GRIP: The Sparks Foundation

Data Science and Business Analytics Internship Task 3: Exploratory Data Analysis - Retail

Perform 'Exploratory Data Analysis' on dataset 'SampleSuperstore' Python 3 Jupyter Notebook Name-Chetana Thorat

In [7]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

import warnings
warnings.filterwarnings('ignore')
```

In [8]:
```
df = pd.read_csv("SampleSuperstore.csv")
```

In [13]:
```
df.sample(5)
```

Out[13]:

	Ship Mode	Segment	Country	City	State	Postal Code	Region	Category	Sub-Category	Sales	Quantity	Discount	Profit
906	Standard Class	Consumer	United States	New York City	New York	10009	East	Furniture	Bookcases	323.136	4	0.2	12.1176
847	Standard Class	Consumer	United States	Louisville	Kentucky	40214	South	Furniture	Chairs	287.940	3	0.0	77.7438
9393	First Class	Consumer	United States	New York City	New York	10011	East	Technology	Phones	629.950	5	0.0	157.4875
8952	Standard Class	Consumer	United States	Jackson	Tennessee	38301	South	Office Supplies	Art	23.128	7	0.2	2.8910
6167	Standard Class	Consumer	United States	Houston	Texas	77036	Central	Office Supplies	Paper	117.456	3	0.2	44.0460

In [14]:
```
df.head()
```

Out[14]:

	Ship Mode	Segment	Country	City	State	Postal Code	Region	Category	Sub-Category	Sales	Quantity	Discount	Profit
0	Second Class	Consumer	United States	Henderson	Kentucky	42420	South	Furniture	Bookcases	261.9600	2	0.00	41.9136
1	Second Class	Consumer	United States	Henderson	Kentucky	42420	South	Furniture	Chairs	731.9400	3	0.00	219.5820
2	Second Class	Corporate	United States	Los Angeles	California	90036	West	Office Supplies	Labels	14.6200	2	0.00	6.8714
3	Standard Class	Consumer	United States	Fort Lauderdale	Florida	33311	South	Furniture	Tables	957.5775	5	0.45	-383.0310
4	Standard Class	Consumer	United States	Fort Lauderdale	Florida	33311	South	Office Supplies	Storage	22.3680	2	0.20	2.5164

In [15]:
```
df.tail()
```

Out[15]:

	Ship Mode	Segment	Country	City	State	Postal Code	Region	Category	Sub-Category	Sales	Quantity	Discount	Profit
9989	Second Class	Consumer	United States	Miami	Florida	33180	South	Furniture	Furnishings	25.248	3	0.2	4.1028
9990	Standard Class	Consumer	United States	Costa Mesa	California	92627	West	Furniture	Furnishings	91.960	2	0.0	15.6332
9991	Standard Class	Consumer	United States	Costa Mesa	California	92627	West	Technology	Phones	258.576	2	0.2	19.3932
9992	Standard Class	Consumer	United States	Costa Mesa	California	92627	West	Office Supplies	Paper	29.600	4	0.0	13.3200
9993	Second Class	Consumer	United States	Westminster	California	92683	West	Office Supplies	Appliances	243.160	2	0.0	72.9480

In [16]:
```
df.shape
```

Out[16]: (9994, 13)

In [17]:
```
df.info
```

Out[17]:
```
<bound method DataFrame.info of            Ship Mode    Segment        Country             City       State  \
0       Second Class   Consumer  United States        Henderson    Kentucky
1       Second Class   Consumer  United States        Henderson    Kentucky
2       Second Class  Corporate  United States      Los Angeles  California
3     Standard Class   Consumer  United States  Fort Lauderdale     Florida
4     Standard Class   Consumer  United States  Fort Lauderdale     Florida
...              ...        ...            ...              ...         ...
9989    Second Class   Consumer  United States            Miami     Florida
9990  Standard Class   Consumer  United States       Costa Mesa  California
9991  Standard Class   Consumer  United States       Costa Mesa  California
9992  Standard Class   Consumer  United States       Costa Mesa  California
9993    Second Class   Consumer  United States      Westminster  California

      Postal Code Region         Category Sub-Category     Sales  Quantity  \
0           42420  South        Furniture    Bookcases  261.9600         2
1           42420  South        Furniture       Chairs  731.9400         3
2           90036   West  Office Supplies       Labels   14.6200         2
3           33311  South        Furniture       Tables  957.5775         5
4           33311  South  Office Supplies      Storage   22.3680         2
...           ...    ...              ...          ...       ...       ...
9989        33180  South        Furniture  Furnishings   25.2480         3
9990        92627   West        Furniture  Furnishings   91.9600         2
9991        92627   West       Technology       Phones  258.5760         2
9992        92627   West  Office Supplies        Paper   29.6000         4
9993        92683   West  Office Supplies   Appliances  243.1600         2

      Discount    Profit
0         0.00   41.9136
1         0.00  219.5820
2         0.00    6.8714
3         0.45 -383.0310
4         0.20    2.5164
...        ...       ...
9989      0.20    4.1028
9990      0.00   15.6332
9991      0.20   19.3932
9992      0.00   13.3200
9993      0.00   72.9480

[9994 rows x 13 columns]>
```

In [18]:
```
df.describe()
```

Out[18]:

	Postal Code	Sales	Quantity	Discount	Profit
count	9994.000000	9994.000000	9994.000000	9994.000000	9994.000000
mean	55190.379428	229.858001	3.789574	0.156203	28.656896
std	32063.693350	623.245101	2.225110	0.206452	234.260108
min	1040.000000	0.444000	1.000000	0.000000	-6599.978000
25%	23223.000000	17.280000	2.000000	0.000000	1.728750
50%	56430.500000	54.490000	3.000000	0.200000	8.666500
75%	90008.000000	209.940000	5.000000	0.200000	29.364000
max	99301.000000	22638.480000	14.000000	0.800000	8399.976000

In [19]:
```
for i in df.columns:
    print(i,len(df[i].unique()))
```

```
Ship Mode 4
Segment 3
Country 1
City 531
State 49
Postal Code 631
Region 4
Category 3
Sub-Category 17
Sales 5825
Quantity 14
Discount 12
Profit 7287
```

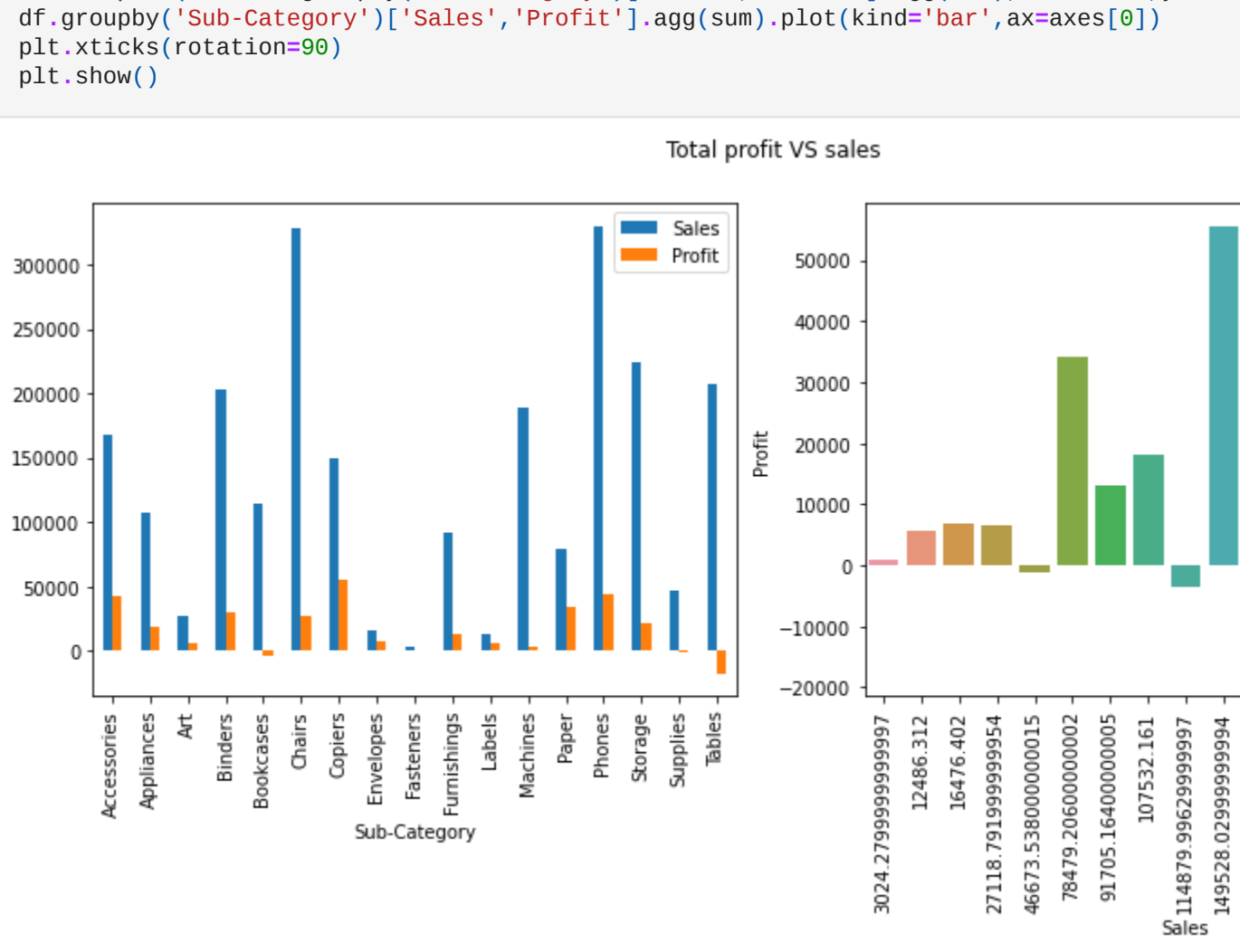
In [20]:
```
df.isnull().sum()
```

Out[20]:
```
Ship Mode       0
Segment         0
Country         0
City            0
State           0
Postal Code     0
Region          0
Category        0
Sub-Category    0
Sales           0
Quantity        0
Discount        0
Profit          0
dtype: int64
```

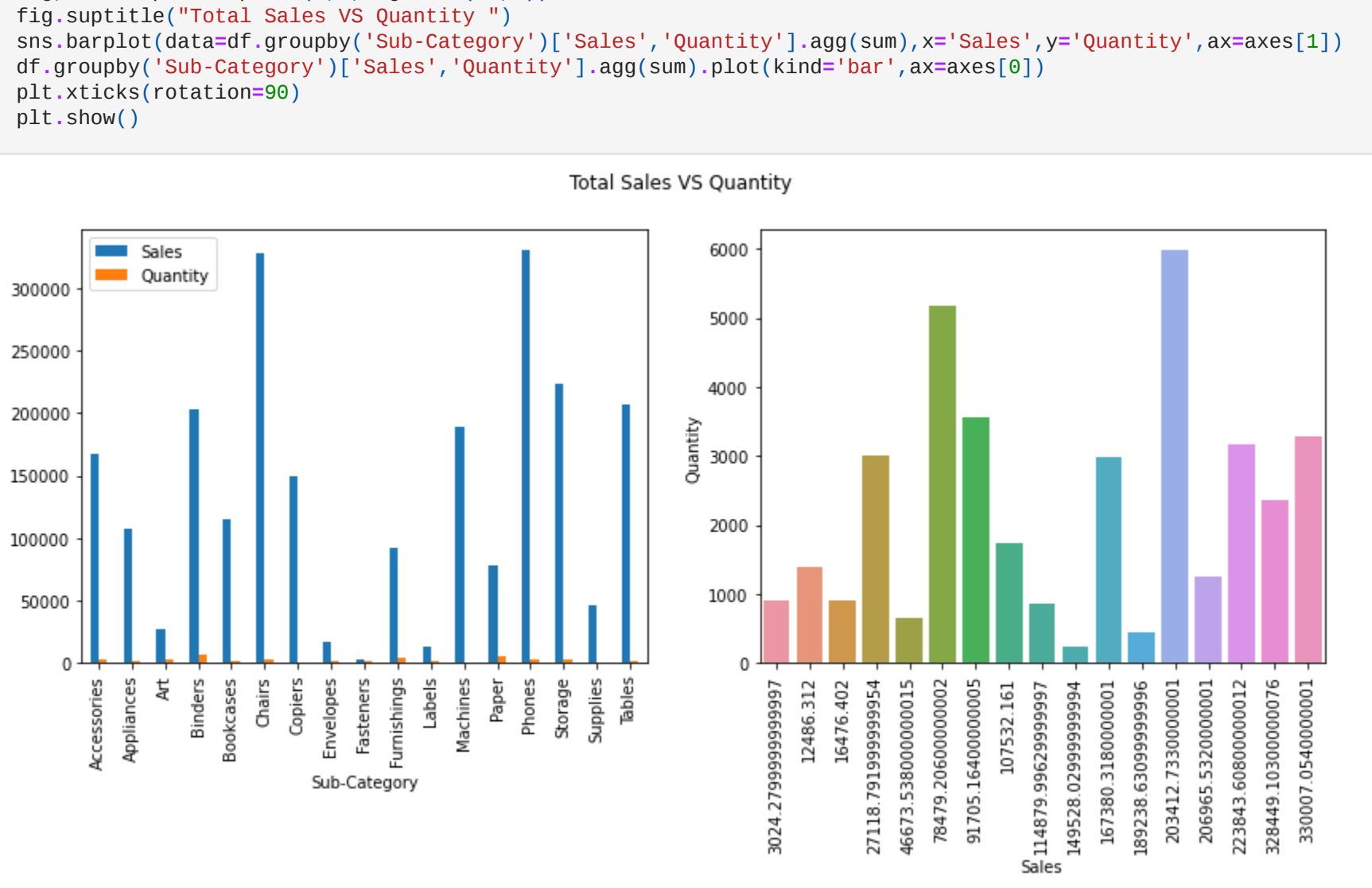
In [21]:
```
sns.pairplot(df)
```

Out[21]: <seaborn.axisgrid.PairGrid at 0x25818a01520>

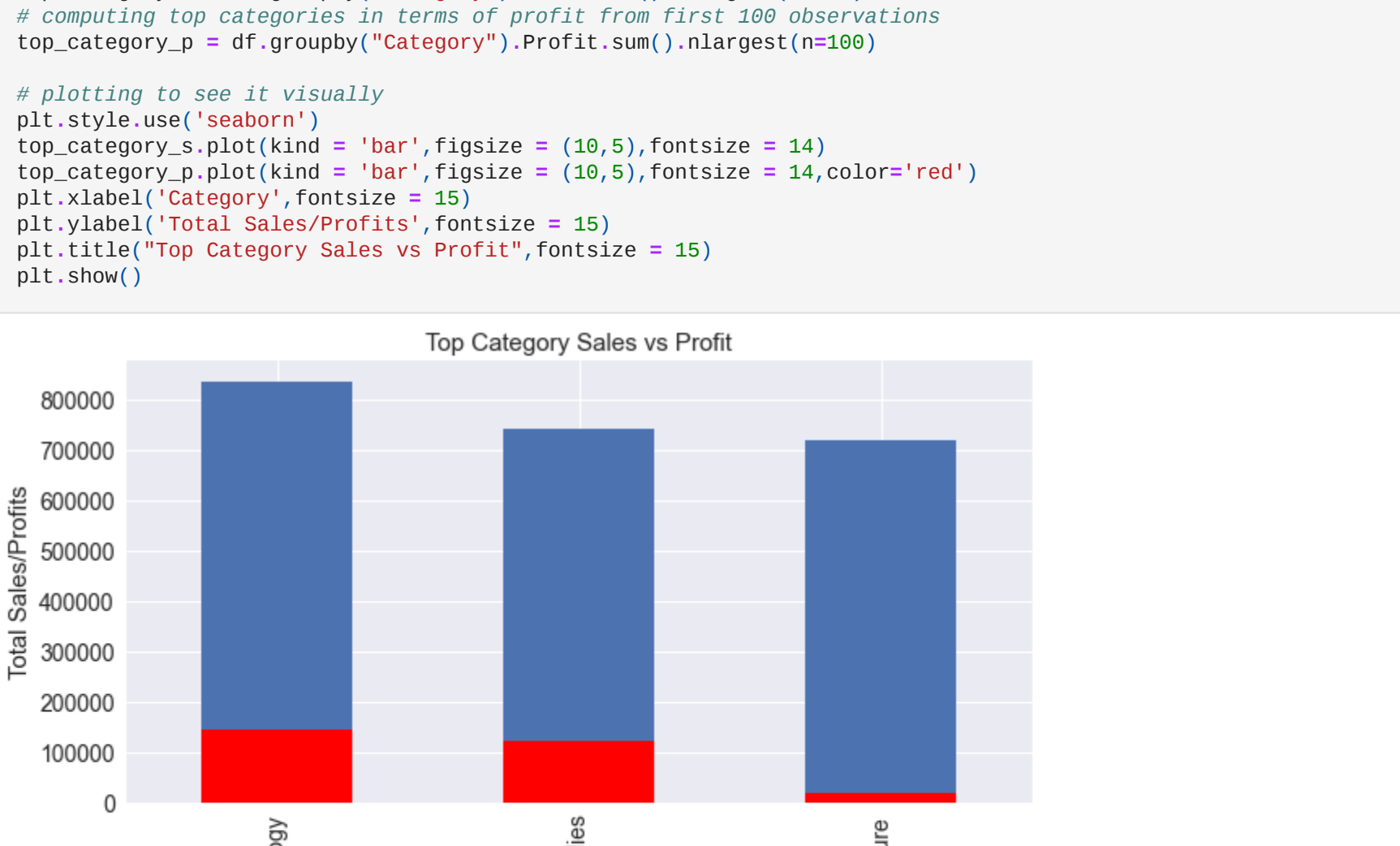
In [22]:
```
fig,axes = plt.subplots(1,1,figsize=(12,7))
sns.heatmap(df.corr())
plt.show()
```



In [23]:
```
fig,axes = plt.subplots(1,2,figsize=(14,5))
fig.suptitle("Total profit VS sales ")
sns.barplot(data=df.groupby('Sub-Category')['Sales','Profit'].agg(sum),x='Sales',y='Profit',ax=axes[1])
df.groupby('Sub-Category')['Sales','Profit'].agg(sum).plot(kind='bar',ax=axes[0])
plt.xticks(rotation=90)
plt.show()
```

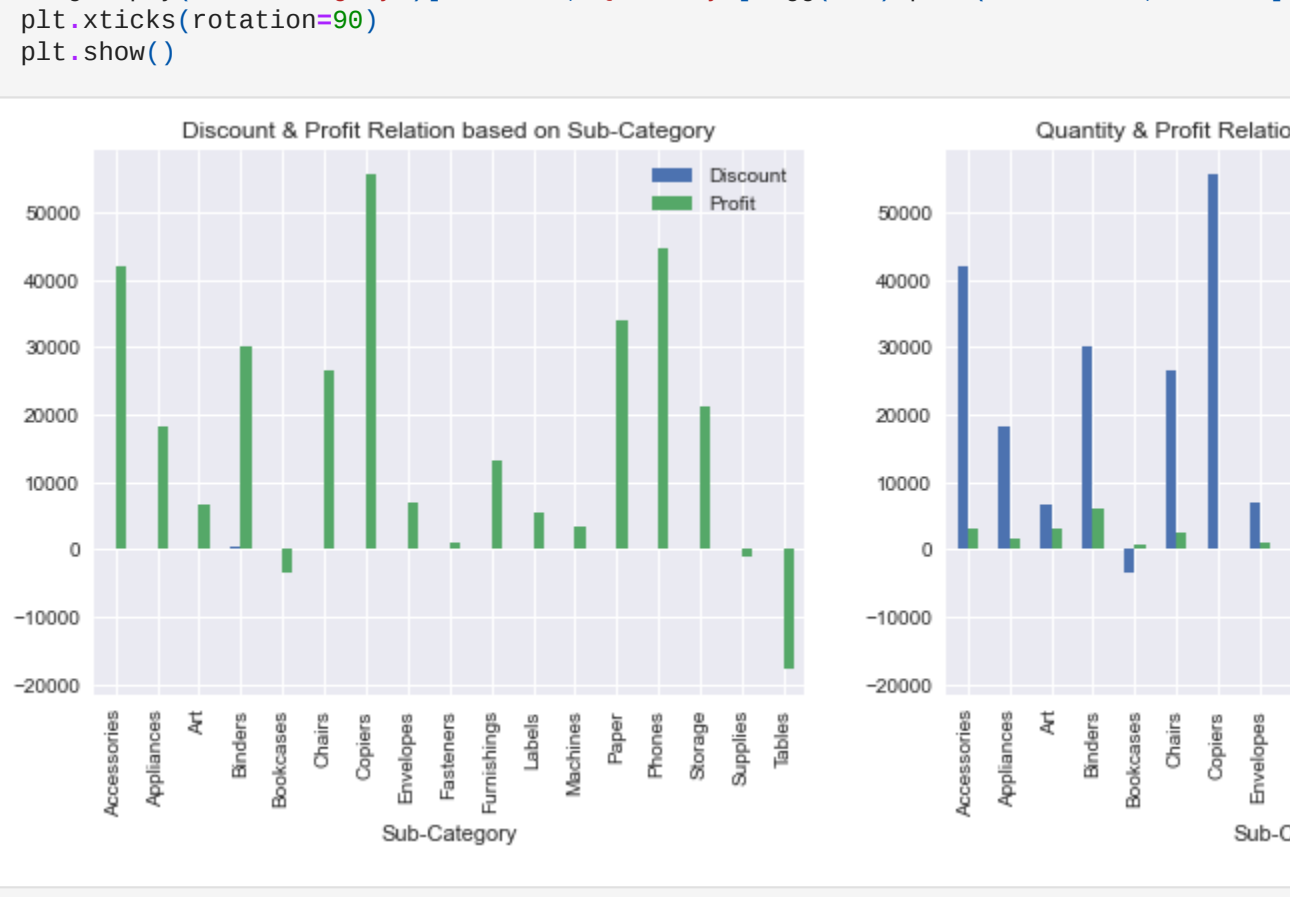


In [24]:
```
fig,axes = plt.subplots(1,2,figsize=(14,5))
fig.suptitle("Total Sales VS Quantity ")
sns.barplot(data=df.groupby('Sub-Category')['Sales','Quantity'].agg(sum),x='Sales',y='Quantity',ax=axes[1])
df.groupby('Sub-Category')['Sales','Quantity'].agg(sum).plot(kind='bar',ax=axes[0])
plt.xticks(rotation=90)
plt.show()
```

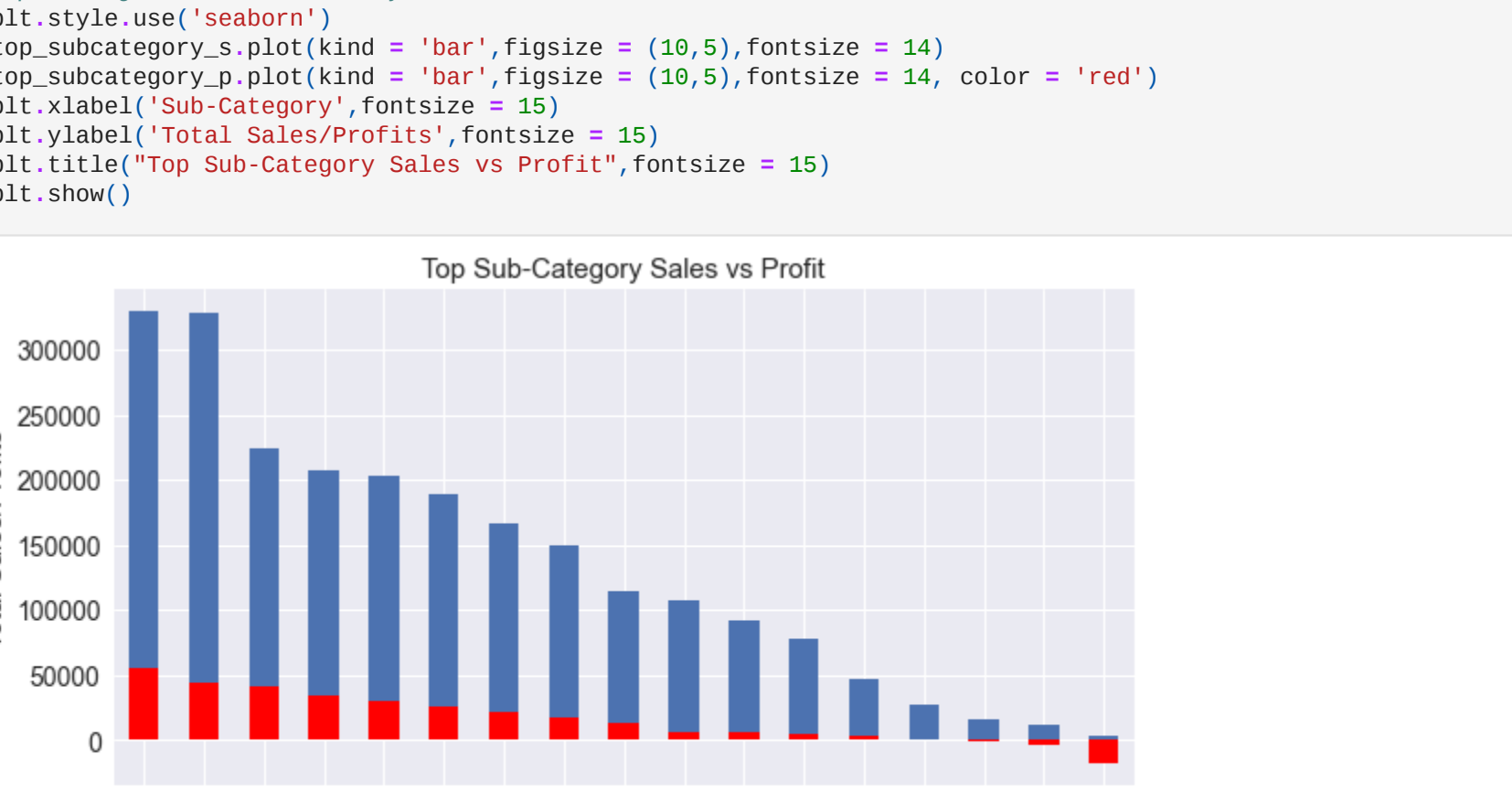


In [25]:
```
# computing top categories in terms of sales from first 100 observations
top_category_s = df.groupby("Category").Sales.sum().nlargest(n=100)
# computing top categories in terms of profit from first 100 observations
top_category_p = df.groupby("Category").Profit.sum().nlargest(n=100)

# plotting to see it visually
plt.style.use('seaborn')
top_category_s.plot(kind = 'bar',figsize = (10,5),fontsize = 14)
top_category_p.plot(kind = 'bar',figsize = (10,5),fontsize = 14,color='red')
plt.xlabel('Category',fontsize = 15)
plt.ylabel('Total Sales/Profits',fontsize = 15)
plt.title("Top Category Sales vs Profit",fontsize = 15)
plt.show()
```



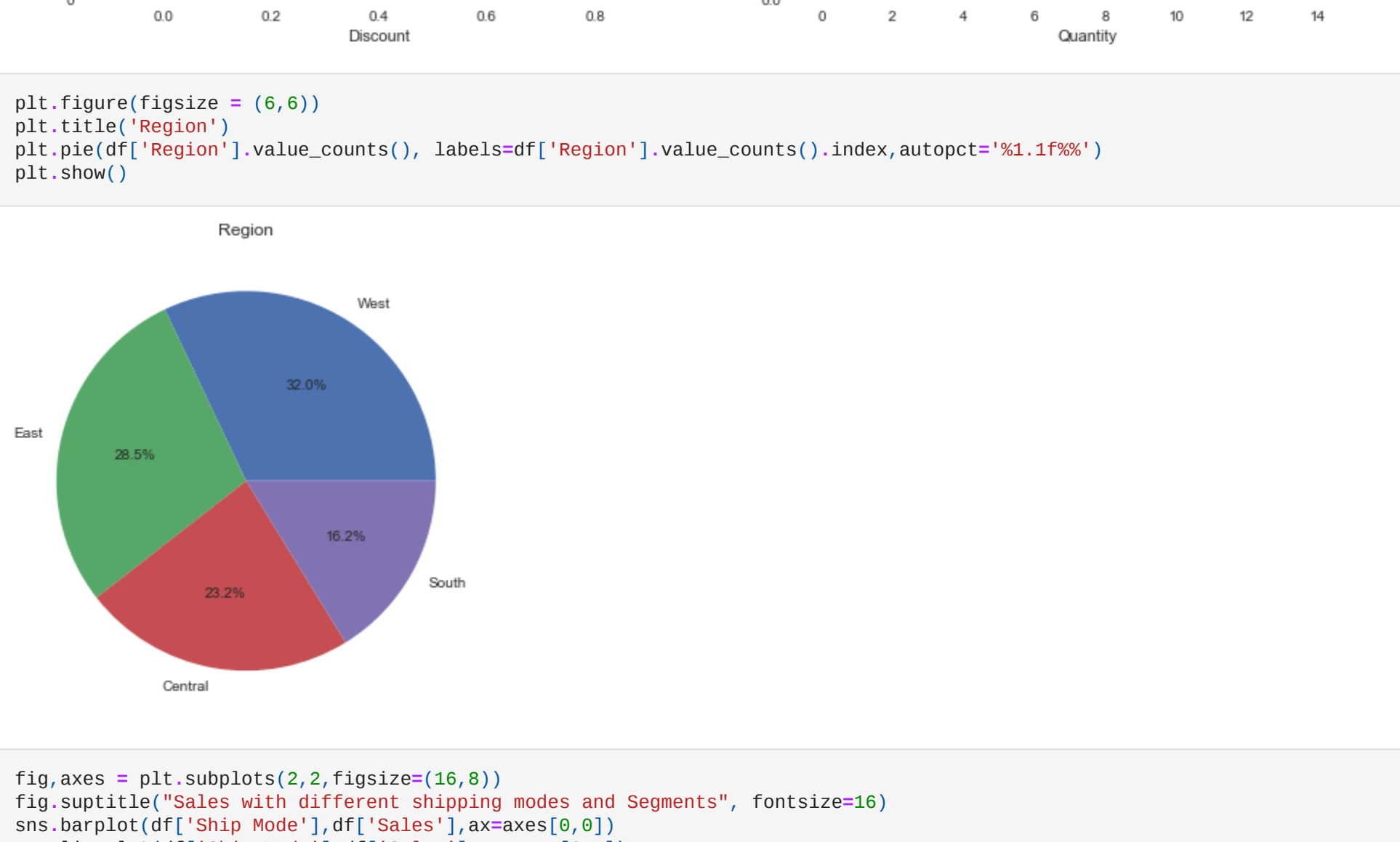
In [26]:
```
fig,axes = plt.subplots(1,2,figsize=(14,5))
df.groupby('Sub-Category')['Discount','Profit'].agg(sum).plot(kind='bar',ax=axes[0]).set_title('Discount & Profit Relation based on Sub-Category')
df.groupby('Sub-Category')['Profit','Quantity'].agg(sum).plot(kind='bar',ax=axes[1]).set_title('Quantity & Profit Relation based on Sub-Category')
plt.xticks(rotation=90)
plt.show()
```



In [27]:
```
# computing top sub-categories in terms of sales from first 100 observations
top_subcategory_s = df.groupby("Sub-Category").Sales.sum().nlargest(n = 100)
# computing top sub-categories in terms of profit from first 100 observations
top_subcategory_p = df.groupby("Sub-Category").Profit.sum().nlargest(n = 100)

# plotting to see it visually
plt.style.use('seaborn')
top_subcategory_s.plot(kind = 'bar',figsize = (10,5),fontsize = 14)
top_subcategory_p.plot(kind = 'bar',figsize = (10,5),fontsize = 14, color = 'red')
plt.xlabel('Sub-Category',fontsize = 15)
plt.ylabel('Total Sales/Profits',fontsize = 15)
plt.title("Top Sub-Category Sales vs Profit",fontsize = 15)
plt.show()
```

In [28]:
```
fig,axes = plt.subplots(2,2,figsize=(16,8))
fig.suptitle("Distribution plots", fontsize=16)
sns.distplot(df['Sales'],ax=axes[0,0])
sns.distplot(df['Profit'],ax=axes[0,1])
sns.distplot(df['Discount'],ax=axes[1,0])
sns.distplot(df['Quantity'],ax=axes[1,1])
plt.show()
```



In [29]:
```
plt.figure(figsize = (6,6))
plt.title('Region')
plt.pie(df['Region'].value_counts(), labels=df['Region'].value_counts().index,autopct='%1.1f%%')
plt.show()
```

In [30]:
```
fig,axes = plt.subplots(2,2,figsize=(16,8))
fig.suptitle("Sales with different shipping modes and Segments", fontsize=16)
sns.barplot(df['Ship Mode'],df['Sales'],ax=axes[0,0])
sns.lineplot(df['Ship Mode'],df['Sales'],ax=axes[0,1])
sns.barplot(df['Segment'],df['Sales'],ax=axes[1,0])
sns.lineplot(df['Segment'],df['Sales'],ax=axes[1,1])
plt.show()
```

In [31]:
```
fig,ax= plt.subplots(1,1,figsize=(12,7))
sns.countplot(df['Quantity'],hue=df['Region'])
plt.show()
```


The weak areas where one can work to make more profit are : #### We should limit sales of furniture and increase that of technology and office suppliers as furniture has very less profit as compared to sales. #### Considering the sub-categories sales of tables should be minimized. #### Increase sales more in the east as profit is more. #### We should concentrate on the states like 'New York' and 'California' to make more profits. #### The features Profit and Discounts are highly related. #### Over Less quantity of products also the sales were high. #### The maximum quantity of product in demand was in range 2-4. #### The mode of shipping doesn't affect much to the sales #### The Home Office provides highest sales followed by Corporate by a slight variation

In [ ]: