OPTIMIZING SALES AND IMPROVING CUSTOMER EXPERIENCE AT EXPRESSMART

Introduction:

This project focuses on providing a comprehensive analysis of sales data across multiple dimensions, including time of day, month, product performance, and regional sales. The data used in this analysis, *ExpressMartData*, want provided by ***Only Quality Data.***

Objective:

The objective of the ExpressMart Sales Performance Analysis Project is to uncover insights into customer purchasing behaviours, identify peak sales periods, and analyse top-performing products, regional sales performance, and customer purchasing patterns. This analysis will assist ExpressMart in optimizing staffing, inventory management, and marketing strategies while enhancing customer experience and overall sales performance.

Dataset Overview

1. Order Id: A unique identifier for each order
2. Product: Indicates the product ordered by the customer.
3. Quantity Ordered: The quantity ordered by customer.
4. Price: The price of the product
5. Order Date: The date the order was made.
6. Purchase Address: The Purchase address of the customer
7. Time: The time of day the order was made
8. Sales: How much revenue was made from that order. Obtained by multiplying quantity ordered with price

In [29]:
```
# Importing relevant libraries
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [19]:
```
# load expressmart dataset
expressmart_df= pd.read_excel("ExpressMartData. - Copy 2.xlsx")
```

In [20]:
```
# load the first 5 rows
expressmart_df.head()
```

Out[20]:

	Order ID	Product	Quantity Ordered	Price Each	Order Date	Purchase Address	Time	Sales
0	295665	Macbook Pro Laptop	1	1700.00	2019-12-30	136 Church St, New York City, NY 10001	00:01:00	1700.00
1	295666	LG Washing Machine	1	600.00	2019-12-29	562 2nd St, New York City, NY 10001	07:03:00	600.00
2	295667	USB-C Charging Cable	1	11.95	2019-12-12	277 Main St, New York City, NY 10001	18:21:00	11.95
3	295668	27in FHD Monitor	1	149.99	2019-12-22	410 6th St, San Francisco, CA 94016	15:13:00	149.99
4	295669	USB-C Charging Cable	1	11.95	2019-12-18	43 Hill St, Atlanta, GA 30301	12:38:00	11.95

In [21]:
```
#checking the data types of the columns
expressmart_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 185950 entries, 0 to 185949
Data columns (total 8 columns):
 #   Column            Non-Null Count   Dtype         
---  ------            --------------   -----         
 0   Order ID          185950 non-null  int64         
 1   Product           185950 non-null  object        
 2   Quantity Ordered  185950 non-null  int64         
 3   Price Each        185950 non-null  float64       
 4   Order Date        185950 non-null  datetime64[ns]
 5   Purchase Address  185950 non-null  object        
 6   Time              185950 non-null  object        
 7   Sales             185950 non-null  float64       
dtypes: datetime64[ns](1), float64(2), int64(2), object(3)
memory usage: 11.3+ MB
```

In [22]:
```
expressmart_df.columns
```

Out[22]:
```
Index(['Order ID', 'Product', 'Quantity Ordered', 'Price Each', 'Order Date',
       'Purchase Address', 'Time', 'Sales'],
      dtype='object')
```

In [ ]:
```

```

Transforming the Data

In [23]:
```
# extract the hour from the time column.
expressmart_df['Hour'] = pd.to_datetime(expressmart_df['Time'], format='%H:%M:%S').

# Verify the change
expressmart_df[['Time', 'Hour']]
```

Out[23]:

	Time	Hour
0	00:01:00	0
1	07:03:00	7
2	18:21:00	18
3	15:13:00	15
4	12:38:00	12
...	...	...
185945	19:02:00	19
185946	19:29:00	19
185947	18:57:00	18
185948	18:35:00	18
185949	14:33:00	14

185950 rows × 2 columns

In [24]:

```
# Extract the month name and create a new column 'Month'
expressmart_df['Month'] = expressmart_df['Order Date'].dt.strftime('%b')

#%b: Represents the month abbreviation (Jan, Feb, Mar, etc.)

# Verify the change
expressmart_df[['Order Date', 'Month']]
```

Out[24]:

	Order Date	Month
0	2019-12-30	Dec
1	2019-12-29	Dec
2	2019-12-12	Dec
3	2019-12-22	Dec
4	2019-12-18	Dec
...	...	...
185945	2019-06-07	Jun
185946	2019-06-01	Jun
185947	2019-06-22	Jun
185948	2019-06-26	Jun
185949	2019-06-25	Jun

185950 rows × 2 columns

In [30]:

```
# Create a function to classify AM/PM
def classify_am_pm(time):
    return 'AM' if time.hour < 12 else 'PM'

# Apply the function to create the 'AM/PM' column
expressmart_df['AM/PM'] = expressmart_df['Time'].apply(classify_am_pm)
```

```
# Verify the change
expressmart_df[['Time', 'AM/PM']]
```

Out[30]:

	Time	AM/PM
0	00:01:00	AM
1	07:03:00	AM
2	18:21:00	PM
3	15:13:00	PM
4	12:38:00	PM
...	...	...
185945	19:02:00	PM
185946	19:29:00	PM
185947	18:57:00	PM
185948	18:35:00	PM
185949	14:33:00	PM

185950 rows × 2 columns

In [31]:

```
# Extract the quarter and format it as 'Qtr 1', 'Qtr 2', etc.
expressmart_df['Quarter'] = 'Qtr ' + expressmart_df['Order Date'].dt.quarter.astype

# Verify the change
expressmart_df[['Order Date', 'Quarter']]
```

Out[31]:

	Order Date	Quarter
0	2019-12-30	Qtr 4
1	2019-12-29	Qtr 4
2	2019-12-12	Qtr 4
3	2019-12-22	Qtr 4
4	2019-12-18	Qtr 4
...	...	...
185945	2019-06-07	Qtr 2
185946	2019-06-01	Qtr 2
185947	2019-06-22	Qtr 2
185948	2019-06-26	Qtr 2
185949	2019-06-25	Qtr 2

185950 rows × 2 columns

In [34]:

```
# Extract the year and create a new column 'Year'
expressmart_df['Year'] = expressmart_df['Order Date'].dt.year

# Verify the change
expressmart_df[['Order Date', 'Year']]
```

Out[34]:

	Order Date	Year
0	2019-12-30	2019
1	2019-12-29	2019
2	2019-12-12	2019
3	2019-12-22	2019
4	2019-12-18	2019
...	...	...
185945	2019-06-07	2019
185946	2019-06-01	2019
185947	2019-06-22	2019
185948	2019-06-26	2019
185949	2019-06-25	2019

185950 rows × 2 columns

In [43]:
```
# Extract city name from the 'Purchase Address' column
expressmart_df['City'] = expressmart_df['Purchase Address'].apply(lambda x: x.split



expressmart_df['City'].unique()
```

Out[43]:
```
array(['New York City', 'San Francisco', 'Atlanta', 'Portland', 'Dallas',
       'Los Angeles', 'Boston', 'Austin', 'Seattle'], dtype=object)
```

In [ ]:

In [ ]:

Performing some Exploratory Data Analysis (EDA)

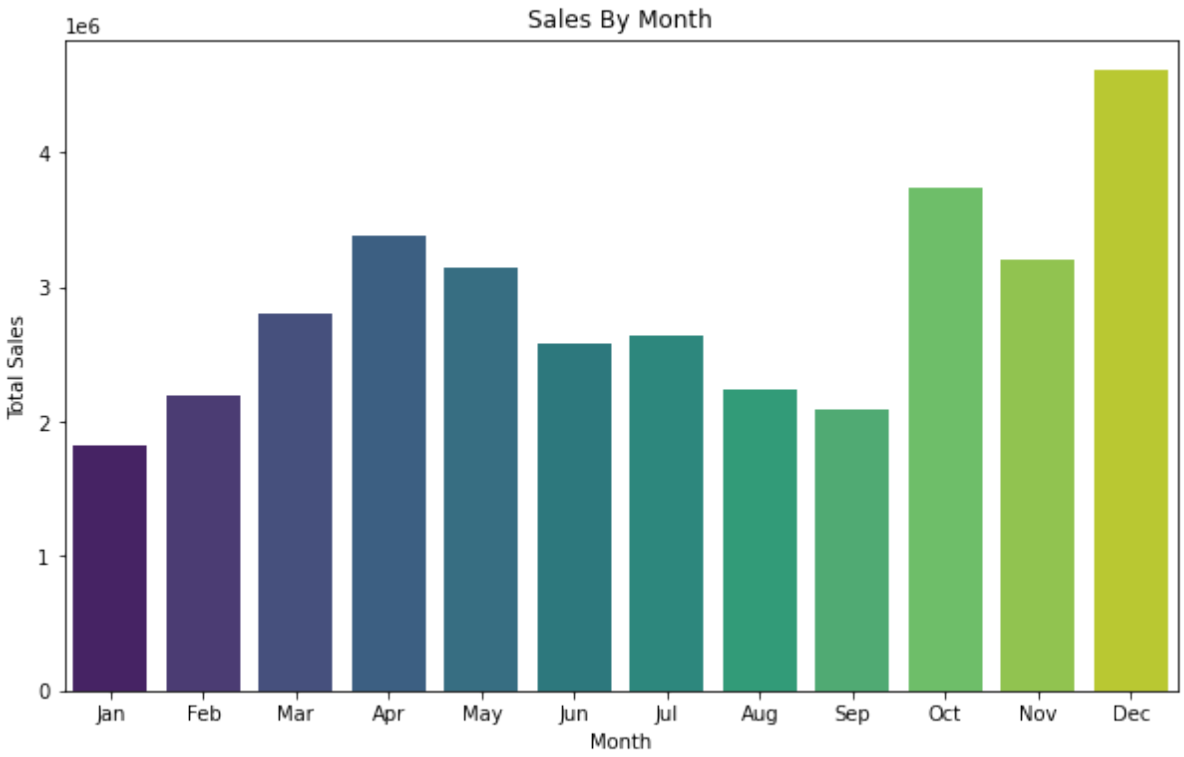
In [37]:
```
# Calculate the total quantity
total_quantity = expressmart_df['Quantity Ordered'].sum()

# Calculate the total sales
total_sales = expressmart_df['Sales'].sum()

# Calculate the total number of unique products
total_products = expressmart_df['Product'].nunique()

print(f"Total Quantity: {total_quantity}")
print(f"Total Sales: {total_sales}")
print(f"Total Products: {total_products}")
```

```
Total Quantity: 209079
Total Sales: 34492035.97
Total Products: 19
```

In [ ]:

Creating visuals

In [46]:
```
# Group by month and sum sales
monthly_sales = expressmart_df.groupby('Month')['Sales'].sum().reindex(['Jan', 'Feb

# Plot the histogram using Seaborn
plt.figure(figsize=(10, 6))
sns.barplot(x=monthly_sales.index, y=monthly_sales.values, palette='viridis')


plt.title('Sales By Month')
plt.xlabel('Month')
plt.ylabel('Total Sales')
plt.show()
```



In [40]:
```
monthly_sales
```

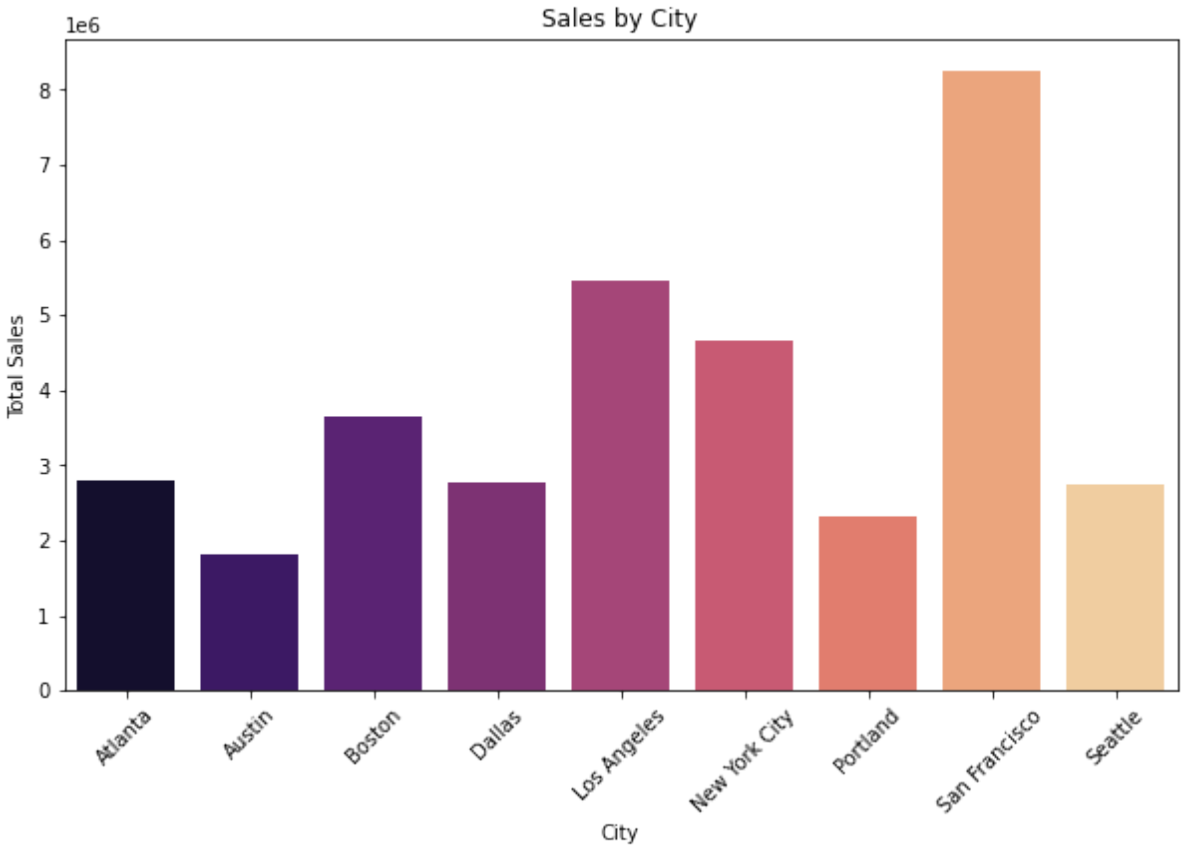
Out[40]:
```
Month
Jan    1822256.73
Feb    2202022.42
Mar    2807100.38
Apr    3390670.24
May    3152606.75
Jun    2577802.26
Jul    2647775.76
Aug    2244467.88
Sep    2097560.13
Oct    3736726.88
Nov    3199603.20
Dec    4613443.34
Name: Sales, dtype: float64
```

In [ ]:

In [ ]:

In [61]:
```
# Group by the 'City' column and sum sales
city_sales = expressmart_df.groupby('City')['Sales'].sum()

# Plot the bar chart using Seaborn
```

```
plt.figure(figsize=(10, 6))
sns.barplot(x=city_sales.index, y=city_sales.values, palette='magma')


plt.title('Sales by City')
plt.xlabel('City')
plt.ylabel('Total Sales')
plt.xticks(rotation=45)
plt.show()
```



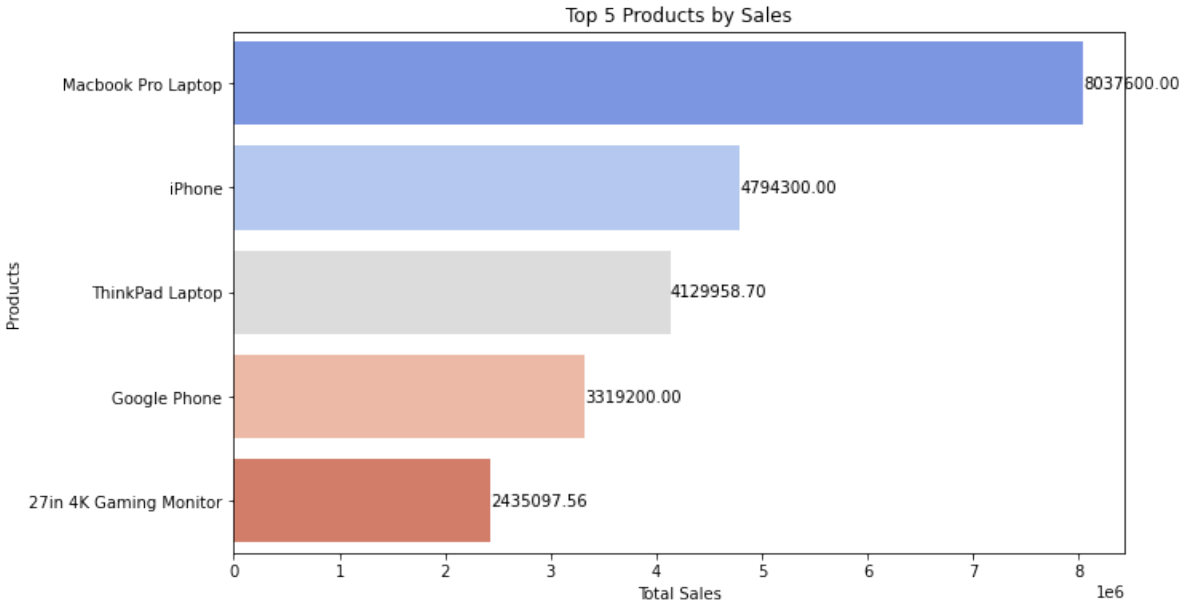
In [45]:
```
city_sales
```

Out[45]:
```
City
Atlanta          2795498.58
Austin           1819581.75
Boston           3661642.01
Dallas           2767975.40
Los Angeles      5452570.80
New York City    4664317.43
Portland         2320490.61
San Francisco    8262203.91
Seattle          2747755.48
Name: Sales, dtype: float64
```

In [ ]:
```

```

In [47]:
```
# Group by 'Product' and sum the sales
product_sales = expressmart_df.groupby('Product')['Sales'].sum()

# Sort the product sales in descending order and get the top 5 products
top_5_products = product_sales.sort_values(ascending=False).head(5)

# Plot the bar graph using Seaborn
plt.figure(figsize=(10, 6))
sns.barplot(x=top_5_products.values, y=top_5_products.index, palette='coolwarm')
```

```
# Add data labels
for index, value in enumerate(top_5_products.values):
    plt.text(value, index, f'{value:.2f}', color='black', va='center')

plt.title('Top 5 Products by Sales')
plt.xlabel('Total Sales')
plt.ylabel('Products')
plt.show()
```

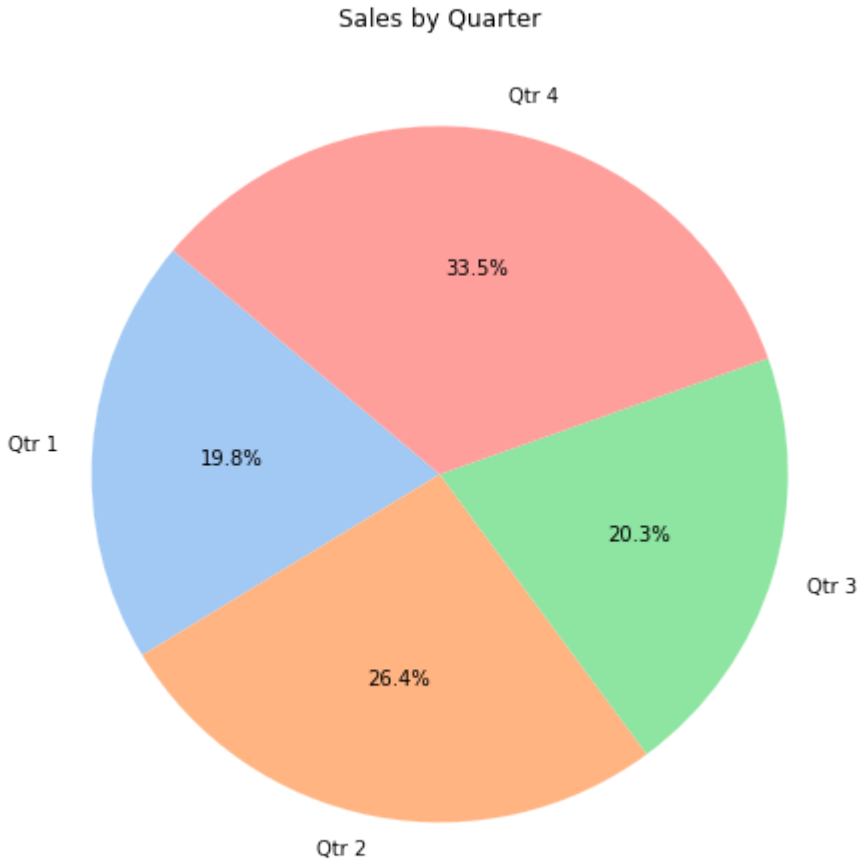


In [48]:
```
top_5_products
```

Out[48]:
```
Product
Macbook Pro Laptop        8037600.00
iPhone                    4794300.00
ThinkPad Laptop           4129958.70
Google Phone              3319200.00
27in 4K Gaming Monitor    2435097.56
Name: Sales, dtype: float64
```

In [ ]:
```

```

In [49]:
```
# Group by quarter and sum sales
quarterly_sales = expressmart_df.groupby('Quarter')['Sales'].sum()

# Plot the pie chart
plt.figure(figsize=(8, 8))
colors = sns.color_palette('pastel')[0:4]
plt.pie(quarterly_sales, labels=quarterly_sales.index, autopct='%1.1f%%', colors=cc

plt.title('Sales by Quarter')
plt.show()
```

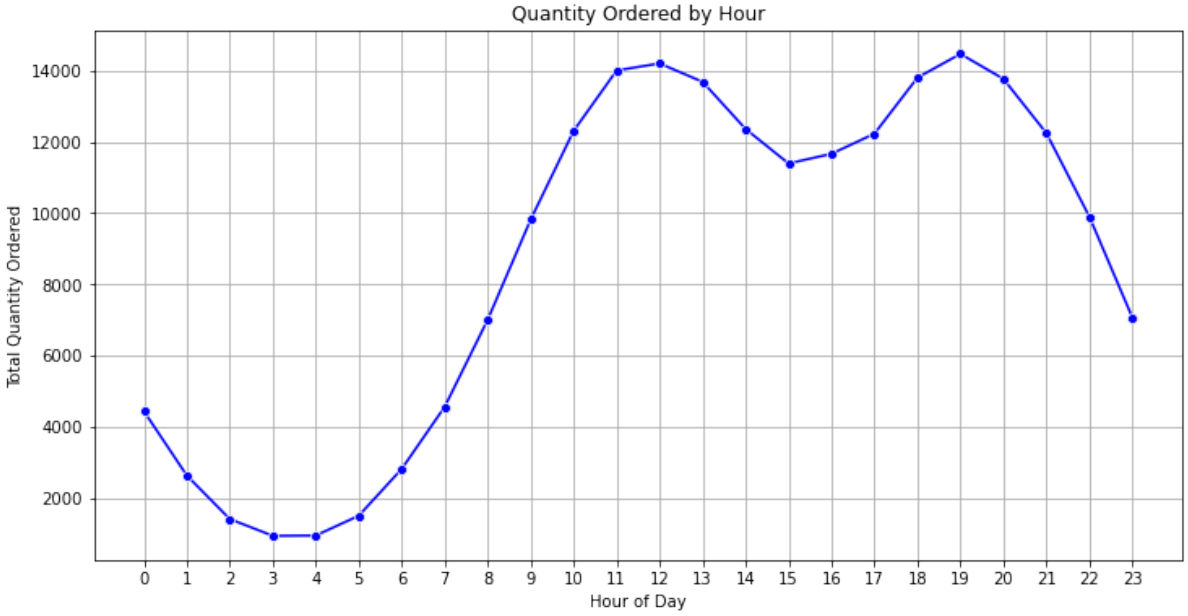


In [50]:
```
quarterly_sales
```

Out[50]:
```
Quarter
Qtr 1     6831379.53
Qtr 2     9121079.25
Qtr 3     6989803.77
Qtr 4    11549773.42
Name: Sales, dtype: float64
```

In [ ]:
```

```

In [57]:
```
# Group by hour and sum the quantity ordered
hourly_quantity = expressmart_df.groupby('Hour')['Quantity Ordered'].sum()

# Plot the line graph using Seaborn
plt.figure(figsize=(12, 6))
sns.lineplot(x=hourly_quantity.index, y=hourly_quantity.values, marker='o', linesty



plt.title('Quantity Ordered by Hour')
plt.xlabel('Hour of Day')
plt.ylabel('Total Quantity Ordered')
plt.grid(True)
plt.xticks(range(0, 24))  # Ensure all hours are shown on x-axis
plt.show()
```



In [54]:
```
hourly_quantity
```

Out[54]:
```
Hour
0      4428
1      2619
2      1398
3       928
4       937
5      1493
6      2810
7      4556
8      7002
9      9816
10    12308
11    14005
12    14202
13    13685
14    12362
15    11391
16    11662
17    12229
18    13802
19    14470
20    13768
21    12244
22     9899
23     7065
Name: Quantity Ordered, dtype: int64
```

Insights

1. **Sales by Month**:

   - **December** had the highest sales at **$4,613,443.34**, followed closely by **October** at **$3,736,726.88**.
   - Sales dipped in **September** to **$2,097,560.13**, indicating it was one of the slower months.
   - Sales show a general upward trend from January to May, peaking in December, suggesting that **seasonal factors**, particularly holiday months, play a significant role.

2. **Sales by City**:

    - **San Francisco** led sales by a substantial margin, achieving **$8,262,203.91**, indicating strong demand in the area.
    - **Los Angeles** and **New York City** followed, with sales figures of **$5,452,570.80** and **$4,664,317.43**, respectively.
    - Smaller cities like **Austin** and **Portland** had lower sales, around **$1,819,581.75** and **$2,320,490.61**, respectively, which might point to differing customer bases or regional preferences.
3. **Top 5 Products by Sales**:

    - The **Macbook Pro Laptop** was the top-selling product, generating **$8,037,600.00**, followed by the **iPhone** and **ThinkPad Laptop** with **$4,794,300.00** and **$4,129,958.70**, respectively.
    - High-end tech products dominated sales, suggesting a customer base that values premium technology.
    - The **Google Phone** and **27in 4K Gaming Monitor** also performed well, showing customer interest in both mobile and gaming technologies.
4. **Sales by Quarter**:

    - The **fourth quarter** generated the highest sales, totaling **$11,549,773.42**, likely due to holiday spending.
    - Sales were lowest in **Q1**, indicating that the **first quarter** is a slower season for ExpressMart.
    - The significant rise in Q4 suggests the impact of **year-end spending**, a trend that could be leveraged for targeted marketing efforts.
5. **Quantity Ordered by Hour of Day**:

    - The highest order quantities occurred from **11 AM to 8 PM**, with peaks around midday and evening (**12 PM: 14,202**, **7 PM: 14,470**).
    - Order quantities were lowest between **midnight and early morning** (12 AM to 4 AM), likely due to reduced customer activity.
    - Afternoon and evening peaks indicate **times of high demand**, which can inform staffing and operational planning.

Recommendations

1. **Optimizing Staffing and Inventory for Peak Sales Periods**:

    - **Staffing**: Increase staffing levels between 11 AM and 8 PM, especially around the midday and evening peaks, to manage high order volumes and ensure a seamless customer experience. Additional training for peak hour efficiency could further streamline operations.
    - **Inventory Management**: Stock essential items, particularly top-performing products, more heavily during Q4 and holiday months like December. Implement automated reorder thresholds for popular items to prevent stockouts during these high-demand periods.
2. **Marketing Strategies for Top Performing and Underperforming Products**:

- **Top Performers**: Emphasize high-end technology products, such as the Macbook Pro, iPhone, and ThinkPad Laptop, in marketing campaigns to maintain their visibility. Consider bundling these items with accessories or offering limited-time discounts to enhance their appeal.
- **Underperforming Products**: Analyze the underperforming product categories to determine the cause of low sales. Target these items with promotional discounts, bundle offers, or strategic positioning in-store and online to boost interest.

3. **Targeted Regional Marketing Campaigns**:

   - **High-Performing Cities**: In cities with high sales volumes like San Francisco, Los Angeles, and New York City, maintain a steady advertising presence. Invest in local marketing partnerships and explore community-based promotions to reinforce customer loyalty.
   - **Growth Opportunities in Smaller Markets**: For cities like Austin and Portland, explore targeted campaigns aimed at growing the customer base. Focus on digital advertising tailored to these regions, offering region-specific discounts or loyalty programs to attract new customers.

4. **Tailoring Marketing to Customer Purchasing Behaviors**:

   - **Demographic-Based Campaigns**: Use demographic data to segment customers by age, income level, and preferences, allowing for customized campaigns that better resonate with specific groups.
   - **Personalized Recommendations**: Implement a recommendation engine based on past purchases to offer personalized suggestions, increasing the likelihood of repeat purchases and boosting sales.

5. **Seasonal Campaigns for Low-Performing Months**:

   - **Q1 Sales Boost**: Plan post-holiday promotions in January and February to counteract the typical Q1 sales slump. Options include clearance sales on older inventory or a “New Year, New Tech” campaign.
   - **End-of-Summer Strategies**: In slower months like August and September, introduce back-to-school or pre-fall promotions to stimulate demand. Consider a “back-to-work” campaign for office supplies or tech upgrades, appealing to both students and professionals returning to their routines.

In [ ]: