The Spark Foundation - Data Science & Business Analytics Internship

TASK-3 'Exploratory Data Analysis' on dataset ‘SampleSuperstore’

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In [1]:
```
import math
import warnings
import numpy as np
import pandas as pd
import seaborn as sns
import plotly.offline as py
import plotly.graph_objs as go
import matplotlib.pyplot as plt
warnings.filterwarnings('ignore')
```

Reading the Dataset

In [8]:
```
# Let's import to our data and check the basics.

dataset = pd.read_csv(r'C:\Users\BHAVANI\Downloads\SampleSuperstore.csv')
dataset.head()
```

Out[8]:

	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

Data Preprocessing and Analysis

In [6]:
```
dataset.columns
```

Out[6]:
```
Index(['Ship Mode', 'Segment', 'Country', 'City', 'State', 'Postal Code',
       'Region', 'Category', 'Sub-Category', 'Sales', 'Quantity', 'Discount',
       'Profit'],
      dtype='object')
```

In [7]:
```
dataset.shape
```

Out[7]:
```
(9994, 13)
```

In [9]:
```
dataset.isnull().sum()
```

Out[9]:
```
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 [10]:
```
dataset.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 [11]:
```
dataset.describe()
```

Out[11]:

	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 [12]:
```
# checking for duplicate values
dataset.duplicated().sum()
```

Out[12]:
```
17
```

In [13]:
```
# dropping the duplicates
dataset.drop_duplicates()
dataset.head()
```

Out[13]:

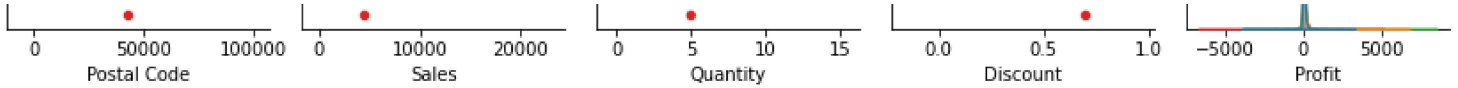
	Ship Mode	Segment	Country	City	State	Postal Code	Region	Category	Sub-Category	Sales	Quantity	Discount	Profit
0	Second Class	Consumer	United States	Henderson	Kentucky	42420	South	Furniture	Bookcases	261.9600	2	0.00	41.9136
1	Second Class	Consumer	United States	Henderson	Kentucky	42420	South	Furniture	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

Data Visualization

In [16]:
```
# visualizing the dataset as a whole using the pair plot
import seaborn as sns
sns.pairplot(dataset,hue='Region')
plt.show
```

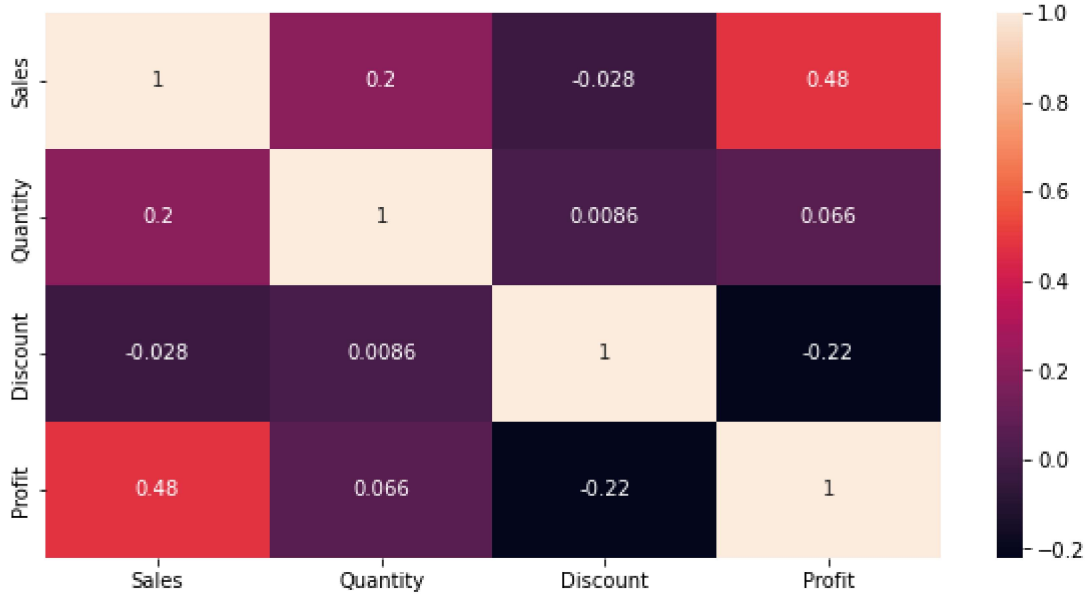
Out[16]:
```
<function matplotlib.pyplot.show(close=None, block=None)>
```


Postal Code
Sales
Quantity
Discount
Profit
Region
South
West
Central
East



In [17]:
```
# removing the unnecessary columns such as postal code
dataset = dataset.drop(['Postal Code'],axis=1)
```

In [18]:
```
# finding the pairwise correlations between the columns and visualising using heatmaps
dataset.corr()
plt.figure(figsize=(10,5))
sns.heatmap(dataset.corr(), annot=True)
plt.show()
```



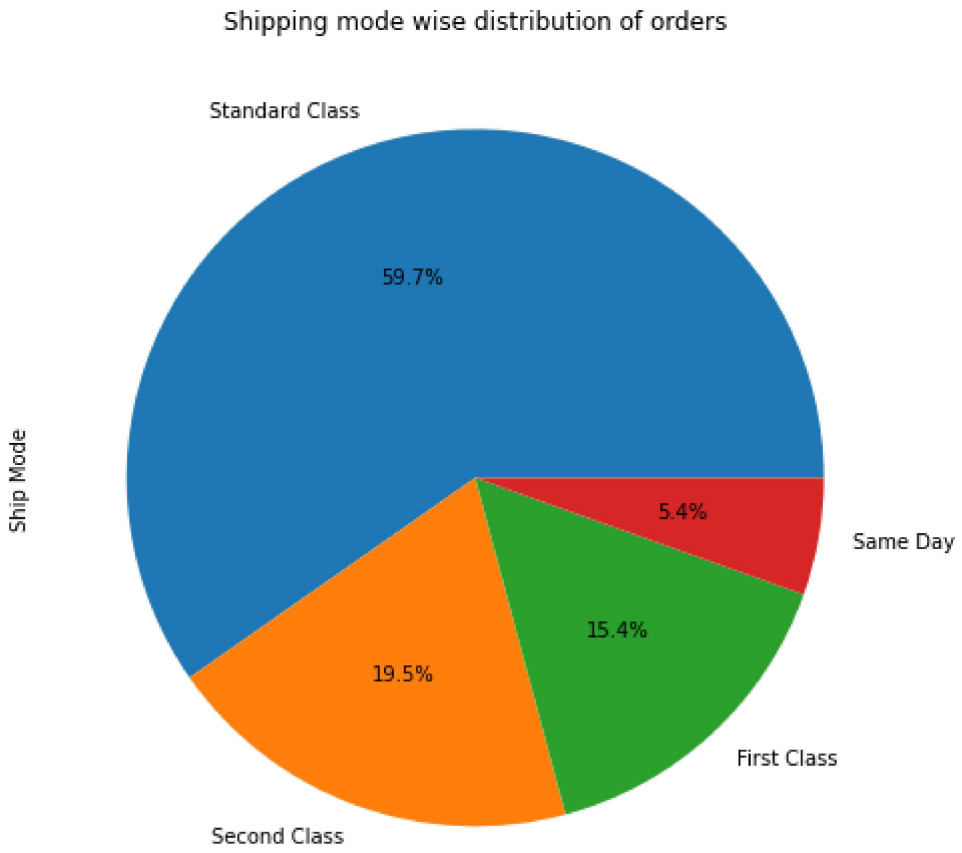
Univariate Analysis

In [19]:
```
dataset["Ship Mode"].value_counts()
```

Out[19]:
```
Standard Class    5968
Second Class      1945
First Class       1538
Same Day           543
Name: Ship Mode, dtype: int64
```

In [20]:
```
dataset['Ship Mode'].value_counts().plot(kind='pie',figsize=[8,8],autopct='%1.1f%%')
plt.title('Shipping mode wise distribution of orders')
```

Out[20]:
```
Text(0.5, 1.0, 'Shipping mode wise distribution of orders')
```



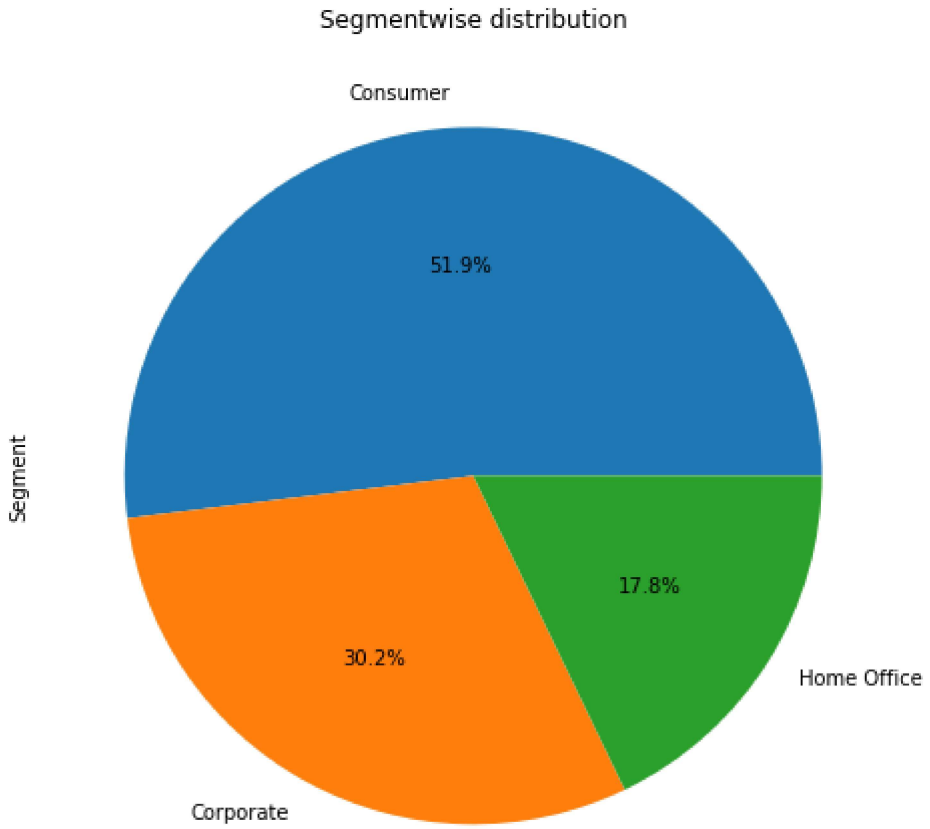
Observation : 'Standard Shipping' mode is highly preferred whersas 'Same Day' is least

