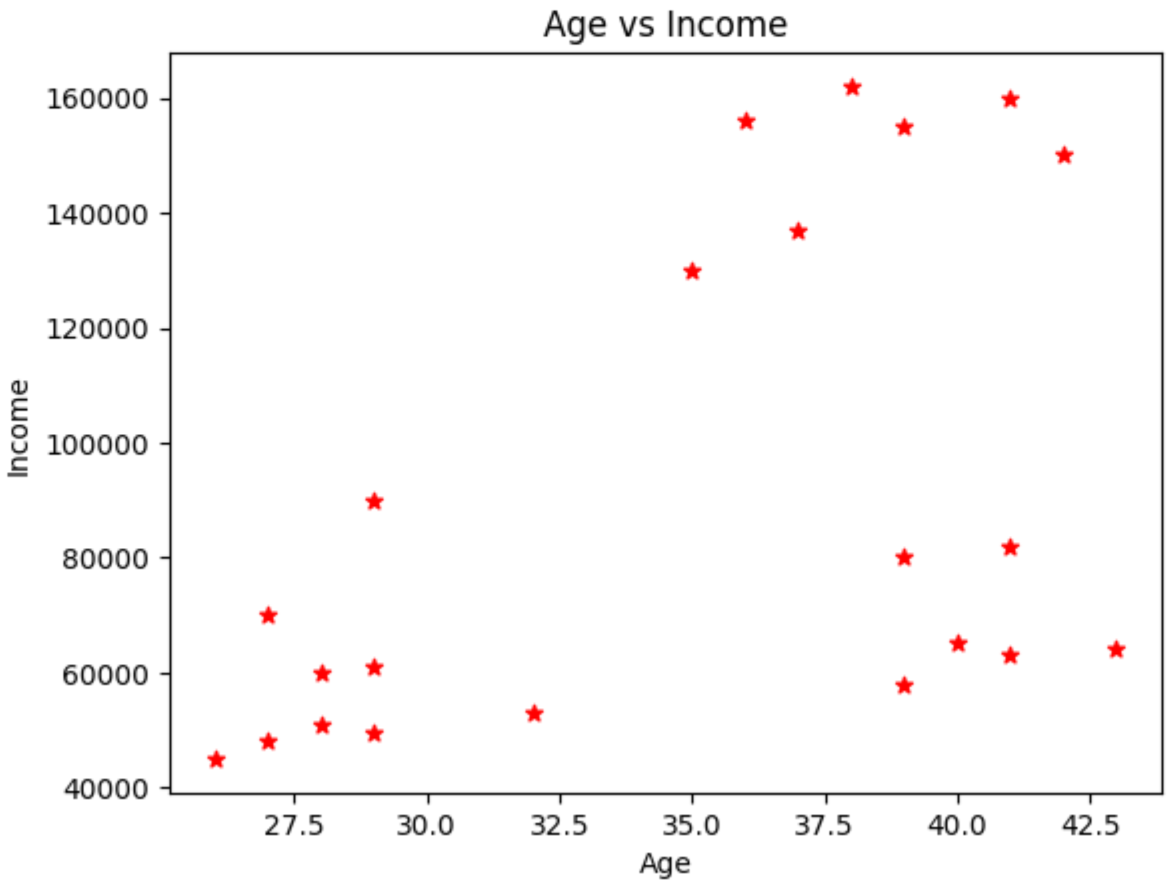
```python
df = pd.read_csv("income_clustering.csv")

df = df[["Age", "Income($)"]]

scaler = StandardScaler()
sc_df = scaler.fit_transform(df[['Age', 'Income($)']])
```

In [88]:

```python
plt.scatter(df["Age"], df["Income($)"], color="r", marker="*")
plt.title("Age vs Income")
plt.xlabel("Age")
plt.ylabel("Income")
```

Out[88]:

```
Text(0, 0.5, 'Income')
```



In [89]:

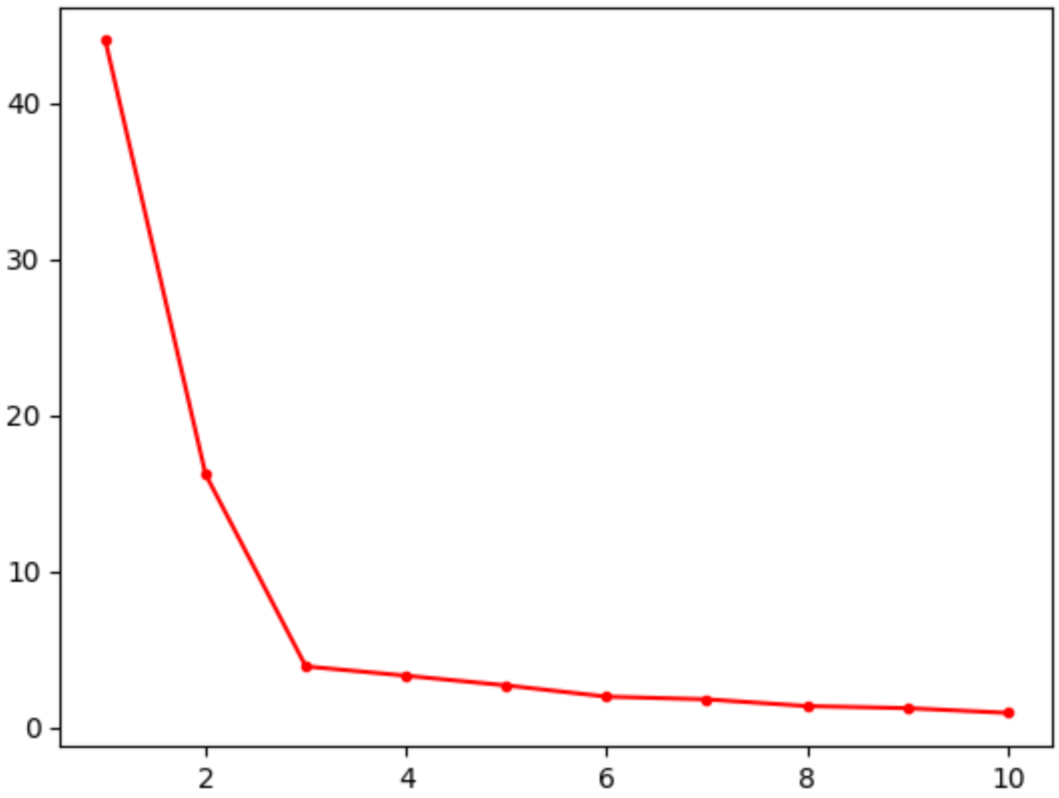
```
k_range = range(1, 11)
sse = []
for k in k_range:
    kmn = KMeans(n_clusters=k)
    kmn.fit(sc_df)
    sse.append(kmn.inertia_)
```

In [90]:

```
plt.plot(k_range, sse, color="r", marker=".")
```

Out[90]:

```
[<matplotlib.lines.Line2D at 0x7f8790756850>]
```



In [91]:

```
kmn = KMeans(n_clusters=3)
clusters = kmn.fit_predict(sc_df)
```

In [92]:

```
df['clusters'] = clusters
df.head()
```

Out[92]:

	Age	Income($)	clusters
0	27	70000	0
1	29	90000	0
2	29	61000	0
3	28	60000	0
4	42	150000	2

In [93]:

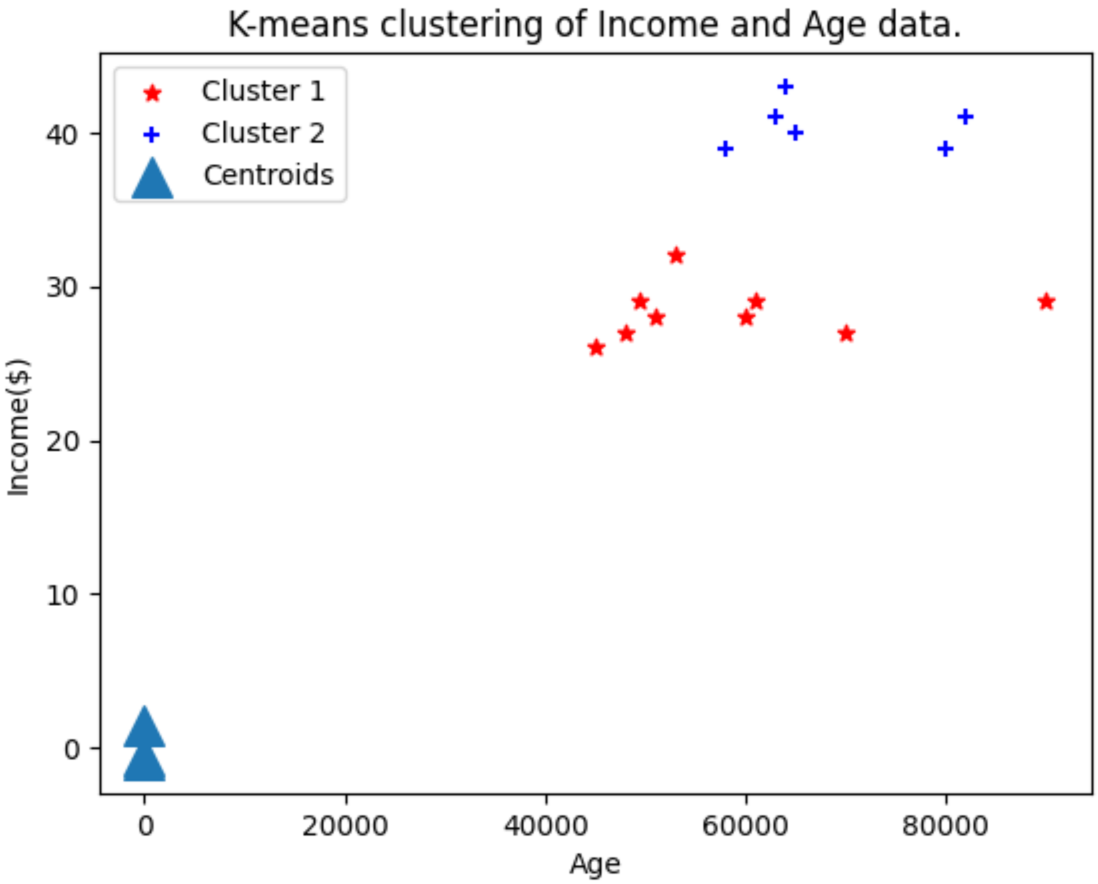
```
cl1 = df[df['clusters'] == 0]
cl2 = df[df['clusters'] == 1]
```

```
cl3 = df[df['clusters'] == 2]
kmn.cluster_centers_
```

```
Out[93]:  array([[-1.1247901 , -0.74862223],
                 [ 0.98550535, -0.51205261],
                 [ 0.60143983,  1.40141653]])
```

```
In [94]:  plt.title("K-means clustering of Income and Age data.")
          plt.xlabel("Age")
          plt.ylabel("Income($)")
          plt.scatter(cl1['Income($)'], cl1['Age'], color="r", marker="*", label="Cluster 1")
          plt.scatter(cl2['Income($)'], cl2['Age'], color="b", marker="+", label="Cluster 2")
          plt.scatter(kmn.cluster_centers_[:, 0],kmn.cluster_centers_[:, 1], label="Centroids", s=
          plt.legend()
```

```
Out[94]:  <matplotlib.legend.Legend at 0x7f87907abb10>
```


K-means clustering of Income and Age data.
★ Cluster 1
+ Cluster 2
▲ Centroids
Income($)
Age