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

In [18]:
```
df=pd.read_excel(r"C:\Users\rushg\Downloads\Customer Segmentation\Coustomer Segmentation.xlsx")
data1=df.sample(100000)
data= data1.drop(['Description'], axis=1)
data
```

Out[18]:

	InvoiceNo	StockCode	Quantity	InvoiceDate	UnitPrice	CustomerID	Country
99518	544774	22138	3	2011-02-23 11:32:00	4.95	17711.0	United Kingdom
452476	575337	78124	1	2011-11-09 14:11:00	1.25	17867.0	United Kingdom
81212	543114	21535	6	2011-02-03 13:26:00	2.55	14156.0	EIRE
191689	553385	10125	1	2011-05-16 15:53:00	0.85	16710.0	United Kingdom
484170	577523	23660	12	2011-11-20 13:33:00	1.65	12597.0	Spain
...	...	...	...	...	...	...	...
441690	574624	23531	6	2011-11-06 11:20:00	6.95	17769.0	United Kingdom
181617	552493	85099B	1	2011-05-09 16:21:00	4.13	NaN	United Kingdom
411656	572227	23349	12	2011-10-21 14:01:00	1.25	15051.0	United Kingdom
202755	554494	72351A	3	2011-05-24 14:00:00	2.10	16327.0	United Kingdom
26589	538518	22713	12	2010-12-12 16:14:00	0.42	14505.0	United Kingdom

100000 rows × 7 columns

In [19]:
```
data.describe()
```

Out[19]:

	Quantity	InvoiceDate	UnitPrice	CustomerID
count	100000.000000	100000	100000.000000	75079.000000
mean	8.586130	2011-07-04 11:30:00.095999744	4.381572	15286.509783
min	-80995.000000	2010-12-01 08:26:00	0.000000	12347.000000
25%	1.000000	2011-03-28 11:56:15	1.250000	13956.000000
50%	3.000000	2011-07-20 12:29:00	2.080000	15150.000000
75%	10.000000	2011-10-19 10:48:00	4.130000	16791.000000
max	4000.000000	2011-12-09 12:50:00	13541.330000	18287.000000
std	261.711147	NaN	62.033860	1710.279544

In [20]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 100000 entries, 99518 to 26589
Data columns (total 7 columns):
 #   Column       Non-Null Count   Dtype         
---  ------       --------------   -----         
 0   InvoiceNo    100000 non-null  object        
 1   StockCode    100000 non-null  object        
 2   Quantity     100000 non-null  int64         
 3   InvoiceDate  100000 non-null  datetime64[ns]
 4   UnitPrice    100000 non-null  float64       
 5   CustomerID   75079 non-null   float64       
 6   Country      100000 non-null  object        
dtypes: datetime64[ns](1), float64(2), int64(1), object(3)
memory usage: 6.1+ MB
```

In [21]:
```
data['CustomerID'] = data.CustomerID.fillna(data.CustomerID.median())
```

In [22]:
```
data.isnull().sum()
```

Out[22]:
```
InvoiceNo      0
StockCode      0
Quantity       0
InvoiceDate    0
UnitPrice      0
CustomerID     0
Country        0
dtype: int64
```

In [55]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 100000 entries, 99518 to 26589
Data columns (total 7 columns):
 #   Column       Non-Null Count   Dtype         
---  ------       --------------   -----         
 0   InvoiceNo    100000 non-null  object        
 1   StockCode    100000 non-null  object        
 2   Quantity     100000 non-null  int64         
 3   InvoiceDate  100000 non-null  datetime64[ns]
 4   UnitPrice    100000 non-null  float64       
 5   CustomerID   100000 non-null  float64       
 6   Country      100000 non-null  int64         
dtypes: datetime64[ns](1), float64(2), int64(2), object(2)
memory usage: 6.1+ MB
```

In [ ]:

In [35]:

```python
X=data[['Quantity','UnitPrice']]
```

In [38]:

```python
X
```

Out[38]:

	Quantity	UnitPrice
99518	3	4.95
452476	1	1.25
81212	6	2.55
191689	1	0.85
484170	12	1.65
...	...	...
441690	6	6.95
181617	1	4.13
411656	12	1.25
202755	3	2.10
26589	12	0.42

100000 rows × 2 columns

In [39]:

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

In [40]:

```python
k1=KMeans(n_clusters=8)
```

In [41]:

```python
k1.fit(X)
```

```
C:\Users\rushg\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:1412: FutureWarning: The default value of
`n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  super()._check_params_vs_input(X, default_n_init=10)
```