In [21]:
```
dataset["Segment"].value_counts()
```

Out[21]:
```
Consumer       5191
Corporate      3020
Home Office    1783
Name: Segment, dtype: int64
```

In [22]:
```
dataset['Segment'].value_counts().plot(kind='pie',figsize=[8,8],autopct='%1.1f%%')
plt.title('Segmentwise distribution')
```

Out[22]:
```
Text(0.5, 1.0, 'Segmentwise distribution')
```



Observation : 50% of people belong to consumer class whereas 20-30% people belong to Home Office & Corporate

In [23]:
```
dataset['Country'].value_counts()
# all the orders are within the United states
```

Out[23]:
```
United States    9994
Name: Country, dtype: int64
```

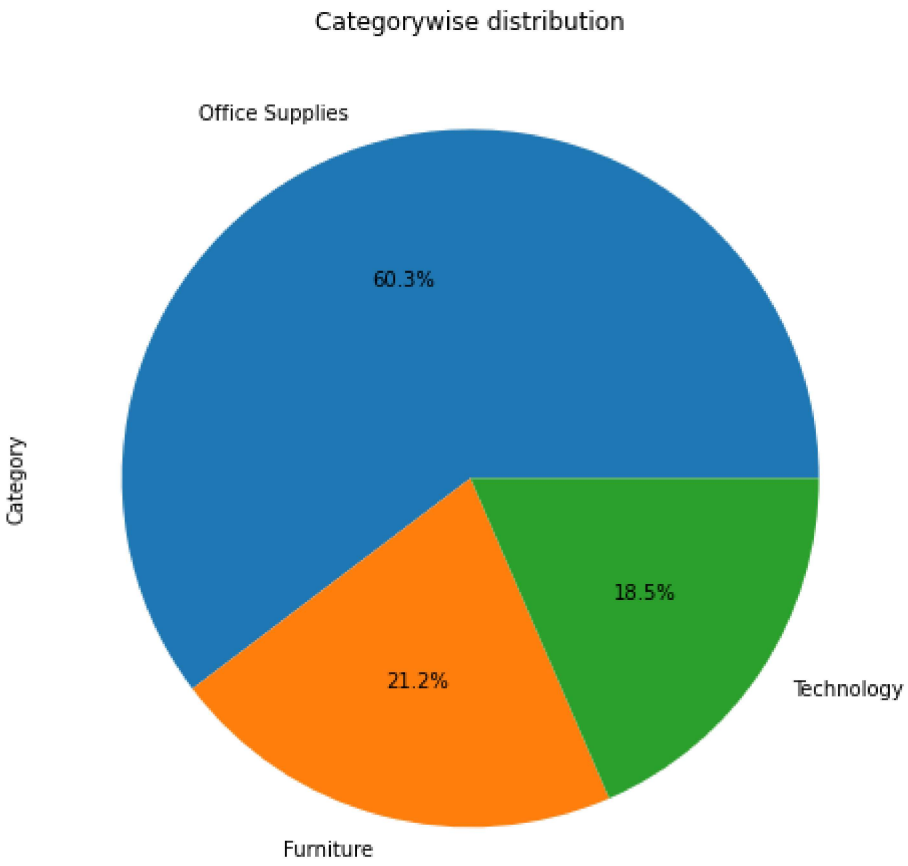
Observation : All works are within the United States, So this can be dropped

In [24]:
```
dataset['Category'].value_counts()
```

Out[24]:
```
Office Supplies    6026
Furniture          2121
Technology         1847
Name: Category, dtype: int64
```

In [25]:
```
dataset['Category'].value_counts().plot(kind='pie',figsize=[8,8],autopct='%1.1f%%')
plt.title('Categorywise distribution')
```

Out[25]:
```
Text(0.5, 1.0, 'Categorywise distribution')
```



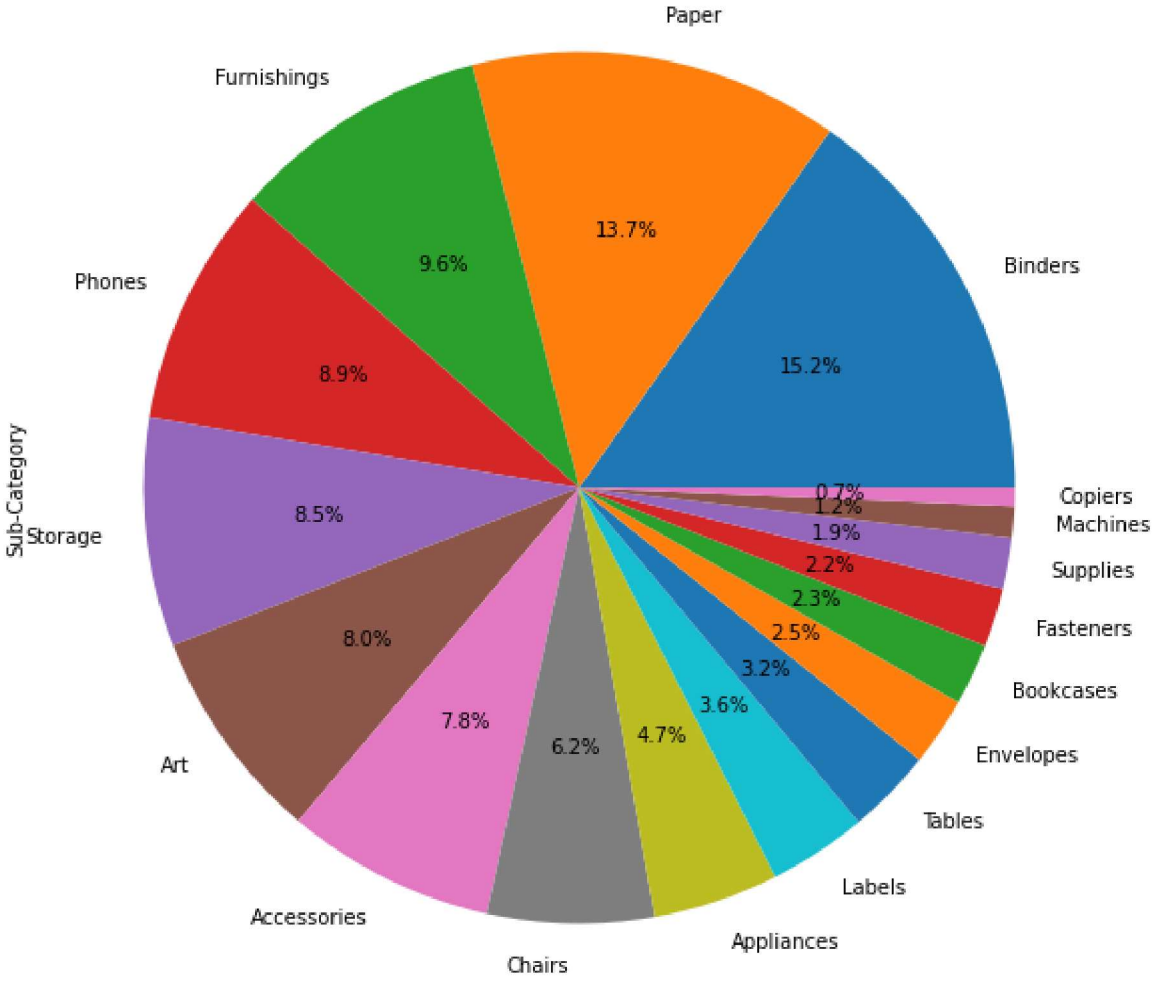
Observation : 60% of the Categories belong to Office Supplies whereas approximately 20% of Categories belongs to Furniture and Technology supplies each

In [26]:
```
dataset['Sub-Category'].value_counts()
```

Out[26]:
```
Binders        1523
Paper          1370
Furnishings     957
Phones          889
Storage         846
Art             796
Accessories     775
Chairs          617
Appliances      466
Labels          364
Tables          319
Envelopes       254
Bookcases       228
Fasteners       217
Supplies        190
Machines        115
Copiers          68
Name: Sub-Category, dtype: int64
```

In [27]:
```
dataset['Sub-Category'].value_counts().plot(kind = 'pie', figsize = [10,10], autopct='%1.1f%%')
```

Out[27]:
```
<AxesSubplot:ylabel='Sub-Category'>
```



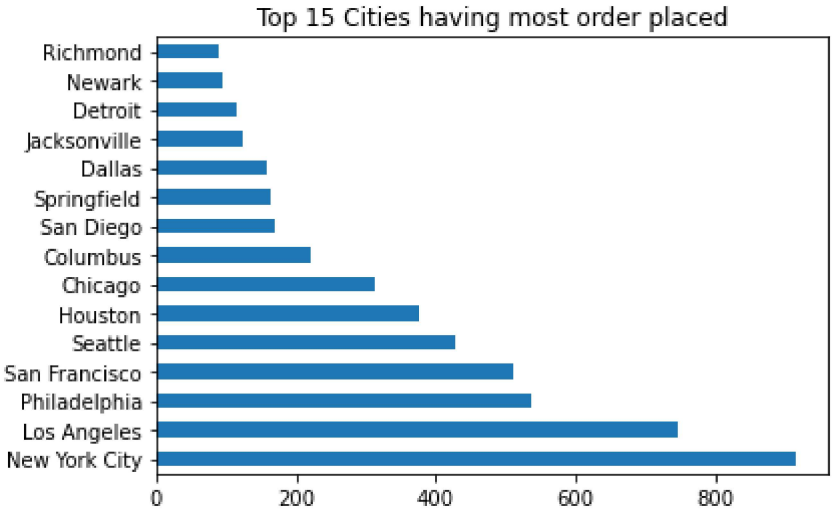
Observation : Binders and Papers are the most exisiting Sub-Category in Superstore

In [28]:
```
dataset['City'].value_counts().head(15)
```

Out[28]:
```
New York City    915
Los Angeles      747
Philadelphia     537
San Francisco    510
Seattle          428
Houston          377
Chicago          314
Columbus         222
San Diego        170
Springfield      163
Dallas           157
Jacksonville     125
Detroit          115
Newark            95
Richmond          90
Name: City, dtype: int64
```

In [29]:
```
dataset['City'].value_counts().head(15).plot(kind = 'barh')
plt.title('Top 15 Cities having most order placed')
```

Out[29]:
```
Text(0.5, 1.0, 'Top 15 Cities having most order placed')
```



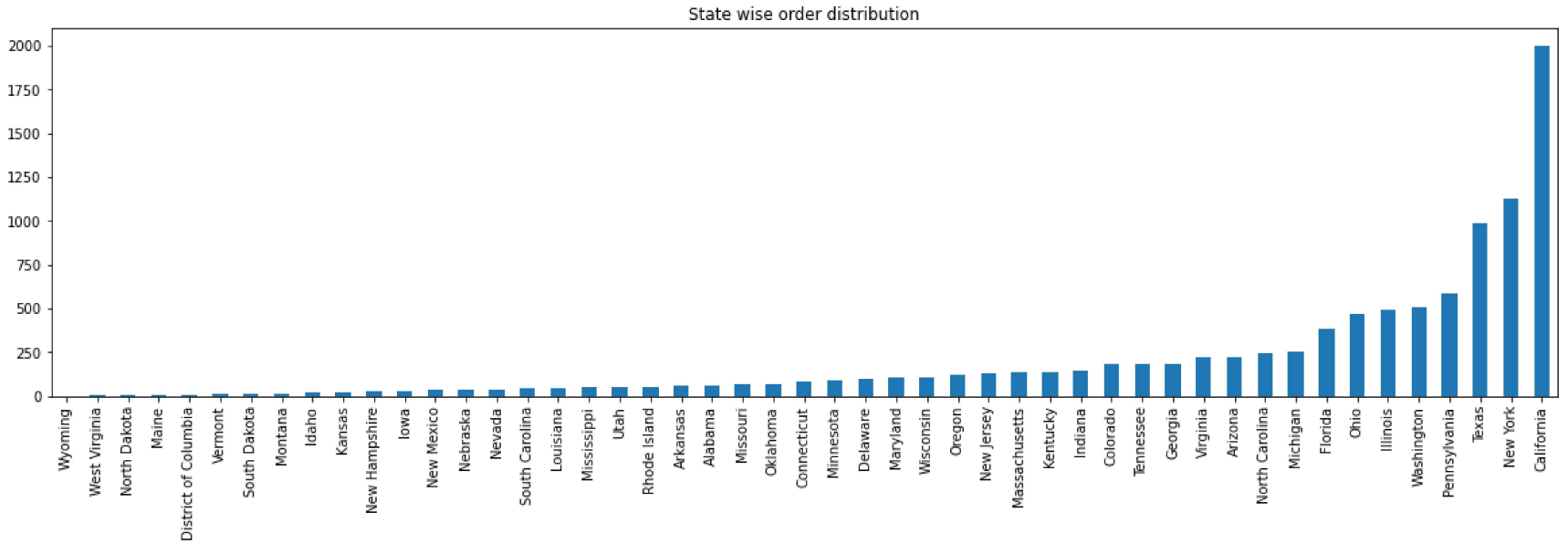
Observation : Most no of order is placed in New York City

In [30]:
```
dataset['State'].value_counts().head()
```

Out[30]:
```
California      2001
New York        1128
Texas            985
Pennsylvania     587
Washington       506
Name: State, dtype: int64
```

In [31]:
```
dataset['State'].value_counts().sort_values(ascending = True).plot(kind = 'bar', figsize =[20,5])
plt.title('State wise order distribution')
```

Out[31]:
```
Text(0.5, 1.0, 'State wise order distribution')
```



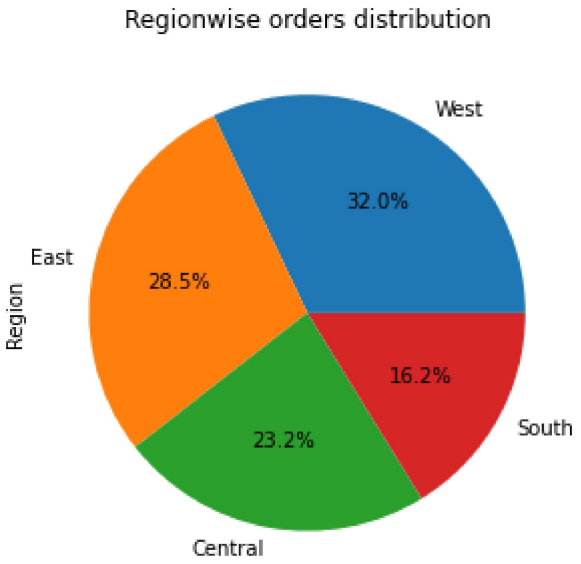
Observation : In case of State, Most no of order is placed in California

In [32]:
```
dataset['Region'].value_counts()
```

Out[32]:
```
West       3203
East       2848
Central    2323
South      1620
Name: Region, dtype: int64
```

In [33]:
```
dataset['Region'].value_counts().plot(kind = 'pie', figsize=[5,5], autopct='%1.1f%%')
plt.title('Regionwise orders distribution')
```

Out[33]: Text(0.5, 1.0, 'Regionwise orders distribution')



Observation : West Region has the maximum sale of 32%

Bivariate Analysis

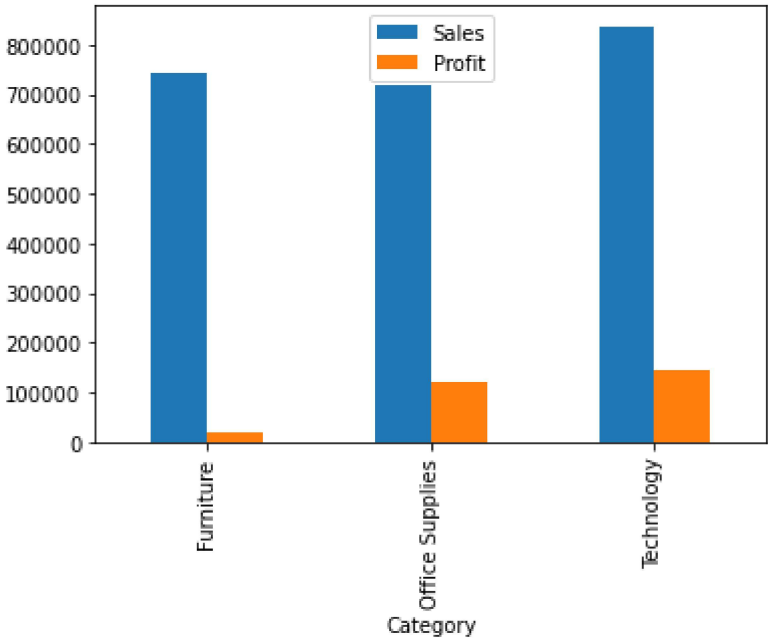
In [34]:
```
categorical_sum=dataset.groupby("Category").sum()
categorical_sum
```

Out[34]:

Category	Sales	Quantity	Discount	Profit
Furniture	741999.7953	8028	368.89	18451.2728
Office Supplies	719047.0320	22906	947.80	122490.8008
Technology	836154.0330	6939	244.40	145454.9481

In [35]:
```
categorical_sum[['Sales', 'Profit']].plot.bar()
```

Out[35]: <AxesSubplot:xlabel='Category'>



Observation :

From this Graph, We can conclude that: Techology Products has the highest Sales and Profit, So we should encourage the sell of office supplies. Furniture has moderate Sales but less Profit, So we should limit the sale of furniture. Office Suplies has the least Sales but moderate Profit.

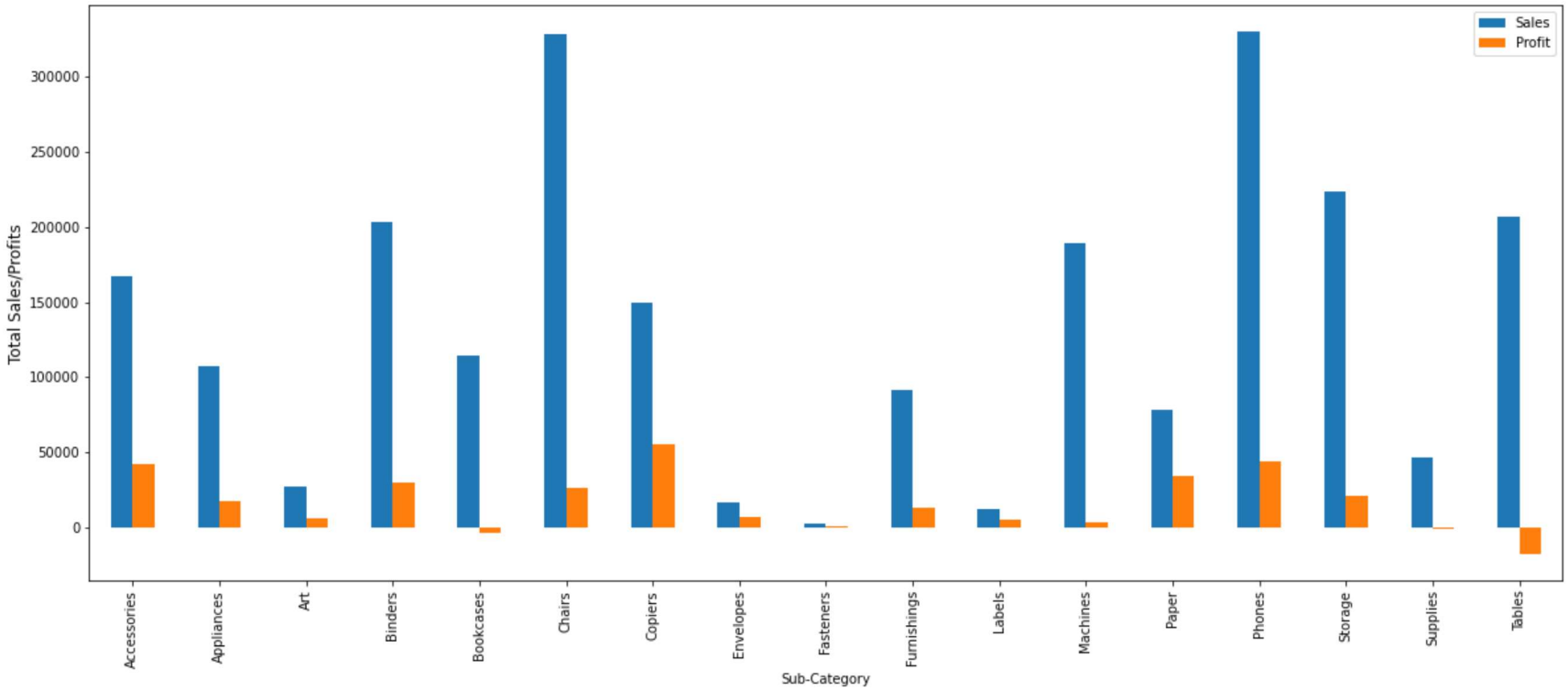
In [36]:
```
subcategorical_sum=dataset.groupby("Sub-Category").sum()
subcategorical_sum
```

Out[36]:

Sub-Category	Sales	Quantity	Discount	Profit
Accessories	167380.3180	2976	60.80	41936.6357
Appliances	107532.1610	1729	77.60	18138.0054
Art	27118.7920	3000	59.60	6527.7870
Binders	203412.7330	5974	567.00	30221.7633
Bookcases	114879.9963	868	48.14	-3472.5560
Chairs	328449.1030	2356	105.00	26590.1663
Copiers	149528.0300	234	11.00	55617.8249
Envelopes	16476.4020	906	20.40	6964.1767
Fasteners	3024.2800	914	17.80	949.5182
Furnishings	91705.1640	3563	132.40	13059.1436
Labels	12486.3120	1400	25.00	5546.2540
Machines	189238.6310	440	35.20	3384.7569
Paper	78479.2060	5178	102.60	34053.5693
Phones	330007.0540	3289	137.40	44515.7306
Storage	223843.6080	3158	63.20	21278.8264
Supplies	46673.5380	647	14.60	-1189.0995
Tables	206965.5320	1241	83.35	-17725.4811

In [37]:
```
subcategorical_sum[['Sales', 'Profit']].plot(kind = 'bar', figsize = [20,8])
plt.ylabel('Total Sales/Profits',fontsize = 12)
```

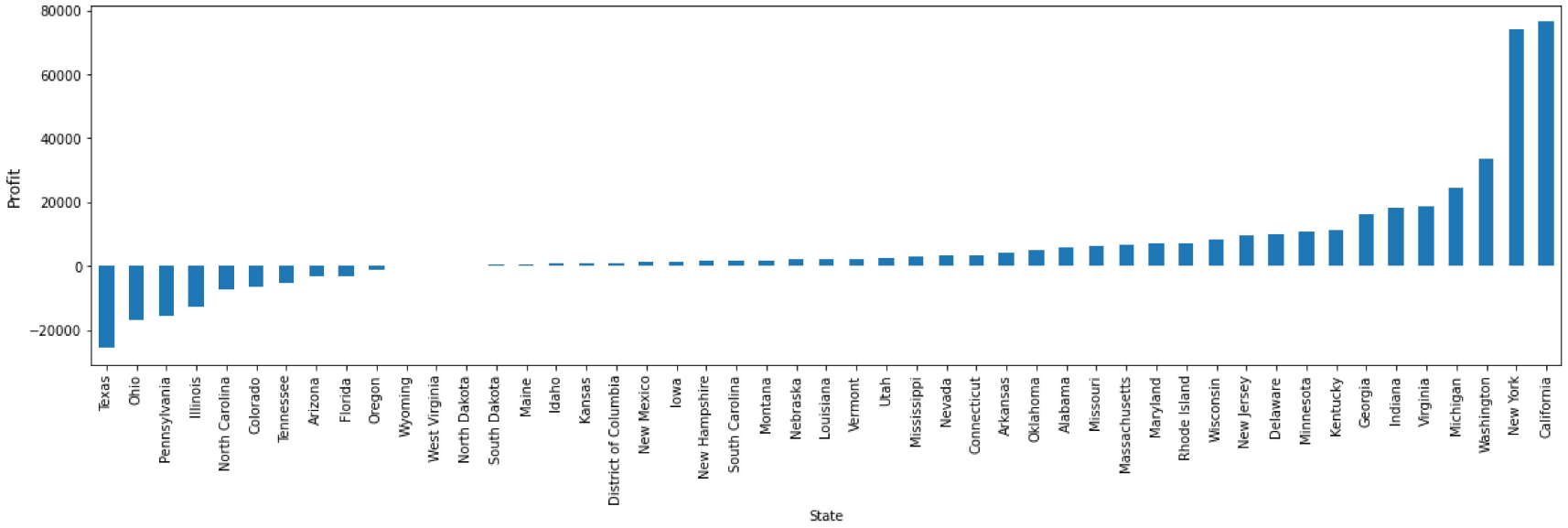
Out[37]:
```
Text(0, 0.5, 'Total Sales/Profits')
```



Observation : From the above graph we can see that tables have the lowest profit and Copiers have the highest profit. The sales is highest in case of phones and lowest in case of Fasteners.

In [38]:
```
dataset.groupby(by ='State')['Profit'].sum().sort_values(ascending = True).plot(kind = 'bar',figsize=[20,5])
plt.ylabel('Profit',fontsize = 12)
```

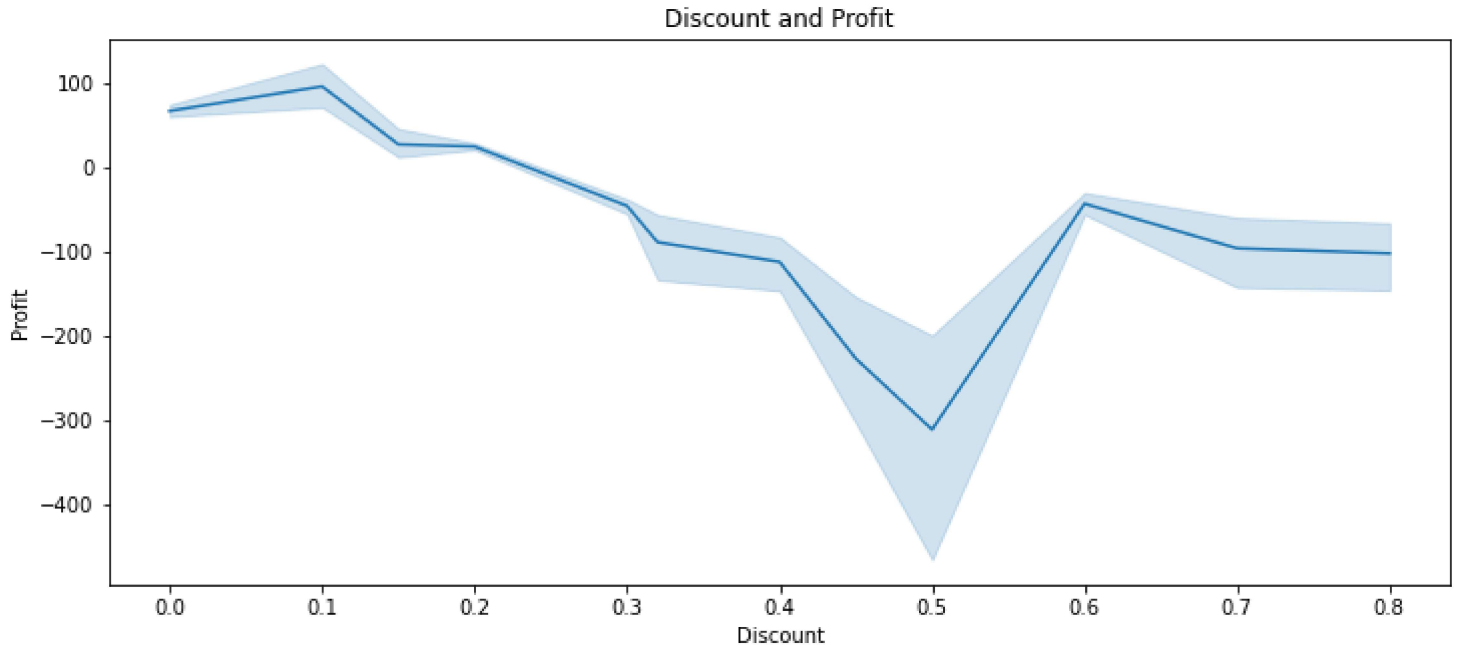
Out[38]:
```
Text(0, 0.5, 'Profit')
```



Observation: Maximum profit is in California and maximum loss is in Texas

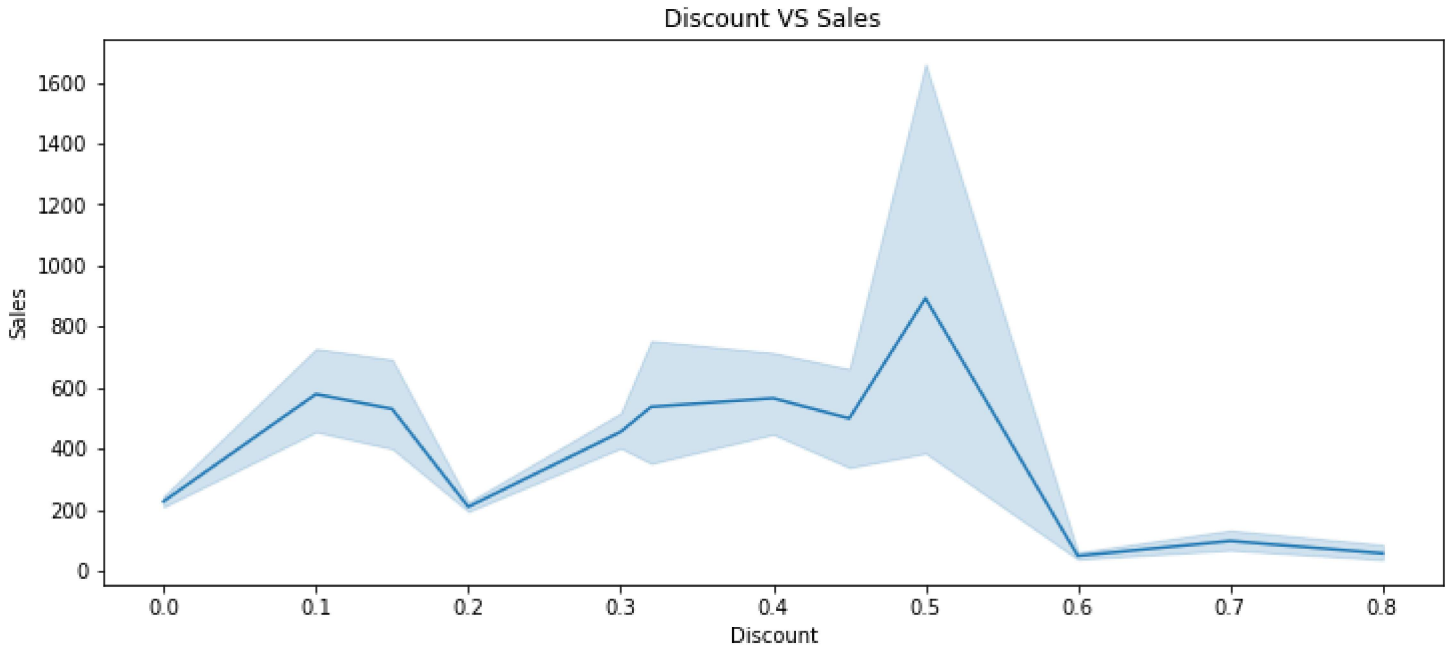
In [39]:
```
plt.figure(figsize=(12,5))
sns.lineplot(x='Discount',y='Profit',data=dataset)
plt.title("Discount and Profit")
```

Out[39]:
```
Text(0.5, 1.0, 'Discount and Profit')
```



In [40]:
```
plt.figure(figsize=(12,5))
sns.lineplot(x='Discount',y='Sales',data=dataset)
plt.title('Discount VS Sales')
```

Out[40]:
```
Text(0.5, 1.0, 'Discount VS Sales')
```



Observation: The graph clearly shows that if we give more discount on our products, sales increases but profit decreases.

Conclusion

1.Discount > 30% to the Segment, would result in loss whereas <30% is making profit. 2.We should limit sales of furniture and increase that of technology and office suppliers as furniture has very less profit as compared to sales. 3.In the sub-gategories, we are facing huge loss on the sale of tables so its sale should be minimized 4.We should concentrate on the states like 'New York' and 'California' to make more profits.

In [ ]: