-->> let's Import important Libraries

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
```

--++ Read the file ++--

```
dataset = pd.read_excel(r"D:\Data Analysis\z_Misc_data\US super EDA
py\US Superstore data.xls")

print(dataset.head())
```

```
   Row ID        Order ID Order Date  Ship Date       Ship Mode
Customer ID  \
0       1  CA-2016-152156 2016-11-08 2016-11-11    Second Class    CG-
12520
1       2  CA-2016-152156 2016-11-08 2016-11-11    Second Class    CG-
12520
2       3  CA-2016-138688 2016-06-12 2016-06-16    Second Class    DV-
13045
3       4  US-2015-108966 2015-10-11 2015-10-18  Standard Class    SO-
20335
4       5  US-2015-108966 2015-10-11 2015-10-18  Standard Class    SO-
20335

     Customer Name    Segment        Country             City  ...  \
0      Claire Gute   Consumer  United States        Henderson  ...
1      Claire Gute   Consumer  United States        Henderson  ...
2  Darrin Van Huff  Corporate  United States      Los Angeles  ...
3   Sean O'Donnell   Consumer  United States  Fort Lauderdale  ...
4   Sean O'Donnell   Consumer  United States  Fort Lauderdale  ...

  Postal Code  Region       Product ID         Category Sub-
Category  \
0       42420   South  FUR-BO-10001798        Furniture    Bookcases

1       42420   South  FUR-CH-10000454        Furniture       Chairs

2       90036    West  OFF-LA-10000240  Office Supplies       Labels

3       33311   South  FUR-TA-10000577        Furniture       Tables

4       33311   South  OFF-ST-10000760  Office Supplies      Storage


                                        Product Name     Sales
Quantity  \
0                  Bush Somerset Collection Bookcase  261.9600
```

```
2
1  Hon Deluxe Fabric Upholstered Stacking Chairs,...  731.9400
3
2  Self-Adhesive Address Labels for Typewriters b...   14.6200
2
3      Bretford CR4500 Series Slim Rectangular Table  957.5775
5
4                    Eldon Fold 'N Roll Cart System   22.3680
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

[5 rows x 21 columns]
```

--++ calculate the overall size of data ++--

```
dataset.shape  # Rows and columns count

(9994, 21)

dataset.info()  # Check data types, non-null counts

<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   datetime64[ns]
 3   Ship Date      9994 non-null   datetime64[ns]
 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: datetime64[ns](2), float64(3), int64(3), object(13)
memory usage: 1.6+ MB
```

```
dataset.describe() # Summary statistics
```

```
            Row ID                      Order Date  \
count  9994.000000                            9994
mean   4997.500000  2016-04-30 00:07:12.259355648
min       1.000000            2014-01-03 00:00:00
25%    2499.250000            2015-05-23 00:00:00
50%    4997.500000            2016-06-26 00:00:00
75%    7495.750000            2017-05-14 00:00:00
max    9994.000000            2017-12-30 00:00:00
std    2885.163629                            NaN

                           Ship Date   Postal Code         Sales
Quantity  \
count                           9994   9994.000000   9994.000000
9994.000000
mean   2016-05-03 23:06:58.571142912  55190.379428    229.858001
3.789574
min              2014-01-07 00:00:00   1040.000000      0.444000
1.000000
25%              2015-05-27 00:00:00  23223.000000     17.280000
2.000000
50%              2016-06-29 00:00:00  56430.500000     54.490000
3.000000
75%              2017-05-18 00:00:00  90008.000000    209.940000
5.000000
max              2018-01-05 00:00:00  99301.000000  22638.480000
14.000000
std                              NaN  32063.693350    623.245101
2.225110

          Discount       Profit
count  9994.000000  9994.000000
mean      0.156203    28.656896
min       0.000000 -6599.978000
25%       0.000000     1.728750
50%       0.200000     8.666500
75%       0.200000    29.364000
max       0.800000  8399.976000
std       0.206452   234.260108
```

```
dataset.head(2)
```

```
   Row ID        Order ID Order Date  Ship Date     Ship Mode Customer
ID  \
0       1  CA-2016-152156 2016-11-08 2016-11-11  Second Class    CG-
12520
1       2  CA-2016-152156 2016-11-08 2016-11-11  Second Class    CG-
12520

  Customer Name   Segment        Country       City  ... Postal Code
Region  \
0   Claire Gute  Consumer  United States  Henderson  ...       42420
South
1   Claire Gute  Consumer  United States  Henderson  ...       42420
South

        Product ID   Category Sub-Category  \
0  FUR-BO-10001798  Furniture    Bookcases
1  FUR-CH-10000454  Furniture       Chairs

                                         Product Name   Sales  Quantity
\
0                  Bush Somerset Collection Bookcase  261.96         2

1  Hon Deluxe Fabric Upholstered Stacking Chairs,...  731.94         3


   Discount    Profit
0       0.0   41.9136
1       0.0  219.5820

[2 rows x 21 columns]
```

--++ check for missing values ++--

```
dataset.isnull().sum()

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
```

```
dataset.duplicated().sum() # Count duplicate rows
```

```
np.int64(0)
```

-->> Data is Free of Missing values and duplicate values

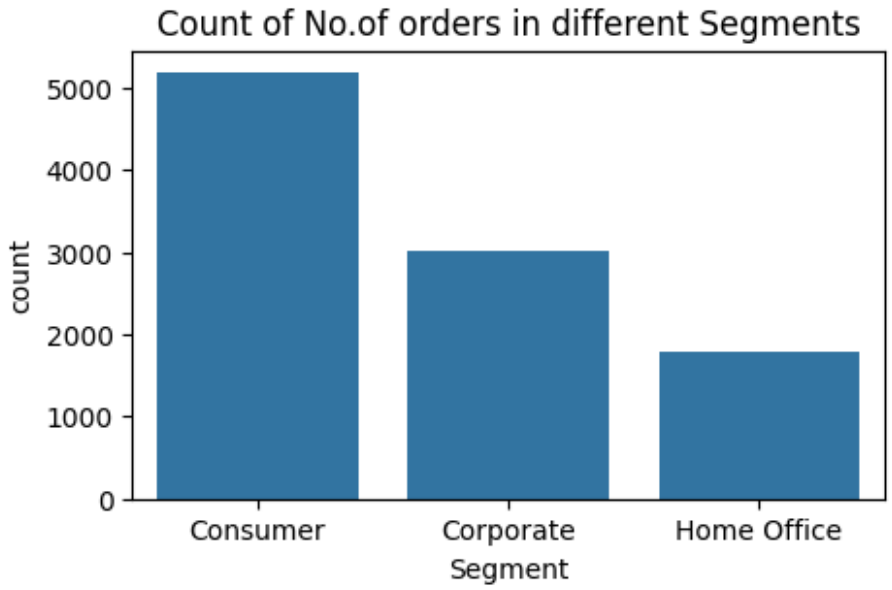
--++ check for orders in multiple segments ++--

```
dataset['Segment'].value_counts()
```

```
Segment
Consumer       5191
Corporate      3020
Home Office    1783
Name: count, dtype: int64
```

--++ Visulising the Result ++--

```
plt.figure(figsize = (5,3))
sns.countplot(x = "Segment", data = dataset)
plt.title('Count of No.of orders in different Segments')
plt.show()
```



--++ Figuring out unqiue order IDs in data ++--

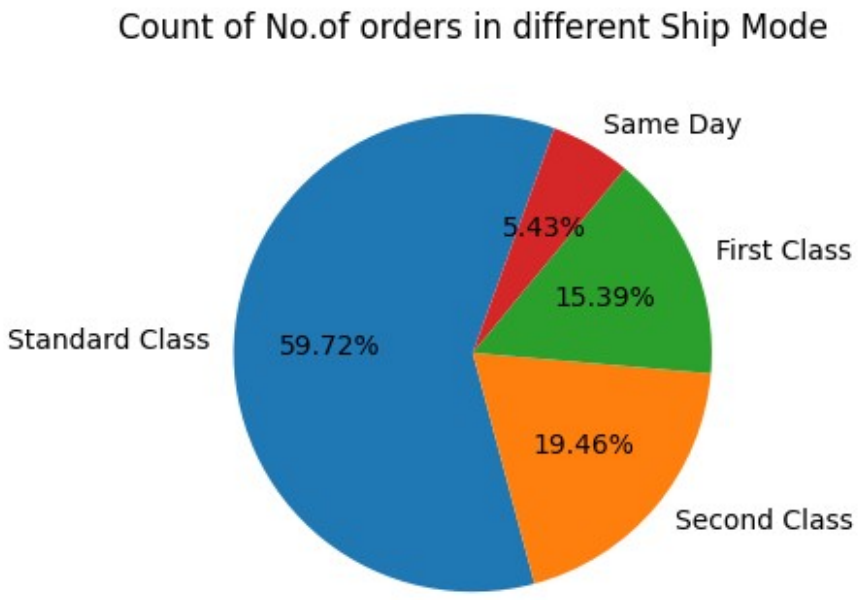
```
unique_orders = dataset['Order ID'].nunique()
print(f"Number of unique Order IDs: {unique_orders}")

Number of unique Order IDs: 5009
```

--++ Finding out the shipping Mode mostly used ++--

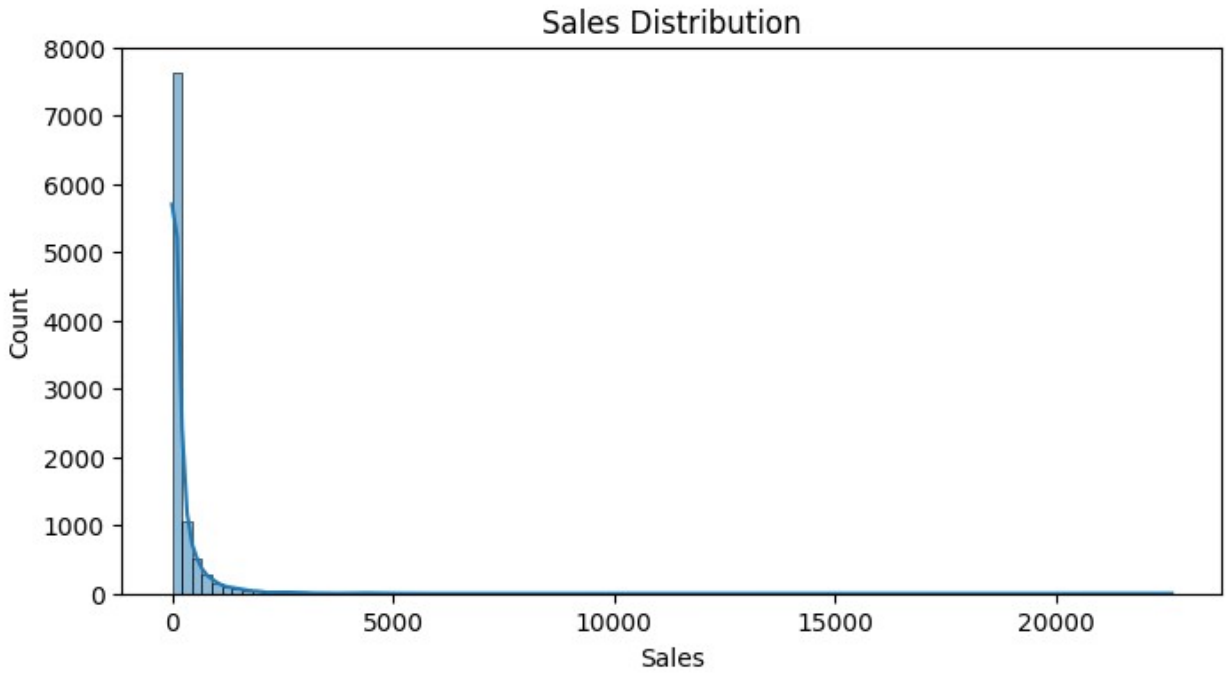
```
dataset['Ship Mode'].value_counts()

Ship Mode
Standard Class    5968
Second Class      1945
First Class       1538
Same Day           543
Name: count, dtype: int64
```

--++ Visualizing result ++--

```
plt.figure(figsize = (4,4))
x = dataset["Ship Mode"].value_counts().index
y = dataset["Ship Mode"].value_counts().values

plt.pie(y, labels = x,startangle = 70, autopct = "%0.2f%%")
plt.title('Count of No.of orders in different Ship Mode')
plt.show()
```



```
plt.figure(figsize=(8, 4))
sns.histplot(dataset['Sales'], kde=True, bins=100)
plt.title('Sales Distribution')
plt.show()
```



What is the date range of the dataset?

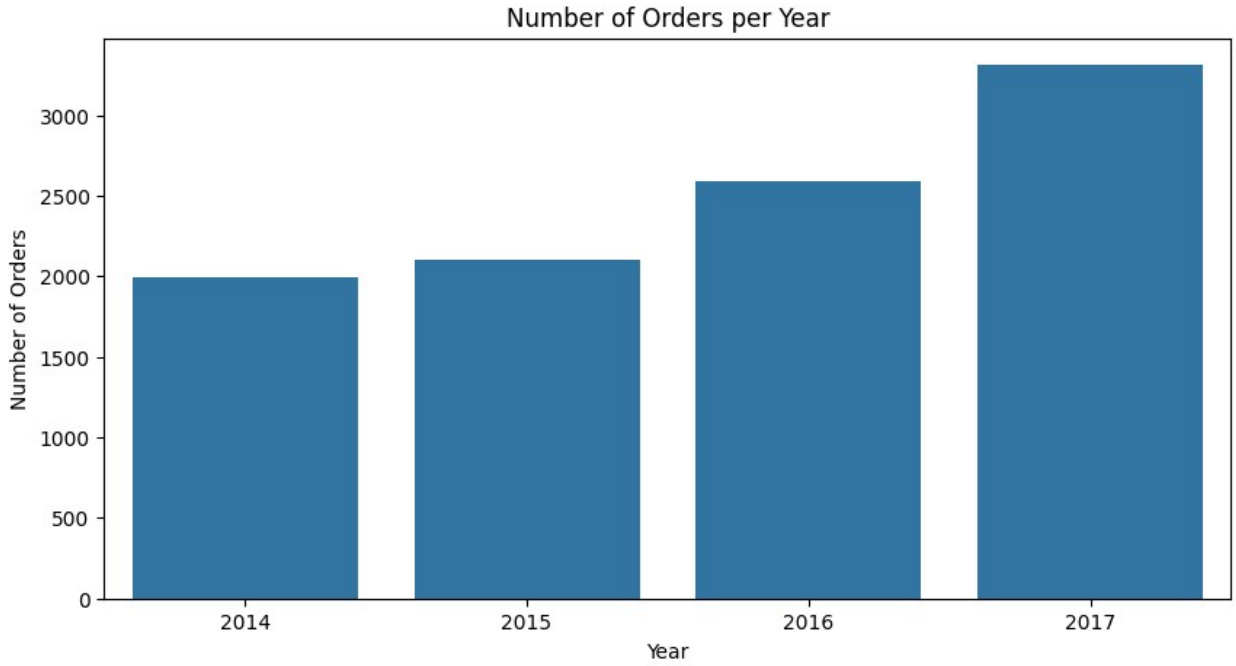
```
# Ensure 'Order Date' is in datetime format
dataset['Order Date'] = pd.to_datetime(dataset['Order Date'])

# Date range
print("Date Range:", dataset['Order Date'].min(), "to", dataset['Order
Date'].max())
```

```
Date Range: 2014-01-03 00:00:00 to 2017-12-30 00:00:00
```

How many orders were placed per year?

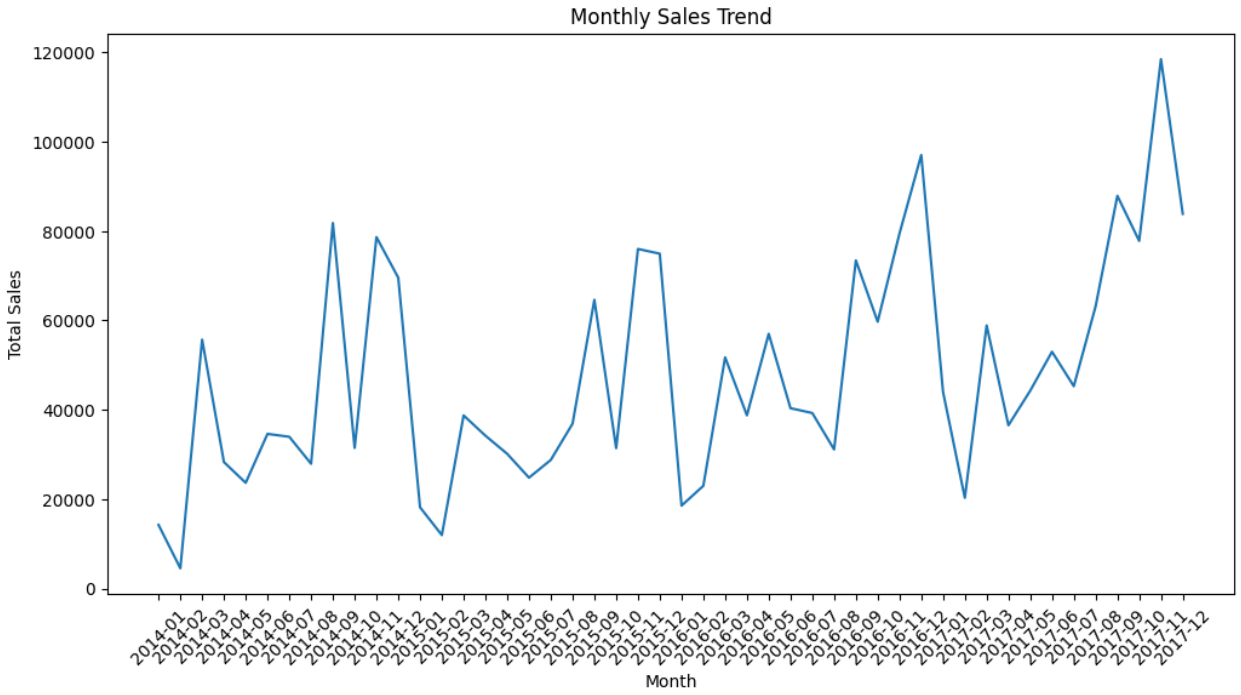
```
# Extract year from Order Date
dataset['Year'] = dataset['Order Date'].dt.year

# Count orders per year
orders_per_year = dataset['Year'].value_counts().sort_index()

# Plot
plt.figure(figsize=(10, 5))
sns.barplot(x=orders_per_year.index, y=orders_per_year.values)
plt.title('Number of Orders per Year')
```

```
plt.xlabel('Year')
plt.ylabel('Number of Orders')
plt.show()
```



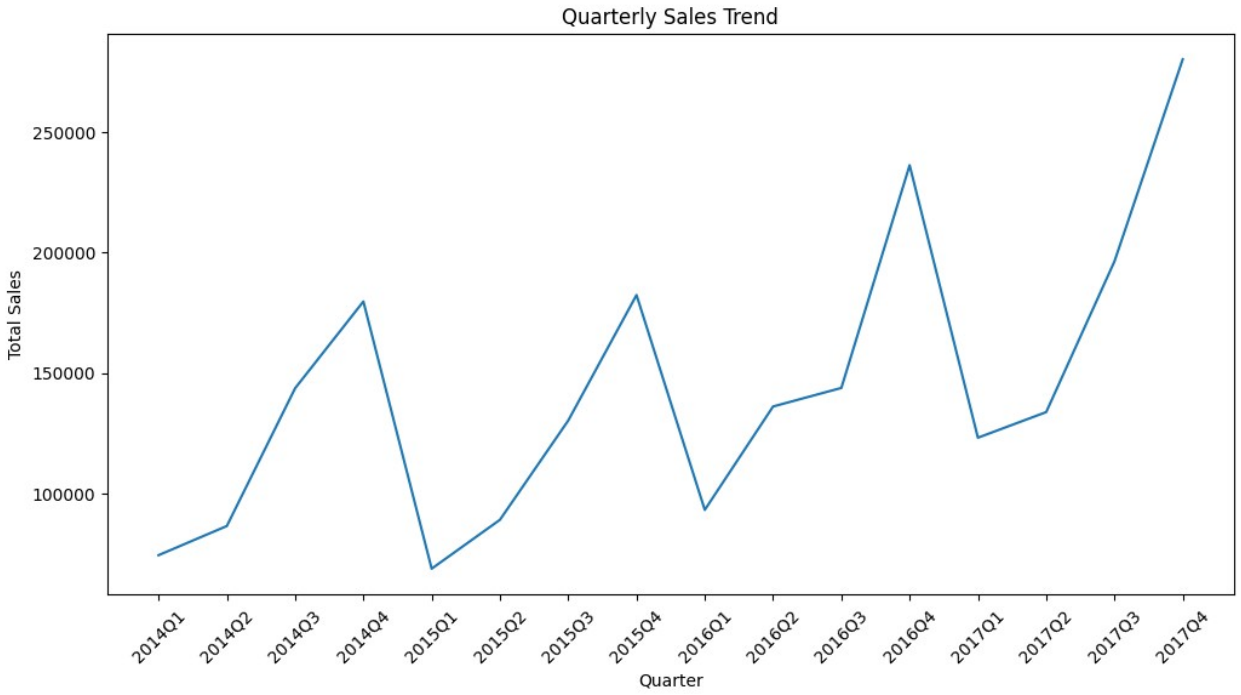
How do sales vary over time?

```
# Extract month-year as string
dataset['Month'] = dataset['Order Date'].dt.to_period('M').astype(str)

# Sales by month
monthly_sales = dataset.groupby('Month')['Sales'].sum().reset_index()

# Plotting sales over time
plt.figure(figsize=(12, 6))
sns.lineplot(x='Month', y='Sales', data=monthly_sales)
plt.title('Monthly Sales Trend')
plt.xticks(rotation=45)
plt.xlabel('Month')
plt.ylabel('Total Sales')
plt.show()
```



How do sales vary by quarter?

```
# Extract quarter
dataset['Quarter'] = dataset['Order
Date'].dt.to_period('Q').astype(str)

# Sales by quarter
quarterly_sales = dataset.groupby('Quarter')
['Sales'].sum().reset_index()

# Plot
plt.figure(figsize=(12, 6))
sns.lineplot(x='Quarter', y='Sales', data=quarterly_sales)
plt.title('Quarterly Sales Trend')
plt.xticks(rotation=45)
plt.xlabel('Quarter')
plt.ylabel('Total Sales')
plt.show()
```

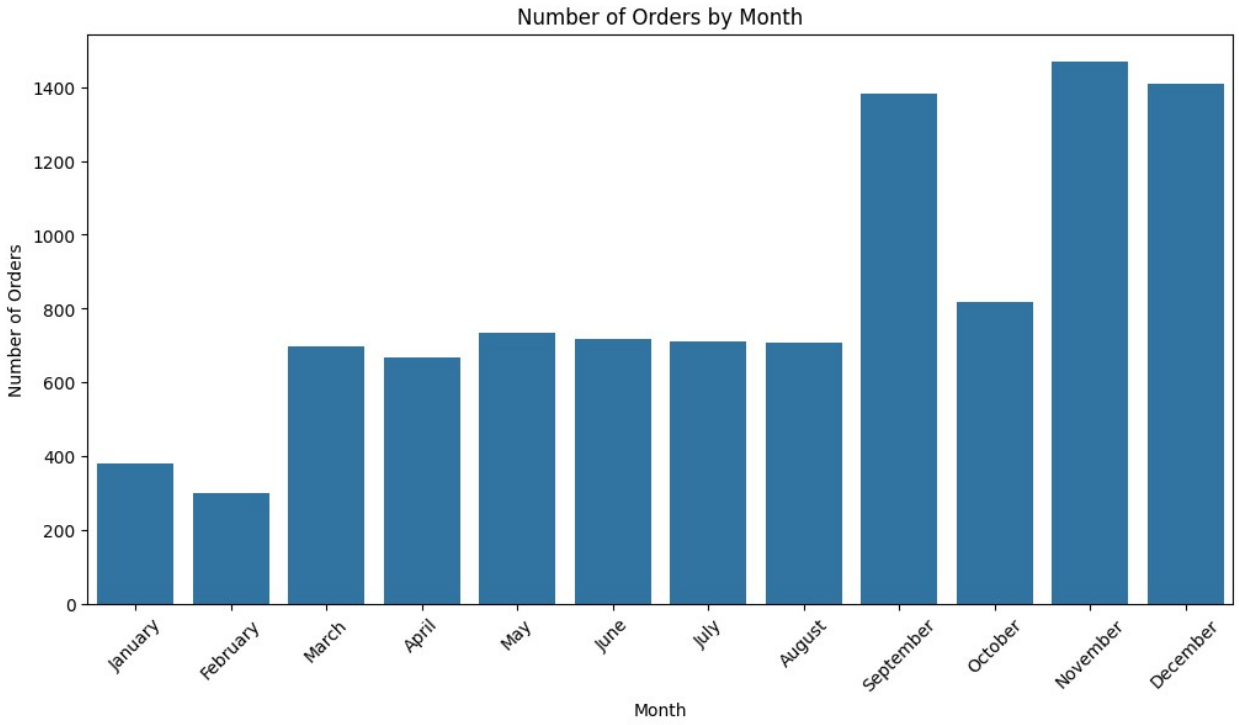


What is the average delivery time (Order Date → Ship Date)?

```
# Ensure 'Ship Date' is datetime format
dataset['Ship Date'] = pd.to_datetime(dataset['Ship Date'])

# Calculate delivery time in days
dataset['Delivery Time'] = (dataset['Ship Date'] - dataset['Order
Date']).dt.days

# Plot delivery time distribution
plt.figure(figsize=(10, 5))
sns.histplot(dataset['Delivery Time'], bins=20, kde=True)
plt.title('Distribution of Delivery Time (in days)')
plt.xlabel('Delivery Time (days)')
plt.ylabel('Frequency')
plt.show()
```

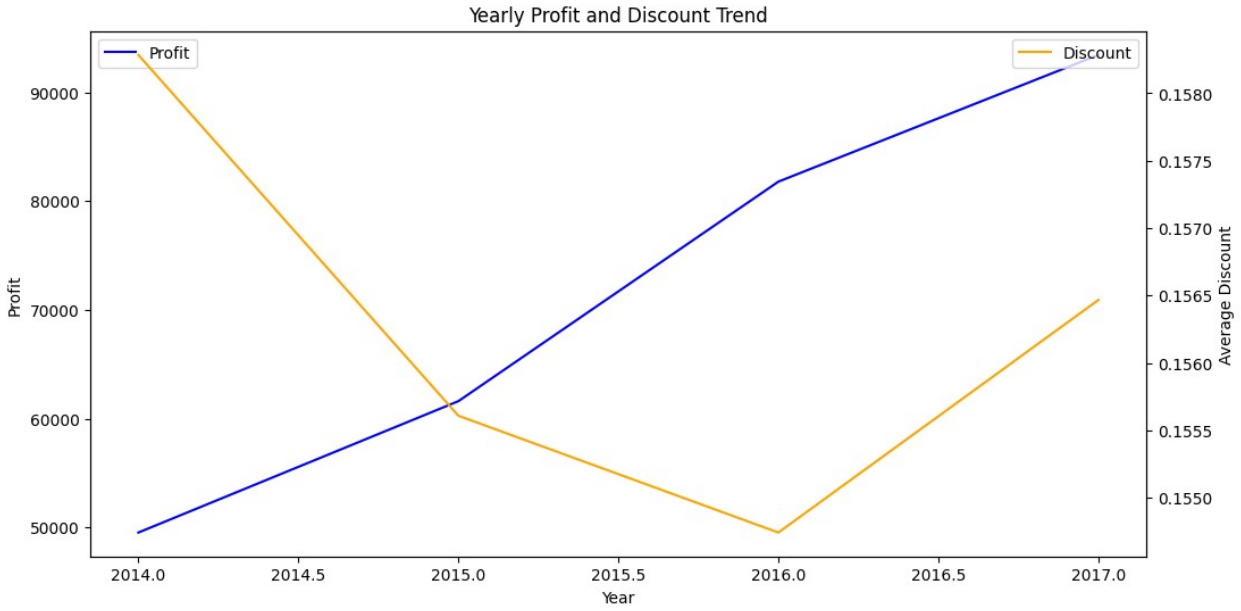
Are there seasonal trends in orders?

```
# Extract month names
dataset['Month Name'] = dataset['Order Date'].dt.month_name()

# Count orders by month
monthly_orders = dataset['Month Name'].value_counts().reindex([
    'January', 'February', 'March', 'April', 'May', 'June',
    'July', 'August', 'September', 'October', 'November', 'December'
])

# Plot seasonal trends
plt.figure(figsize=(12, 6))
sns.barplot(x=monthly_orders.index, y=monthly_orders.values)
plt.title('Number of Orders by Month')
plt.xlabel('Month')
plt.ylabel('Number of Orders')
plt.xticks(rotation=45)
plt.show()
```



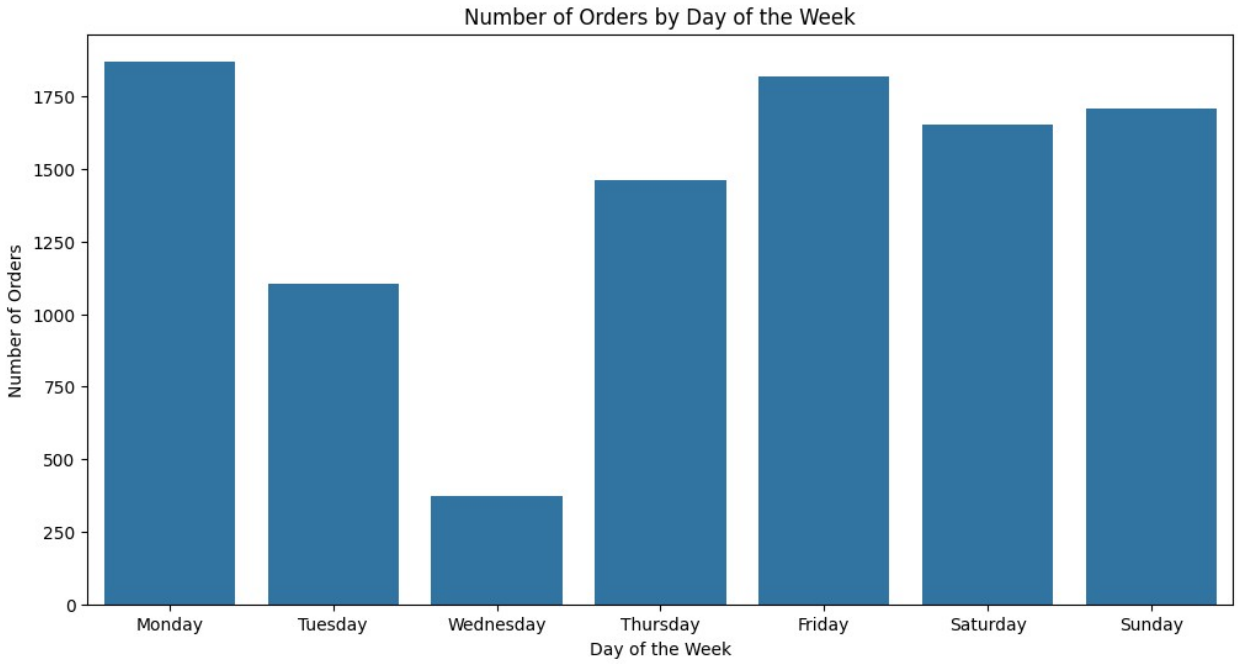
How do profit and discounts vary over the years?

```
# Aggregating profit and discount by year
yearly_data = dataset.groupby('Year').agg({'Profit': 'sum',
'Discount': 'mean'}).reset_index()

# Plot
fig, ax1 = plt.subplots(figsize=(12, 6))

# Profit line
sns.lineplot(x='Year', y='Profit', data=yearly_data, ax=ax1,
label='Profit', color='blue')
ax1.set_ylabel('Profit')

# Discount line on secondary axis
ax2 = ax1.twinx()
sns.lineplot(x='Year', y='Discount', data=yearly_data, ax=ax2,
label='Discount', color='orange')
ax2.set_ylabel('Average Discount')

plt.title('Yearly Profit and Discount Trend')
plt.show()
```



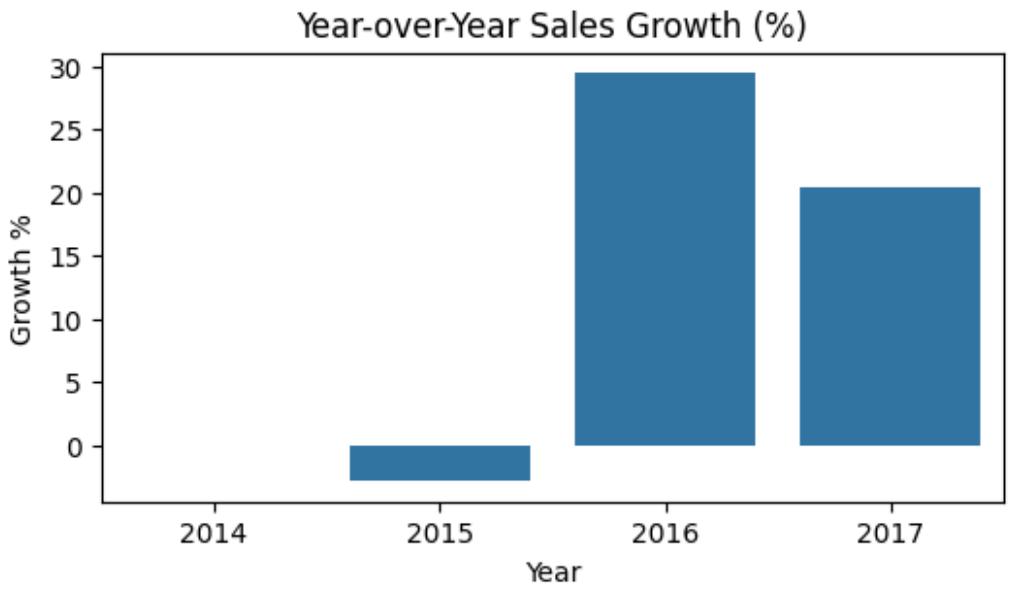
Are there specific days with more orders?

```
# Extract day of the week
dataset['Day of Week'] = dataset['Order Date'].dt.day_name()

# Count orders by day
orders_by_day = dataset['Day of Week'].value_counts().reindex([
    'Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday',
'Saturday', 'Sunday'
])

# Plot
plt.figure(figsize=(12, 6))
sns.barplot(x=orders_by_day.index, y=orders_by_day.values)
plt.title('Number of Orders by Day of the Week')
plt.xlabel('Day of the Week')
plt.ylabel('Number of Orders')
plt.show()
```



What is the year-over-year sales growth percentage?

```
# Yearly sales
yearly_sales = dataset.groupby('Year')['Sales'].sum().reset_index()

# Calculate year-over-year growth
yearly_sales['YoY Growth %'] = yearly_sales['Sales'].pct_change() *
100

# Plot
plt.figure(figsize=(6,3))
sns.barplot(x='Year', y='YoY Growth %', data=yearly_sales)
plt.title('Year-over-Year Sales Growth (%)')
plt.xlabel('Year')
plt.ylabel('Growth %')
plt.show()
```



What is the average shipping time (difference between Order Date and Ship Date)?

```
# Calculate shipping time in days
dataset['Shipping Time'] = (dataset['Ship Date'] - dataset['Order
Date']).dt.days

# Average shipping time
avg_shipping_time = dataset['Shipping Time'].mean()
print(f"Average Shipping Time: {avg_shipping_time:.2f} days")
```

```
Average Shipping Time: 3.96 days
```

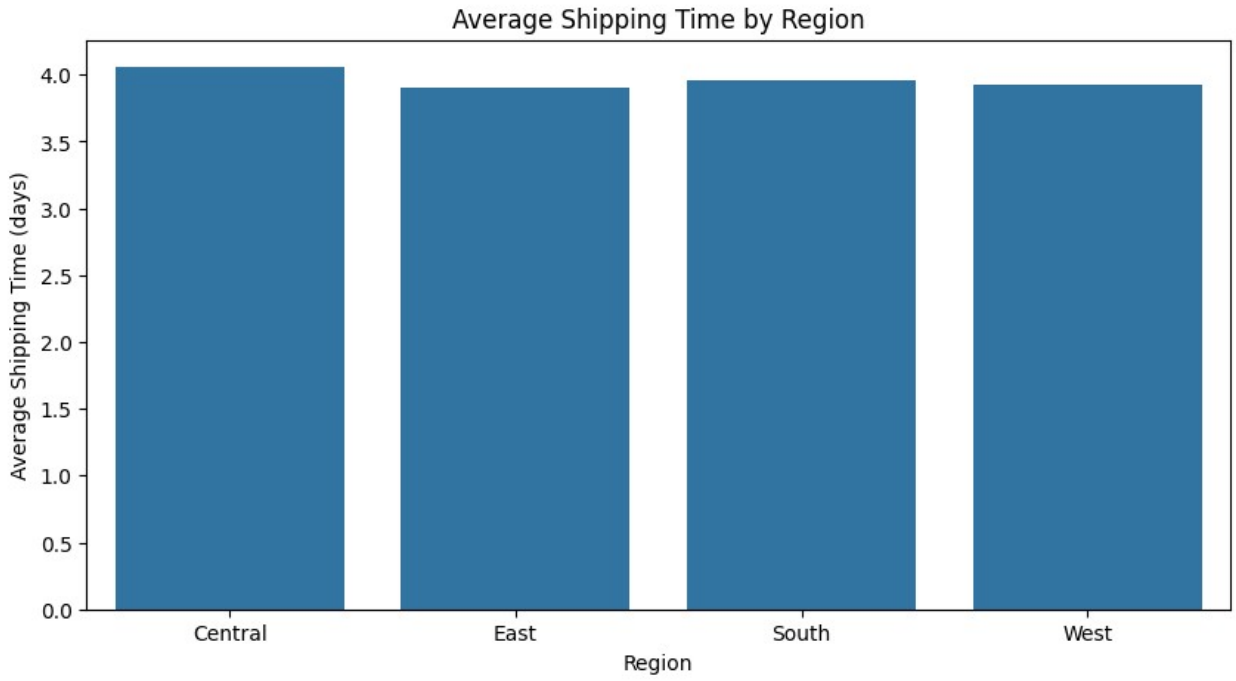
Which shipping mode is the most common and fastest?

```
# Average shipping time by mode
shipping_by_mode = dataset.groupby('Ship Mode')['Shipping
Time'].mean().reset_index()

# Plot
plt.figure(figsize=(10, 5))
sns.barplot(x='Ship Mode', y='Shipping Time', data=shipping_by_mode)
plt.title('Average Shipping Time by Mode')
plt.xlabel('Ship Mode')
plt.ylabel('Average Shipping Time (days)')
plt.show()

# Most common shipping mode
common_mode = dataset['Ship Mode'].value_counts().idxmax()
print(f"Most Common Shipping Mode: {common_mode}")
```


```
Most Common Shipping Mode: Standard Class
```

How does shipping time vary by region?

```
# Average shipping time by region
shipping_by_region = dataset.groupby('Region')['Shipping
Time'].mean().reset_index()

# Plot
plt.figure(figsize=(10, 5))
sns.barplot(x='Region', y='Shipping Time', data=shipping_by_region)
plt.title('Average Shipping Time by Region')
plt.xlabel('Region')
plt.ylabel('Average Shipping Time (days)')
plt.show()
```



How many late shipments are there?

```
# Identify late shipments (ship date > order date + 4 days)
late_shipments = dataset[dataset['Shipping Time'] > 4]

# Count late shipments
num_late_shipments = late_shipments.shape[0]
total_orders = dataset.shape[0]
late_percentage = (num_late_shipments / total_orders) * 100

print(f"Late Shipments: {num_late_shipments} ({late_percentage:.2f}
%)")
```

```
Late Shipments: 3993 (39.95%)
```

Is there a correlation between shipping time and profit?

```
# Correlation between shipping time and profit
correlation = dataset[['Shipping Time', 'Profit']].corr().iloc[0, 1]
print(f"Correlation between Shipping Time and Profit:
{correlation:.4f}")

# Scatter plot
plt.figure(figsize=(10, 5))
sns.scatterplot(x='Shipping Time', y='Profit', data=dataset)
plt.title('Shipping Time vs Profit')
plt.xlabel('Shipping Time (days)')
plt.ylabel('Profit')
plt.show()
```

```
Correlation between Shipping Time and Profit: -0.0046
```

How many unique customers are there?

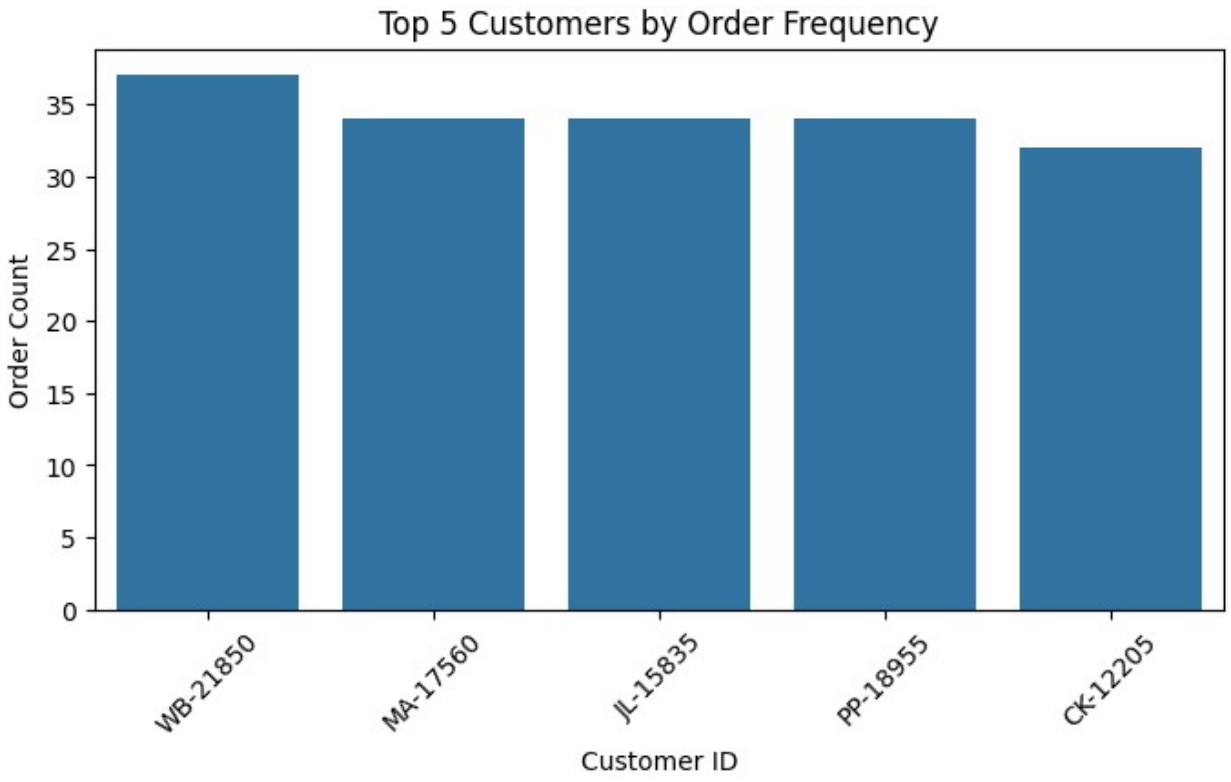
```
# Count unique customers
unique_customers = dataset['Customer ID'].nunique()
print(f"Unique Customers: {unique_customers}")
```

```
Unique Customers: 793
```

Which customers have placed the most orders?

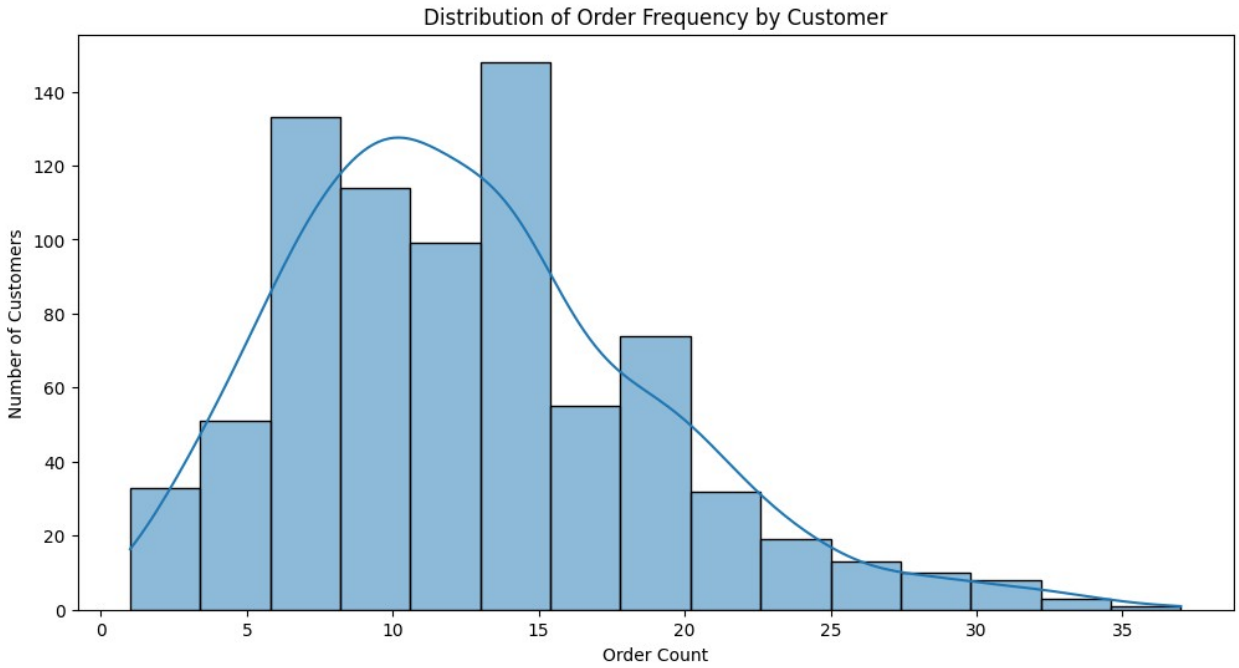
```
# Count customer occurrences
customer_orders = dataset['Customer ID'].value_counts().reset_index()
customer_orders.columns = ['Customer ID', 'Order Count']

# Top 5 frequent customers
top_customers = customer_orders.head(5)
print("Top 5 Customers by Order Frequency:")
print(top_customers)

plt.figure(figsize=(8, 4))
sns.barplot(x='Customer ID', y='Order Count', data=top_customers)
plt.title('Top 5 Customers by Order Frequency')
plt.xlabel('Customer ID')
plt.ylabel('Order Count')
plt.xticks(rotation=45)
plt.show()
```

```
Top 5 Customers by Order Frequency:
  Customer ID  Order Count
0    WB-21850           37
1    MA-17560           34
2    JL-15835           34
3    PP-18955           34
4    CK-12205           32
```



What is the distribution of order frequency by customer?

```
# Plot distribution of customer order frequency
plt.figure(figsize=(12, 6))
sns.histplot(customer_orders['Order Count'], bins=15, kde=True)
plt.title('Distribution of Order Frequency by Customer')
plt.xlabel('Order Count')
plt.ylabel('Number of Customers')
plt.show()
```



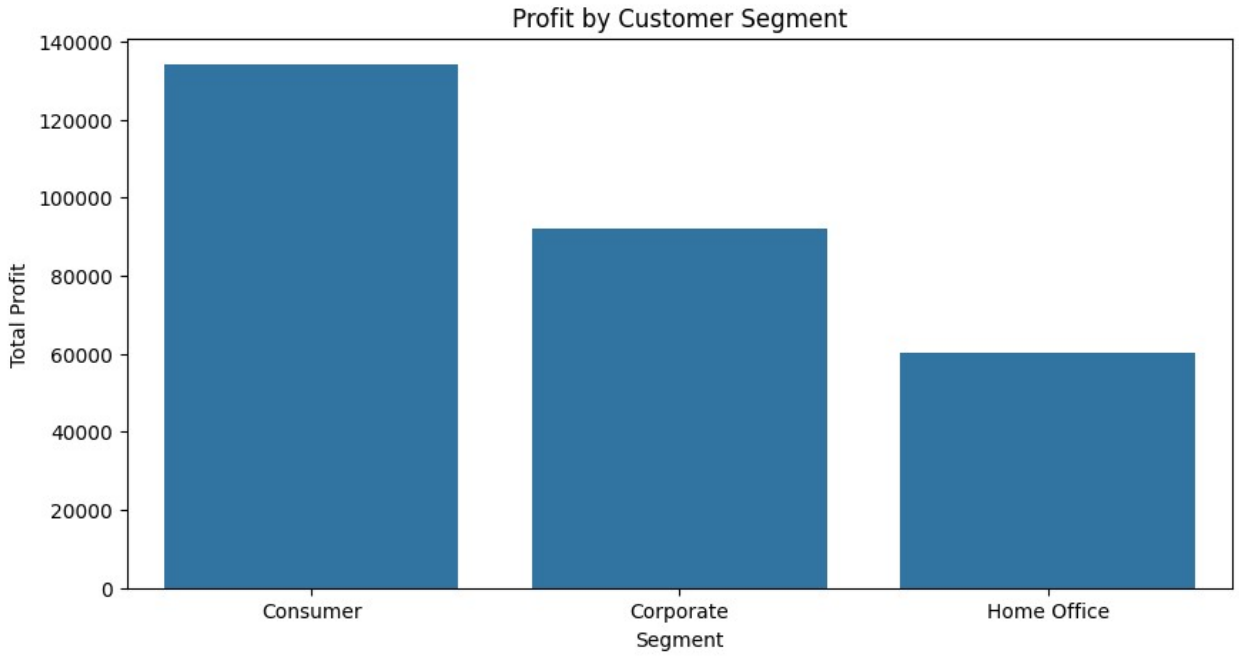
How many one-time customers are there?

```
# Count one-time customers
one_time_customers = customer_orders[customer_orders['Order Count'] ==
1].shape[0]
percentage_one_time = (one_time_customers / unique_customers) * 100

print(f"One-time Customers: {one_time_customers}
({percentage_one_time:.2f}%)")
```

```
One-time Customers: 5 (0.63%)
```

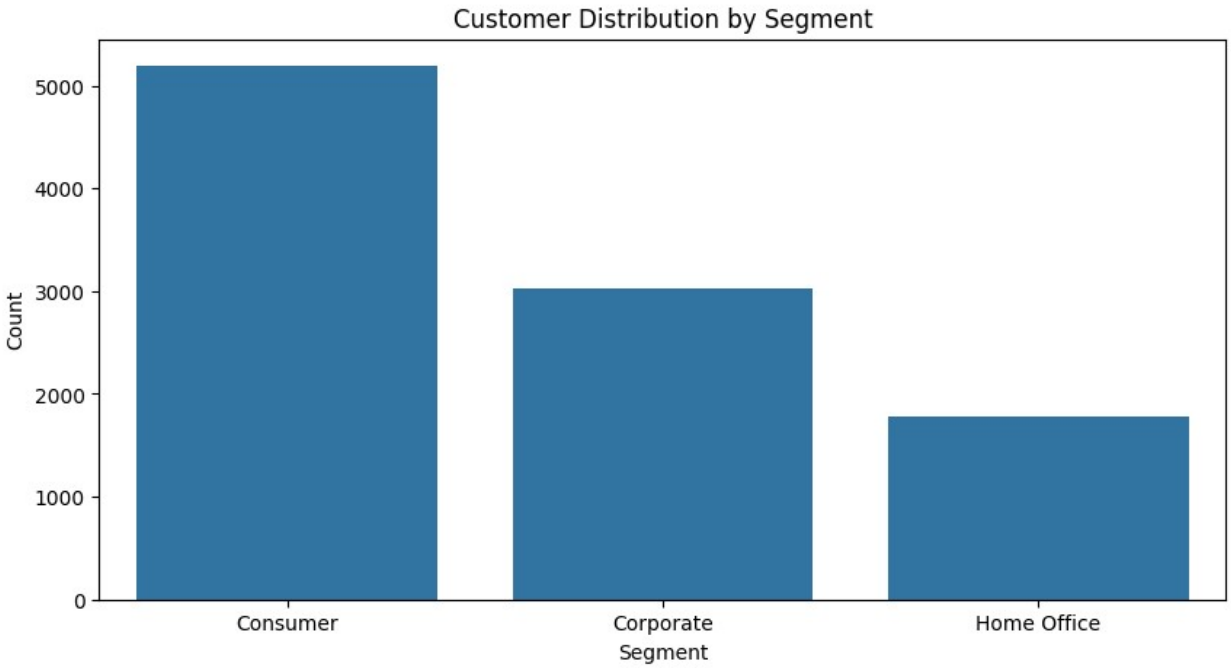
Are there profitable or loss-making customer groups?

```
# Profit by segment
profit_by_segment = dataset.groupby('Segment')
['Profit'].sum().reset_index()

# Plot
plt.figure(figsize=(10, 5))
sns.barplot(x='Segment', y='Profit', data=profit_by_segment)
plt.title('Profit by Customer Segment')
plt.xlabel('Segment')
plt.ylabel('Total Profit')
plt.show()
```



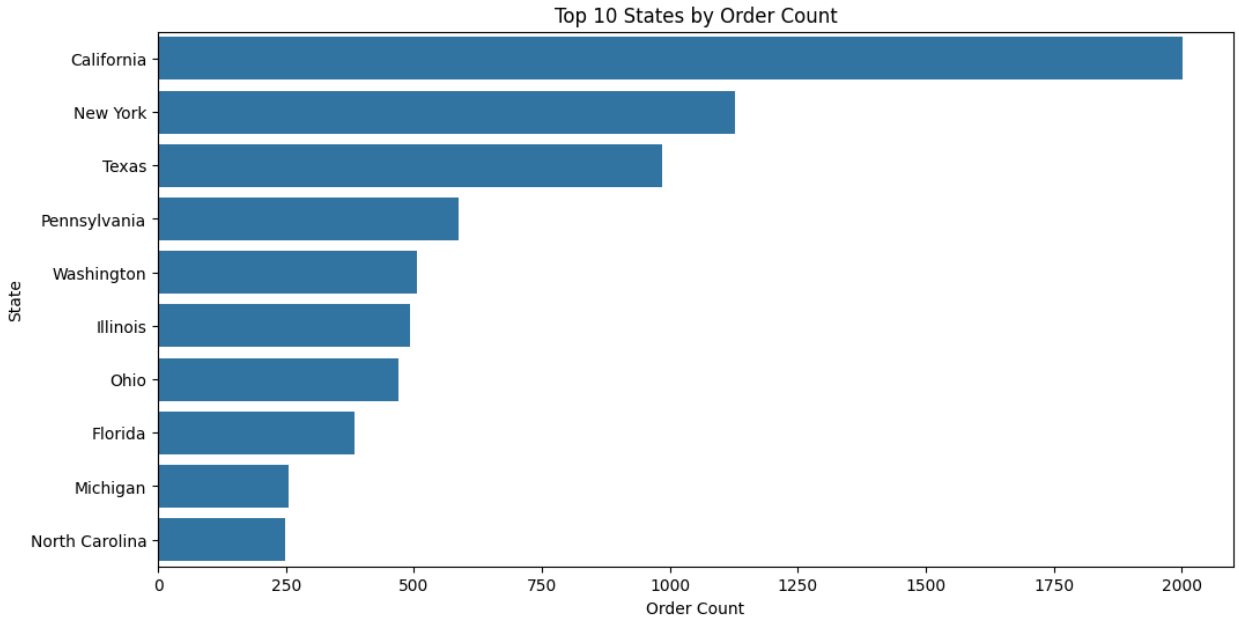
How are the customers distributed by segment?

```
# Customer distribution by segment
segment_distribution = dataset['Segment'].value_counts().reset_index()
segment_distribution.columns = ['Segment', 'Count']

# Plot
plt.figure(figsize=(10, 5))
sns.barplot(x='Segment', y='Count', data=segment_distribution)
plt.title('Customer Distribution by Segment')
plt.xlabel('Segment')
plt.ylabel('Count')
plt.show()
```



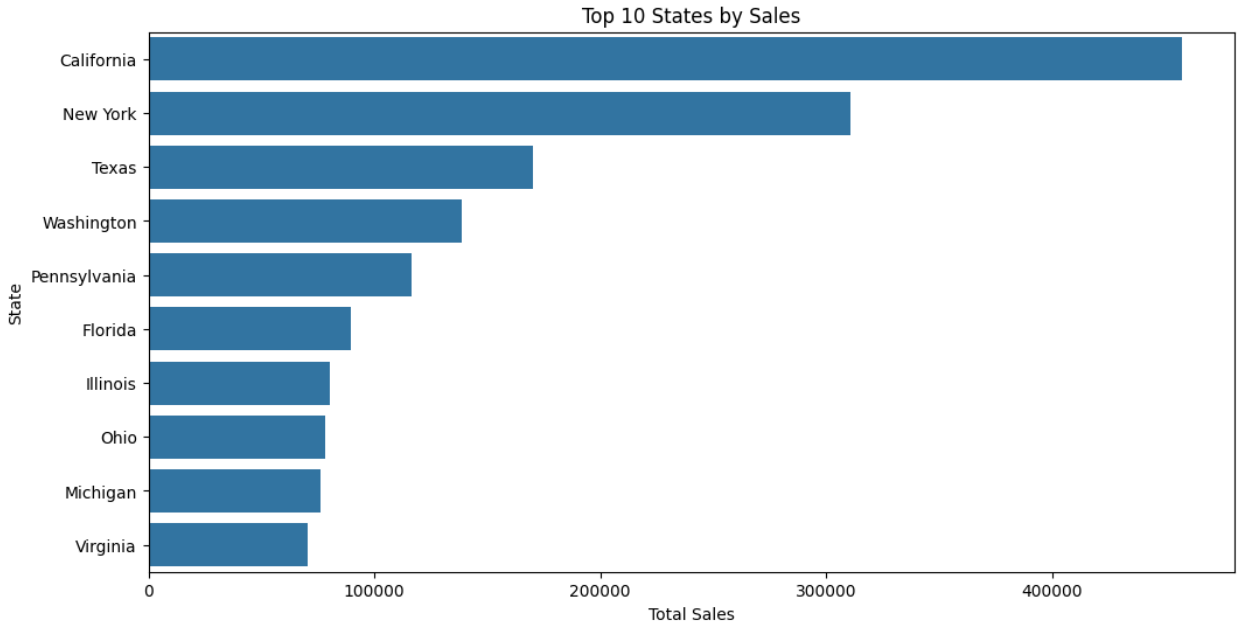
Which states have the most orders?

```
# Order frequency by state
state_orders = dataset['State'].value_counts().reset_index()
state_orders.columns = ['State', 'Order Count']

# Plot
plt.figure(figsize=(12, 6))
sns.barplot(x='Order Count', y='State', data=state_orders.head(10))
plt.title('Top 10 States by Order Count')
plt.xlabel('Order Count')
plt.ylabel('State')
plt.show()
```



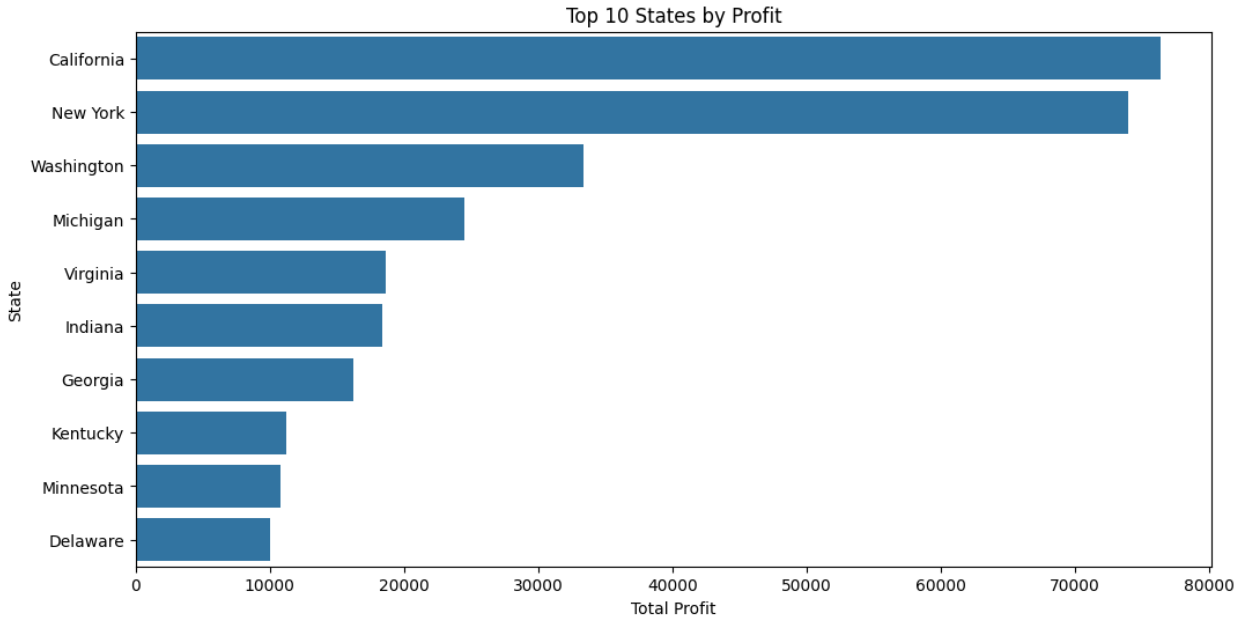
Which states have the highest total sales?

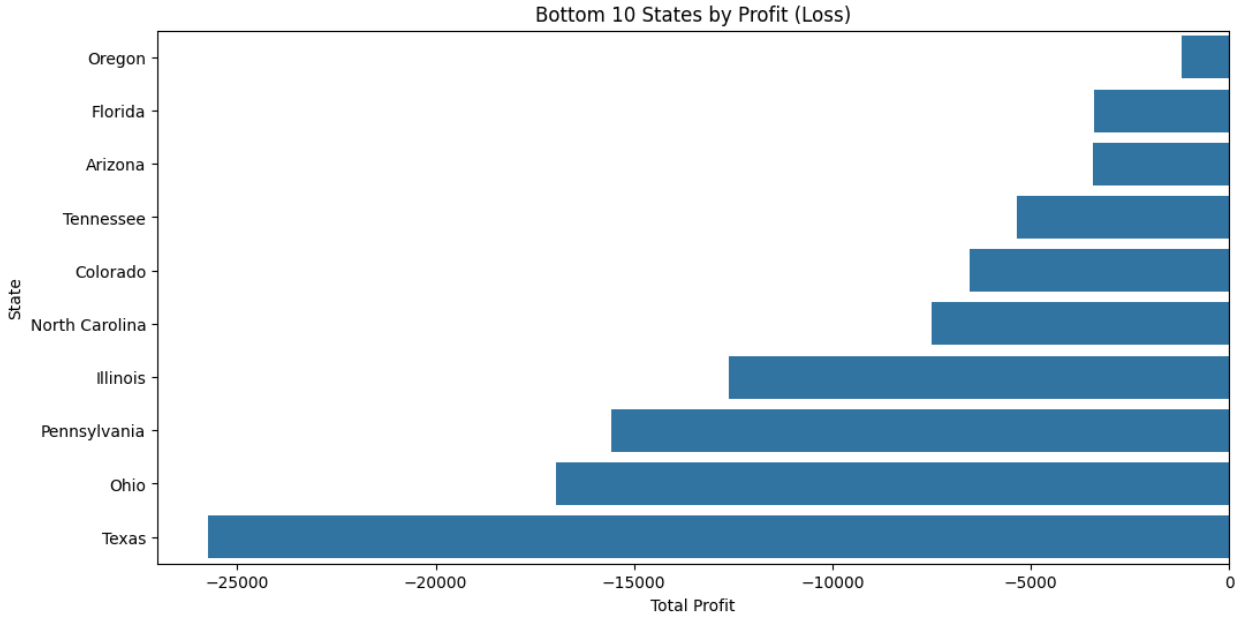
```
# Sales by state
state_sales = dataset.groupby('State')
['Sales'].sum().reset_index().sort_values('Sales', ascending=False)

# Plot
plt.figure(figsize=(12, 6))
sns.barplot(x='Sales', y='State', data=state_sales.head(10))
plt.title('Top 10 States by Sales')
plt.xlabel('Total Sales')
plt.ylabel('State')
plt.show()
```



Which states have the highest profit/loss?

```
state_profit = dataset.groupby('State')
['Profit'].sum().reset_index().sort_values('Profit', ascending=False)

plt.figure(figsize=(12, 6))
sns.barplot(x='Profit', y='State', data=state_profit.head(10))
plt.title('Top 10 States by Profit')
plt.xlabel('Total Profit')
plt.ylabel('State')
plt.show()

plt.figure(figsize=(12, 6))
sns.barplot(x='Profit', y='State', data=state_profit.tail(10))
plt.title('Bottom 10 States by Profit (Loss)')
plt.xlabel('Total Profit')
plt.ylabel('State')
plt.show()
```

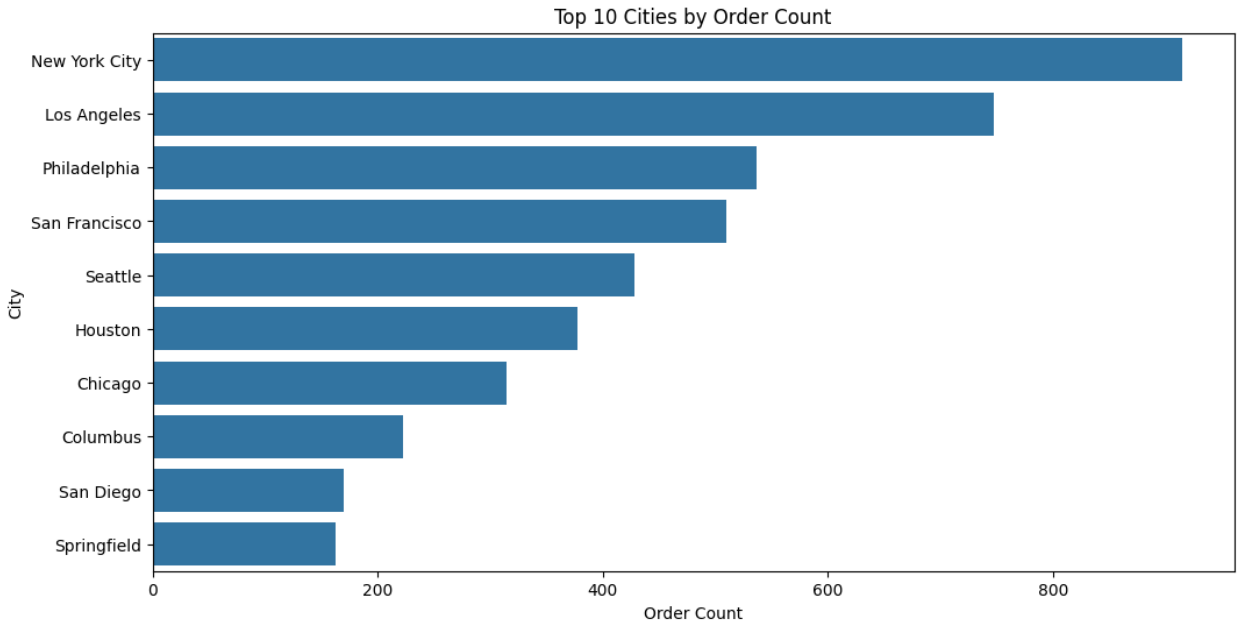




Which cities have the most orders?

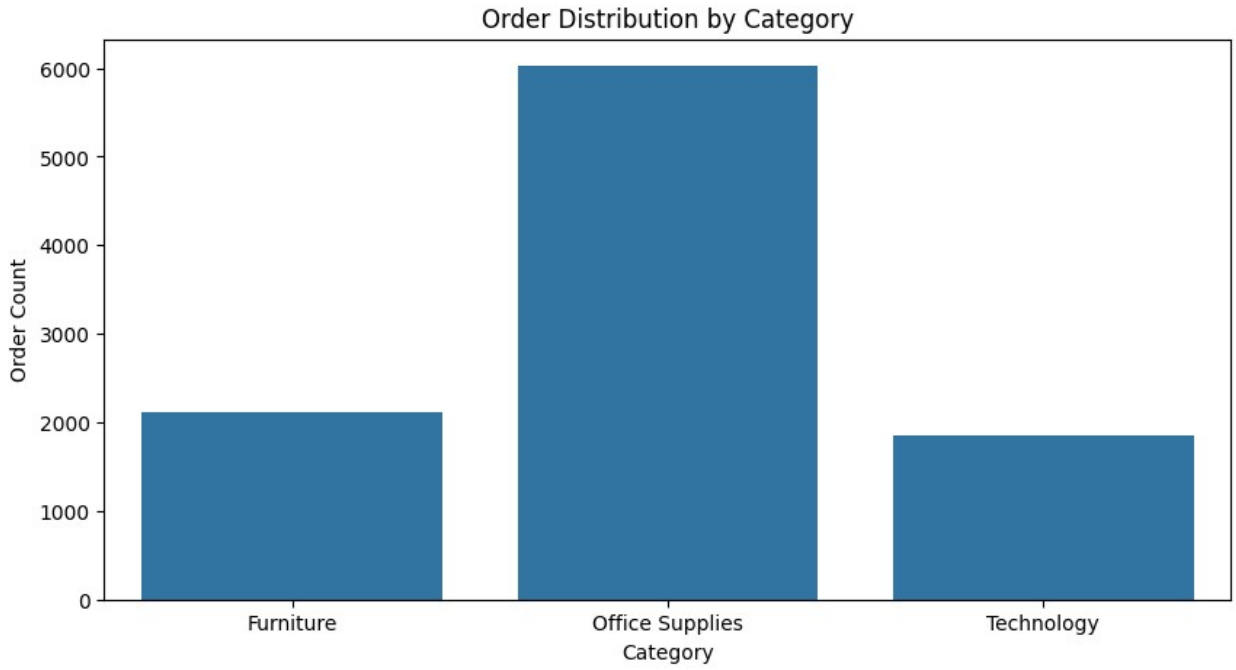
```
# Order frequency by city
city_orders = dataset['City'].value_counts().reset_index()
city_orders.columns = ['City', 'Order Count']

# Plot
plt.figure(figsize=(12, 6))
sns.barplot(x='Order Count', y='City', data=city_orders.head(10))
plt.title('Top 10 Cities by Order Count')
plt.xlabel('Order Count')
```

```
plt.ylabel('City')
plt.show()
```



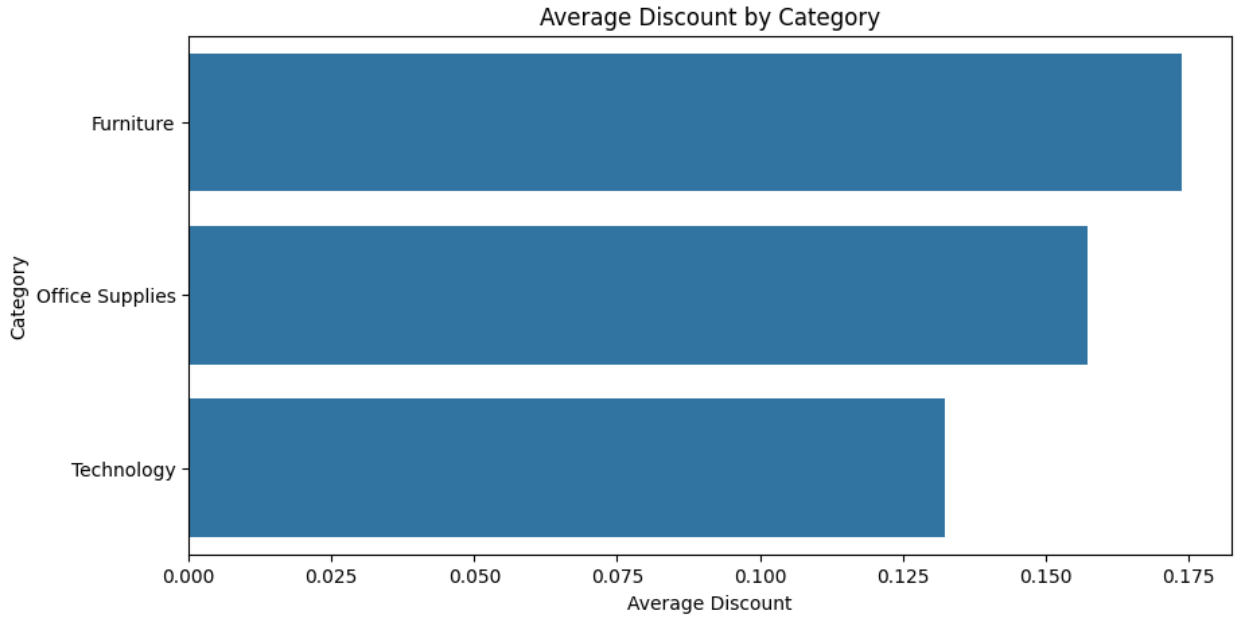
What is the distribution of orders across categories?

```
# Distribution of orders by category
plt.figure(figsize=(10, 5))
sns.countplot(x='Category', data=dataset)
plt.title('Order Distribution by Category')
plt.xlabel('Category')
plt.ylabel('Order Count')
plt.show()
```



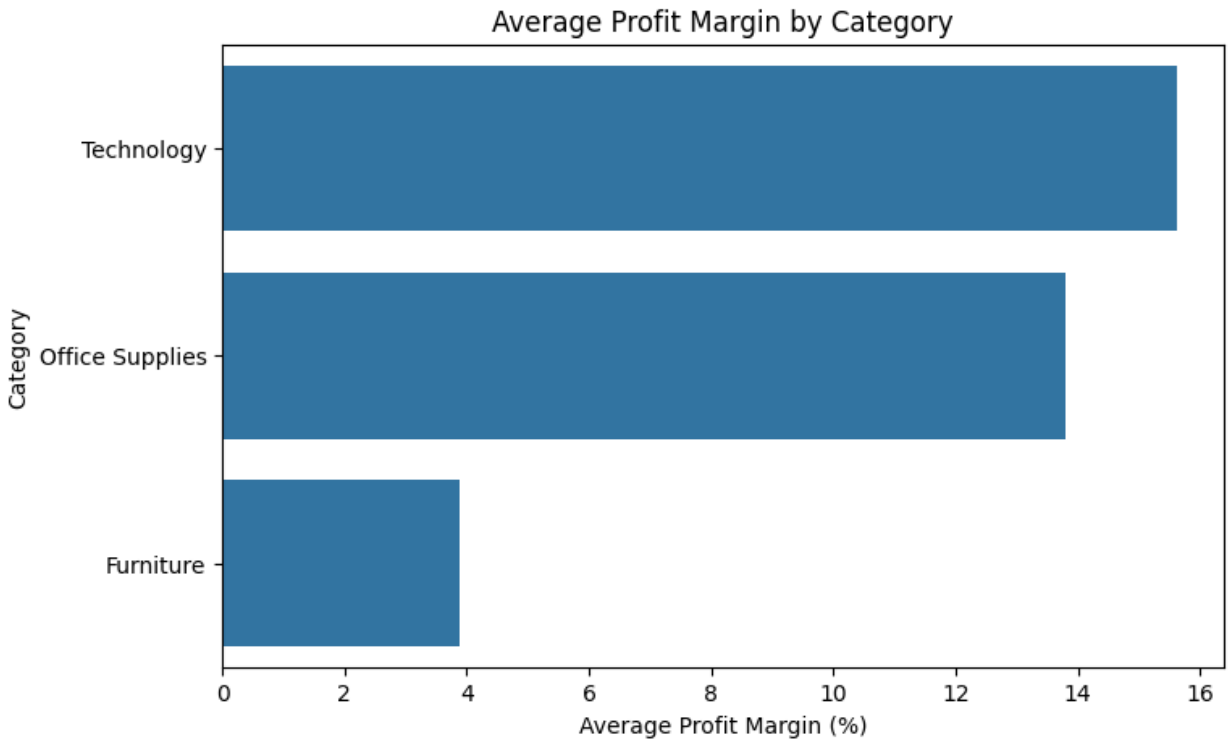
What is the average discount by category?

```
# Average discount by category
category_discount = dataset.groupby('Category')
['Discount'].mean().reset_index().sort_values('Discount',
ascending=False)

# Plot
plt.figure(figsize=(10, 5))
sns.barplot(x='Discount', y='Category', data=category_discount)
plt.title('Average Discount by Category')
plt.xlabel('Average Discount')
plt.ylabel('Category')
plt.show()
```



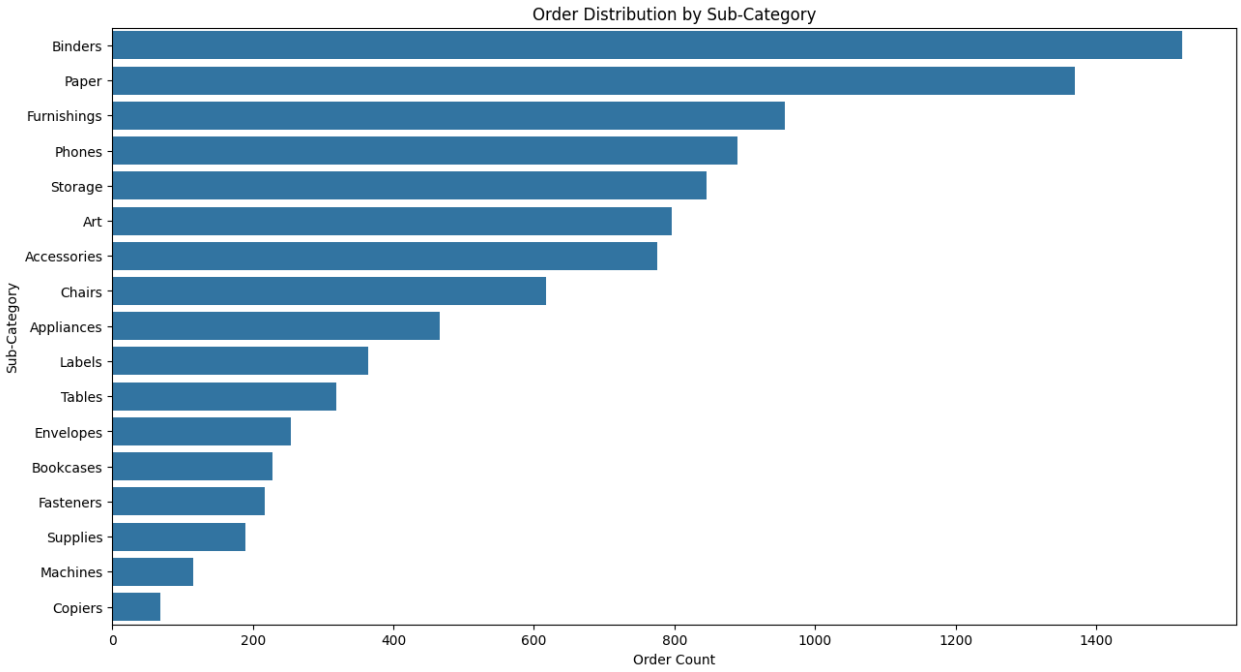
What is the average profit margin by category?

```
# Average profit margin by category
dataset['Profit Margin'] = (dataset['Profit'] / dataset['Sales']) *
100
category_margin = dataset.groupby('Category')['Profit
Margin'].mean().reset_index().sort_values('Profit Margin',
ascending=False)

# Plot
plt.figure(figsize=(8, 5))
sns.barplot(x='Profit Margin', y='Category', data=category_margin)
plt.title('Average Profit Margin by Category')
plt.xlabel('Average Profit Margin (%)')
plt.ylabel('Category')
plt.show()
```



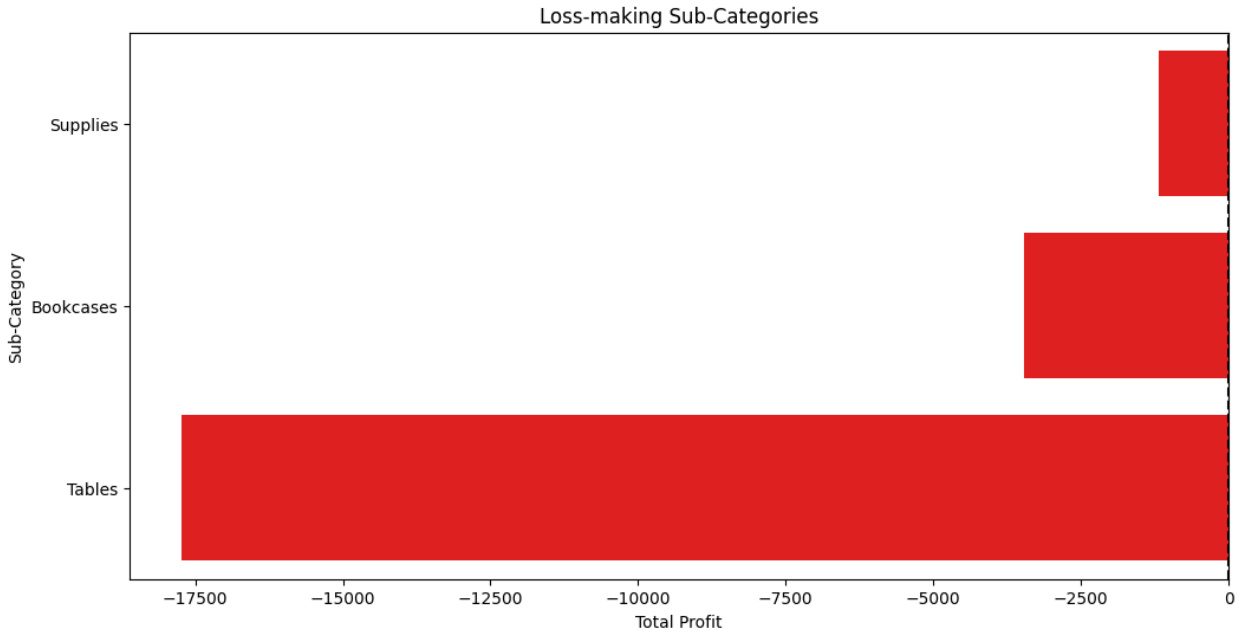
What is the distribution of orders by sub-category?

```
# Distribution of orders by sub-category
plt.figure(figsize=(15, 8))
sns.countplot(y='Sub-Category', data=dataset, order=dataset['Sub-
Category'].value_counts().index)
plt.title('Order Distribution by Sub-Category')
plt.xlabel('Order Count')
plt.ylabel('Sub-Category')
plt.show()
```



Are there loss-making sub-categories?

```
# Calculate total profit by sub-category
subcategory_profit = dataset.groupby('Sub-Category')
['Profit'].sum().reset_index().sort_values('Profit', ascending=False)

# Filter for loss-making sub-categories
loss_subcategories = subcategory_profit[subcategory_profit['Profit'] <
0]

# Plot
plt.figure(figsize=(12, 6))
sns.barplot(x='Profit', y='Sub-Category', data=loss_subcategories,
color='red')

# Customize plot
plt.title('Loss-making Sub-Categories')
plt.xlabel('Total Profit')
plt.ylabel('Sub-Category')
plt.axvline(0, color='black', linestyle='--')  # Add a vertical line
at 0 profit
plt.show()
```



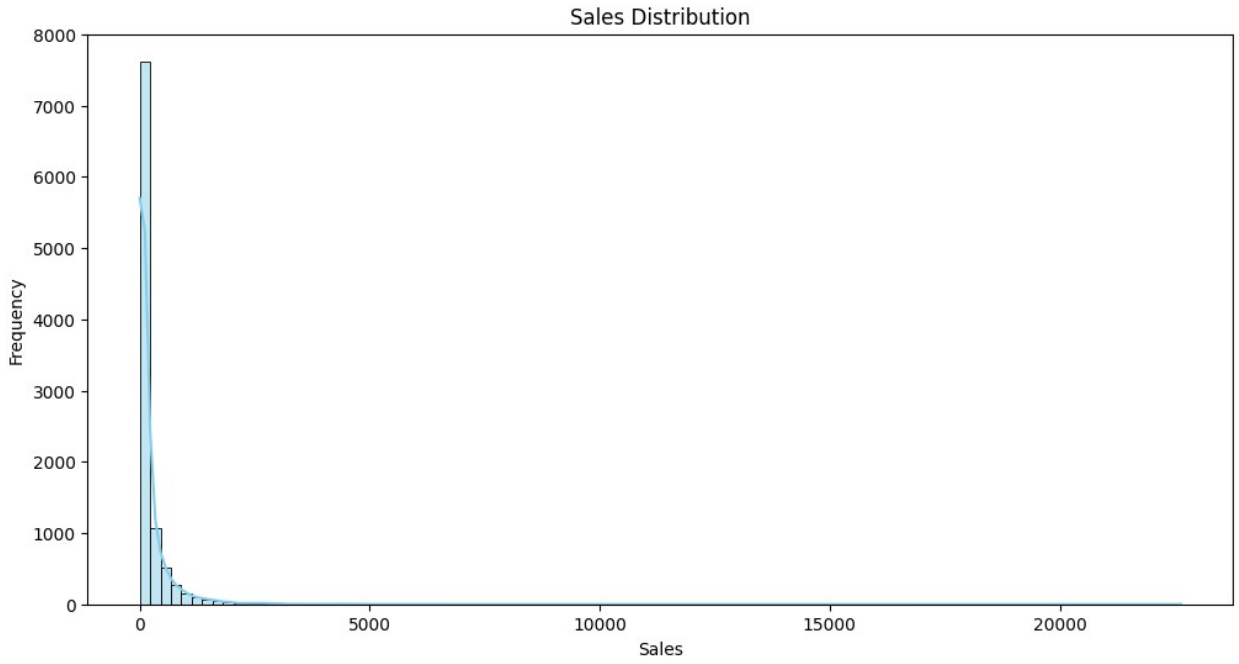
What is the total sales in the dataset?

```
# Total sales
total_sales = dataset['Sales'].sum()
print(f"Total Sales: ${total_sales:.2f}")

# Average sales per order
average_sales = dataset['Sales'].mean()
print(f"Average Sales per Order: ${average_sales:.2f}")

# Median sales
median_sales = dataset['Sales'].median()
print(f"Median Sales: ${median_sales:.2f}")
```

```
Total Sales: $2297200.86
Average Sales per Order: $229.86
Median Sales: $54.49
```

What is the sales distribution ?

```
# Sales distribution histogram
plt.figure(figsize=(12, 6))
sns.histplot(dataset['Sales'], bins=100, kde=True, color='skyblue')
plt.title('Sales Distribution')
plt.xlabel('Sales')
plt.ylabel('Frequency')
plt.show()
```

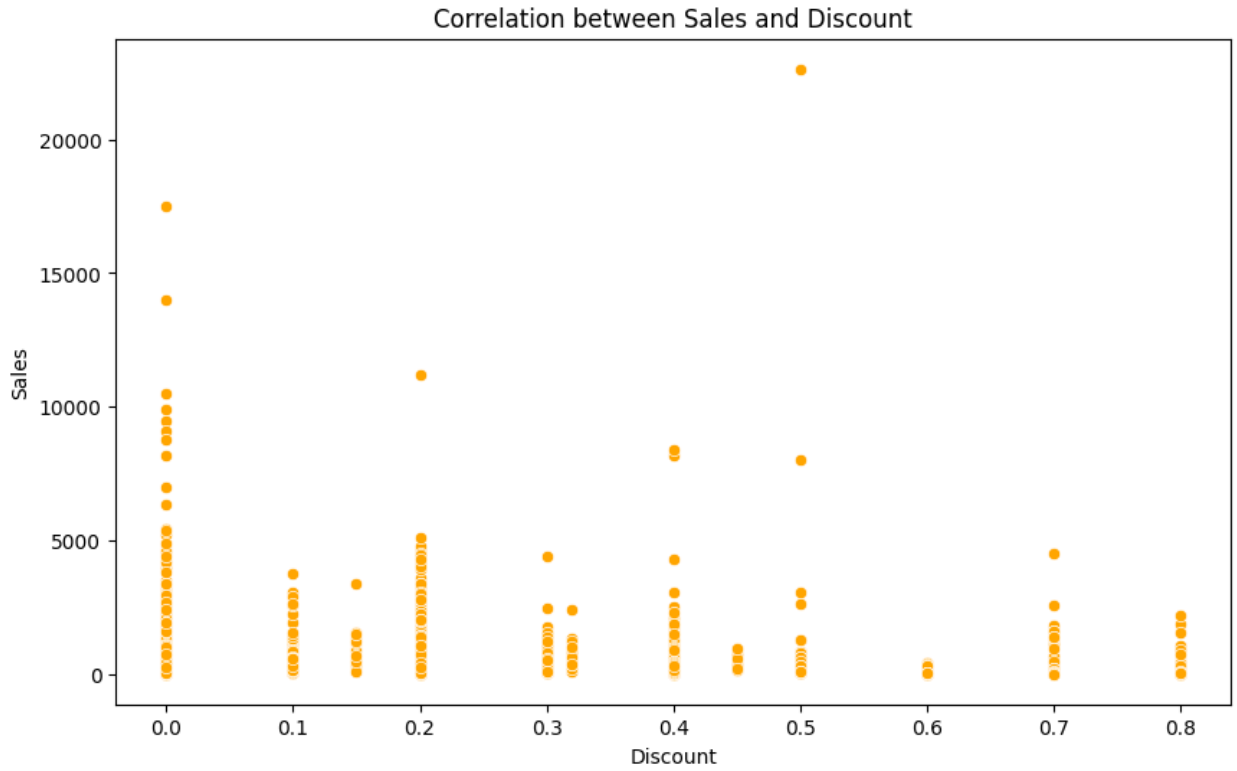


What is the correlation between sales and profit?

```
# Correlation between sales and profit
plt.figure(figsize=(10, 6))
sns.scatterplot(x='Sales', y='Profit', data=dataset, alpha=0.7)
plt.title('Correlation between Sales and Profit')
plt.xlabel('Sales')
plt.ylabel('Profit')
plt.show()
```

What is the correlation between sales and discount?

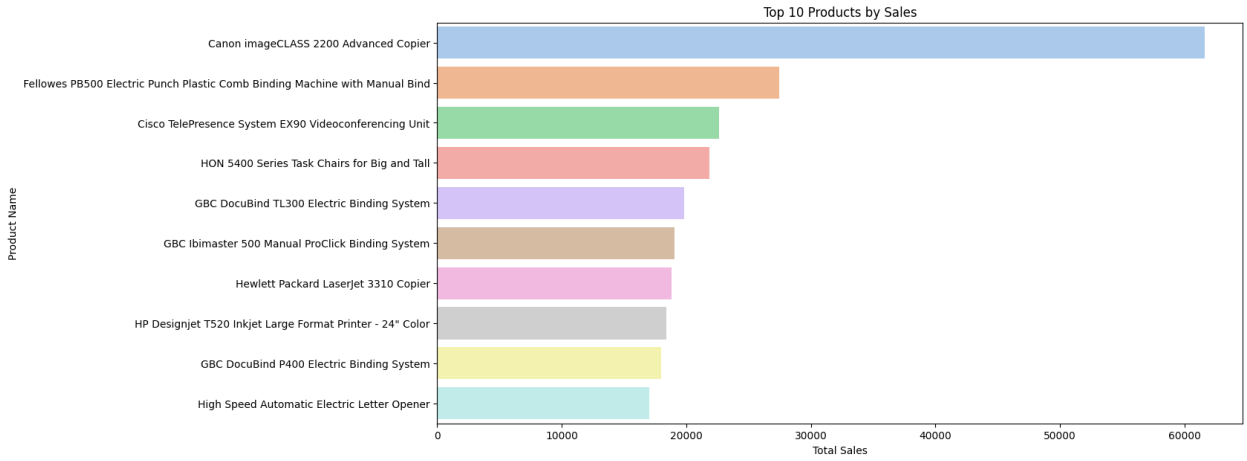
```
# Correlation between sales and discount
plt.figure(figsize=(10, 6))
sns.scatterplot(x='Discount', y='Sales', data=dataset, color='orange')
plt.title('Correlation between Sales and Discount')
plt.xlabel('Discount')
plt.ylabel('Sales')
plt.show()
```



What is the top 10 products by sales?

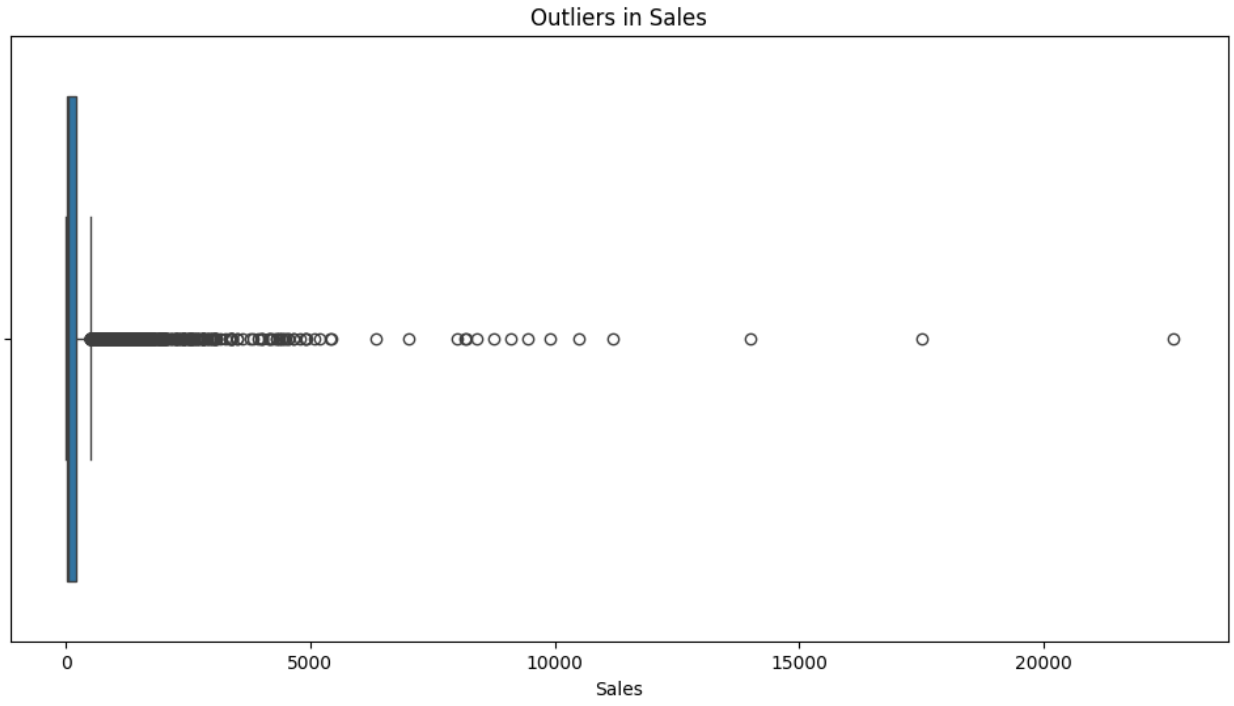
```
# Top 10 products by sales
top_products = dataset.groupby('Product Name')
['Sales'].sum().reset_index().sort_values('Sales',
ascending=False).head(10)

# Plot
plt.figure(figsize=(14, 7))
sns.barplot(x='Sales', y='Product Name', data=top_products,
palette='pastel')
plt.title('Top 10 Products by Sales')
plt.xlabel('Total Sales')
plt.ylabel('Product Name')
plt.show()
```

```
C:\Users\Abhishek upadhyay\AppData\Local\Temp\
ipykernel_14436\3637087065.py:6: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be
removed in v0.14.0. Assign the `y` variable to `hue` and set
`legend=False` for the same effect.

  sns.barplot(x='Sales', y='Product Name', data=top_products,
palette='pastel')
```



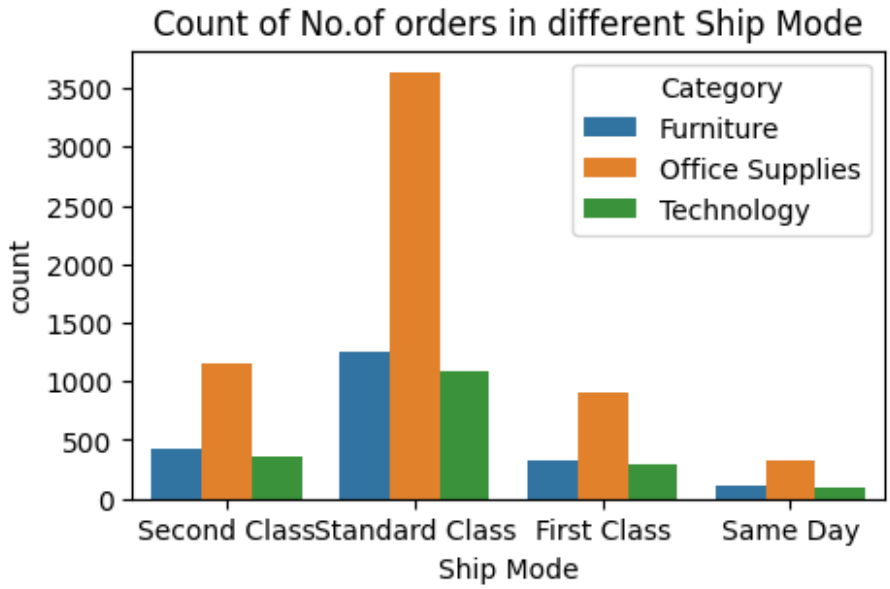
Are there outliers in the sales data?

```
# Boxplot to detect outliers
plt.figure(figsize=(12, 6))
sns.boxplot(x='Sales', data=dataset)
plt.title('Outliers in Sales')
plt.xlabel('Sales')
plt.show()
```



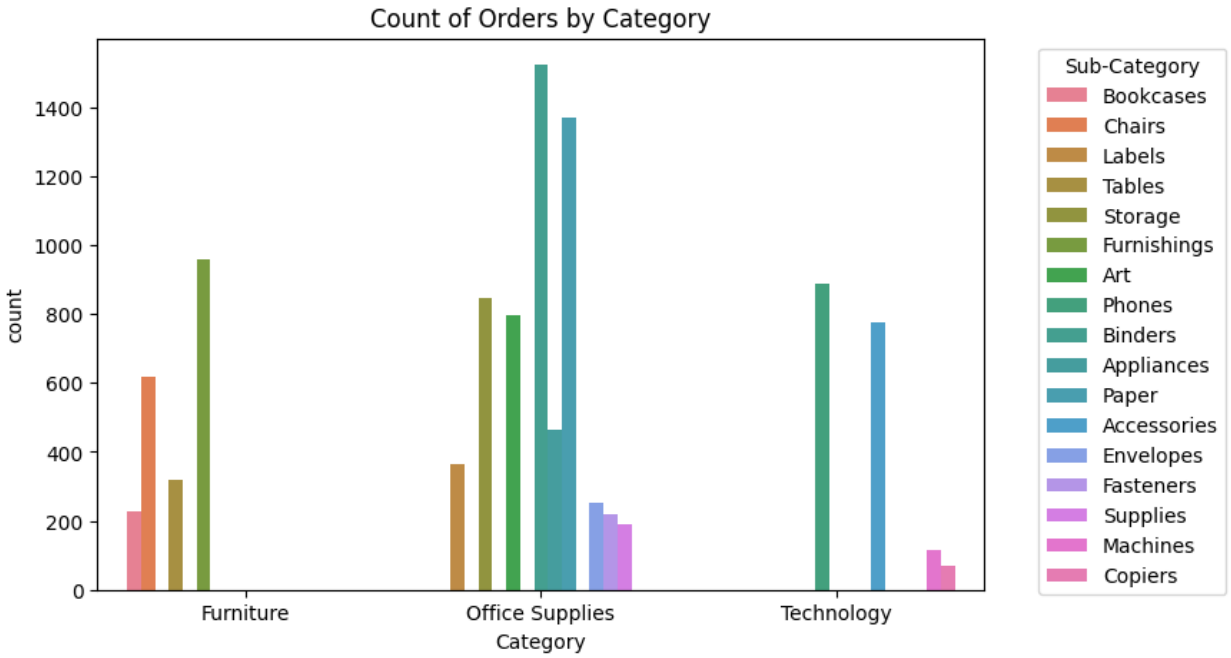
The plot will show the count of orders by Ship Mode, with bars segmented by Category, allowing you to compare how different product categories are distributed across various shipping methods

```
plt.figure(figsize = (5,3))
sns.countplot(x = "Ship Mode", data = dataset, hue = "Category")
plt.title('Count of No.of orders in different Ship Mode')
plt.show()
```



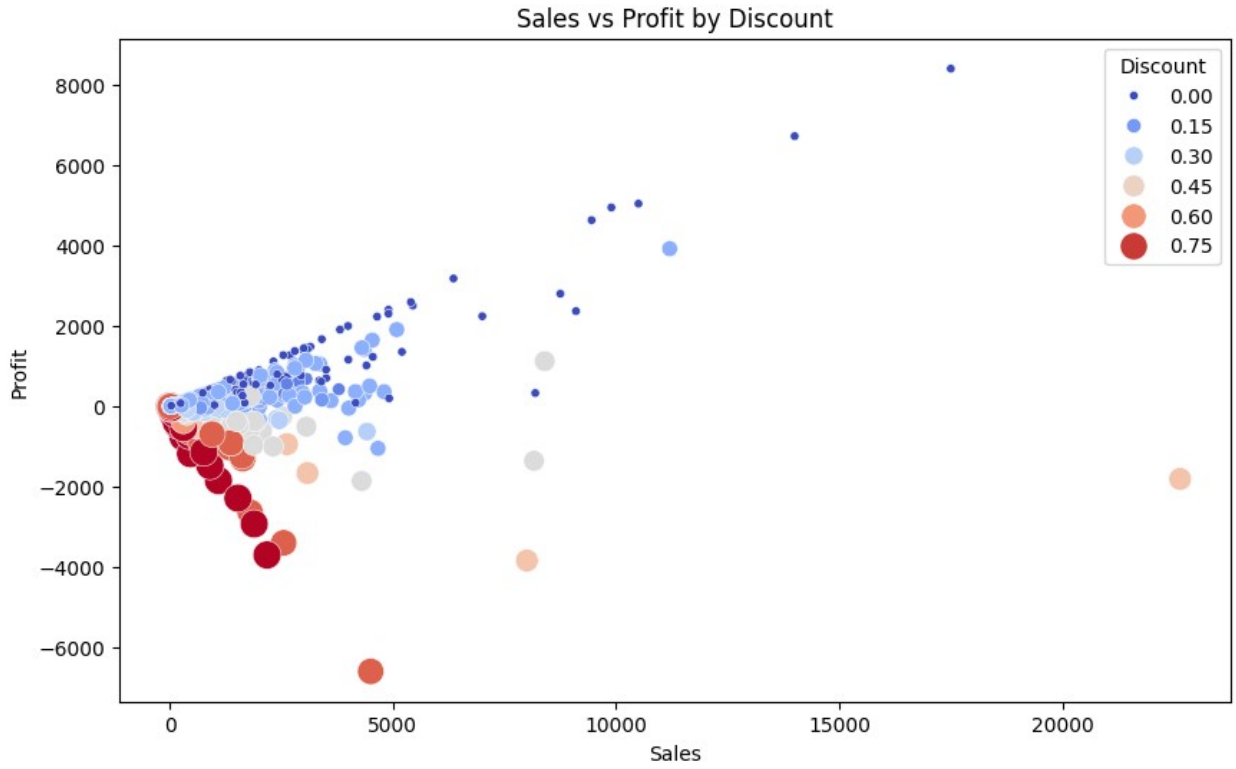
This visualization helps compare the distribution of orders across categories and their sub-categories.

```
plt.figure(figsize=(8, 5))  # Adjust the figure size
sns.countplot(x="Category", data=dataset, hue="Sub-Category")
plt.title('Count of Orders by Category')
# Move the legend outside the plot
plt.legend(title="Sub-Category", bbox_to_anchor=(1.05, 1), loc='upper
left')
plt.show()
```



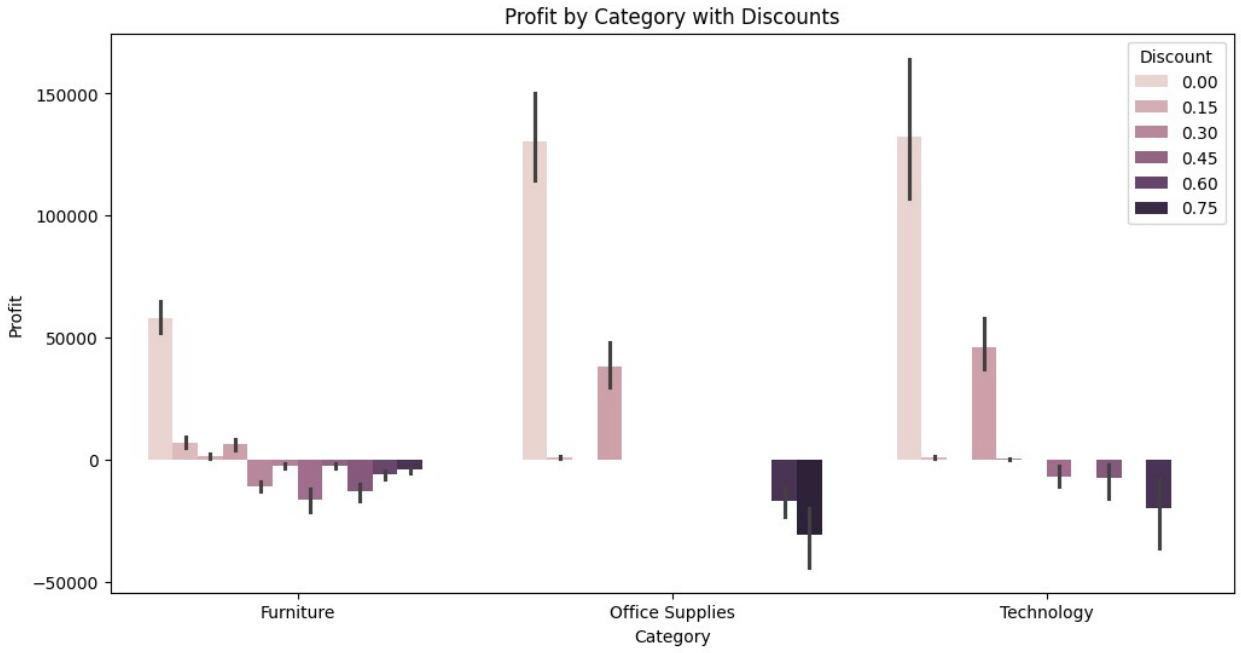
What is the relationship between Sales, Profit, and Discount?

```
import seaborn as sns
import matplotlib.pyplot as plt

plt.figure(figsize=(10, 6))
sns.scatterplot(x='Sales', y='Profit', hue='Discount',
size='Discount', data=dataset, palette='coolwarm', sizes=(20, 200))
plt.title('Sales vs Profit by Discount')
plt.xlabel('Sales')
plt.ylabel('Profit')
plt.show()
```



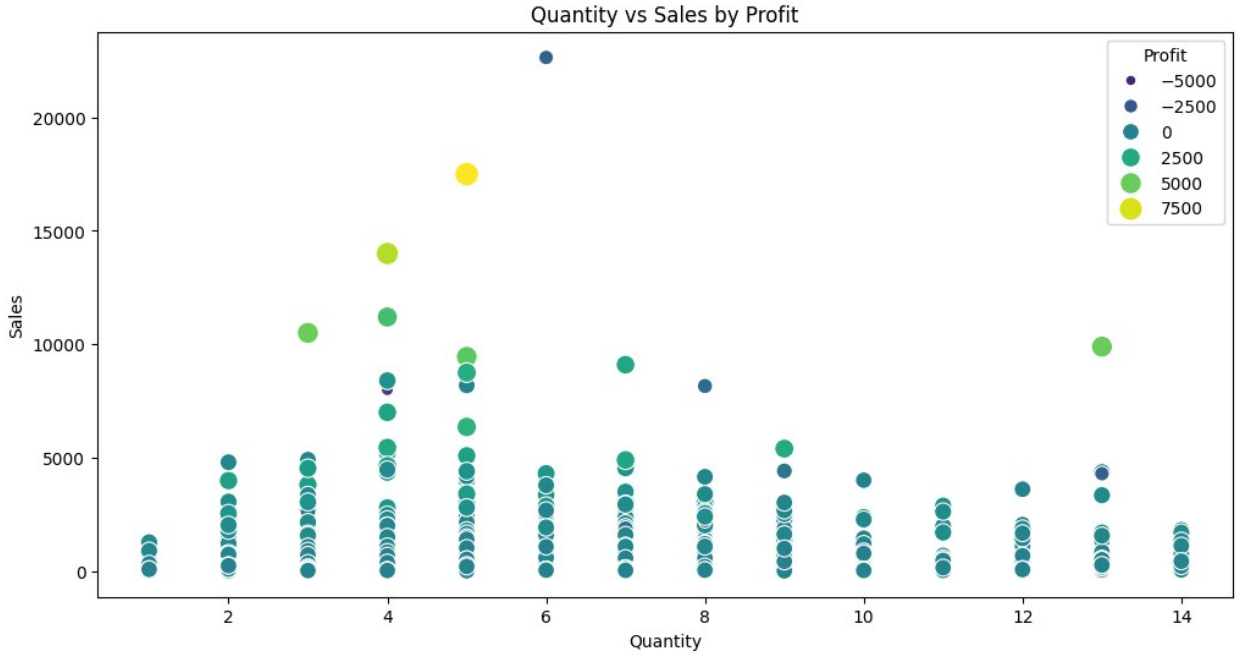
Which product categories have the highest discounts and how do they affect profits?

```
plt.figure(figsize=(12, 6))
sns.barplot(x='Category', y='Profit', hue='Discount', data=dataset,
estimator=sum)
plt.title('Profit by Category with Discounts')
plt.show()
```



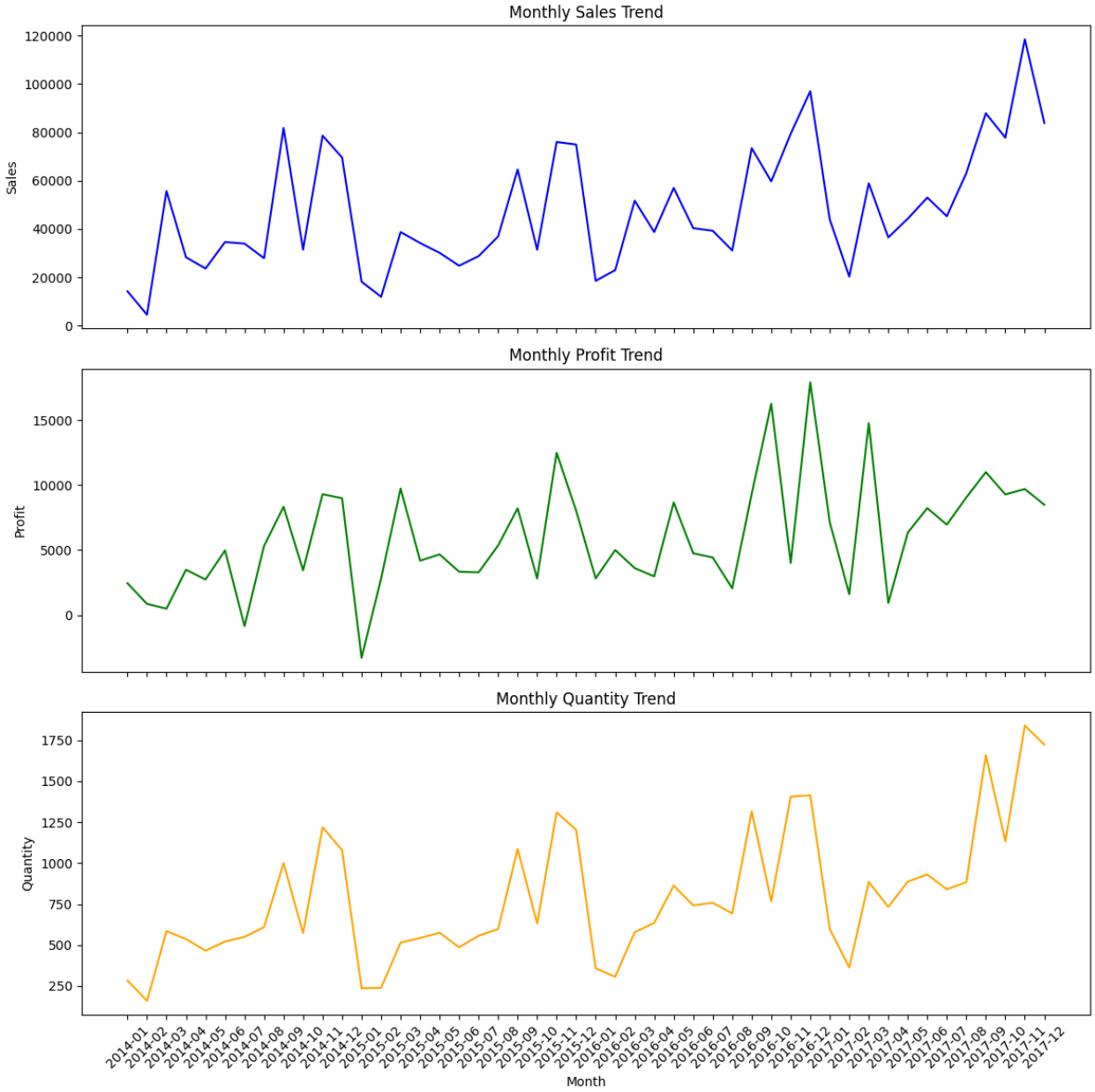
How does Quantity, Sales, and Profit vary by Category?

```
plt.figure(figsize=(12, 6))
sns.scatterplot(x='Quantity', y='Sales', hue='Profit', size='Profit',
data=dataset, palette='viridis', sizes=(20, 200))
plt.title('Quantity vs Sales by Profit')
plt.xlabel('Quantity')
plt.ylabel('Sales')
plt.show()
```



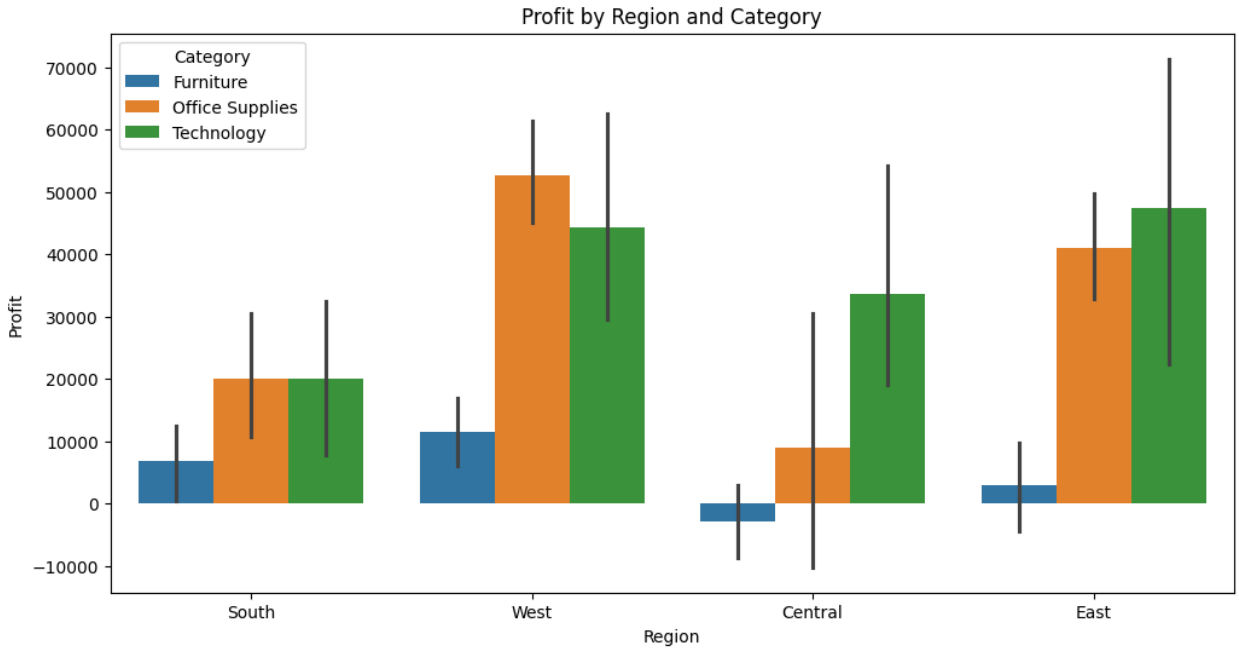
Are there seasonal trends in Sales, Profit, and Quantity?

```
# Extract month and year
dataset['Month'] = dataset['Order Date'].dt.to_period('M').astype(str)

# Group by month
monthly_trend = dataset.groupby('Month').agg({'Sales': 'sum',
'Profit': 'sum', 'Quantity': 'sum'}).reset_index()

# Plotting
fig, axes = plt.subplots(3, 1, figsize=(12, 12), sharex=True)

sns.lineplot(x='Month', y='Sales', data=monthly_trend, ax=axes[0],
color='blue')
axes[0].set_title('Monthly Sales Trend')

sns.lineplot(x='Month', y='Profit', data=monthly_trend, ax=axes[1],
color='green')
axes[1].set_title('Monthly Profit Trend')

sns.lineplot(x='Month', y='Quantity', data=monthly_trend, ax=axes[2],
color='orange')
axes[2].set_title('Monthly Quantity Trend')

plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```



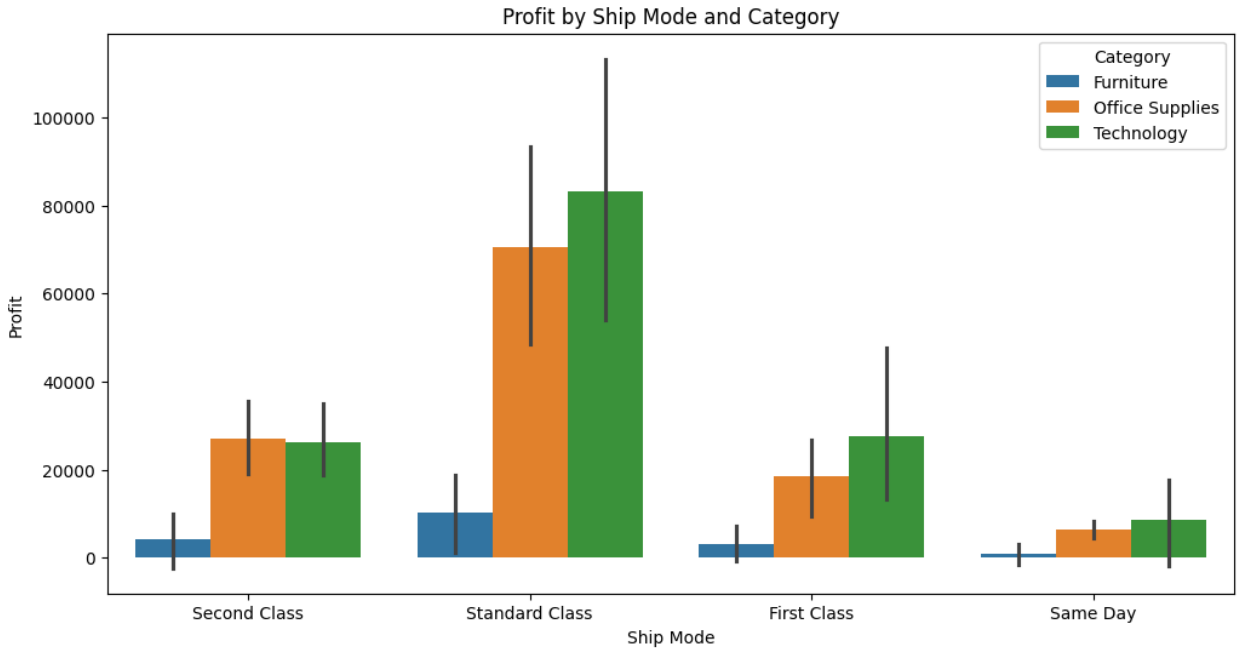
Which regions are the most profitable and which suffer losses?

```
plt.figure(figsize=(12, 6))
sns.barplot(x='Region', y='Profit', hue='Category', data=dataset,
estimator=sum)
plt.title('Profit by Region and Category')
plt.show()
```



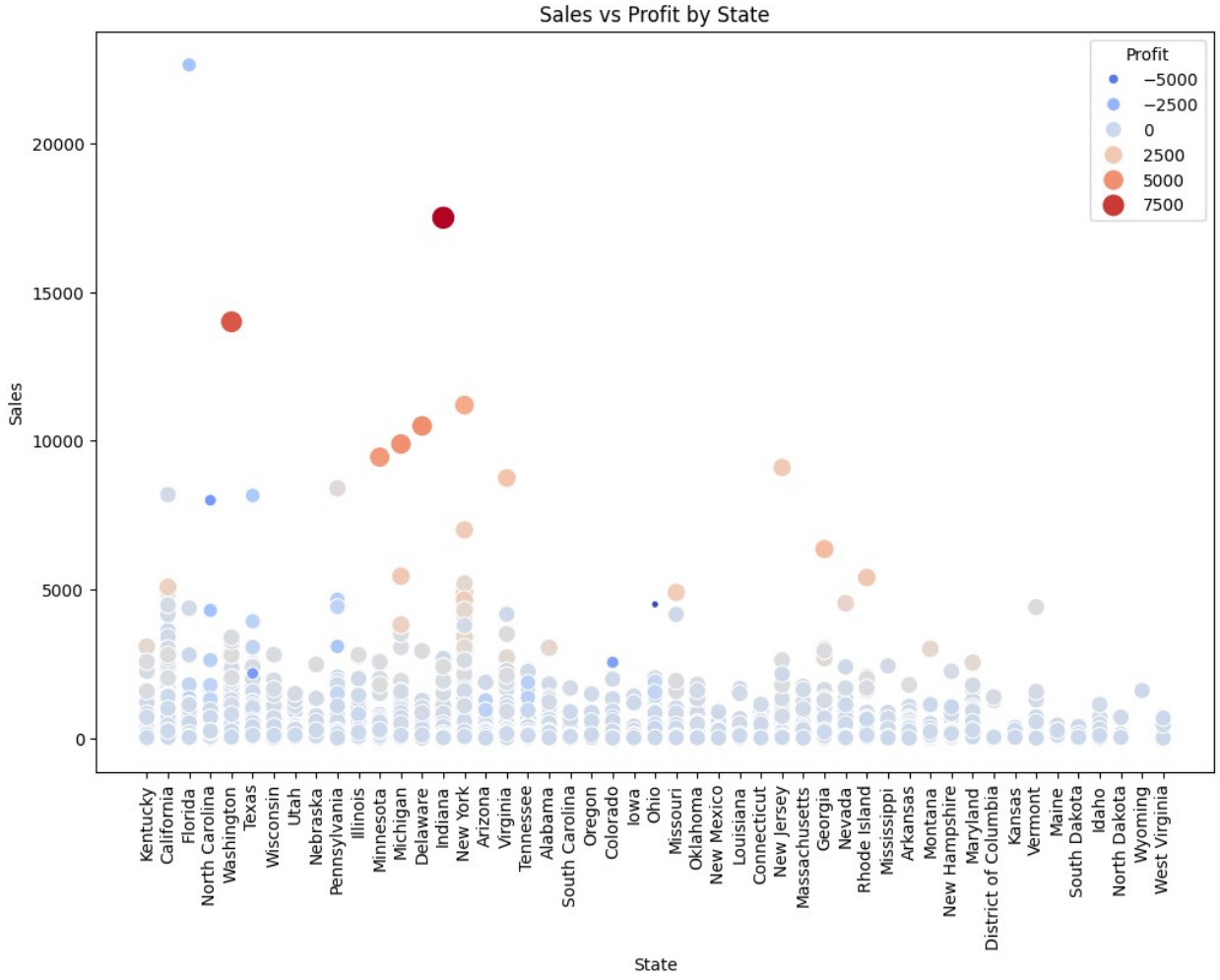
What is the relationship between Ship Mode, Sales, and Profit?

```
plt.figure(figsize=(12, 6))
sns.barplot(x='Ship Mode', y='Profit', hue='Category', data=dataset,
estimator=sum)
plt.title('Profit by Ship Mode and Category')
plt.show()
```



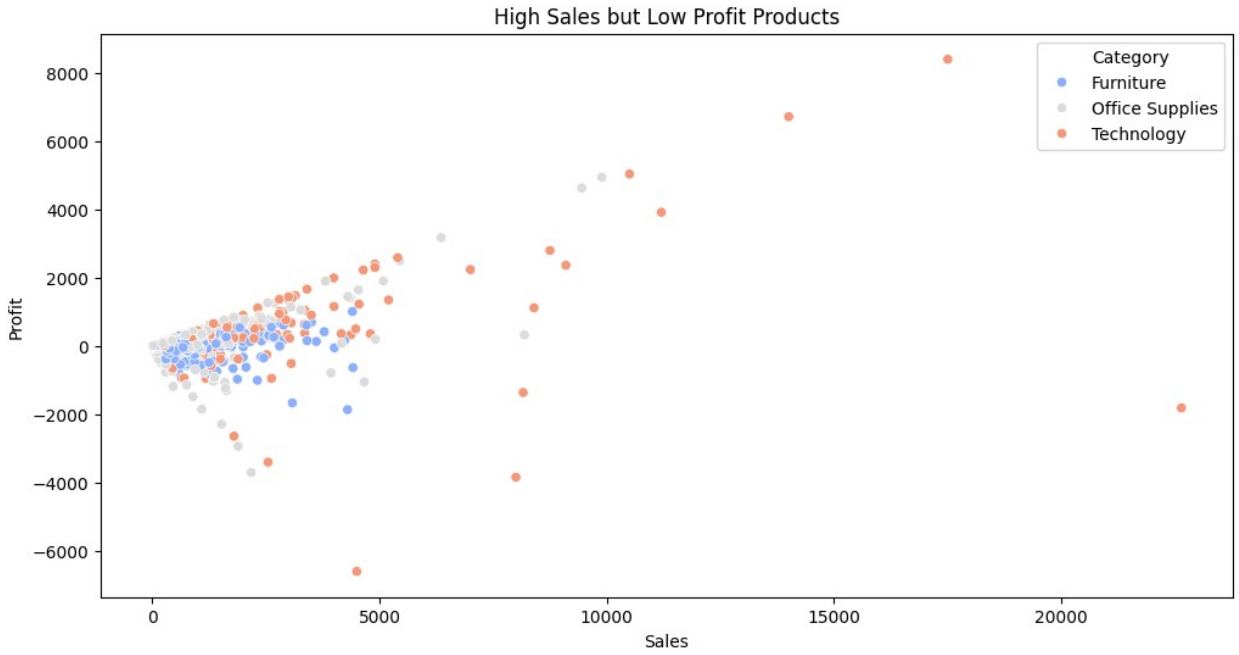
How does Sales and Profit vary by State and Region?

```
plt.figure(figsize=(12, 8))
sns.scatterplot(x='State', y='Sales', hue='Profit', size='Profit',
data=dataset, palette='coolwarm', sizes=(20, 200))
plt.xticks(rotation=90)
plt.title('Sales vs Profit by State')
plt.show()
```



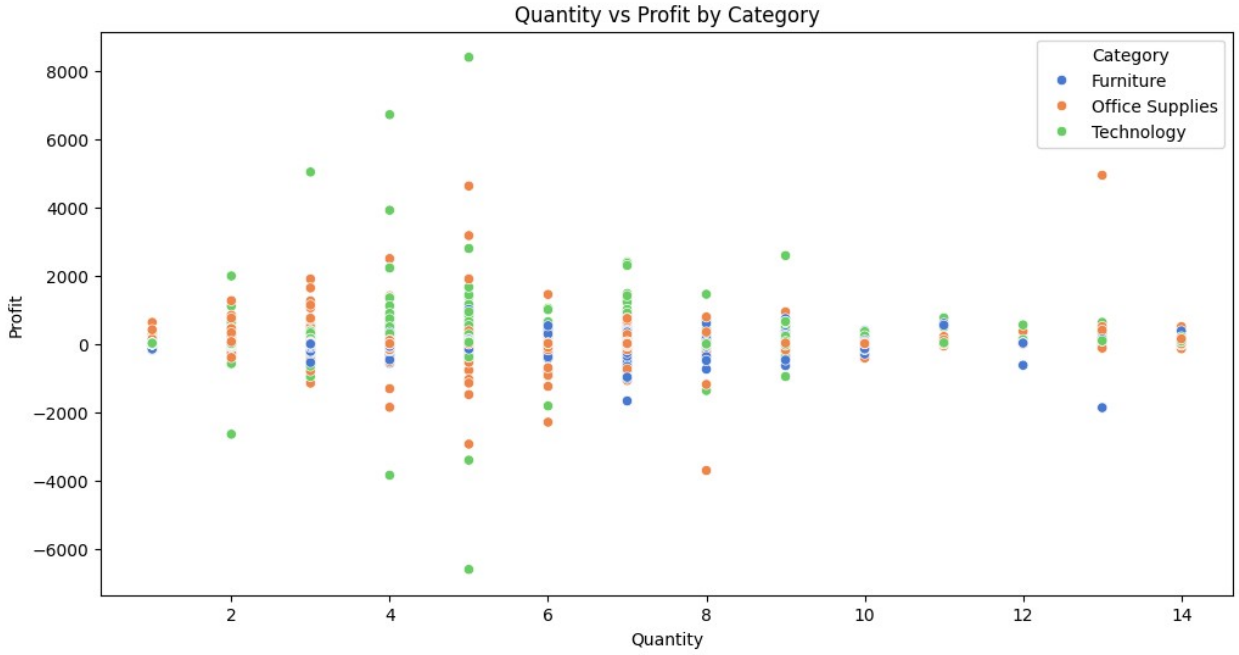
Which products generate high sales but low profits?

```
plt.figure(figsize=(12, 6))
sns.scatterplot(x='Sales', y='Profit', hue='Category', data=dataset,
palette='coolwarm')
plt.title('High Sales but Low Profit Products')
plt.show()
```



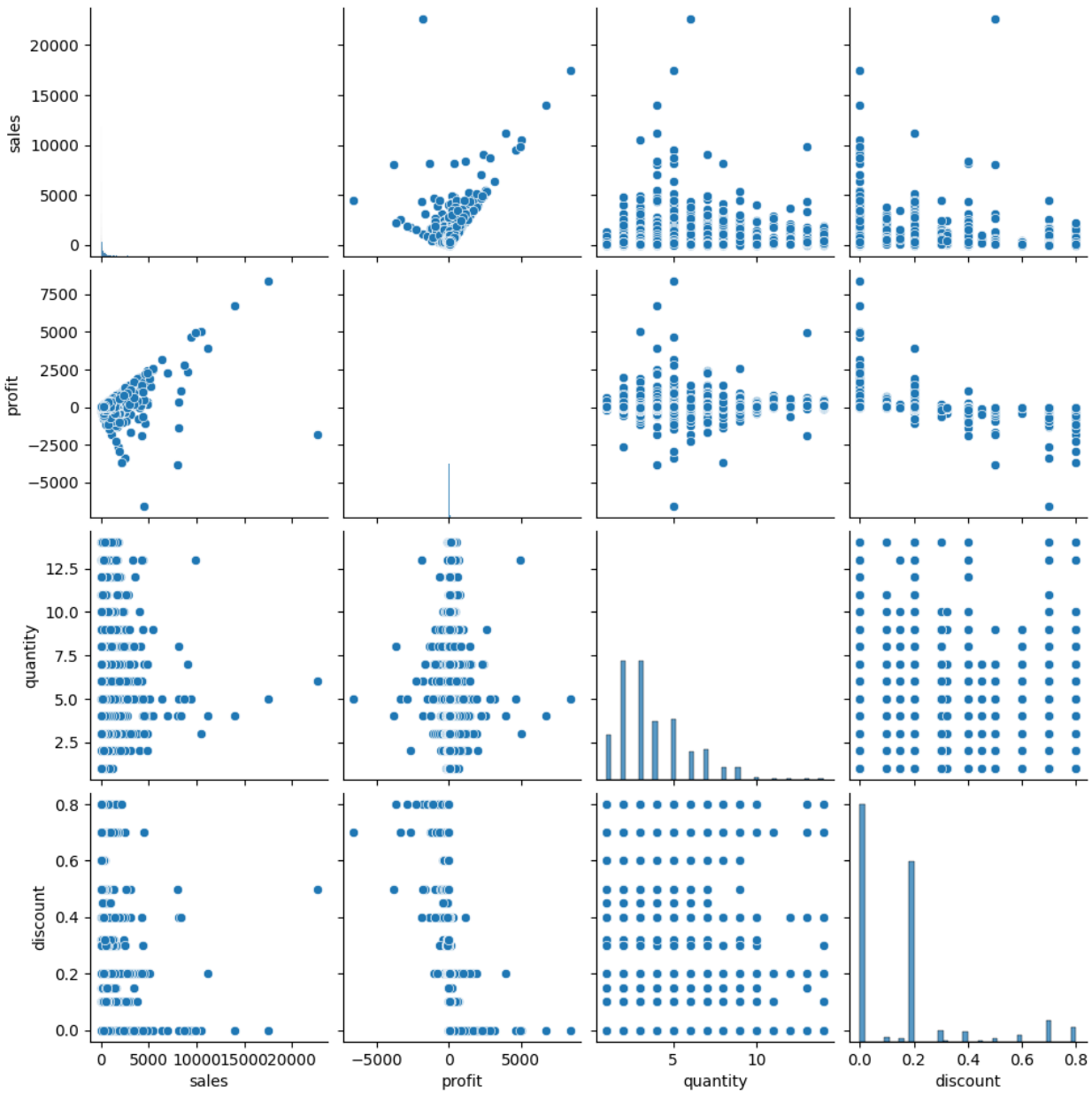
How does Profit vary with Quantity across Categories?

```
plt.figure(figsize=(12, 6))
sns.scatterplot(x='Quantity', y='Profit', hue='Category',
data=dataset, palette='muted')
plt.title('Quantity vs Profit by Category')
plt.show()
```



Are there any correlations between Sales, Profit, and Quantity?

```
sns.pairplot(dataset[['sales', 'profit', 'quantity', 'discount']])
plt.show()
```



Which Sub-Category contributes the most and least to the overall profit?

```
# Group by Sub-Category and sum the Profit
profit_by_subcat = dataset.groupby('Sub-Category')
['Profit'].sum().reset_index()

# Sort by Profit
profit_by_subcat = profit_by_subcat.sort_values('Profit',
ascending=False)
```

```
# Plot
plt.figure(figsize=(12, 6))
sns.barplot(x='Profit', y='Sub-Category', data=profit_by_subcat,
palette='viridis')
plt.title('Profit Contribution by Sub-Category')
plt.xlabel('Total Profit')
plt.ylabel('Sub-Category')
plt.show()
```

```
C:\Users\Abhishek upadhyay\AppData\Local\Temp\
ipykernel_6744\1797967547.py:9: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be
removed in v0.14.0. Assign the `y` variable to `hue` and set
`legend=False` for the same effect.

  sns.barplot(x='Profit', y='Sub-Category', data=profit_by_subcat,
palette='viridis')
```