Exploratory Data Analysis

Perform 'Exploratory Data Analysis' on the provided dataset 'SampleSuperstore'

Installing required packages

In [1]:

```
!pip3 install cufflinks
```

```
'pip3' is not recognized as an internal or external command,
operable program or batch file.
```

In [2]:

```
#import all the libraries first
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

import cufflinks as cf
from plotly.offline import download_plotlyjs,init_notebook_mode,plot,iplot
init_notebook_mode(connected=True)
cf.go_offline()

%matplotlib inline
```

In [4]:

```
#Now read the given csv file for the EDA

df1 = pd.read_csv('SampleSuperstore.csv')
print("Data imported successfully")
df1.head(10)
```

```
Data imported successfully
```

Out[4]:

	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
5	Standard Class	Consumer	United States	Los Angeles	California	90032	West	Furniture	Furnishings	48.8600	7	0.00	14.1694
6	Standard Class	Consumer	United States	Los Angeles	California	90032	West	Office Supplies	Art	7.2800	4	0.00	1.9656
7	Standard Class	Consumer	United States	Los Angeles	California	90032	West	Technology	Phones	907.1520	6	0.20	90.7152
8	Standard Class	Consumer	United States	Los Angeles	California	90032	West	Office Supplies	Binders	18.5040	3	0.20	5.7825

	Ship Mode	Segment	Country	City	State	Postal Code	Region	Category	Sub-Category	Sales	Quantity	Discount	Profit
9	Standard Class	Consumer	United States	Los Angeles	California	90032	West	Office Supplies	Appliances	114.9000	5	0.00	34.4700

In [5]:

```
#For find the data tail
df1.tail(10)
```

Out[5]:

	Ship Mode	Segment	Country	City	State	Postal Code	Region	Category	Sub-Category	Sales	Quantity	Discount	Pro
9984	Standard Class	Consumer	United States	Long Beach	New York	11561	East	Office Supplies	Labels	31.500	10	0.0	15.12
9985	Standard Class	Consumer	United States	Long Beach	New York	11561	East	Office Supplies	Supplies	55.600	4	0.0	16.12
9986	Standard Class	Consumer	United States	Los Angeles	California	90008	West	Technology	Accessories	36.240	1	0.0	15.22
9987	Standard Class	Corporate	United States	Athens	Georgia	30605	South	Technology	Accessories	79.990	1	0.0	28.79
9988	Standard Class	Corporate	United States	Athens	Georgia	30605	South	Technology	Phones	206.100	5	0.0	55.64
9989	Second Class	Consumer	United States	Miami	Florida	33180	South	Furniture	Furnishings	25.248	3	0.2	4.10
9990	Standard Class	Consumer	United States	Costa Mesa	California	92627	West	Furniture	Furnishings	91.960	2	0.0	15.63
9991	Standard Class	Consumer	United States	Costa Mesa	California	92627	West	Technology	Phones	258.576	2	0.2	19.39
9992	Standard Class	Consumer	United States	Costa Mesa	California	92627	West	Office Supplies	Paper	29.600	4	0.0	13.32
9993	Second Class	Consumer	United States	Westminster	California	92683	West	Office Supplies	Appliances	243.160	2	0.0	72.94

In [6]:

```
#In this we should find the whole information odf the given data.
df1.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 [7]:

```
#In this we should find whole descrpition of the given data.
df1.describe()
```

Out[7]:

	Postal Code	Sales	Quantity	Discount	Profit

	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 [8]:

```
#In this we find all the maximum values of each coloumn.
df1.max()
```

Out[8]:

```
Ship Mode       Standard Class
Segment            Home Office
Country          United States
City                      Yuma
State                  Wyoming
Postal Code              99301
Region                    West
Category            Technology
Sub-Category            Tables
Sales                  22638.5
Quantity                    14
Discount                   0.8
Profit                 8399.98
dtype: object
```

In [9]:

```
#In this we find all the mainimum values of each coloumn.
df1.min()
```

Out[9]:

```
Ship Mode         First Class
Segment              Consumer
Country         United States
City                 Aberdeen
State                 Alabama
Postal Code              1040
Region                Central
Category            Furniture
Sub-Category      Accessories
Sales                   0.444
Quantity                    1
Discount                    0
Profit               -6599.98
dtype: object
```

In [10]:

```
#For the Unique Values
df1['Category'].unique()
```

Out[10]:

```
array(['Furniture', 'Office Supplies', 'Technology'], dtype=object)
```

In [11]:

```
#For finding the Missing Values
df1.isna().any()
```

Out[11]:

```
Ship Mode        False
Segment          False
Country          False
City             False
State            False
Postal Code      False
Region           False
Category         False
Sub-Category     False
Sales            False
Quantity         False
Discount         False
Profit           False
dtype: bool
```

In [12]:

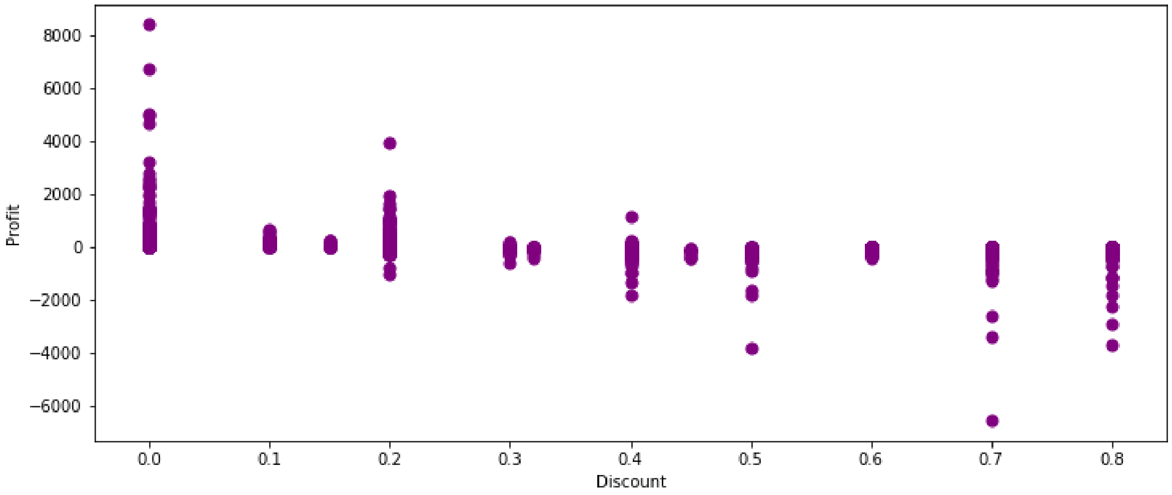
```
#Computing Pairwise Correlation of Columns
df1.corr()
```

Out[12]:

	Postal Code	Sales	Quantity	Discount	Profit
Postal Code	1.000000	-0.023854	0.012761	0.058443	-0.029961
Sales	-0.023854	1.000000	0.200795	-0.028190	0.479064
Quantity	0.012761	0.200795	1.000000	0.008623	0.066253
Discount	0.058443	-0.028190	0.008623	1.000000	-0.219487
Profit	-0.029961	0.479064	0.066253	-0.219487	1.000000

In [13]:

```
#For create the scatter plot
df1.plot.scatter(x='Discount',y='Profit',c='purple',s=50,figsize=(12,5))
plt.show()
```



In [14]:

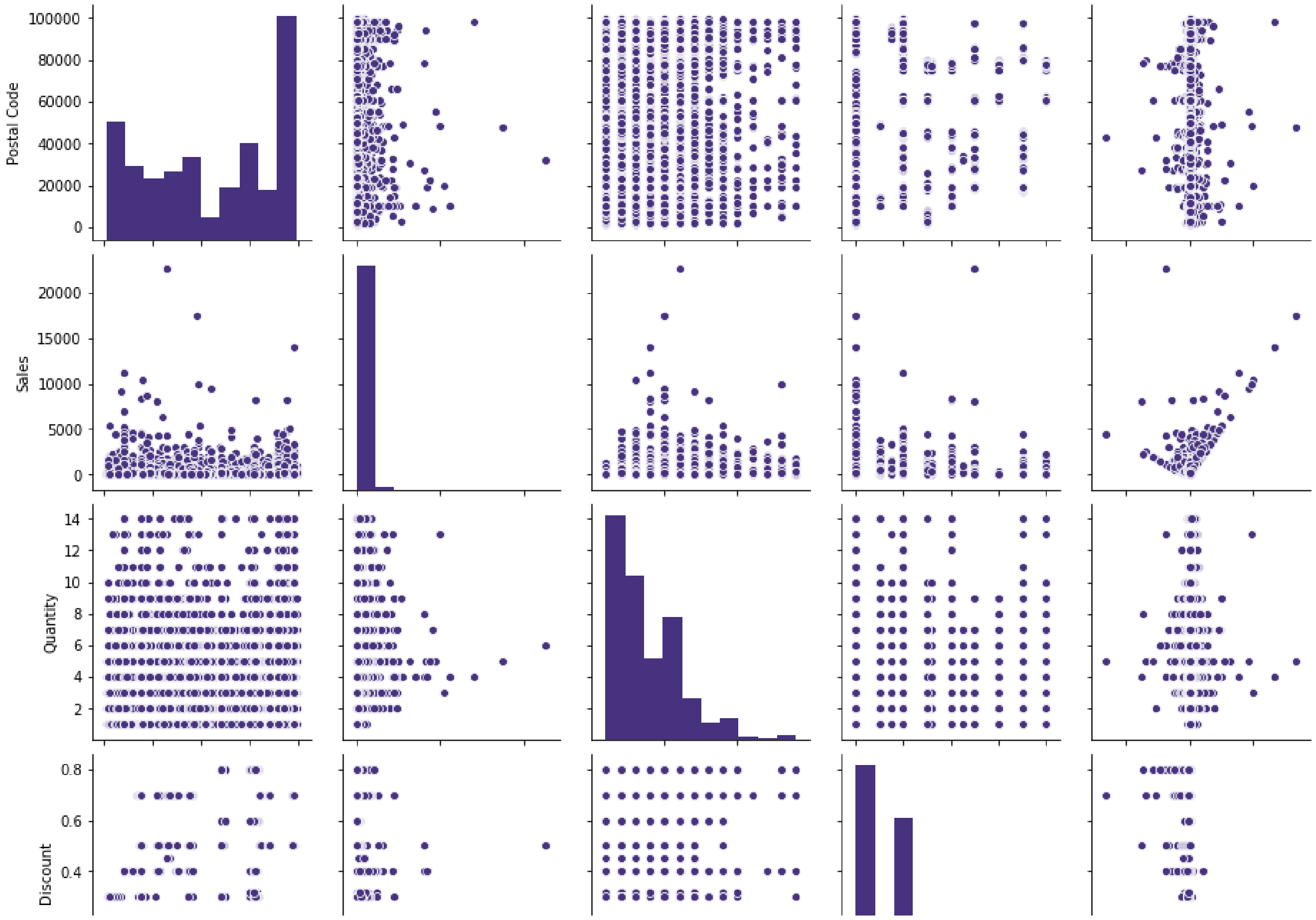
```
#Sperad plot for 3D Visulization
df1[['Discount','Profit']].iplot(kind='spread')
```

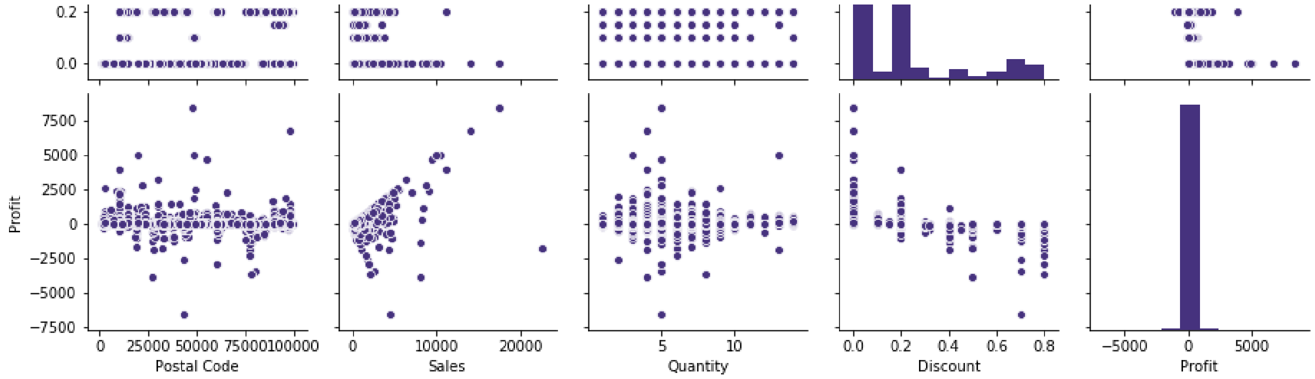
```
C:\Users\hp\anaconda3\lib\site-packages\cufflinks\plotlytools.py:849: FutureWarning:

The pandas.np module is deprecated and will be removed from pandas in a future version. Import num
py directly instead

C:\Users\hp\anaconda3\lib\site-packages\cufflinks\plotlytools.py:850: FutureWarning:

The pandas.np module is deprecated and will be removed from pandas in a future version. Import num
```

```
py directly instead
```

In [15]:

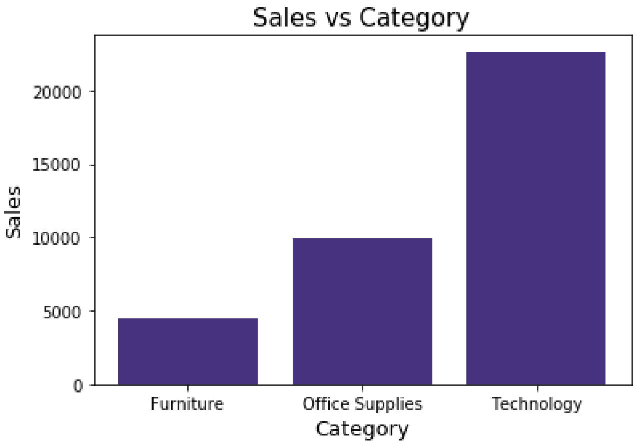
```
#All data in one code
sns.set_palette('viridis')
sns.pairplot(df1)
plt.show()
```





In [16]:

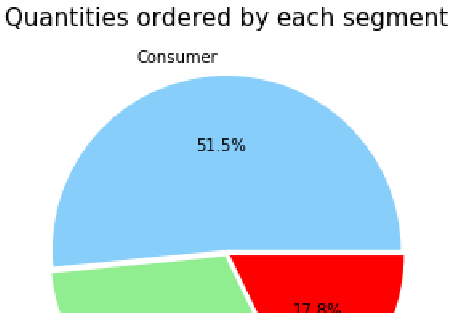
```
#Category vs Sales Bar Graph

plt.bar('Category','Sales',data=df1)
plt.title('Sales vs Category',size= 15)
plt.xlabel('Category',size= 13)
plt.ylabel('Sales',size= 13)
plt.show()
```

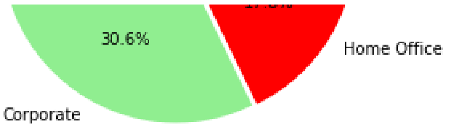


In [18]:

```
#Quantities Ordered by each Segment

df_group = df1.groupby('Segment')['Quantity'].sum().reset_index()
print(df_group)
labels = df1['Segment'].unique()
colors = ['lightskyblue', 'lightgreen', 'red']
plt.figure(figsize=(5,5))
plt.pie(df_group['Quantity'],autopct='%1.1f%%',labels=labels,explode=(0.02,0.02,0.02), colors=color
s)
plt.title('Quantities ordered by each segment',size= 15)
plt.show()
```

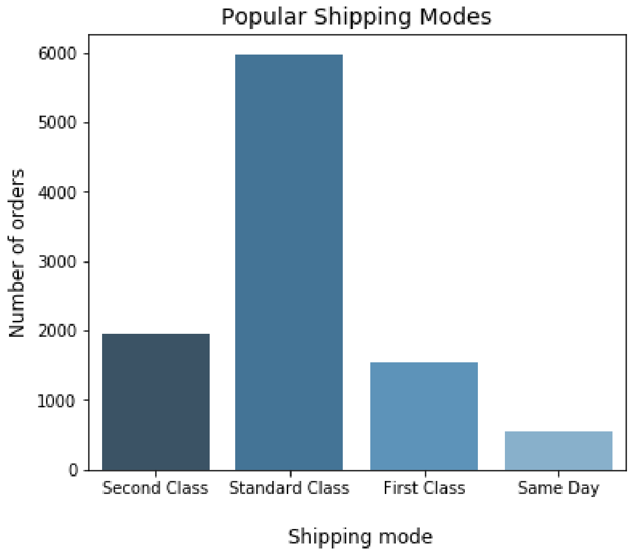
```
       Segment  Quantity
0     Consumer     19521
1    Corporate     11608
2  Home Office      6744
```





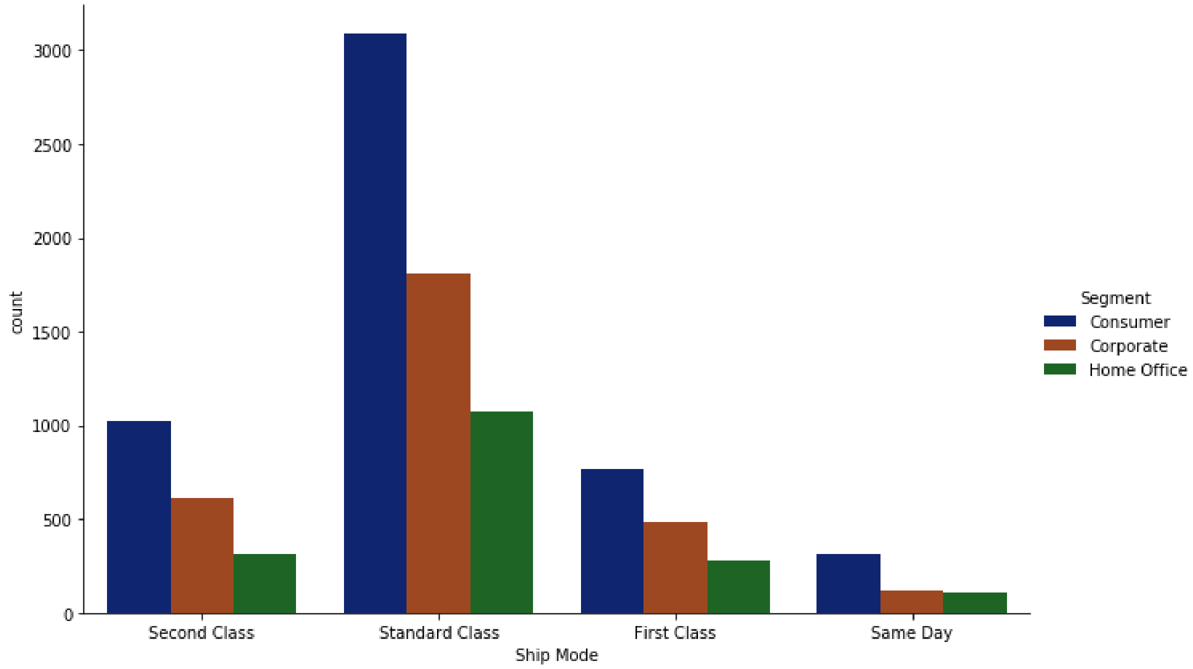
In [19]:

```
#Shipping Models

plt.figure(figsize=(6,5))
sns.countplot('Ship Mode',data=df1, palette='Blues_d')
plt.title('Popular Shipping Modes',size=14)
plt.xlabel('\n Shipping mode',size=12)
plt.ylabel('Number of orders',size=12)
plt.xticks(fontsize=10)
plt.show()
```



In [21]:

```
#Shipping Mode vs Count

sns.catplot('Ship Mode',data=df1,hue='Segment',kind='count',palette='dark',aspect=1.5,height=6)
plt.show()
```



In [22]:

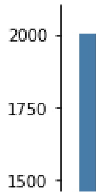
```
#State counts of Unique Values

df1['State'].value_counts()
```

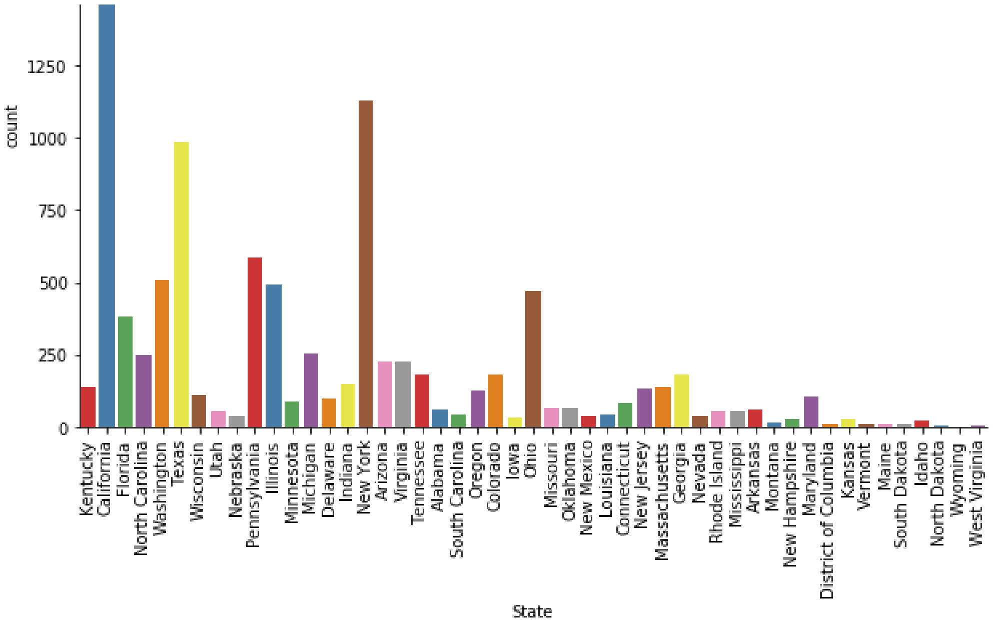
Out[22]:

```
California              2001
New York                1128
Texas                    985
Pennsylvania             587
Washington               506
Illinois                 492
Ohio                     469
Florida                  383
Michigan                 255
North Carolina           249
Arizona                  224
Virginia                 224
Georgia                  184
Tennessee                183
Colorado                 182
Indiana                  149
Kentucky                 139
Massachusetts            135
New Jersey               130
Oregon                   124
Wisconsin                110
Maryland                 105
Delaware                  96
Minnesota                 89
Connecticut               82
Oklahoma                  66
Missouri                  66
Alabama                   61
Arkansas                  60
Rhode Island              56
Utah                      53
Mississippi               53
Louisiana                 42
South Carolina            42
Nevada                    39
Nebraska                  38
New Mexico                37
Iowa                      30
New Hampshire             27
Kansas                    24
Idaho                     21
Montana                   15
South Dakota              12
Vermont                   11
District of Columbia      10
Maine                      8
North Dakota               7
West Virginia              4
Wyoming                    1
Name: State, dtype: int64
```

In [23]:

```
#Cities each of Least and Most Quantities Ordered

sns.catplot('State',kind='count',data=df1,palette='Set1',height=6,aspect=1.5)
plt.xticks(rotation=90)
plt.show()
```





In [24]:

```
#Grouping by Quantity of Cities

dftop10 = df1.groupby('City')['Quantity'].sum().reset_index().sort_values(by='Quantity',ascending=True)
dftop10
```

Out[24]:

	City	Quantity
386	Port Orange	1
259	Littleton	1
257	Lindenhurst	1
140	Elyria	1
213	Iowa City	1
...	...	...
452	Seattle	1590
438	San Francisco	1935
374	Philadelphia	1981
266	Los Angeles	2879
329	New York City	3417

531 rows × 2 columns

In [25]:

```
#Top 10 Most Ordering Cities

dftop10 = dftop10.head(10)
dftop10.reset_index(drop=True,inplace=True)
dftop10
```

Out[25]:

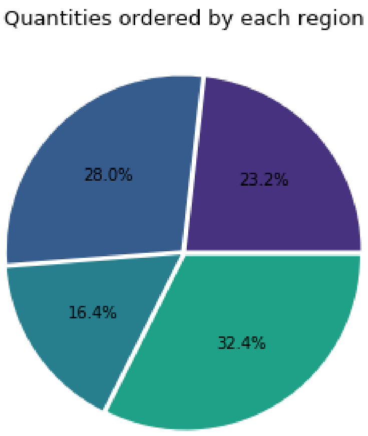
	City	Quantity
0	Port Orange	1
1	Littleton	1
2	Lindenhurst	1
3	Elyria	1

	City	Quantity
4	Iowa City	1
5	Jupiter	1
6	Keller	2
7	Grand Island	2
8	Baytown	2
9	Holyoke	2

In [26]:

```
#Quantities Ordered Region Wise

df_region=df1.groupby('Region')['Quantity'].sum().reset_index()
print(df_region)

labels = df_region['Region'].unique()
plt.figure(figsize=(5,5))
plt.pie(df_region['Quantity'],autopct='%1.1f%%',explode=(0.02,0.02,0.02,0.02),)
plt.title('Quantities ordered by each region',size=13)

plt.show()
```

```
    Region  Quantity
0  Central      8780
1     East     10618
2    South      6209
3     West     12266
```



In [27]:

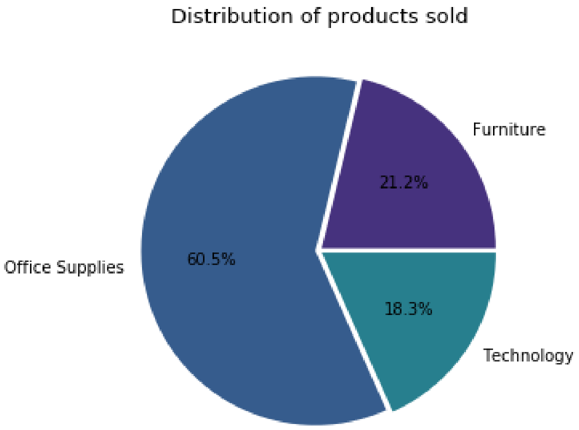
```
#Highest Selling Categories

df_cats = df1.groupby('Category')['Quantity'].sum().reset_index()
df_cats
```

Out[27]:

	Category	Quantity
0	Furniture	8028
1	Office Supplies	22906
2	Technology	6939

In [28]:

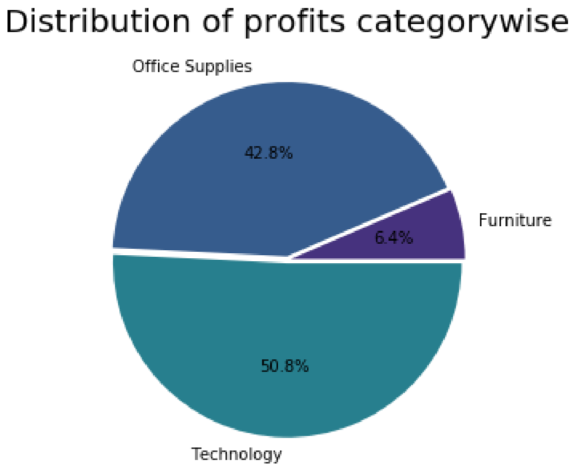
```
#Distribution of Products Sold

plt.figure(figsize=(5,5))
labels=df_cats['Category'].unique()
plt.pie(df_cats['Quantity'],autopct='%1.1f%%',labels=labels,explode=(0.02,0.02,0.02))
plt.title('Distribution of products sold',size=13)

plt.show()
```



In [29]:

```
#Most Profitable Categories

dfprofit = df1.groupby('Category')['Profit'].sum().reset_index()
print(dfprofit)
plt.figure(figsize=(5,5))
labels=dfprofit['Category'].unique()
plt.pie(dfprofit['Profit'],autopct='%1.1f%%',labels=labels,explode=(0.02,0.02,0.02))

plt.title('Distribution of profits categorywise',size=20)
plt.show()
```

```
          Category        Profit
0        Furniture    18451.2728
1  Office Supplies   122490.8008
2       Technology   145454.9481
```



In [30]:

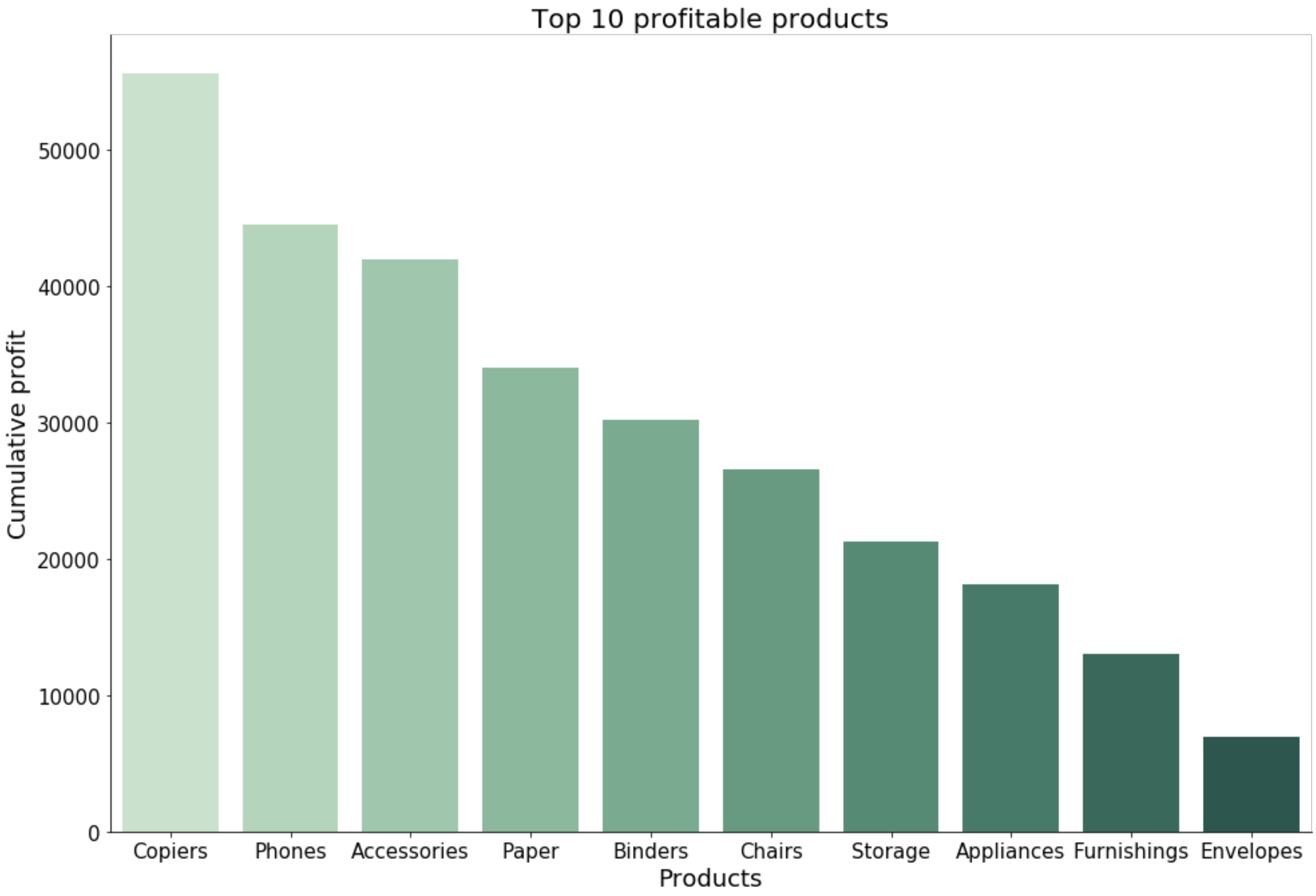
```
#Most Profitable Products

dftop10_items = df1.groupby('Sub-Category')['Profit'].sum().reset_index().sort_values(by='Profit',ascending=False)
dftop10_items.reset_index(drop=True,inplace=True)
dftop10_items=dftop10_items.head(10)
dftop10_items
```

Out[30]:

	Sub-Category	Profit
0	Copiers	55617.8249
1	Phones	44515.7306
2	Accessories	41936.6357
3	Paper	34053.5693
4	Binders	30221.7633
5	Chairs	26590.1663
6	Storage	21278.8264
7	Appliances	18138.0054
8	Furnishings	13059.1436
9	Envelopes	6964.1767

In [31]:

```
#Visualizing the Top 10 Profitable Products

sns.catplot('Sub-Category','Profit',data=dftop10_items,kind='bar',aspect=1.5,height=9,palette='ch:2
.5,-.2,dark=.3')
plt.title('Top 10 profitable products',size=20)
plt.xticks(size=15)
plt.yticks(size=15)
plt.ylabel('Cumulative profit',size=18)
plt.xlabel('Products',size=18)

plt.show()
```



In [32]:

```
#Top Profitable cities

dftop10_cities = df1.groupby('City')['Profit'].sum().reset_index().sort_values(by='Profit',ascendin
g=False)

dftop10_cities = dftop10_cities.head(10)
```

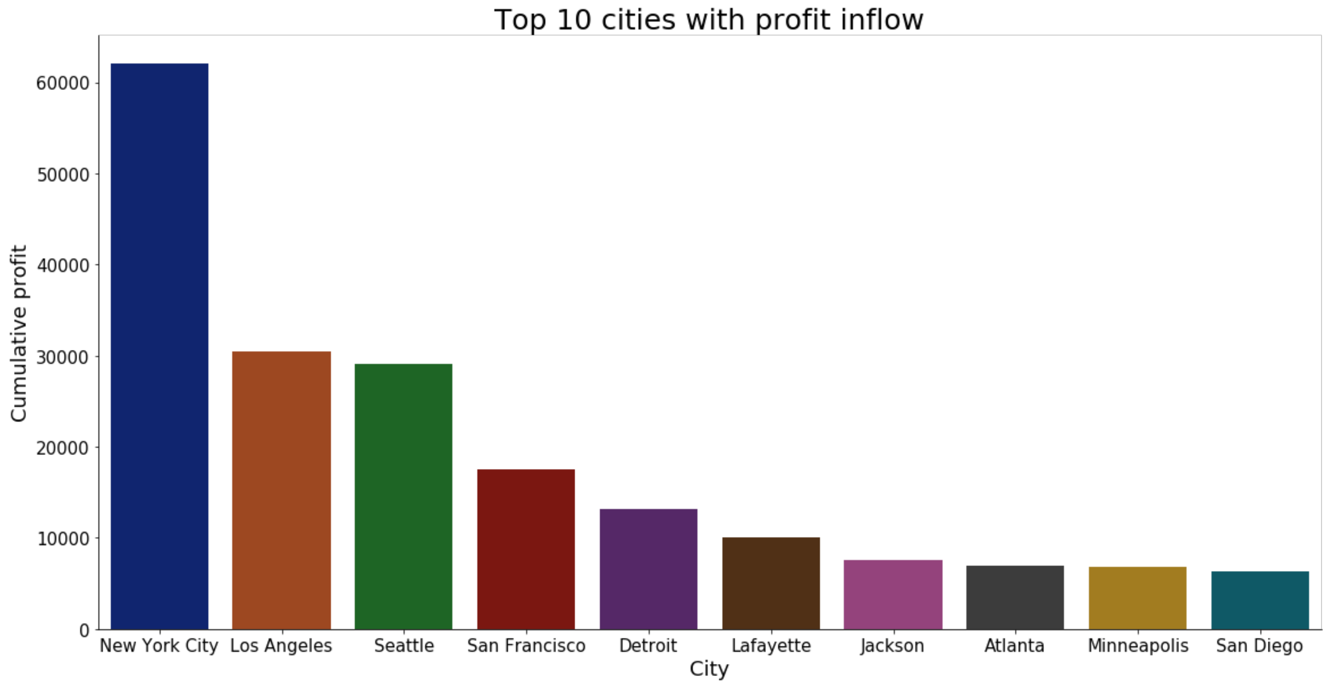
```
dftop10_cities
```

Out[32]:

	City	Profit
329	New York City	62036.9837
266	Los Angeles	30440.7579
452	Seattle	29156.0967
438	San Francisco	17507.3854
123	Detroit	13181.7908
233	Lafayette	10018.3876
215	Jackson	7581.6828
21	Atlanta	6993.6629
300	Minneapolis	6824.5846
437	San Diego	6377.1960

In [33]:

```
#Visualizing the Top 10 Profitable Cities

sns.catplot('City','Profit',data=dftop10_cities,kind='bar',aspect=2,height=8,palette='dark')
plt.title('Top 10 cities with profit inflow',size=25)
plt.xticks(size=15)
plt.yticks(size=15)
plt.ylabel('Cumulative profit',size=18)
plt.xlabel('City',size=18)

plt.show()
```



Conclusion

From above Data Visualization we can conclude as follow:

Data Quality: Good quality data with no need for data preprocessing. No null values in Data set.

'Standard Class' accounts for the majority of profit.

'HomeOffice' segment generates least sale.

In central region Furniture incures loss.

'Florida', 'Oregon', 'Arizona', 'Illinois', 'Texas', 'Pennsylvania', 'Tennessee', 'North Carlina', 'Colorado' and 'Ohio' have noticeably less Profit.¶

In [ ]:

```

```

In [ ]:

```

```