The Spark Foundation

Data Science and Business Analytics Intern

Task 3

Exploratory Data Analysis

- Objective : To find out the weak areas where you can work to make more profit.
- Dataset : https://bit.ly/3i4rbWl
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- Setting Working Directory

In [1]:
```
import os
os.chdir("H:\\Data Science\\Internship\\Spark")
```

- Importing Libraries

In [3]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

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

- Understanding Dataset

In [5]:
```
df = pd.read_csv("SampleSuperstore.csv")
print(df)
```

```
          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]
```

- Basic Data Insights

In [15]:
```
df.sample(5)
```

Out[15]:

	Ship Mode	Segment	Country	City	State	Postal Code	Region	Category	Sub-Category	Sales	Quantity	Discount	Profit
2587	Standard Class	Consumer	United States	New York City	New York	10024	East	Furniture	Furnishings	22.230	1	0.0	9.7812
7334	Standard Class	Consumer	United States	Tampa	Florida	33614	South	Furniture	Furnishings	54.528	3	0.2	14.3136
1790	Standard Class	Consumer	United States	New York City	New York	10011	East	Office Supplies	Paper	48.940	1	0.0	24.4700
776	Standard Class	Consumer	United States	Cincinnati	Ohio	45231	East	Office Supplies	Art	32.760	7	0.2	3.6855
82	Standard Class	Consumer	United States	San Francisco	California	94122	West	Office Supplies	Storage	21.390	1	0.0	6.2031

In [16]:
```
df.head()
```

Out[16]:

	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 [17]:
```
df.tail()
```

Out[17]:

	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 [18]:
```
df.shape
```

Out[18]:
```
(9994, 13)
```

In [19]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9994 entries, 0 to 9993
Data columns (total 13 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   Ship Mode     9994 non-null   object
 1   Segment       9994 non-null   object
 2   Country       9994 non-null   object
 3   City          9994 non-null   object
 4   State         9994 non-null   object
 5   Postal Code   9994 non-null   int64
 6   Region        9994 non-null   object
 7   Category      9994 non-null   object
 8   Sub-Category  9994 non-null   object
 9   Sales         9994 non-null   float64
 10  Quantity      9994 non-null   int64
 11  Discount      9994 non-null   float64
 12  Profit        9994 non-null   float64
dtypes: float64(3), int64(2), object(8)
memory usage: 1015.1+ KB
```

In [20]:
```
df.describe()
```

Out[20]:

	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

- Number of unique values in each column:

In [21]:
```
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
```

- Check for null values

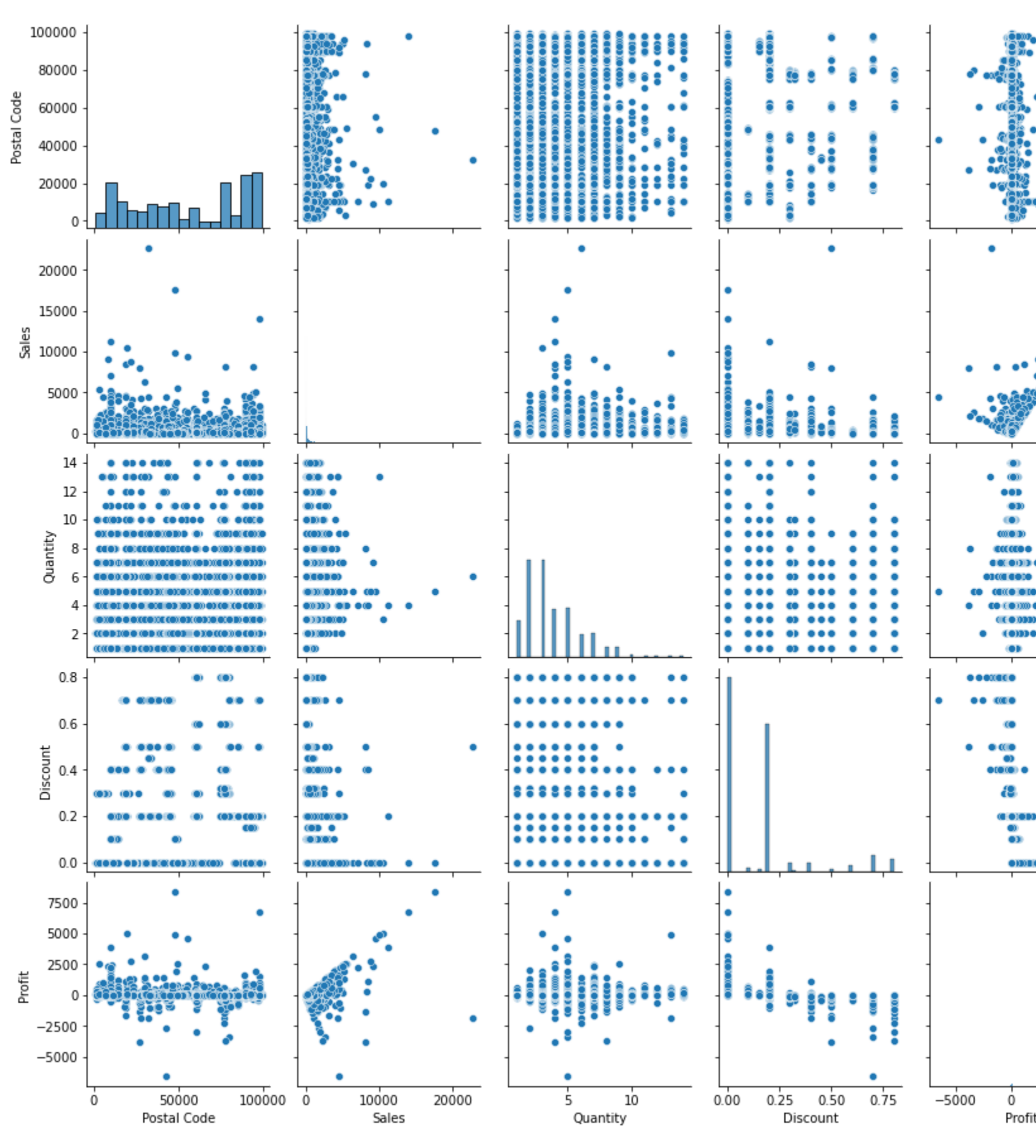
In [22]:
```
df.isnull().sum()
```

Out[22]:
```
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
```

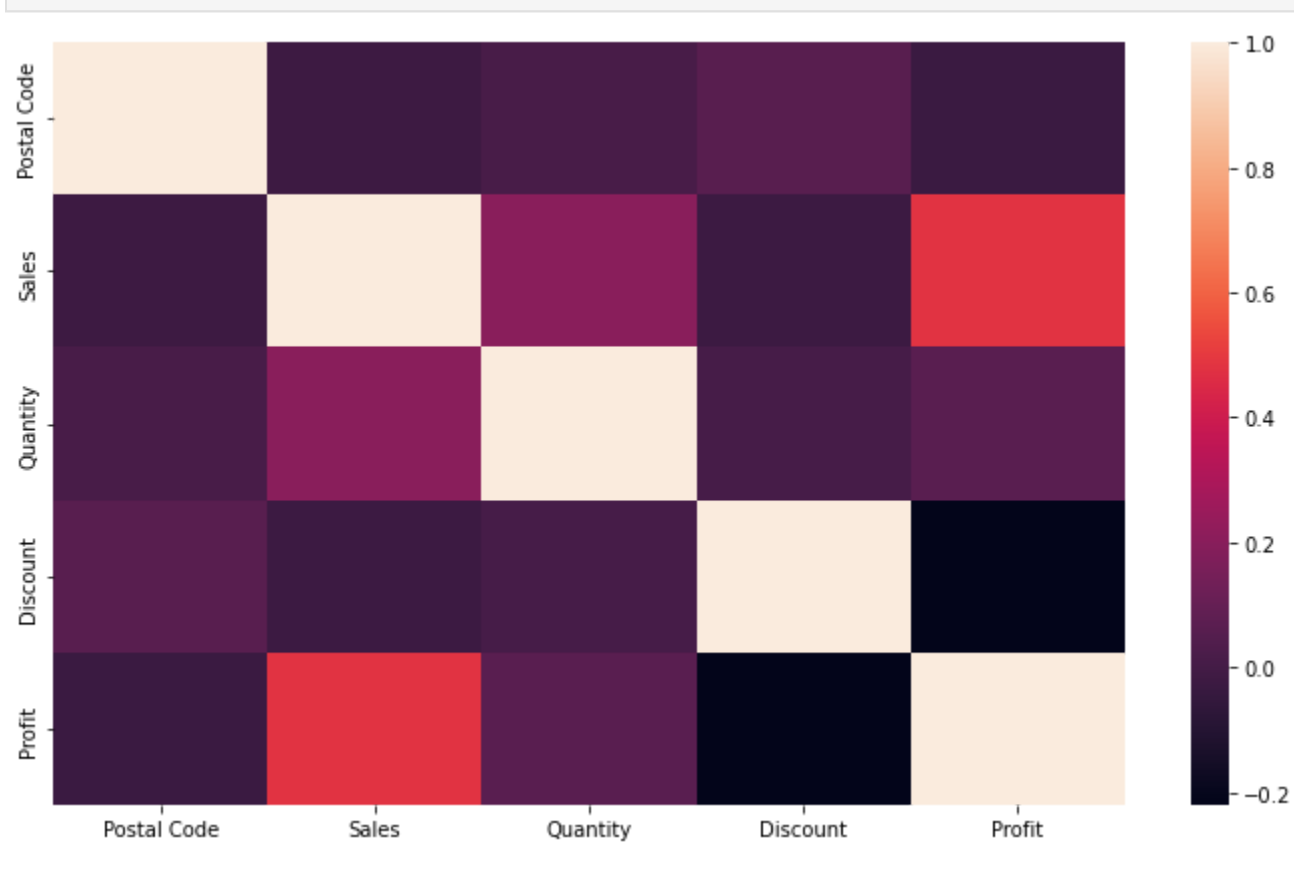
Data Visualization

In [14]:
```
sns.pairplot(df)
```

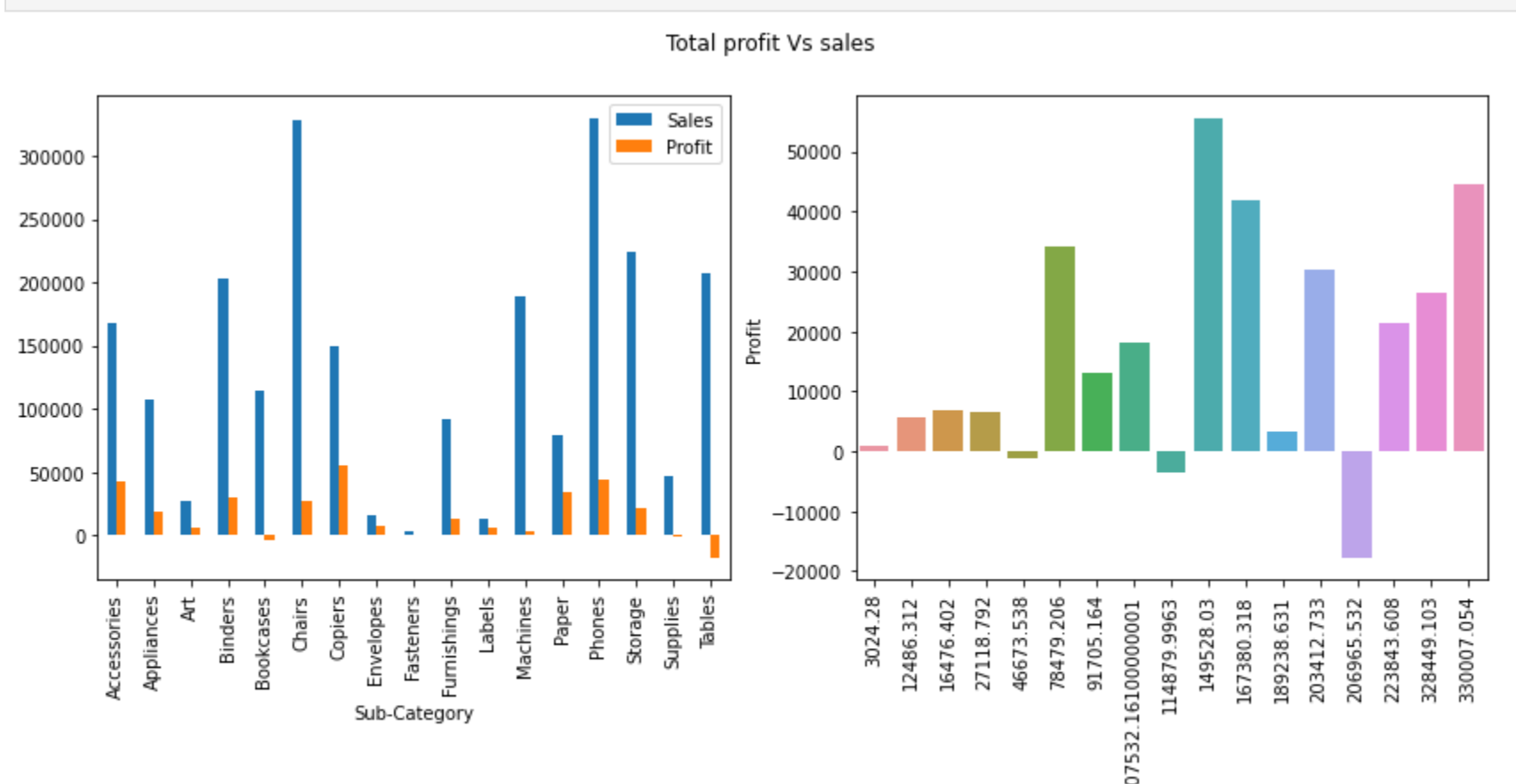
Out[14]:
```
<seaborn.axisgrid.PairGrid at 0x1ce69953fd0>
```



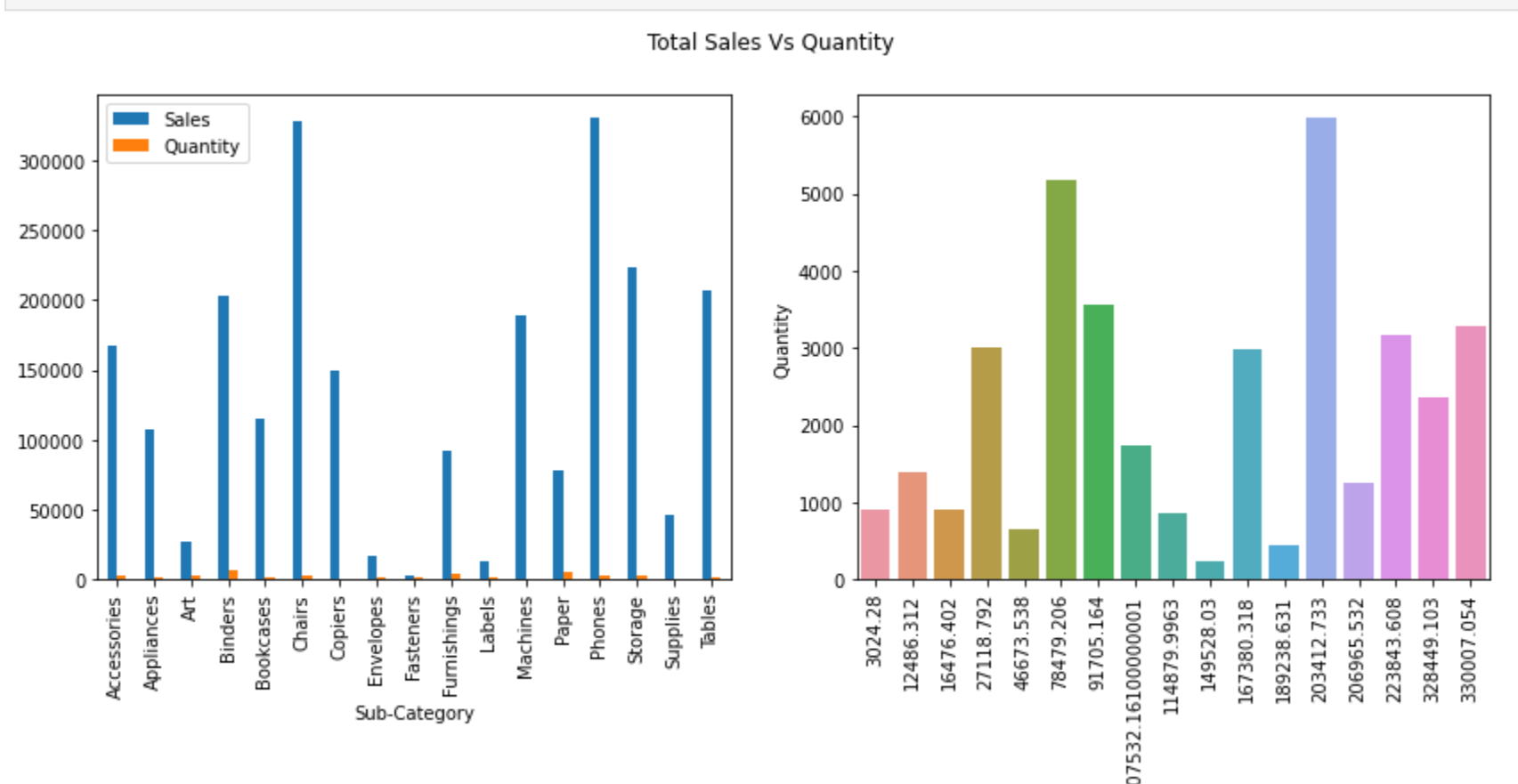
In [23]:
```
fig,axes = plt.subplots(1,1,figsize = (12,7))
sns.heatmap(df.corr())
plt.show()
```



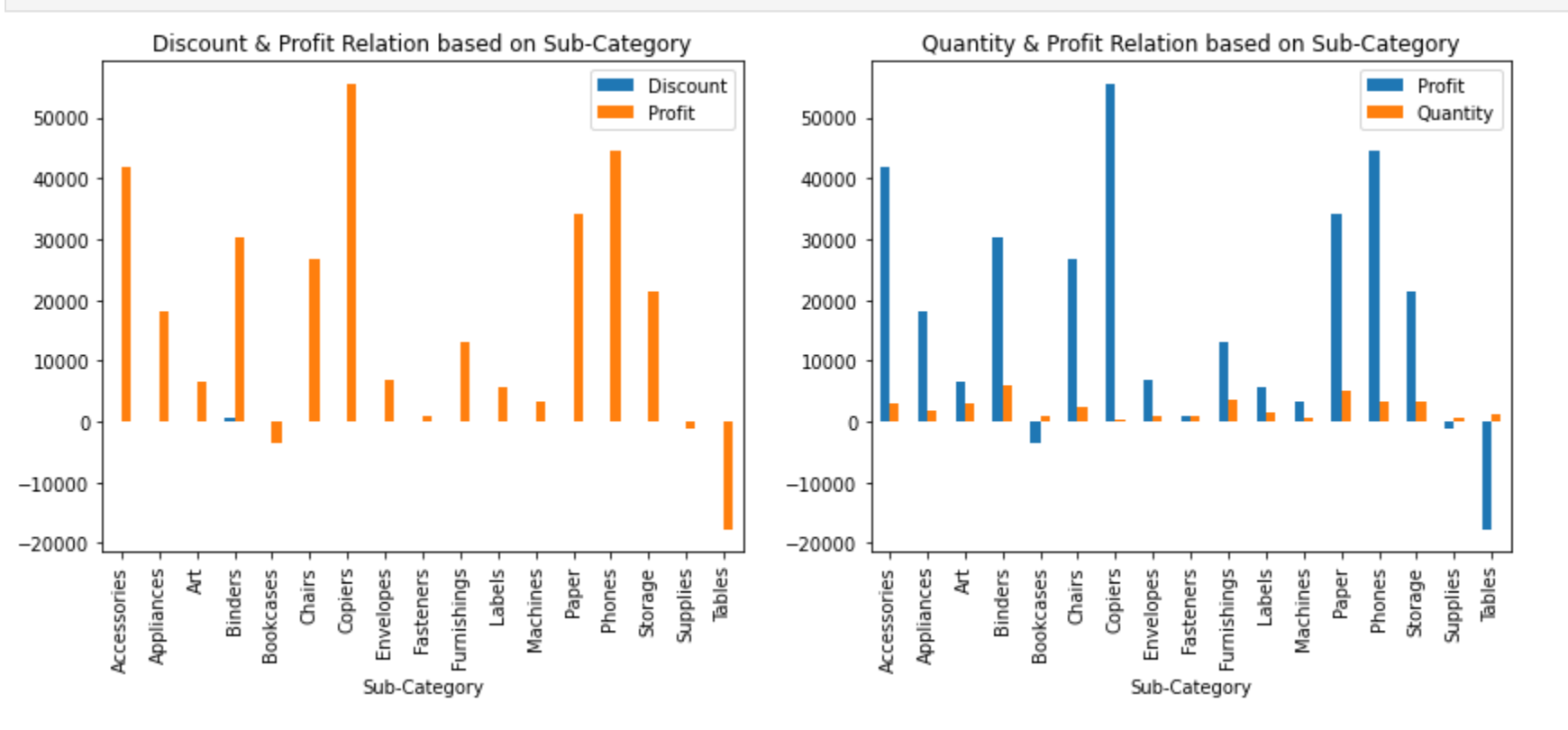
In [26]:
```
fig,axes = plt.subplots(1,2,figsize=(14,5))
fig.suptitle("Total profit Vs sales")
sns.barplot(data = df.groupby('Sub-Category')['Sales','Profit'].agg(sum),x="Sales",y = "Profit",ax = axes[1])
df.groupby('Sub-Category')['Sales','Profit'].agg(sum).plot(kind='bar',ax=axes[0])
plt.xticks(rotation=90)
plt.show()
```



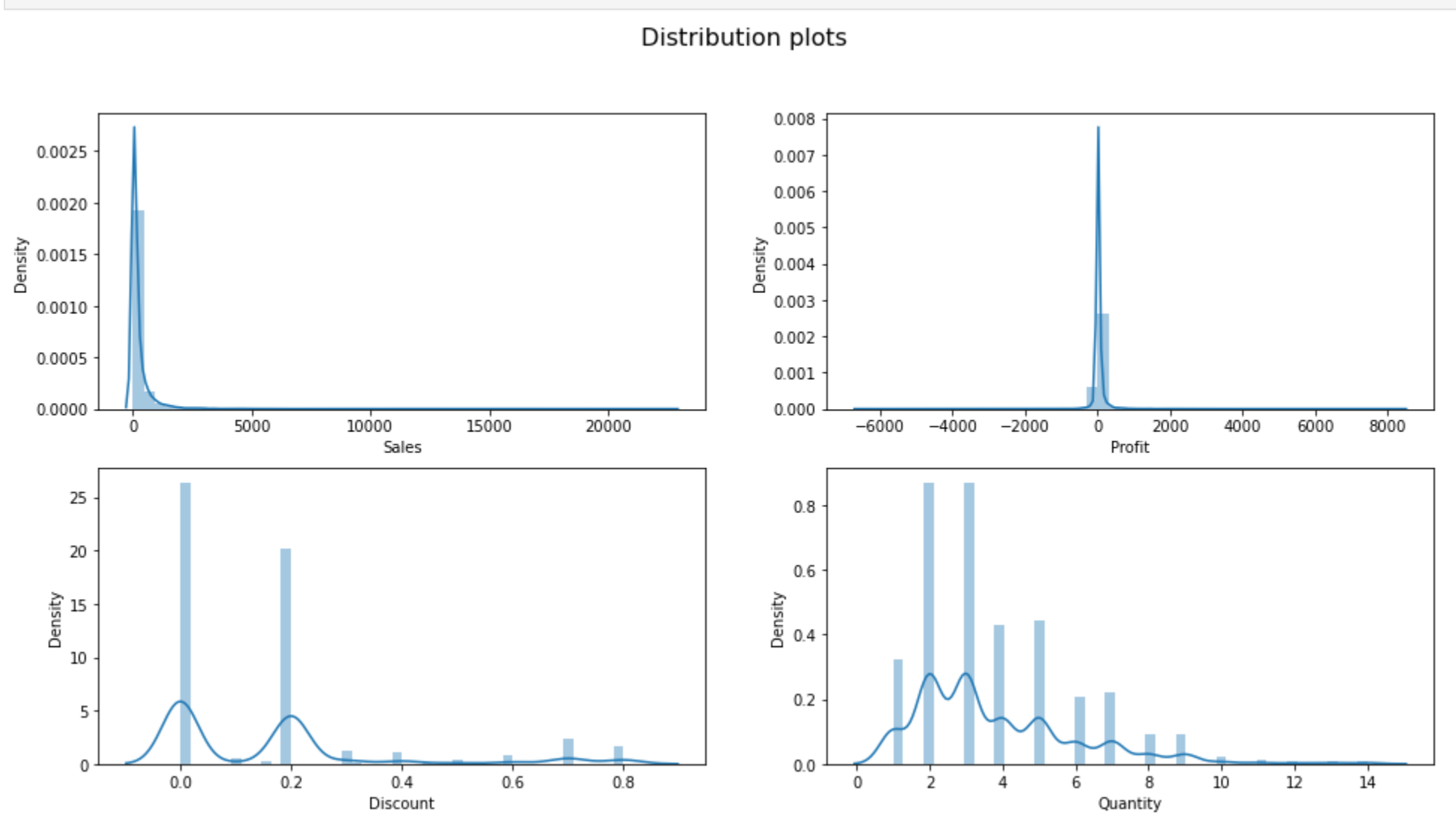
In [27]:
```
fig,axes = plt.subplots(1,2,figsize =(14,5))
fig.suptitle("Total Sales Vs Quantity")
sns.barplot(data=df.groupby('Sub-Category')['Sales','Quantity'].agg(sum),x='Sales',y='Quantity',ax=axes[1])
df.groupby('Sub-Category')['Sales','Quantity'].agg(sum).plot(kind='bar',ax=axes[0])
plt.xticks(rotation=90)
plt.show()
```



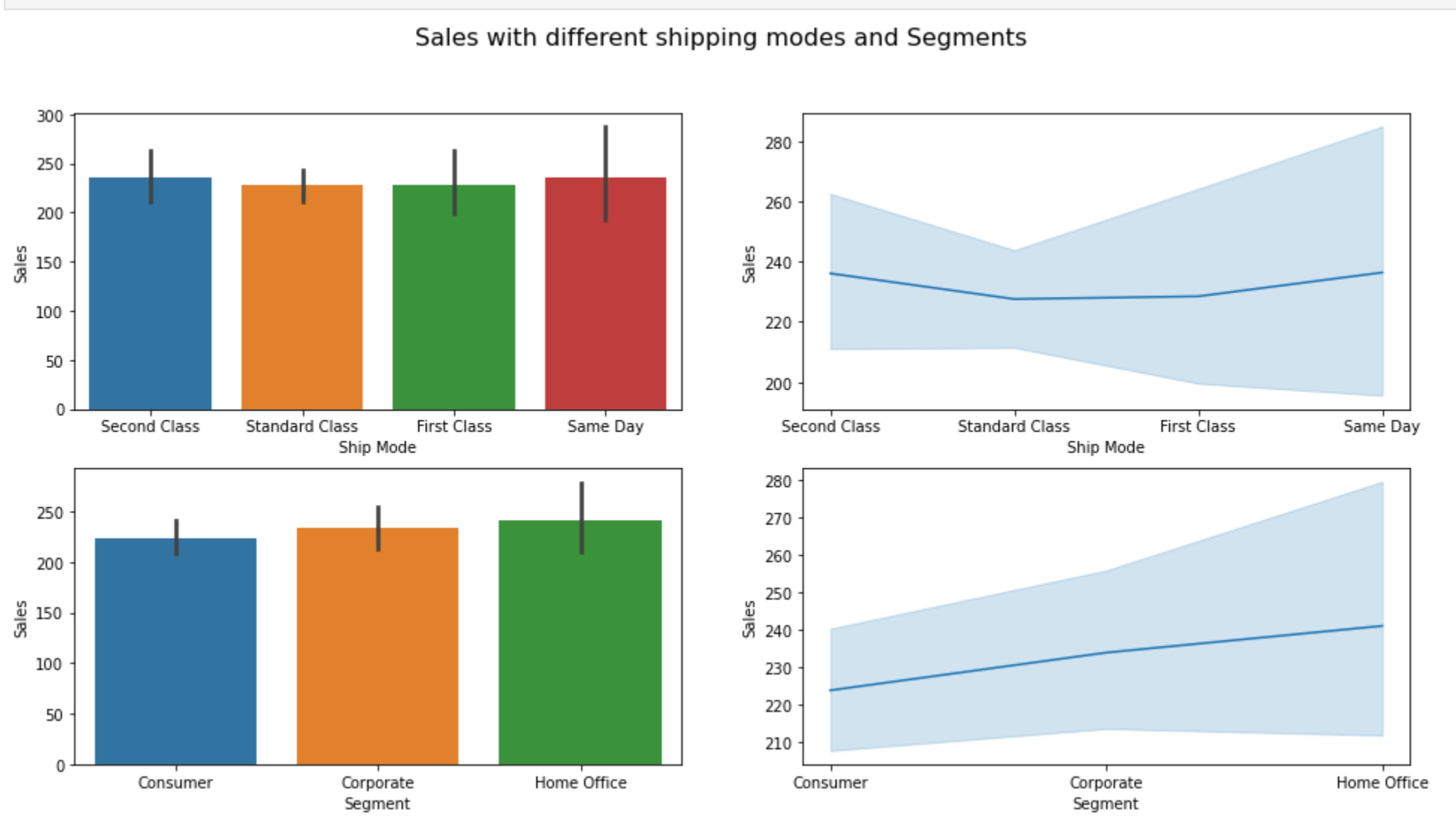
In [28]:
```
fig,axes = plt.subplots(1,2,figsize =(14,5))
df.groupby('Sub-Category')['Discount','Profit'].agg(sum).plot(kind='bar',ax=axes[0]).set_title('Discount & Profit Relation based on Sub-Category')
df.groupby('Sub-Category')['Profit','Quantity'].agg(sum).plot(kind='bar',ax=axes[1]).set_title('Quantity & Profit Relation based on Sub-Category')
plt.xticks(rotation=90)
plt.show()
```



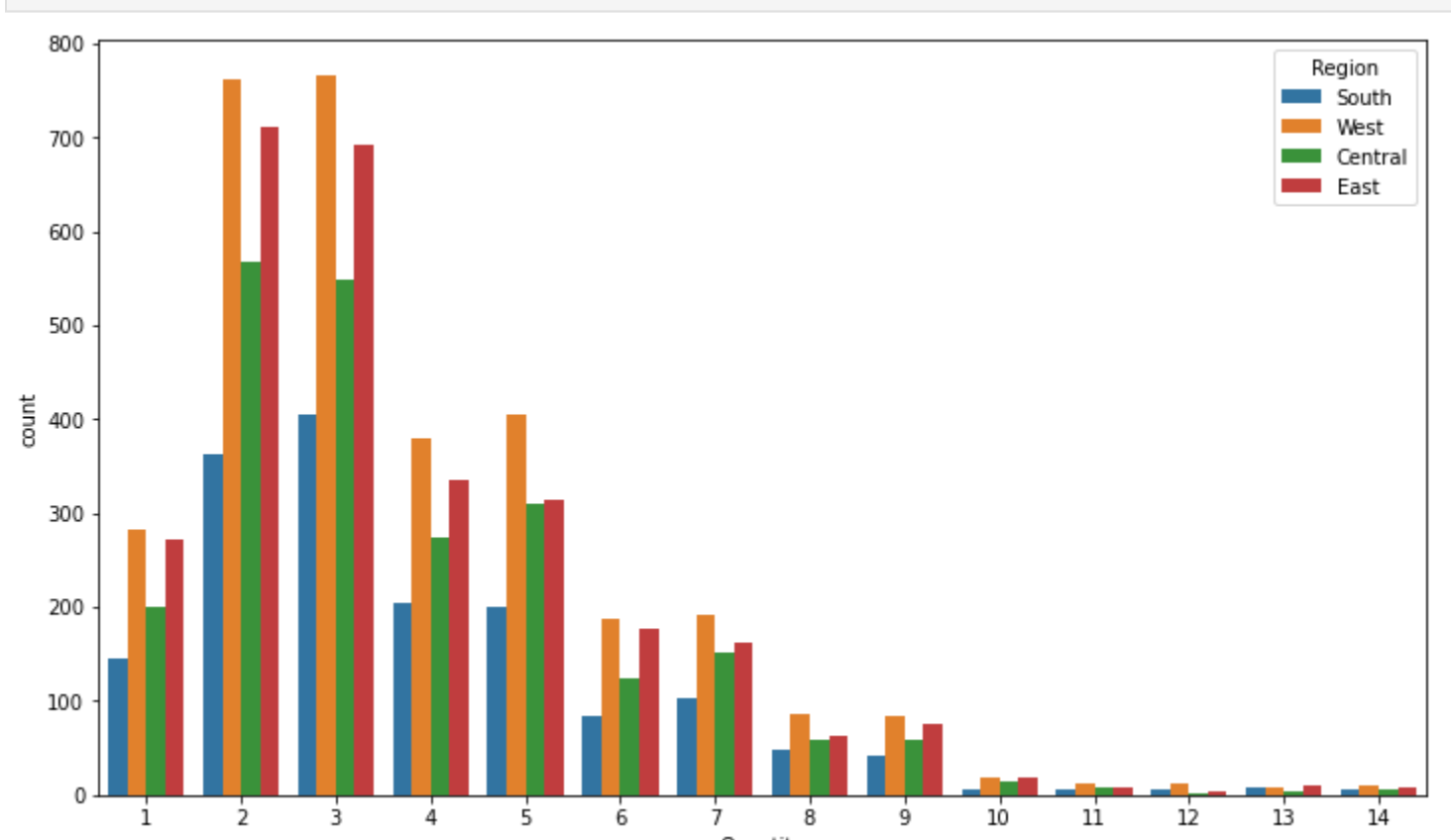
In [33]:
```
fig,axes = plt.subplots(2,2,figsize= (16,8))
fig.suptitle("Distribution plots", fontsize = 16)
sns.distplot(df['Sales'],ax=axes[0,0])
sns.distplot(df['Profit'],ax=axes[0,1])
sns.distplot(df['Discount'],ax=axes[1,0])
sns.distplot(df['Quantity'],ax=axes[1,1])
plt.show()
```



In [34]:
```
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 [35]:
```
fig,ax= plt.subplots(1,1,figsize=(12,7))
sns.countplot(df['Quantity'],hue=df['Region'])
plt.show()
```



Conclusions:

- 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 slight variation.

Suggestions are always Welcome!

Thank You!