```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import plotly.express as px
```

```
Path = '/content/Superstore.csv'
df = pd.read_csv(Path, encoding='latin-1') # or 'ISO-8859-1', or any other relevant encoding
df.head()
```

	Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer ID	Customer Name	Segment	Country	City	...	Postal Code	Region	Product ID	Category	Sub-Category	Product Name	Sales	Quantity	Discount	Profit
0	1	CA-2013-152156	09-11-2013	12-11-2013	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	...	42420	South	FUR-BO-10001798	Furniture	Bookcases	Bush Somerset Collection Bookcase	261.9600	2	0.00	41.9136
1	2	CA-2013-152156	09-11-2013	12-11-2013	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	...	42420	South	FUR-CH-10000454	Furniture	Chairs	Hon Deluxe Fabric Upholstered Stacking Chairs,...	731.9400	3	0.00	219.5820
2	3	CA-2013-138688	13-06-2013	17-06-2013	Second Class	DV-13045	Darrin Van Huff	Corporate	United States	Los Angeles	...	90036	West	OFF-LA-10000240	Office Supplies	Labels	Self-Adhesive Address Labels for Typewriters b...	14.6200	2	0.00	6.8714
3	4	US-2012-108966	11-10-2012	18-10-2012	Standard Class	SO-20335	Sean O'Donnell	Consumer	United States	Fort Lauderdale	...	33311	South	FUR-TA-10000577	Furniture	Tables	Bretford CR4500 Series Slim Rectangular Table	957.5775	5	0.45	-383.0310
4	5	US-2012-108966	11-10-2012	18-10-2012	Standard Class	SO-20335	Sean O'Donnell	Consumer	United States	Fort Lauderdale	...	33311	South	OFF-ST-10000760	Office Supplies	Storage	Eldon Fold 'N Roll Cart System	22.3680	2	0.20	2.5164

5 rows × 21 columns

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9994 entries, 0 to 9993
Data columns (total 21 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Row ID         9994 non-null   int64
 1   Order ID       9994 non-null   object
```

```
  2   Order Date     9994 non-null   object 
  3   Ship Date      9994 non-null   object 
  4   Ship Mode      9994 non-null   object 
  5   Customer ID    9994 non-null   object 
  6   Customer Name  9994 non-null   object 
  7   Segment        9994 non-null   object 
  8   Country        9994 non-null   object 
  9   City           9994 non-null   object 
  10  State          9994 non-null   object 
  11  Postal Code    9994 non-null   int64  
  12  Region         9994 non-null   object 
  13  Product ID     9994 non-null   object 
  14  Category       9994 non-null   object 
  15  Sub-Category   9994 non-null   object 
  16  Product Name   9994 non-null   object 
  17  Sales          9994 non-null   float64
  18  Quantity       9994 non-null   int64  
  19  Discount       9994 non-null   float64
  20  Profit         9994 non-null   float64
dtypes: float64(3), int64(3), object(15)
memory usage: 1.6+ MB
```

```
df.isna().sum()
```

```
                  0
       Row ID     0
     Order ID     0
   Order Date     0
    Ship Date     0
    Ship Mode     0
  Customer ID     0
Customer Name     0
      Segment     0
      Country     0
         City     0
        State     0
  Postal Code     0
       Region     0
   Product ID     0
     Category     0
 Sub-Category     0
 Product Name     0
        Sales     0
     Quantity     0
     Discount     0
       Profit     0

dtype: int64
```

Double-click (or enter) to edit

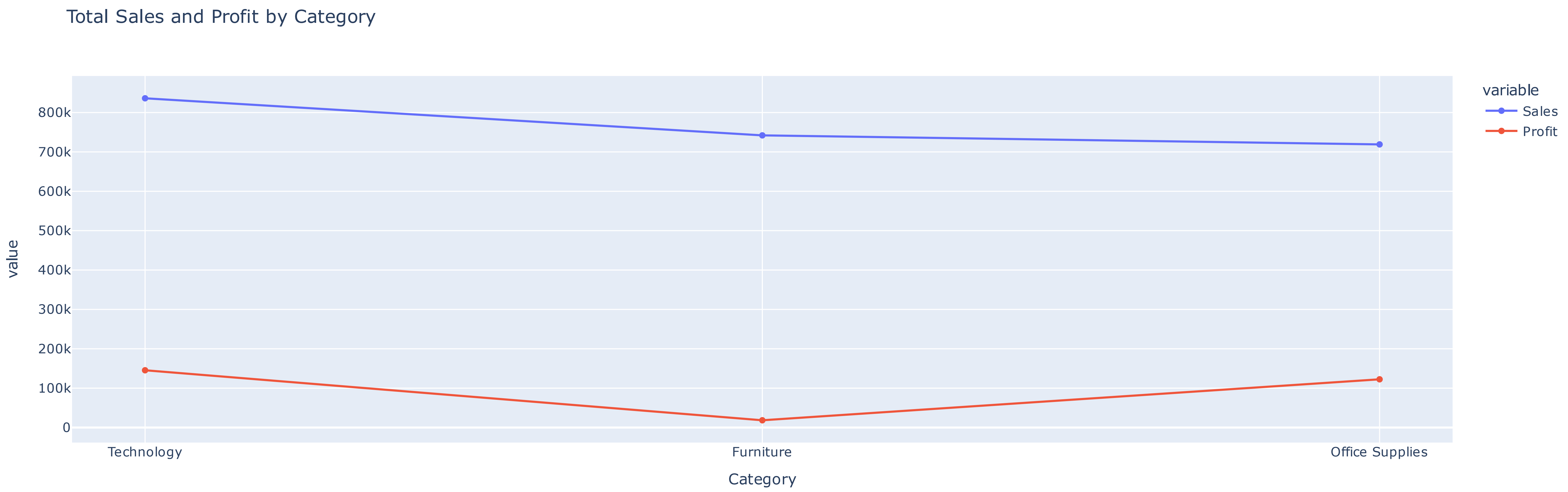
1. Retrieve Total Sales and Profit by Category

```
Total_sales = df.groupby('Category')[['Sales', 'Profit']].sum().sort_values(by='Sales', ascending=False)
Total_sales
```

	Sales	Profit
Category		
Technology	836154.0330	145454.9481
Furniture	741999.7953	18451.2728
Office Supplies	719047.0320	122490.8008

Next steps: Generate code with Total_sales | View recommended plots | New interactive sheet

```
Total_sales_reset = Total_sales.reset_index()
fig = px.line(Total_sales_reset, x='Category', y=['Sales', 'Profit'], markers=True,
              title='Total Sales and Profit by Category')
fig.show()
```



2. Find the Top 5 Most Profitable Products

```
Profitable_products = df.groupby('Product Name')['Sales'].sum().head().sort_values(ascending = False)
Profitable_products
```

Product Name	Sales
#10 White Business Envelopes,4 1/8 x 9 1/2	488.904
#10- 4 1/8" x 9 1/2" Recycled Envelopes	286.672
#10 Self-Seal White Envelopes	108.682
#10 Gummed Flap White Envelopes, 100/Box	41.300
"While you Were Out" Message Book, One Form per Page	25.228

dtype: float64

3. Get the Total Number of Orders Placed in Each Region

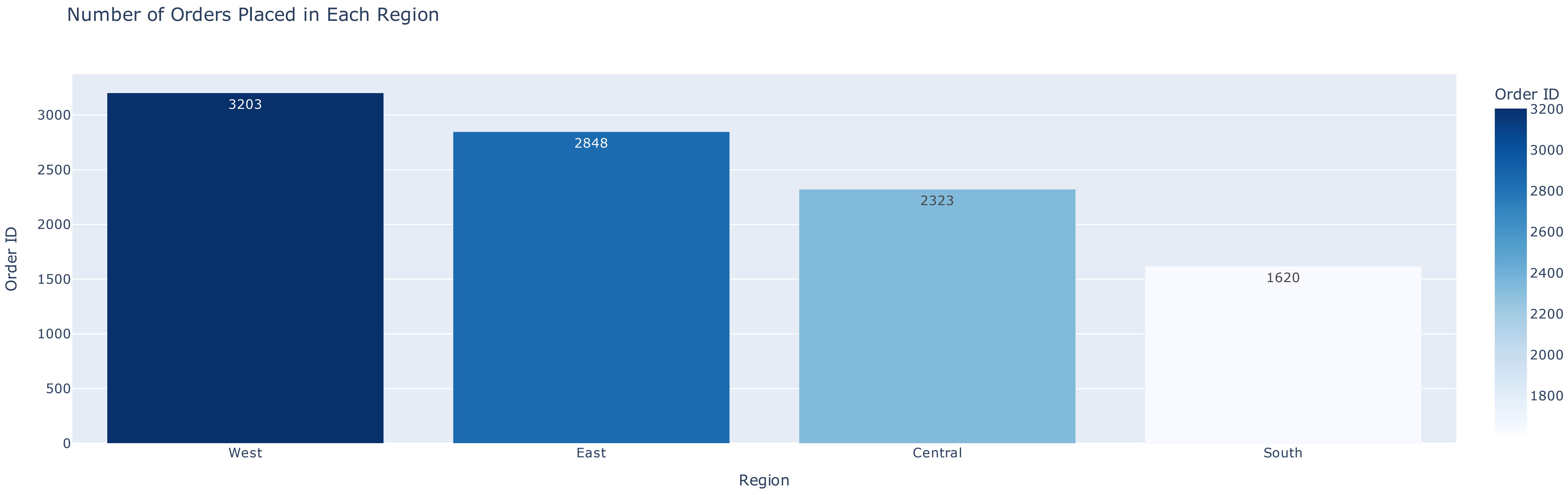
```
Order_placed = df.groupby('Region')['Order ID'].count().sort_values(ascending =False)
Order_placed
```

Region	Order ID
West	3203
East	2848
Central	2323
South	1620

dtype: int64

```
order_placed_reset = Order_placed.reset_index()

fig = px.bar(order_placed_reset, x='Region', y = 'Order ID',
           title = 'Number of Orders Placed in Each Region',
            text = 'Order ID',
            color = 'Order ID',
            color_continuous_scale='Blues')
fig.show()
```



4. Find the Top 5 Customers with the Highest Number of Orders

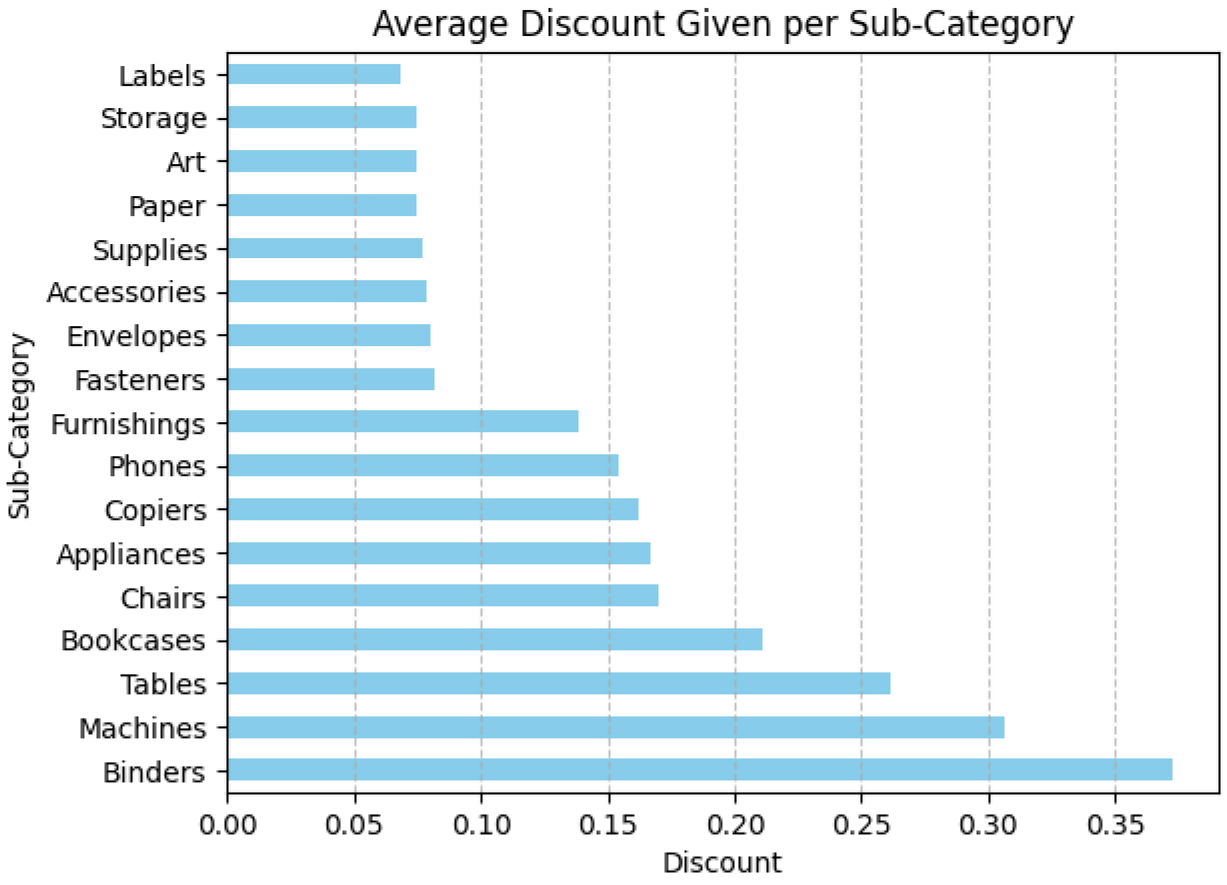
```
Top_customer = df.groupby('Customer Name')['Order ID'].count().sort_values(ascending = False).head()
Top_customer
```

```
                     Order ID
     Customer Name
     William Brown         37
        John Lee           34
      Matt Abelman         34
       Paul Prost          34
  Chloris Kastensmidt      32

dtype: int64
```

5. Calculate the Average Discount Given per Sub-Category

```
Avg_discount = df.groupby('Sub-Category')['Discount'].mean().sort_values(ascending = False)
Avg_discount.plot(kind ='barh',color ='skyblue')
plt.xlabel('Discount')
plt.title('Average Discount Given per Sub-Category')
plt.grid(axis='x', linestyle='--', alpha=0.7)
plt.show()
```



6. List All Orders Where Profit is Negative (Loss-Making Orders)

```
Negetive_Prof = df[df['Profit']<0].head()
Negetive_Prof
```

	Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer ID	Customer Name	Segment	Country	City	...	Postal Code	Region	Product ID	Category	Sub-Category	Product Name	Sales	Quantity	Discount	Pro
3	4	US-2012-108966	11-10-2012	18-10-2012	Standard Class	SO-20335	Sean O'Donnell	Consumer	United States	Fort Lauderdale	...	33311	South	FUR-TA-10000577	Furniture	Tables	Bretford CR4500 Series Slim Rectangular Table	957.5775	5	0.45	-383.0
14	15	US-2012-118983	22-11-2012	26-11-2012	Standard Class	HP-14815	Harold Pawlan	Home Office	United States	Fort Worth	...	76106	Central	OFF-AP-10002311	Office Supplies	Appliances	Holmes Replacement Filter for HEPA Air Cleaner...	68.8100	5	0.80	-123.8
15	16	US-2012-118983	22-11-2012	26-11-2012	Standard Class	HP-14815	Harold Pawlan	Home Office	United States	Fort Worth	...	76106	Central	OFF-BI-10000756	Office Supplies	Binders	Storex DuraTech Recycled Plastic Frosted Binders	2.5440	3	0.80	-3.8
23	24	US-2014-156909	17-07-2014	19-07-2014	Second Class	SF-20065	Sandra Flanagan	Consumer	United States	Philadelphia	...	19140	East	FUR-CH-10002774	Furniture	Chairs	Global Deluxe Stacking Chair, Gray	71.3720	2	0.30	-1.0
27	28	US-2012-150630	17-09-2012	21-09-2012	Standard Class	TB-21520	Tracy Blumstein	Consumer	United States	Philadelphia	...	19140	East	FUR-BO-10004834	Furniture	Bookcases	Riverside Palais Royal Lawyers Bookcase, Royal...	3083.4300	7	0.50	-1665.0

5 rows × 21 columns

7. Find the Top 5 Cities with the Highest Sales Revenue

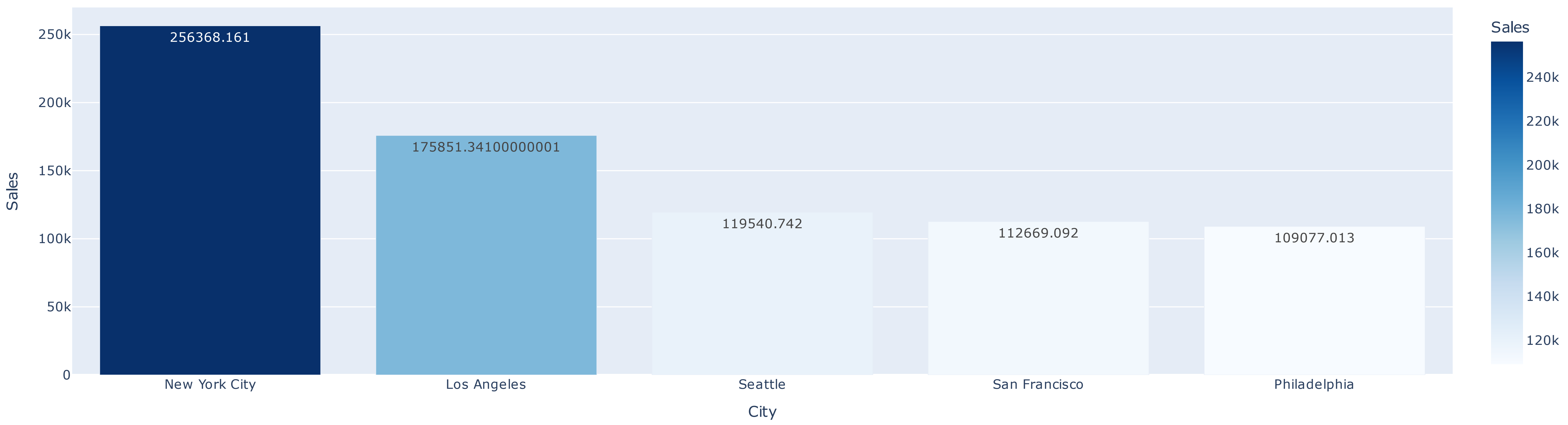
```
Top_city = df.groupby('City')['Sales'].sum().sort_values(ascending =False).head()
Top_city
```

```
                    Sales
         City
New York City  256368.161
  Los Angeles  175851.341
      Seattle  119540.742
San Francisco  112669.092
 Philadelphia  109077.013

dtype: float64
```

```
Top_city_reset = Top_city.reset_index()
fig = px.bar(Top_city_reset, x='City', y='Sales',
             title='Top 5 Cities by Sales',
             text='Sales',
             color='Sales',
             color_continuous_scale='Blues')
fig.show()
```

Top 5 Cities by Sales



8. Get the Total Quantity Sold for Each Shipping Mode

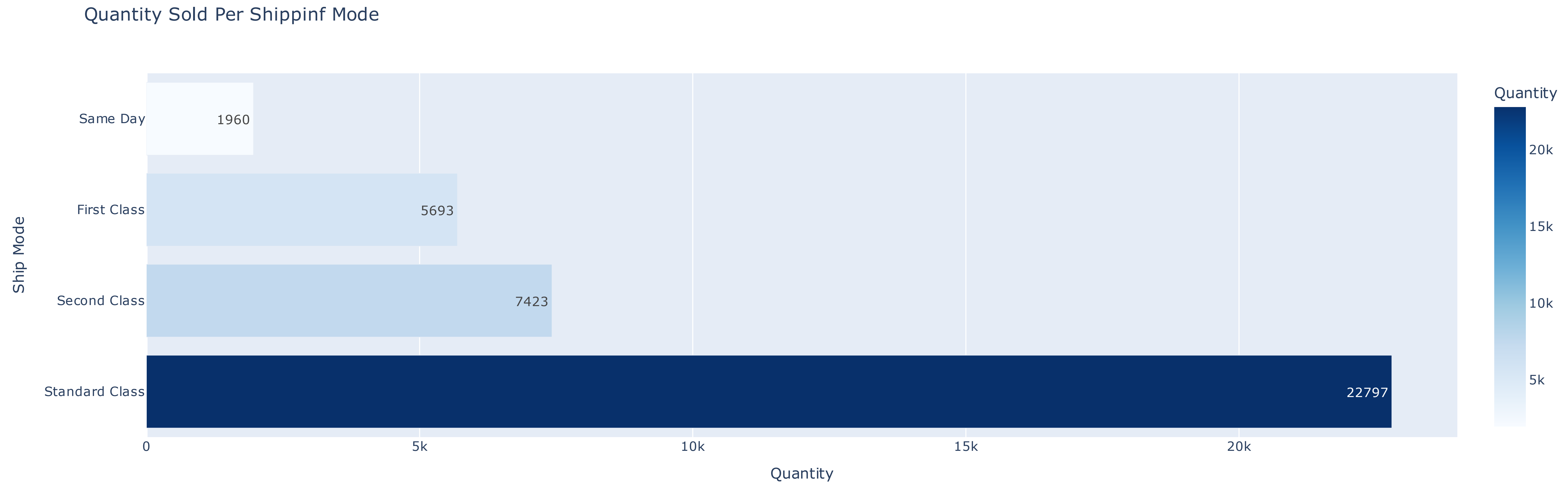
```
Quantity_sold = df.groupby('Ship Mode')['Quantity'].sum().sort_values(ascending=False)
Quantity_sold
```

Ship Mode	Quantity
Standard Class	22797
Second Class	7423
First Class	5693
Same Day	1960

dtype: int64

```
Quantitysold = Quantity_sold.reset_index()

fig = px.bar(Quantitysold,y ='Ship Mode', x ='Quantity',
             title = 'Quantity Sold Per Shippinf Mode',
             text ='Quantity',
             color = 'Quantity',
             color_continuous_scale='Blues')
fig.show()
```



9. Find the renvnue in All Years

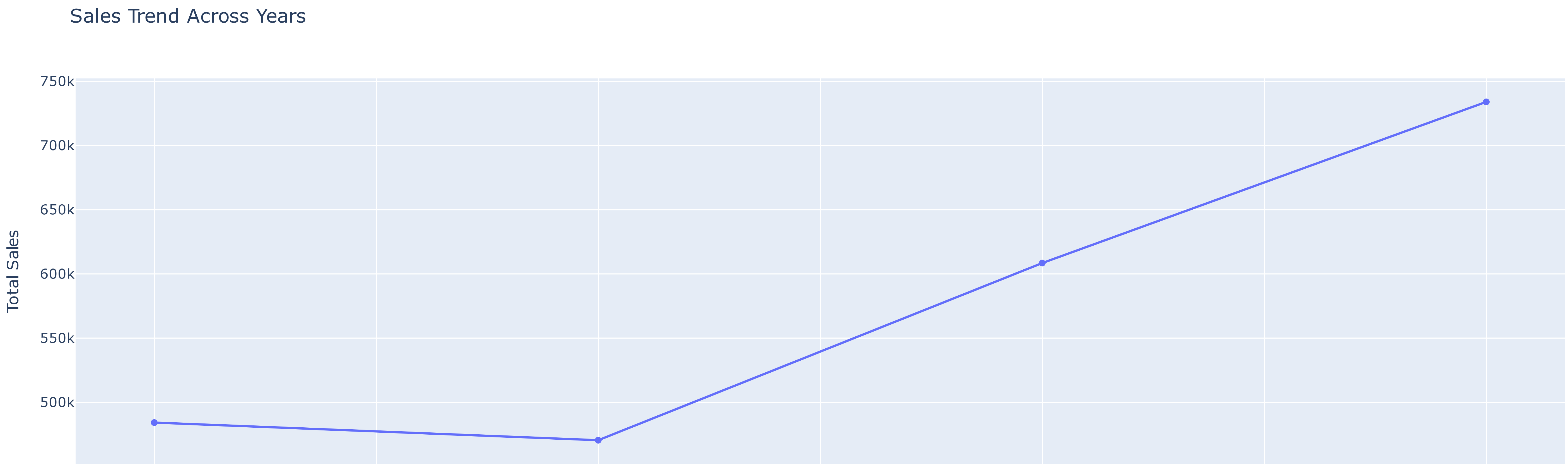
```
df['Order Date'] = pd.to_datetime(df['Order Date'], format='%d-%m-%Y', errors='coerce')  # Specify the correct format
df['Year'] = df['Order Date'].dt.year
yearly_sales = df.groupby('Year')['Sales'].sum().sort_index()
yearly_sales
```

```
            Sales
Year
2011  484247.4981
2012  470532.5090
2013  608473.8300
2014  733947.0232

dtype: float64
```

```
yearly_sales_df =yearly_sales.reset_index()
yearly_sales_df = yearly_sales.reset_index()
fig = px.line(yearly_sales_df, x='Year', y='Sales',
              title='Sales Trend Across Years',
              labels={'Year': 'Year', 'Sales': 'Total Sales'},
              markers=True)

fig.show()
```


Sales Trend Across Years
750k
700k
650k
600k
550k
500k
Total Sales