Out[41]:

```
▾ KMeans
KMeans()
```

In [42]:

```python
k1.labels_
```

Out[42]:

```
array([0, 0, 0, ..., 0, 0, 0])
```

In [43]:

```python
from sklearn.metrics import silhouette_score
```

In [54]:

```python
silhouette_score(X,k1.labels_)
```

Out[54]:

```
0.9485064877787178
```

In [44]:

```python
wcss=[]
for i in range(1,50):
  k2=KMeans(n_clusters=i)
  k2.fit(X)
  wcss.append(k2.inertia_)
```

```
C:\Users\rushg\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:1412: FutureWarning: The default value of
`n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
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```

```
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C:\Users\rushg\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:1412: FutureWarning: The default value of
```

```
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  super()._check_params_vs_input(X, default_n_init=10)
```
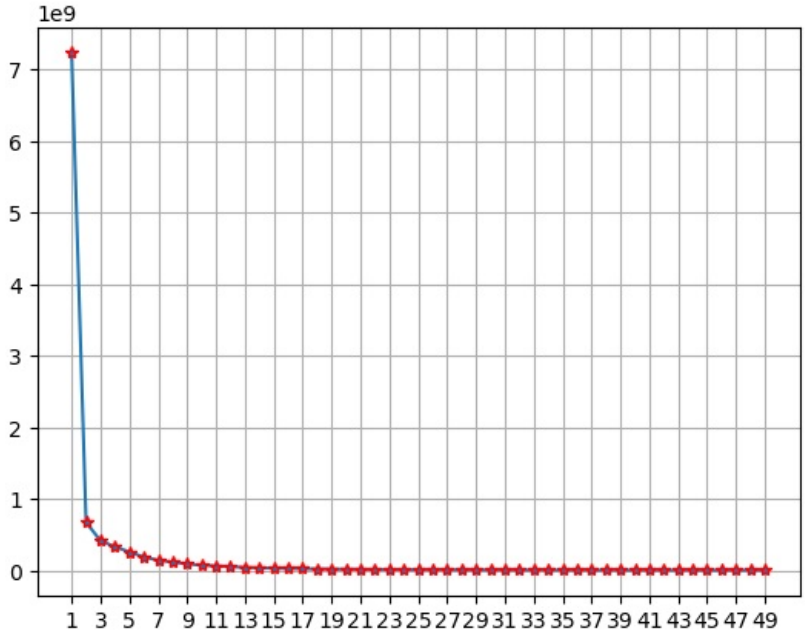

In [45]:

```
plt.plot(range(1,50),wcss,marker='*',mec='r')
plt.xticks(range(1,50,2))
plt.grid()
plt.show()
```



In [46]:

```
k2=KMeans(n_clusters=5)
```

In [47]:

```
k2.fit(X)
```

```
C:\Users\rushg\anaconda3\Lib\site-packages\sklearn\cluster\_kmeans.py:1412: FutureWarning: The default value of
`n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
  super()._check_params_vs_input(X, default_n_init=10)
```

Out[47]:
```
KMeans
KMeans(n_clusters=5)
```

In [48]:
```
k2.labels_
```

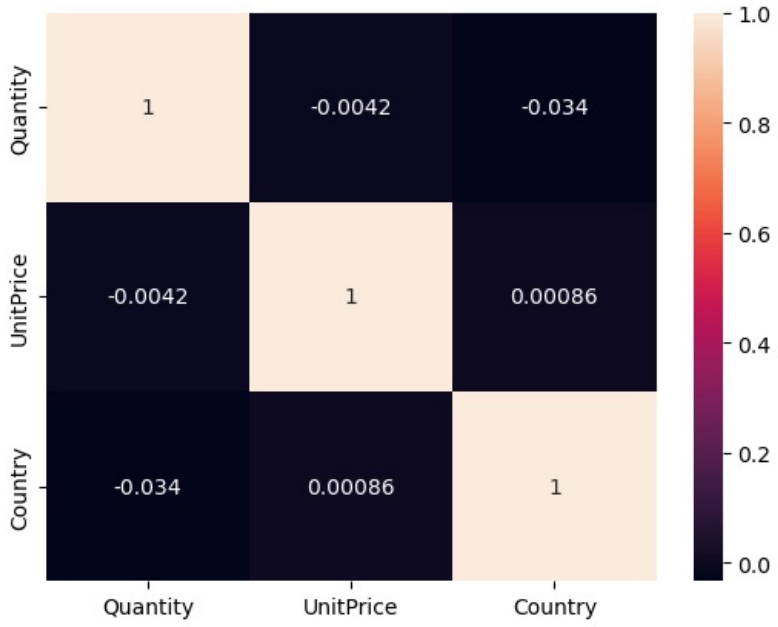
Out[48]:
```
array([0, 0, 0, ..., 0, 0, 0])
```

In [49]:
```
silhouette_score(X,k2.labels_)
```

Out[49]:
```
0.9957121310742266
```

In [49]:
```
#plt.figure(figsize=(15,10))
sns.heatmap(X.corr(),annot=True)
```

Out[49]:
```
<Axes: >
```



In [ ]:

In [ ]: