Project 1 : Sales Data Analysis

In [2]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import plotly
sales_data = pd.read_excel("C:/Users/Ayush/Desktop/Afame Tech/DA Project Details/ECOMM DATA.xlsx") #reading sales excel file
```

In [3]:

```
sales_data.columns #columns
```

Out[3]:

```
Index(['Row ID', 'Order ID', 'Order Date', 'Ship Date', 'Ship Mode',
       'Customer ID', 'Customer Name', 'Segment', 'City', 'State', 'Country',
       'Postal Code', 'Market', 'Region', 'Product ID', 'Category',
       'Sub-Category', 'Product Name', 'Sales', 'Quantity', 'Discount',
       'Profit', 'Shipping Cost', 'Order Priority'],
      dtype='object')
```

In [4]:

```
sales_data.shape #dimensions no of rows and columns
```

Out[4]:

```
(51290, 24)
```

In [5]:

```
sales_data.shape #dimensions no of rows and columns
```

Out[5]:

```
(51290, 24)
```

In [8]:

```
sales_data
```

Out[8]:

	Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer ID	Customer Name	Segment	City	State	...	Product ID	Category	Sub-Category	Product Name	Sales	Quantity	Discount	Profit	Shipping Cost	Order Priority
0	32298	CA-2012-124891	2012-07-31	2012-07-31	Same Day	RH-19495	Rick Hansen	Consumer	New York City	New York	...	TEC-AC-10003033	Technology	Accessories	Plantronics CS510 - Over-the-Head monaural Wir...	2309.650	7	0.0	762.1845	933.570	Critical
1	26341	IN-2013-77878	2013-02-05	2013-02-07	Second Class	JR-16210	Justin Ritter	Corporate	Wollongong	New South Wales	...	FUR-CH-10003950	Furniture	Chairs	Novimex Executive Leather Armchair, Black	3709.395	9	0.1	-288.7650	923.630	Critical
2	25330	IN-2013-71249	2013-10-17	2013-10-18	First Class	CR-12730	Craig Reiter	Consumer	Brisbane	Queensland	...	TEC-PH-10004664	Technology	Phones	Nokia Smart Phone, with Caller ID	5175.171	9	0.1	919.9710	915.490	Medium
3	13524	ES-2013-1579342	2013-01-28	2013-01-30	First Class	KM-16375	Katherine Murray	Home Office	Berlin	Berlin	...	TEC-PH-10004583	Technology	Phones	Motorola Smart Phone, Cordless	2892.510	5	0.1	-96.5400	910.160	Medium
4	47221	SG-2013-4320	2013-11-05	2013-11-06	Same Day	RH-9495	Rick Hansen	Consumer	Dakar	Dakar	...	TEC-SHA-10000501	Technology	Copiers	Sharp Wireless Fax, High-Speed	2832.960	8	0.0	311.5200	903.040	Critical
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
51285	29002	IN-2014-62366	2014-06-19	2014-06-19	Same Day	KE-16420	Katrina Edelman	Corporate	Kure	Hiroshima	...	OFF-FA-10000746	Office Supplies	Fasteners	Advantus Thumb Tacks, 12 Pack	65.100	5	0.0	4.5000	0.010	Medium
51286	35398	US-2014-102288	2014-06-20	2014-06-24	Standard Class	ZC-21910	Zuschuss Carroll	Consumer	Houston	Texas	...	OFF-AP-10002906	Office Supplies	Appliances	Hoover Replacement Belt for Commercial Guardsm...	0.444	1	0.8	-1.1100	0.010	Medium
51287	40470	US-2013-155768	2013-12-02	2013-12-02	Same Day	LB-16795	Laurel Beltran	Home Office	Oxnard	California	...	OFF-EN-10001219	Office Supplies	Envelopes	#10- 4 1/8" x 9 1/2" Security-Tint Envelopes	22.920	3	0.0	11.2308	0.010	High
51288	9596	MX-2012-140767	2012-02-18	2012-02-22	Standard Class	RB-19795	Ross Baird	Home Office	Valinhos	São Paulo	...	OFF-BI-10000806	Office Supplies	Binders	Acco Index Tab, Economy	13.440	2	0.0	2.4000	0.003	Medium
51289	6147	MX-2012-134460	2012-05-22	2012-05-26	Second Class	MC-18100	Mick Crebagga	Consumer	Tipitapa	Managua	...	OFF-PA-10004155	Office Supplies	Paper	Eaton Computer Printout Paper, 8.5 x 11	61.380	3	0.0	1.8000	0.002	High

51290 rows × 24 columns

Details About Dataset

In [10]:

```
sales_data.info() #info
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 51290 entries, 0 to 51289
Data columns (total 24 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Row ID          51290 non-null  int64
 1   Order ID        51290 non-null  object
 2   Order Date      51290 non-null  datetime64[ns]
 3   Ship Date       51290 non-null  datetime64[ns]
 4   Ship Mode       51290 non-null  object
 5   Customer ID     51290 non-null  object
 6   Customer Name   51290 non-null  object
 7   Segment         51290 non-null  object
 8   City            51290 non-null  object
 9   State           51290 non-null  object
 10  Country         51290 non-null  object
 11  Postal Code     9994 non-null   float64
 12  Market          51290 non-null  object
 13  Region          51290 non-null  object
 14  Product ID      51290 non-null  object
 15  Category        51290 non-null  object
 16  Sub-Category    51290 non-null  object
 17  Product Name    51290 non-null  object
 18  Sales           51290 non-null  float64
 19  Quantity        51290 non-null  int64
 20  Discount        51290 non-null  float64
 21  Profit          51290 non-null  float64
 22  Shipping Cost   51290 non-null  float64
 23  Order Priority  51290 non-null  object
dtypes: datetime64[ns](2), float64(5), int64(2), object(15)
memory usage: 9.4+ MB
```

In [11]:

```
sales_data.describe() #all numerical data of dataset
```

Out[11]:

	Row ID	Order Date	Ship Date	Postal Code	Sales	Quantity	Discount	Profit	Shipping Cost
count	51290.00000	51290	51290	9994.000000	51290.000000	51290.000000	51290.000000	51290.000000	51290.000000
mean	25645.50000	2013-05-11 21:26:49.155781120	2013-05-15 20:42:42.745174528	55190.379428	246.490581	3.476545	0.142908	28.610982	26.375818
min	1.00000	2011-01-01 00:00:00	2011-01-03 00:00:00	1040.000000	0.444000	1.000000	0.000000	-6599.978000	0.002000
25%	12823.25000	2012-06-19 00:00:00	2012-06-23 00:00:00	23223.000000	30.758625	2.000000	0.000000	0.000000	2.610000
50%	25645.50000	2013-07-08 00:00:00	2013-07-12 00:00:00	56430.500000	85.053000	3.000000	0.000000	9.240000	7.790000
75%	38467.75000	2014-05-22 00:00:00	2014-05-26 00:00:00	90008.000000	251.053200	5.000000	0.200000	36.810000	24.450000
max	51290.00000	2014-12-31 00:00:00	2015-01-07 00:00:00	99301.000000	22638.480000	14.000000	0.850000	8399.976000	933.570000
std	14806.29199	NaN	NaN	32063.693350	487.565361	2.278766	0.212280	174.340972	57.296810

Finding Missing Values of Dataset

In [12]:

```
sales_data.isna().any() #postal code having some missing values
```

Out[12]:

```
Row ID            False
Order ID          False
Order Date        False
Ship Date         False
Ship Mode         False
Customer ID       False
Customer Name     False
Segment           False
City              False
State             False
Country           False
Postal Code        True
Market            False
Region            False
Product ID        False
Category          False
Sub-Category      False
Product Name      False
Sales             False
Quantity          False
Discount          False
Profit            False
Shipping Cost     False
Order Priority    False
dtype: bool
```

Column Name Postal Code having Missing Values

In [13]:

```
sales_data.isna().sum() #sum of missing values in postal code is 41296
```

Out[13]:

```
Row ID                0
Order ID              0
Order Date            0
Ship Date             0
Ship Mode             0
Customer ID           0
Customer Name         0
Segment               0
City                  0
State                 0
Country               0
Postal Code       41296
Market                0
Region                0
Product ID            0
Category              0
Sub-Category          0
Product Name          0
Sales                 0
Quantity              0
Discount              0
Profit                0
Shipping Cost         0
Order Priority        0
dtype: int64
```

In [14]:

```
sales_data['Postal Code'] #lets check the postal code
```

Out[14]:

```
0        10024.0
1            NaN
2            NaN
3            NaN
4            NaN
          ...   
51285        NaN
51286    77095.0
51287    93030.0
51288        NaN
51289        NaN
Name: Postal Code, Length: 51290, dtype: float64
```

In [15]:

```
sales_data['Postal Code'].unique()
```

```
Out[15]: array([10024.,    nan, 95823., 28027., 22304., 42420., 60610., 90008.,
                79109., 93727., 10009., 27217., 55407., 92646., 98115., 32303.,
                23223., 30318., 49201., 19134., 89015., 98105.,  8701., 90045.,
                48205., 22801., 19120.,  2149., 92037., 53711., 90805., 10035.,
                77036., 10701., 73071., 43130., 28205., 89031., 90049., 19711.,
                 2908., 11561., 94122., 43229., 90032., 48227., 23464.,  7960.,
                94110., 43055., 41042., 65807., 47905., 35810., 31907., 78207.,
                14701., 46203., 48234., 53132., 68104., 92704., 36608., 22153.,
                18018., 98226.,  2920., 70506., 60623., 44052., 84043., 98103.,
                65203., 75007., 10011., 90004., 77095., 30328., 44105., 78664.,
                76106.,  3820., 32216., 94521., 30076., 45373., 19140., 85323.,
                45014.,  1852., 80219., 21044., 46060., 92804., 27604.,  2886.,
                60653., 48911., 92374., 94601.,  5408., 74403., 23320., 98198.,
                53209., 19143., 93101., 14609., 91776., 45231., 13601., 28314.,
                85705., 33180., 27834., 81001., 40214., 43615., 89431., 22980.,
                94109., 60505., 77070., 35630., 48104., 46142., 85023., 92105.,
                33012., 30062., 80229., 40324., 77041., 40475., 74133., 33801.,
                94513., 84062., 28806., 61107., 85301., 75081., 68025., 92683.,
                28540., 99207., 21215., 58103., 80013., 19805.,  6824., 90036.,
                79907., 33311.,  6040.,  1841., 94526., 43302., 98026., 60201.,
                71111., 33614., 53142., 47201., 92592., 92307., 75080., 36116.,
                78745., 94533., 84057., 23602.,  2038., 77581., 80501., 89115.,
                 7060.,  1915., 14215., 27405., 97030., 89502., 37042., 29203.,
                74012., 46226., 80906., 73120., 59405., 55044., 80027., 30080.,
                56301., 75217., 22204., 54915., 97206.,  6450., 37211., 52001.,
                44107., 72209., 60540., 99301., 82001., 92024., 50315., 75220.,
                94086., 44134., 87401., 85234., 11572., 77506., 23434., 80525.,
                43017., 37918., 48640., 45503., 61604., 39212.,  7109.,  3301.,
                64055., 78521., 78577., 91505., 32725., 38109., 27707.,  8861.,
                43402., 33319., 20735., 95123., 77340., 19013., 38301., 55113.,
                98059., 10550., 90278., 72401., 80134., 83704., 76063., 37167.,
                35244., 77705., 20016., 95928., 91104., 73034., 62521., 18103.,
                85281., 72701., 34741., 84604., 36830., 90503., 33065., 78041.,
                60035., 35601., 61761., 97756., 97477., 76017.,  6708., 83201.,
                47374., 38401., 84106., 85224., 60126., 80004., 29501., 33317.,
                55369., 13021., 90301., 60174., 91767., 28052., 85345., 87105.,
                75023., 54302.,  6457., 91911., 92503., 12180., 92020., 78501.,
                44256., 48126., 85254., 93030., 63122., 85204., 98031., 33142.,
                46614., 48066., 48187., 42071., 66212., 73505.,  7501., 63376.,
                90712., 54601., 30188., 26003., 38671., 97301., 94591., 93010.,
                92691., 55125., 60016., 95661.,  7055., 48127., 83301., 85364.,
                29464., 28403., 87124., 48183., 71203., 92630., 60090., 19601.,
                92345., 92404., 32712.,  2151., 67212., 97405., 93309., 44060.,
                75051., 77642., 44312., 80020., 46350., 60089., 60098., 28110.,
                55901., 13501., 32839., 90660., 98502., 95687., 97224., 95207.,
                11550., 64118., 37604., 92054., 48237., 54703., 17403., 60076.,
                60543., 93905., 92627., 54880., 90604., 95037., 60188., 79424.,
                33021., 71603.,  7011., 37064.,  4401., 46544., 92563., 56560.,
                93454., 88220., 77803., 30605., 33710.,  2169., 17602.,  7090.,
                76706., 75061., 71854., 91761., 70601., 57103., 92530., 10801.,
                72032., 39401., 11520., 59601., 32137., 95336., 78539., 92553.,
                 7601., 13440., 33445., 33024.,  6010., 59801., 33023., 23666.,
                96003., 75701.,  1040., 95695., 84020., 37087.,  7017.,  8360.,
                91730., 76903., 48180., 63116., 52402., 33178., 37421., 24153.,
                76021., 93277., 37075., 77573., 57701., 60423., 60068.,  6360.,
                66502., 75056., 32771., 77301., 98042., 66062., 91941., 93534.,
                32114., 61701., 20852., 61032., 14304., 67846., 60067., 29406.,
                60025., 75019., 20877., 77590., 44240., 34952., 31088., 48185.,
                94403., 19901.,  6460., 29483., 77840., 42104., 27893., 78550.,
                98661., 84107., 49505., 95610., 71901., 55433.,  2138., 88001.,
                63301., 78666., 83605., 43123., 48307., 27511., 76117.,  2895.,
                33437., 75002., 45011., 52302., 79762., 48146., 46514., 62301.,
                60462., 83642., 31204.,  1752., 49423., 80022., 37620., 92677.,
                 7036., 61821., 54401., 92236., 80122., 84084., 70065., 60440.,
       33068., 48601., 78415., 32935., 88101.,  2740., 95351., 75104.,
        7050., 55106., 92253., 28601., 97123., 39503., 20707., 27534.,
       33030., 47150., 47401., 95051., 35401., 30344., 55016., 55124.,
       55122.,  1453., 37130., 95240., 80112., 91360.,  7002., 65109.,
       45040., 50322., 27360.,  2148., 98270.,  1810., 47362., 33134.,
       75150., 94061., 48310., 92672., 72756., 11757., 77571., 90640.,
       33407., 29730., 22901.,  6484., 57401., 76051., 21740., 85635.,
       92399., 33433., 84321., 42301., 52601., 98632., 87505., 75043.,
       75034., 94509., 53214., 92025., 61832., 53186., 38134.,  3060.,
       59715., 48858., 46368.,  8302., 97504., 60477., 16602., 53081.,
       98006.,  6810., 95616., 98052.,  4240., 80634., 48073., 59102.,
       27514., 33063., 94568., 44221., 77489., 80538., 77536., 33161.,
       32503., 77520., 50701., 86442., 32127., 60004.,  8901., 68701.,
       52240., 68801., 72762., 76248., 60302.,  8401., 60441., 84041.,
       44035., 33458., 98208., 98002., 32174., 93405., 79605., 83501.])
```

In [16]:

```python
postal_codes = sales_data['Postal Code']

# Converting the "Postal Code" column to numeric format
try:
    postal_codes_numeric = pd.to_numeric(postal_codes)
    print("Conversion of numeric format successful.")
except ValueError as e:
    print("Error encountered during conversion of numeric format:")
    print(e)
```

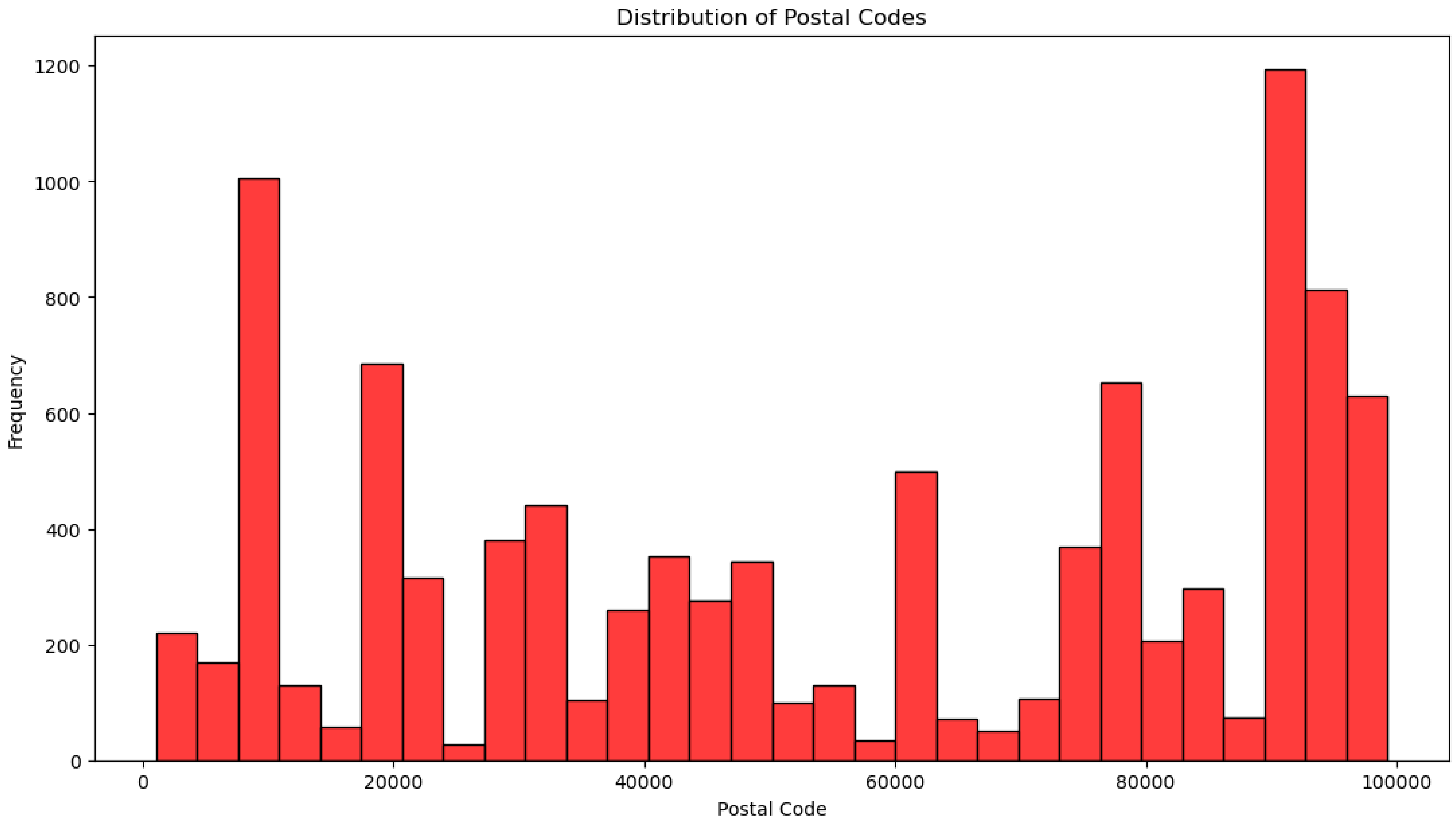
```
Conversion of numeric format successful.
```

In [17]:

```python
# Converting the values in the "Postal Code" column to numeric format
sales_data['Postal Code'] = pd.to_numeric(sales_data['Postal Code'])
```

In [18]:

```python
# Plot distribution of postal codes
plt.figure(figsize=(13, 7))
sns.histplot(postal_codes, bins=30, color='red')
plt.xlabel('Postal Code')
plt.ylabel('Frequency')
plt.title('Distribution of Postal Codes')
plt.show()
```



In [19]:
```
sales_data['Postal Code']
```

Out[19]:
```
0        10024.0
1            NaN
2            NaN
3            NaN
4            NaN
          ...   
51285        NaN
51286    77095.0
51287    93030.0
51288        NaN
51289        NaN
Name: Postal Code, Length: 51290, dtype: float64
```

In [21]:
```
# Filling the missing values with the mode
mode_postal_code = sales_data['Postal Code'].mode()[0]
sales_data['Postal Code'].fillna(mode_postal_code, inplace=True)
```

In [22]:
```
sales_data['Postal Code'].isna().sum() #cleaned the column
```

Out[22]:
```
0
```

Now presenting All whole columns Dataset

ROW ID Column

```
In [23]: sales_data['Row ID'] #row_id
```

```
Out[23]: 0        32298
         1        26341
         2        25330
         3        13524
         4        47221
                  ...
         51285    29002
         51286    35398
         51287    40470
         51288     9596
         51289     6147
         Name: Row ID, Length: 51290, dtype: int64
```

```
In [24]: print(sales_data['Row ID'].unique())
         print(sales_data['Row ID'].nunique())
```

```
[32298 26341 25330 ... 40470  9596  6147]
51290
```

ORDER ID Column

```
In [25]: sales_data['Order ID'].dtype
```

```
Out[25]: dtype('O')
```

```
In [26]: sales_data['Order ID']
```

```
Out[26]: 0         CA-2012-124891
         1          IN-2013-77878
         2          IN-2013-71249
         3        ES-2013-1579342
         4           SG-2013-4320
                       ...
         51285      IN-2014-62366
         51286     US-2014-102288
         51287     US-2013-155768
         51288     MX-2012-140767
         51289     MX-2012-134460
         Name: Order ID, Length: 51290, dtype: object
```

```
In [27]: print(sales_data['Order ID'].unique())
         print(sales_data['Order ID'].nunique())
```

```
['CA-2012-124891' 'IN-2013-77878' 'IN-2013-71249' ... 'IN-2014-72327'
 'IN-2014-57662' 'MX-2012-134460']
25035
```

Grapgh of ORDER ID Column

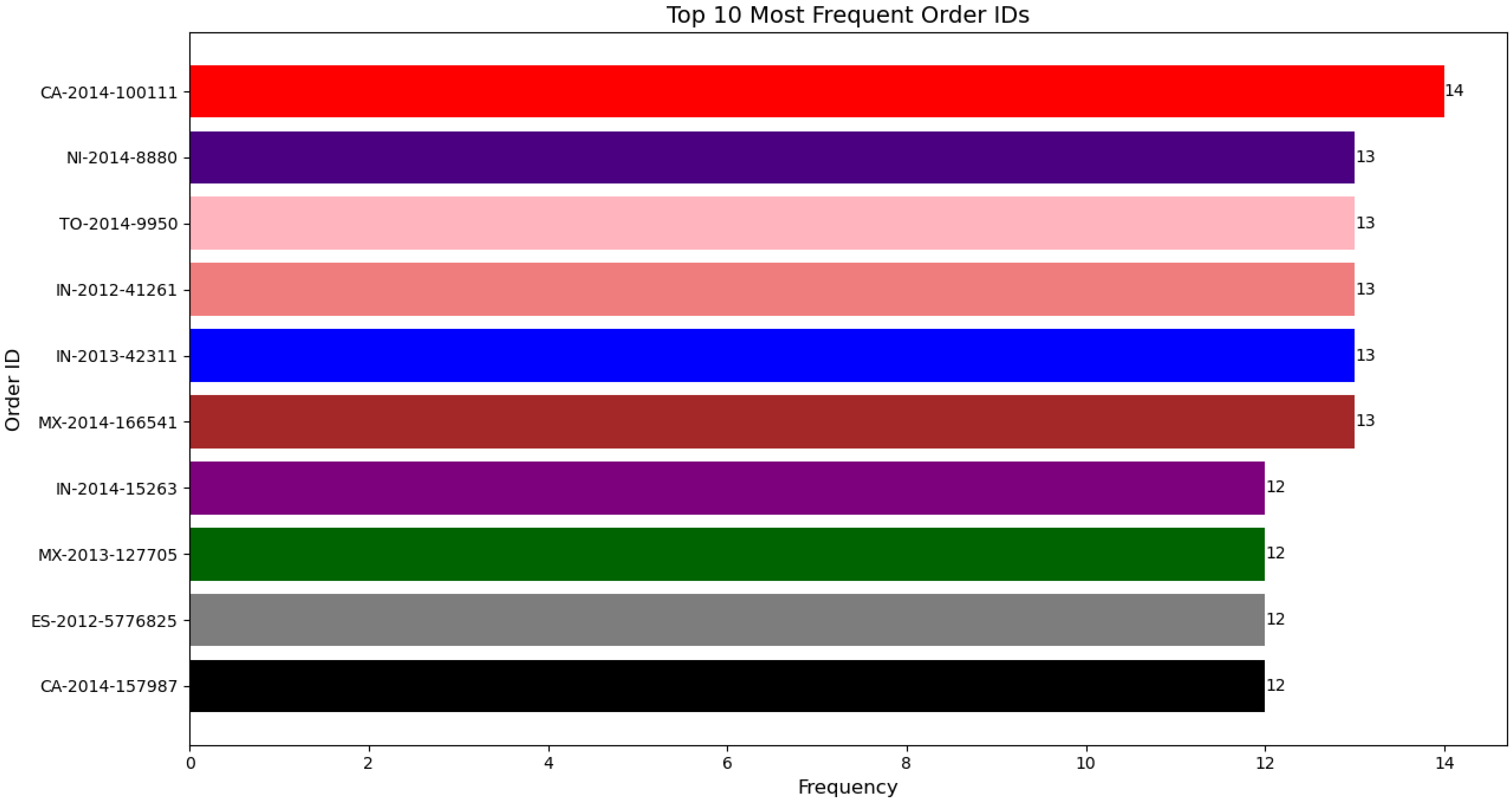
```
In [29]: # Get the unique values and their counts
         unique_ids, counts = sales_data['Order ID'].value_counts().index, sales_data['Order ID'].value_counts().values

         # Define colors for bars
         colors = ['Red', 'indigo', 'lightpink', 'lightcoral', 'blue',
                   'Brown', 'purple', 'darkgreen', 'grey', 'black']

         # Plot the bar plot
         plt.figure(figsize=(13, 7))
         bars = plt.barh(unique_ids[:10], counts[:10], color=colors)
```

```python
# Add labels and title
plt.xlabel('Frequency', fontsize=12)
plt.ylabel('Order ID', fontsize=12)
plt.title('Top 10 Most Frequent Order IDs', fontsize=14)

# Add frequency labels on each bar
for bar, count in zip(bars, counts[:10]):
    plt.text(bar.get_width(), bar.get_y() + bar.get_height() / 2, f'{count}',
             va='center', ha='left', fontsize=10, color='black')

# Invert y-axis to display the highest frequency at the top
plt.gca().invert_yaxis()

# Show plot
plt.tight_layout()
plt.show()
```



Order Date Column

In [30]:

```
sales_data['Order Date']
```

Out[30]:

```
0       2012-07-31
1       2013-02-05
2       2013-10-17
3       2013-01-28
4       2013-11-05
           ...
51285   2014-06-19
51286   2014-06-20
51287   2013-12-02
51288   2012-02-18
51289   2012-05-22
Name: Order Date, Length: 51290, dtype: datetime64[ns]
```

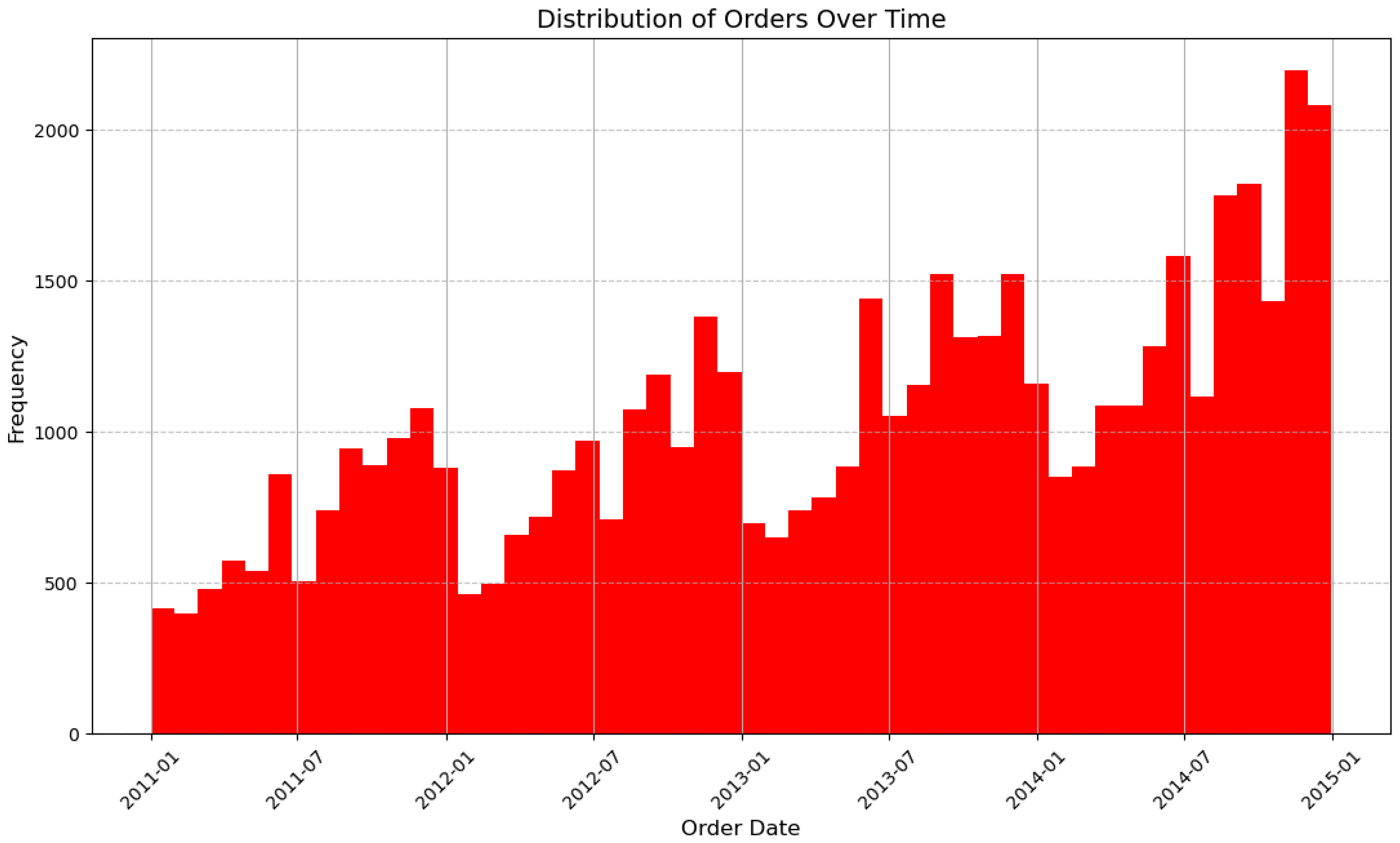
In [31]:

```
print(sales_data['Order Date'].unique())
print(sales_data['Order Date'].nunique())
```

```
<DatetimeArray>
['2012-07-31 00:00:00', '2013-02-05 00:00:00', '2013-10-17 00:00:00',
 '2013-01-28 00:00:00', '2013-11-05 00:00:00', '2013-06-28 00:00:00',
 '2011-11-07 00:00:00', '2012-04-14 00:00:00', '2014-10-14 00:00:00',
 '2012-01-28 00:00:00',
 ...
 '2014-01-12 00:00:00', '2012-07-29 00:00:00', '2012-07-15 00:00:00',
 '2012-08-19 00:00:00', '2011-03-27 00:00:00', '2011-06-12 00:00:00',
 '2012-07-08 00:00:00', '2013-07-07 00:00:00', '2012-05-27 00:00:00',
 '2011-02-06 00:00:00']
Length: 1430, dtype: datetime64[ns]
1430
```

In [32]:

```
# Plot the histogram of order dates
plt.figure(figsize=(13, 7))
sales_data['Order Date'].hist(bins=50, color='red')
plt.xlabel('Order Date', fontsize=12)
plt.ylabel('Frequency', fontsize=12)
plt.title('Distribution of Orders Over Time', fontsize=14)
plt.xticks(rotation=45)  # Rotate x-axis labels for better readability
plt.grid(axis='y', linestyle='--', alpha=0.7)  # Add grid lines for better visualization
plt.show()
```



Ship Date Column

```
In [33]: sales_data['Ship Date']
```

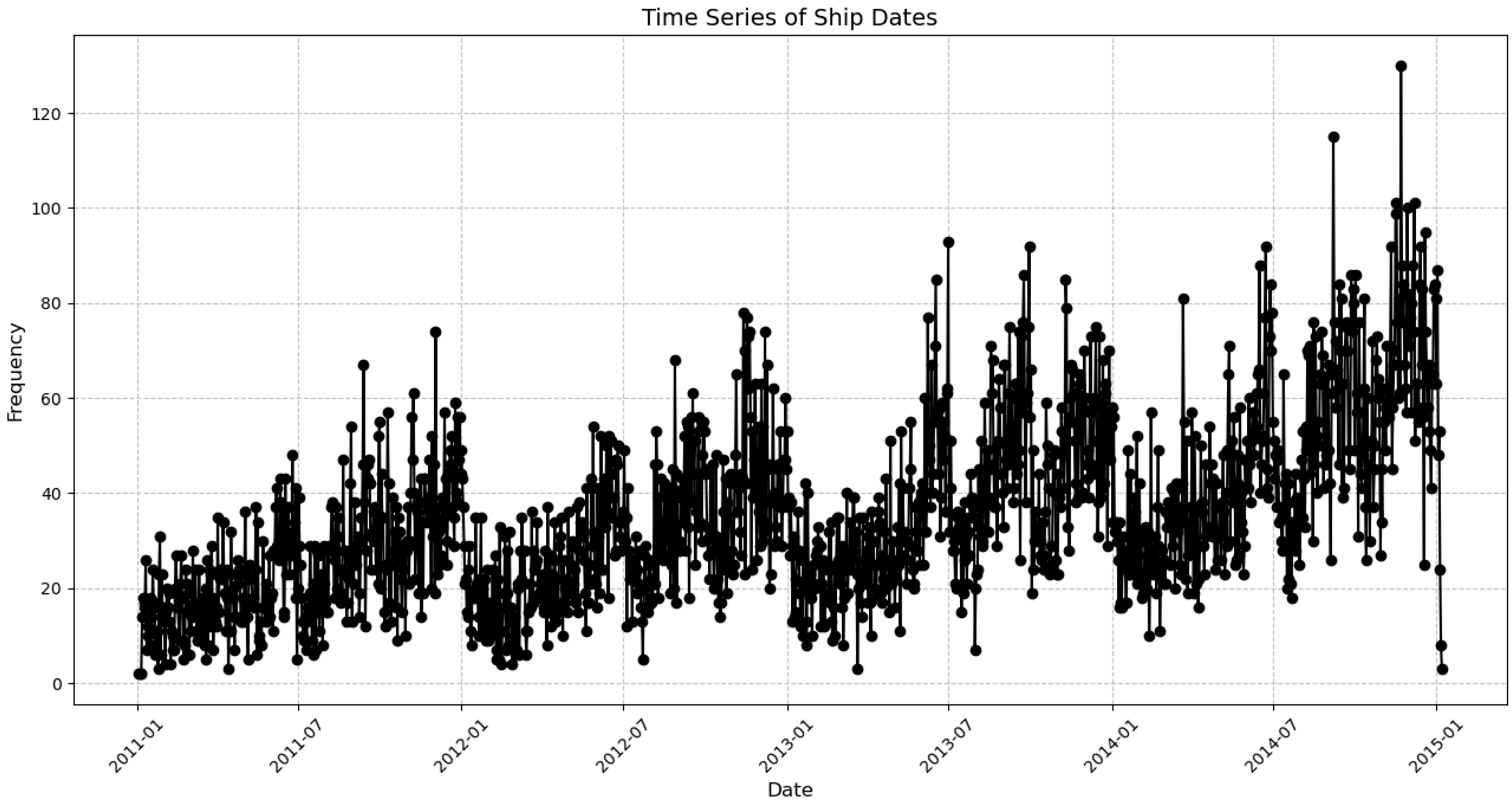
```
Out[33]: 0        2012-07-31
         1        2013-02-07
         2        2013-10-18
         3        2013-01-30
         4        2013-11-06
                     ...
         51285    2014-06-19
         51286    2014-06-24
         51287    2013-12-02
         51288    2012-02-22
         51289    2012-05-26
         Name: Ship Date, Length: 51290, dtype: datetime64[ns]
```

```
In [34]: print(sales_data['Ship Date'].unique())
         print(sales_data['Ship Date'].nunique())
```

```
<DatetimeArray>
['2012-07-31 00:00:00', '2013-02-07 00:00:00', '2013-10-18 00:00:00',
 '2013-01-30 00:00:00', '2013-11-06 00:00:00', '2013-07-01 00:00:00',
 '2011-11-09 00:00:00', '2012-04-18 00:00:00', '2014-10-21 00:00:00',
 '2012-01-31 00:00:00',
 ...
 '2011-07-11 00:00:00', '2011-02-23 00:00:00', '2011-01-25 00:00:00',
 '2015-01-07 00:00:00', '2011-02-08 00:00:00', '2012-01-24 00:00:00',
 '2012-02-15 00:00:00', '2012-07-23 00:00:00', '2012-04-08 00:00:00',
 '2011-01-05 00:00:00']
Length: 1464, dtype: datetime64[ns]
1464
```

In [35]:

```
# Plot the time series of ship dates as a line plot
plt.figure(figsize=(13, 7))
plt.plot(sales_data['Ship Date'].value_counts().sort_index(), marker='o', color='Black', linestyle='-')
plt.xlabel('Date', fontsize=12)
plt.ylabel('Frequency', fontsize=12)
plt.title('Time Series of Ship Dates', fontsize=14)
plt.grid(True, linestyle='--', alpha=0.7)  # Add grid lines for better visualization
plt.xticks(rotation=45)  # Rotate x-axis labels for better readability
plt.tight_layout()
plt.show()
```



Ship Mode Column

```
In [36]: sales_data['Ship Mode']
```

```
Out[36]: 0             Same Day
         1         Second Class
         2          First Class
         3          First Class
         4             Same Day
                        ...
         51285         Same Day
         51286   Standard Class
         51287         Same Day
         51288   Standard Class
         51289     Second Class
         Name: Ship Mode, Length: 51290, dtype: object
```

```
In [37]: print(sales_data['Ship Mode'].unique())
         print(sales_data['Ship Mode'].nunique())
```

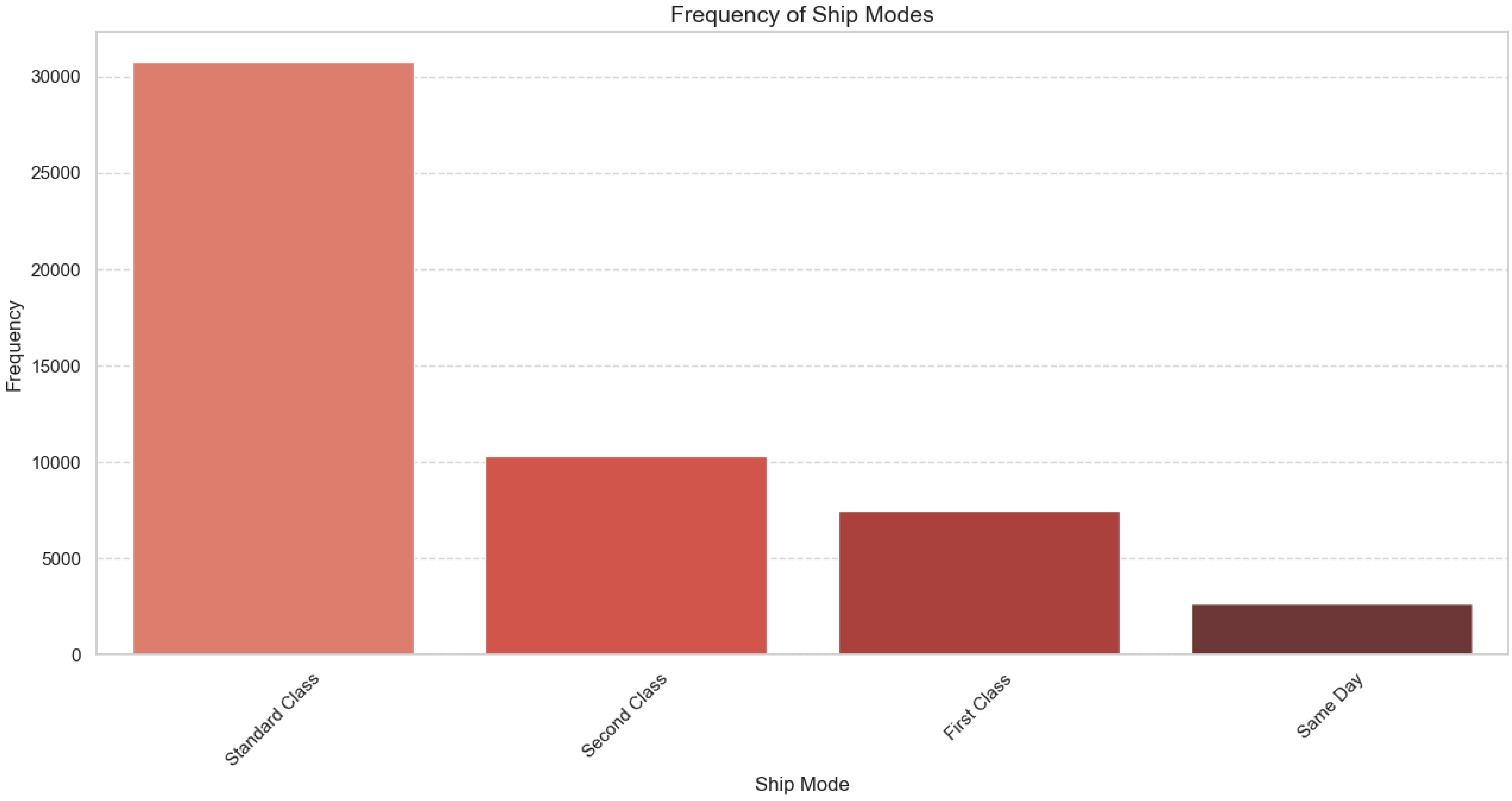
```
['Same Day' 'Second Class' 'First Class' 'Standard Class']
4
```

In [39]:

```
# Set Seaborn style
sns.set(style="whitegrid")

# Count the frequency of each ship mode
ship_mode_counts = sales_data['Ship Mode'].value_counts()

# Plot the bar chart using Seaborn
plt.figure(figsize=(13, 7))
sns.barplot(x=ship_mode_counts.index, y=ship_mode_counts.values, palette="Reds_d")
plt.title('Frequency of Ship Modes', fontsize=14)
plt.xlabel('Ship Mode', fontsize=12)
plt.ylabel('Frequency', fontsize=12)
plt.xticks(rotation=45)
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.tight_layout()
plt.show()
```



Customer ID Column

In [41]:

```
sales_data['Customer ID']
```

Out[41]:

```
0        RH-19495
1        JR-16210
2        CR-12730
3        KM-16375
4         RH-9495
           ...   
51285    KE-16420
51286    ZC-21910
51287    LB-16795
51288    RB-19795
51289    MC-18100
Name: Customer ID, Length: 51290, dtype: object
```

In [42]:

```
print(sales_data['Customer ID'].unique())
print(sales_data['Customer ID'].nunique())
```

```
['RH-19495' 'JR-16210' 'CR-12730' ... 'RC-9825' 'MG-7890' 'ZC-11910']
1590
```

In [47]:

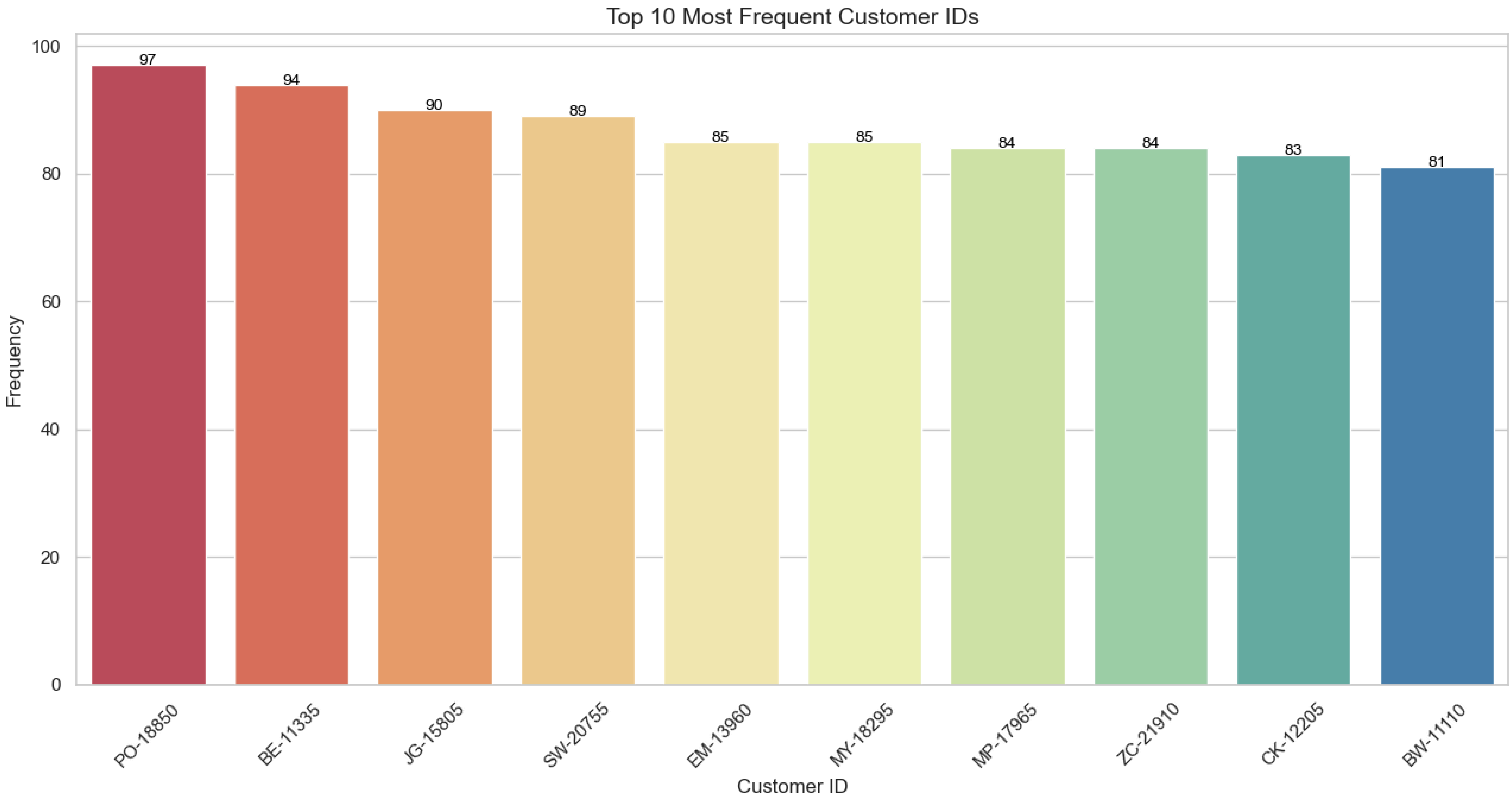
```
# Set Seaborn style
sns.set(style="whitegrid")

# Count the frequency of each customer ID
customer_id_counts = sales_data['Customer ID'].value_counts()

# Plot the bar chart using Seaborn
plt.figure(figsize=(13, 7))
barplot = sns.barplot(x=customer_id_counts.index[:10], y=customer_id_counts.values[:10], palette="Spectral")
plt.title('Top 10 Most Frequent Customer IDs', fontsize=14)
plt.xlabel('Customer ID', fontsize=12)
plt.ylabel('Frequency', fontsize=12)
plt.xticks(rotation=45)

# Adding annotations
for index, value in enumerate(customer_id_counts.values[:10]):
    barplot.text(index, value, str(value), ha="center", fontsize=10, color='black')

plt.tight_layout()
plt.show()
```



Customer Name Column

In [48]:
```
sales_data['Customer Name']
```

Out[48]:
```
0              Rick Hansen
1            Justin Ritter
2             Craig Reiter
3         Katherine Murray
4              Rick Hansen
               ...        
51285      Katrina Edelman
51286     Zuschuss Carroll
51287       Laurel Beltran
51288           Ross Baird
51289        Mick Crebagga
Name: Customer Name, Length: 51290, dtype: object
```

In [49]:
```
print(sales_data['Customer Name'].unique())
print(sales_data['Customer Name'].nunique())  #795 unique customers
```

```
['Rick Hansen' 'Justin Ritter' 'Craig Reiter' 'Katherine Murray'
 'Jim Mitchum' 'Toby Swindell' 'Mick Brown' 'Jane Waco' 'Joseph Holt'
 'Greg Maxwell' 'Anthony Jacobs' 'Magdelene Morse' 'Vicky Freymann'
 'Peter Fuller' 'Ben Peterman' 'Thomas Boland' 'Patrick Jones' 'Jim Sink'
 'Ritsa Hightower' 'Ann Blume' 'Sue Ann Reed' 'Jason Klamczynski'
 'Laurel Beltran' 'Naresj Patel' 'Valerie Dominguez' 'Phillip Breyer'
 'Eugene Barchas' 'Karen Ferguson' 'Benjamin Patterson' 'Rick Reed'
 'Bill Shonely' 'Joel Eaton' 'Dave Poirier' 'Nora Preis' 'Aaron Hawkins'
 'Darrin Martin' 'Grant Thornton' "Patrick O'Donnell" 'Dan Lawera'
 'Joy Bell-' 'Barry Franz' 'Vivek Grady' 'Greg Tran' 'Zuschuss Carroll'
 'Sanjit Chand' 'Ellis Ballard' 'Arthur Prichep' 'Scott Williamson'
 'John Huston' 'Lena Creighton' 'Trudy Glocke' 'Harold Ryan'
 'Deirdre Greer' 'Sheri Gordon' 'Fred Hopkins' 'Guy Phonely'
 'Mitch Webber' "Patrick O'Brill" 'Chuck Sachs' 'Keith Dawkins'
 'Michael Stewart' 'Kimberly Carter' 'Denny Blanton' 'Jonathan Doherty'
 'Dave Kipp' 'Cari Sayre' 'Evan Minnotte' 'Dianna Wilson'
 'Alan Schoenberger' 'Shui Tom' 'Barry Weirich' 'Laura Armstrong'
 'Aimee Bixby' 'Christopher Martinez' 'Bobby Elias' 'Sam Zeldin'
 'Raymond Messe' 'Harry Greene' 'Andy Reiter' 'Tom Prescott'
 'Anne McFarland' 'Alejandro Ballentine' 'Rachel Payne' 'Berenike Kampe'
 'Janet Martin' 'Lindsay Williams' 'Nick Zandusky' 'Stuart Van'
 'Steve Chapman' 'Noah Childs' 'Natalie Fritzler' 'Paul MacIntyre'
 'Maria Zettner' 'Henry MacAllister' 'Rick Wilson' 'Logan Haushalter'
 'Khloe Miller' 'Adam Bellavance' 'Dave Brooks' 'Valerie Mitchum'
 'Don Miller' 'Neoma Murray' "Rose O'Brian" 'Sarah Brown' 'Erin Mull'
 'Roland Schwarz' 'Odella Nelson' 'Vivek Sundaresam' 'Chad McGuire'
 'Tom Boeckenhauer' 'Adrian Barton' 'Don Weiss' 'Penelope Sewall'
 'Christopher Conant' 'Toby Carlisle' 'Gary McGarr' 'Michael Moore'
 'Julie Kriz' 'Don Jones' 'Alyssa Tate' 'Aaron Bergman' 'Resi Pölking'
 'Max Jones' 'Paul Van Hugh' 'Sean Braxton' 'Sally Matthias'
 'Katharine Harms' 'Mike Pelletier' 'Lisa Hazard' 'Natalie DeCherney'
 'Corey Roper' 'Greg Matthias' 'Ryan Akin' 'Bart Watters' 'Roland Fjeld'
 'Anna Gayman' 'Dario Medina' 'Karen Daniels' 'Bill Eplett'
 "Sean O'Donnell" 'Damala Kotsonis' 'Liz Carlisle' 'Claire Gute'
 'Toby Braunhardt' 'Hunter Glantz' 'Alan Dominguez' 'Becky Pak'
 'Andrew Allen' 'Rob Lucas' 'Cindy Stewart' 'Scot Wooten' 'Tom Ashbrook'
 'Yoseph Carroll' 'Jill Matthias' 'Jason Fortune-' 'John Lee'
 'Monica Federle' 'Jim Epp' 'Christine Phan' 'Eugene Hildebrand'
 'Nat Carroll' 'Joy Smith' 'Alice McCarthy' 'Jamie Frazer' 'James Galang'
 'Dennis Pardue' 'Alex Grayson' 'Grace Kelly' 'Neil Französisch'
 'Daniel Raglin' 'Nona Balk' 'Nathan Mautz' 'Nora Paige'
 'Shahid Collister' 'Pete Armstrong' 'Rob Beeghly' 'Steven Roelle'
 'Rick Huthwaite' 'Larry Hughes' 'Ken Black' 'Eleni McCrary' 'Mary Zewe'
 'Denise Monton' 'Carol Adams' 'Sean Christensen' 'Mick Hernandez'
 'Karen Seio' 'Bruce Geld' 'Christy Brittain' 'Anne Pryor' 'Cyra Reiten'
 'Bart Folk' 'Janet Molinari' 'Tamara Willingham' 'Randy Bradley'
 'Joseph Airdo' 'Jim Radford' 'Maribeth Dona' 'Pete Kriz'
 'Theone Pippenger' 'Jim Kriz' 'Carlos Daly' 'Emily Phan'
 'Maxwell Schwartz' 'Corinna Mitchell' 'Julie Creighton' 'George Bell'
 'Justin Hirsh' 'Michelle Tran' 'Cynthia Voltz' 'Nicole Hansen'
 'Heather Jas' 'James Lanier' 'Muhammed Yedwab' 'Mitch Willingham'
 'Kelly Collister' 'Helen Andreada' 'Meg Tillman' 'Fred Wasserman'
 'Brosina Hoffman' 'Dana Kaydos' 'Sung Chung' 'Craig Yedwab'
 'Hunter Lopez' 'Carol Triggs' 'Georgia Rosenberg' 'Ted Trevino'
 'Phillina Ober' 'Emily Ducich' 'Tony Molinari' 'Anthony Witt'
 'Annie Thurman' 'Speros Goranitis' 'Bryan Mills' 'Dennis Kane'
 'Phillip Flathmann' 'Toby Gnade' 'Sarah Foster' 'Chad Cunningham'
 "Russell D'Ascenzo" 'Charles Sheldon' 'Julia Dunbar' 'Greg Hansen'
 'Carlos Meador' 'Rick Bensley' 'Ross Baird' 'Dionis Lloyd' 'Thomas Seio'
 'Mike Vittorini' 'Brendan Dodson' 'Pamela Stobb' 'Filia McAdams'
 'Cynthia Arntzen' 'Cynthia Delaney' 'Nancy Lomonaco' 'Ted Butterfield'
 'Ken Brennan' 'Katrina Willman' 'Maureen Gnade' 'Harry Marie'
 'Beth Paige' 'Henia Zydlo' 'Tamara Chand' 'Elizabeth Moffitt'
 'Bryan Spruell' 'Dianna Vittorini' 'Maria Bertelson' 'Pauline Chand'
```

```
'Christine Abelman' 'Karen Carlisle' 'Duane Benoit' 'Scott Cohen'
'Bradley Drucker' 'Becky Martin' 'Karl Braun' 'John Murray' 'Art Foster'
'Shirley Jackson' 'William Brown' 'Corey Catlett' 'Brad Eason'
'Maribeth Schnelling' 'Nora Pelletier' 'Robert Marley' 'Skye Norling'
'Christina DeMoss' 'Barry Gonzalez' 'Clay Cheatham' 'Stewart Visinsky'
'Helen Wasserman' 'Alejandro Savely' 'Lela Donovan' 'Neola Schneider'
'Craig Molinari' 'Maureen Gastineau' 'Dean Braden' 'Cari Schnelling'
'Greg Guthrie' 'Brad Norvell' 'Brian Stugart' 'Amy Cox'
'Chloris Kastensmidt' 'Justin Deggeller' 'Melanie Seite' 'Suzanne McNair'
'Craig Leslie' 'Charles McCrossin' 'John Castell' 'Lena Hernandez'
'Darrin Van Huff' 'Bradley Talbott' 'Brian Moss' 'Mitch Gastineau'
'Roger Barcio' 'Frank Carlisle' 'Thomas Thornton' 'Sarah Jordon'
'Patrick Bzostek' 'Robert Waldorf' 'Dennis Bolton' 'David Kendrick'
'Mark Packer' 'Trudy Brown' "Meg O'Connel" 'Mathew Reese' 'Ruben Ausman'
'Mike Gockenbach' 'Justin Ellison' 'Juliana Krohn' 'Eric Murdock'
'Denny Joy' 'Bobby Odegard' 'Luke Weiss' 'Pauline Johnson' 'Kunst Miller'
'Brooke Gillingham' 'Chad Sievert' 'Mark Cousins' 'Brian Derr'
'Randy Ferguson' 'Kristen Hastings' 'Cindy Chapman' 'Larry Tron'
'Barbara Fisher' 'Caroline Jumper' 'Sally Hughsby' 'Sara Luxemburg'
'Jennifer Braxton' 'Tim Brockman' 'Paul Stevenson' 'Brenda Bowman'
'Susan Pistek' 'Dean percer' 'Gary Zandusky' 'Adam Hart'
'Cassandra Brandow' 'Sample Company A' 'Scot Coram' 'Jill Stevenson'
'Bill Stewart' 'Jack Lebron' 'Adam Shillingsburg' 'Ed Ludwig'
'Frank Hawley' 'Olvera Toch' 'Sean Miller' 'Peter McVee' 'Tom Stivers'
'Lynn Smith' 'Candace McMahon' 'Frank Gastineau' 'Kristina Nunn'
'Tracy Blumstein' 'Keith Herrera' 'Denise Leinenbach' 'Katherine Nockton'
'Susan Vittorini' 'Michael Dominguez' 'Luke Schmidt' 'Chuck Magee'
'Saphhira Shifley' 'Gary Hwang' 'Todd Sumrall' 'Duane Huffman'
'Muhammed MacIntyre' 'Art Ferguson' 'Tony Sayre' 'Brendan Murry'
'Andrew Gjertsen' 'Steven Ward' 'Sally Knutson' 'Arthur Gainer'
'Astrea Jones' 'Marc Crier' 'Elpida Rittenbach' 'Ed Jacobs'
'Harold Engle' 'Kean Thornton' 'Sarah Bern' 'Eugene Moren'
'Valerie Takahito' 'John Stevenson' 'Becky Castell' 'Nicole Fjeld'
'Rob Haberlin' 'Carlos Soltero' 'Chris McAfee' 'Laurel Workman'
'Rob Dowd' 'Brian Thompson' 'Charles Crestani' 'Xylona Preis'
'Maris LaWare' 'Quincy Jones' 'Richard Eichhorn' 'Cathy Prescott'
'Joe Kamberova' 'Anemone Ratner' 'Erica Hernandez' 'Jocasta Rupert'
'Paul Lucas' 'Theresa Coyne' 'Dorris liebe' 'Nathan Cano' 'Eric Barreto'
'Daniel Lacy' 'Frank Merwin' 'David Philippe' 'Clytie Kelty'
'Cari MacIntyre' 'Paul Prost' 'Maria Etezadi' 'Cindy Schnelling'
'Gary Hansen' 'Matthew Clasen' 'Liz MacKendrick' 'Andrew Roberts'
'Jonathan Howell' 'Emily Grady' 'Ann Steele' 'Carl Ludwig'
'Christina Anderson' 'Philip Fox' 'Darren Budd' 'Clay Ludtke'
'Maureen Fritzler' 'Ionia McGrath' 'Erica Bern' 'Alex Avila'
'Mark Van Huff' 'Joni Wasserman' 'Troy Staebel' 'Matt Collins'
'Jennifer Ferguson' 'Alan Hwang' 'Katherine Ducich' 'Paul Gonzalez'
'Heather Kirkland' 'Ralph Ritter' 'Hilary Holden' 'Stefanie Holloman'
'Anthony Rawles' 'Roy Phan' 'Lisa Ryan' 'Christine Kargatis'
'Darren Koutras' 'Evan Henry' 'Marina Lichtenstein' 'Benjamin Farhat'
'Clay Rozendal' 'Kean Nguyen' 'Hallie Redmond' 'Cyma Kinney'
'Edward Nazzal' 'Amy Hunt' 'Angele Hood' 'Richard Bierner' 'Andy Gerbode'
'Alex Russell' 'Tiffany House' 'Liz Thompson' 'Harold Dahlen'
'Michelle Huthwaite' 'Charlotte Melton' 'Russell Applegate' 'Erica Smith'
'Craig Carroll' 'Irene Maddox' 'Dianna Arnett' 'Shahid Shariari'
'Sean Wendt' 'Maribeth Yedwab' 'Henry Goldwyn' 'Debra Catini'
'Delfina Latchford' 'Jay Kimmel' 'Cathy Hwang' 'Mark Haberlin'
'Michael Chen' 'Pauline Webber' 'Brendan Sweed' 'Denny Ordway'
'Susan Gilcrest' 'Stephanie Ulpright' 'Thomas Brumley' 'Victoria Pisteka'
'Lena Radford' 'Tracy Hopkins' 'Janet Lee' 'Ralph Kennedy'
'Craig Carreira' 'Dorothy Badders' 'Michael Granlund' 'Matt Abelman'
'Dave Hallsten' 'Bill Tyler' 'Tim Taslimi' 'Vivek Gonzalez'
'Natalie Webber' 'Victor Preis' 'Joe Elijah' 'Alejandro Grove'
'Ben Wallace' 'Eileen Kiefer' 'Sandra Glassco' 'Steven Cartwright'
'Brian Dahlen' 'Peter Bühler' 'Sonia Cooley' 'Chris Cortes'
```

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'Annie Zypern' 'Ivan Gibson' 'Sung Pak' 'Kalyca Meade' 'Michelle Moray'
'Raymond Buch' 'Steve Nguyen' 'Jack Garza' 'Carl Jackson' 'Andy Yotov'
'Benjamin Venier' 'George Zrebassa' 'Parhena Norris' 'Stuart Calhoun'
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'Ken Dana' 'Matt Connell' 'Jim Karlsson' 'Liz Pelletier' "Mary O'Rourke"
'MaryBeth Skach' 'George Ashbrook' 'Christine Sundaresam' 'Gene McClure'
'Michael Nguyen' 'Justin MacKendrick' 'Doug Bickford' 'Paul Knutson'
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'Michelle Arnett' 'Stephanie Phelps' 'Jennifer Halladay' 'Max Ludwig'
'Pamela Coakley' 'Katrina Edelman' 'Steve Carroll' 'John Grady'
'Philisse Overcash' 'Guy Armstrong' 'Guy Thornton' 'Patrick Ryan'
'Anthony Garverick' 'Sanjit Engle' 'Julia Barnett' "Jas O'Carroll"
'Liz Preis' 'Eva Jacobs' 'Victoria Wilson' 'Gary Mitchum'
'Susan MacKendrick' 'Arthur Wiediger' 'Jennifer Patt' 'Alan Shonely'
'Jeremy Pistek' 'Bryan Davis' 'Tom Zandusky' 'Jeremy Ellison'
'Arianne Irving' 'David Smith' 'Anna Chung' 'Mark Hamilton' 'Chuck Clark'
'Nat Gilpin' 'Roy Collins' 'Joy Daniels' 'David Wiener' 'Ruben Dartt'
'Rick Duston' 'Seth Vernon' 'Lycoris Saunders' 'Giulietta Dortch'
'Edward Becker' 'Katherine Hughes' 'Beth Fritzler' 'Corey-Lock'
'Sylvia Foulston' 'Katrina Bavinger' 'Lena Cacioppo' 'Jeremy Lonsdale'
'Bruce Degenhardt' 'Tamara Manning' 'Fred McMath' 'Adrian Hane'
'Luke Foster' 'Doug Jacobs' 'Sanjit Jacobs' 'Muhammed Lee'
'Marc Harrigan' 'Nick Radford' 'Michael Kennedy' 'Patricia Hirasaki'
'Alan Barnes' 'Cathy Armstrong' 'Kean Takahito' 'Ed Braxton'
'Michael Grace' 'Matthew Grinstein' 'Matt Collister' 'Brad Thomas'
'Emily Burns' 'Erin Ashbrook' 'Fred Harton' 'Allen Armold'
'Bradley Nguyen' 'Ricardo Emerson' 'Neil Ducich' 'Michelle Lonsdale'
'Sibella Parks' 'Sandra Flanagan' 'Aaron Smayling' 'Alan Haines'
'Ken Heidel' 'Anna Andreadi' 'Lindsay Shagiari' 'Ken Lonsdale'
'Kelly Williams' 'Frank Atkinson' 'Jill Fjeld' 'Lori Olson'
'Bruce Stewart' 'Herbert Flentye' 'Michael Paige' 'Jennifer Jackson'
'Logan Currie' 'Barry Französisch' 'Erin Smith' 'Fred Chung'
'Theresa Swint' 'Jasper Cacioppo' 'Maya Herman' 'Roy Französisch'
'Patrick Gardner' "Doug O'Connell" 'Tanja Norvell' 'Dan Reichenbach'
'Ralph Arnett' 'Ben Ferrer' 'Shirley Daniels' 'David Bremer'
'Michelle Ellison' 'Anna Häberlin' 'Robert Dilbeck' 'Carol Darley'
'Chris Selesnick' 'Jay Fein' 'Adrian Shami' 'Stefania Perrino'
'Erin Creighton' 'Todd Boyes' 'Matt Hagelstein' 'David Flashing'
'Sonia Sunley' 'Roger Demir' 'Lisa DeCherney' 'Julie Prescott'
'Lindsay Castell' 'Jenna Caffey' 'Ivan Liston' 'Noel Staavos' 'Tracy Zic'
'Anthony Johnson' 'Gene Hale' 'Aleksandra Gannaway' 'Helen Abelman'
'Jason Gross' 'Tracy Collins' 'Allen Rosenblatt' 'Neil Knudson'
'Ashley Jarboe' 'Ricardo Sperren' 'Stewart Carmichael' 'Darren Powers'
'Larry Blacks' 'Maurice Satty' 'Joel Jenkins' 'Kelly Lampkin'
'Ross DeVincentis' 'Deanra Eno' 'Sam Craven' 'Dorothy Wardle'
'Tamara Dahlen' 'Bill Donatelli' 'Carl Weiss' 'Bart Pistole'
'Philip Brown' 'Allen Goldenen' 'Giulietta Baptist' 'Michael Oakman'
'Harold Pawlan' 'Christopher Schild' 'Ryan Crowe' "Anthony O'Donnell"
'Sharelle Roach' 'Thea Hudgings' 'Eudokia Martin' 'Bill Overfelt'
'Dorothy Dickinson' "Jack O'Briant" 'Jamie Kunitz' 'Daniel Byrd'
'Duane Noonan' 'Mike Caudle' 'Rob Williams' 'Bobby Trafton' 'Shaun Weien'
'Christina VanderZanden' 'Nick Crebassa' 'Troy Blackwell' 'Trudy Schmidt'
'Pete Takahito' 'Erica Hackney' 'Max Engle' 'Zuschuss Donatelli'
'Barry Pond' 'Claudia Bergmann' 'Dean Katz' 'Roy Skaria'
'Deborah Brumfield' 'Brian DeCherney' 'Joni Sundaresam' 'Liz Willingham'
'Laurel Elliston' 'Pierre Wener' 'Frank Preis' 'Shahid Hopkins'
'Jessica Myrick' 'Tracy Poddar' 'Darrin Sayre' 'Jesus Ocampo'
'Mike Kennedy' 'Sung Shariari' 'Barry Blumstein' 'Jeremy Farry'
'Shirley Schmidt' 'Robert Barroso' 'Roland Murray' 'Evan Bailliet'
'Tony Chapman' 'Dan Campbell' 'Nicole Brennan' 'Vivian Mathis'
```

```
 'Thais Sissman']
795
```

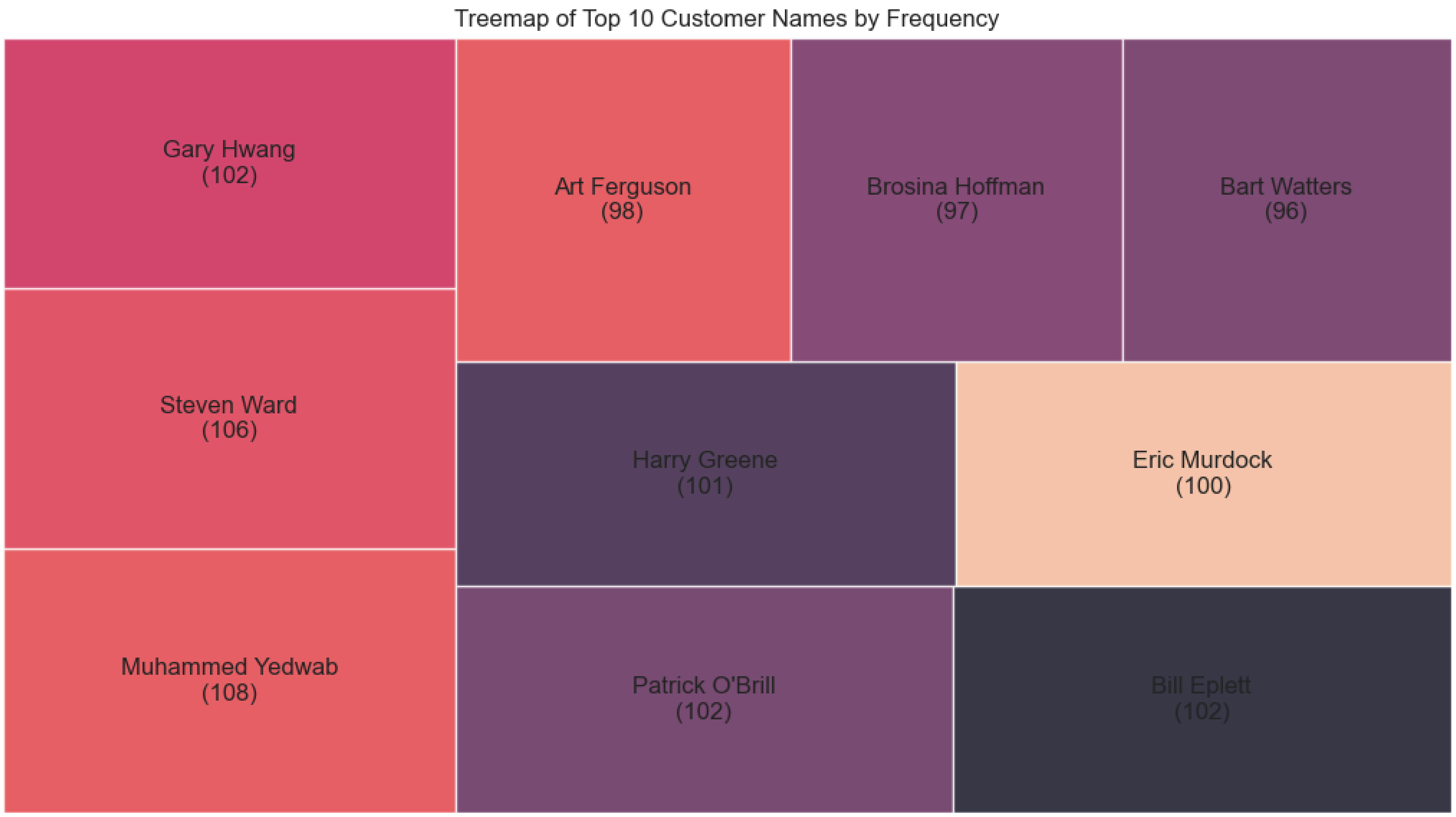
In [50]:

```
!pip install squarify
```

```
Collecting squarify
  Obtaining dependency information for squarify from https://files.pythonhosted.org/packages/b7/3c/eedbe9fb07cc20fd9a8423da14b03bc270d0570b3ba9174a4497156a2152/squarify-0.4.4-py3-none-any.whl.m
etadata
  Downloading squarify-0.4.4-py3-none-any.whl.metadata (600 bytes)
Downloading squarify-0.4.4-py3-none-any.whl (4.1 kB)
Installing collected packages: squarify
Successfully installed squarify-0.4.4
```

In [51]:

```python
import squarify

# Get the frequency of each customer name
customer_name_counts = sales_data['Customer Name'].value_counts()

# Selecting only the top 10 customers
top_10_customers = customer_name_counts.head(10)

# Prepare the labels with frequencies
labels = [f'{name}\n({count})' for name, count in zip(top_10_customers.index, top_10_customers.values)]

# Plotting the treemap with labeled frequencies
plt.figure(figsize=(13, 7))
squarify.plot(sizes=top_10_customers.values, label=labels, alpha=0.8)
plt.axis('off')
plt.title('Treemap of Top 10 Customer Names by Frequency')
plt.show()
```



Segment Name Column

```
In [52]: sales_data['Segment']
```

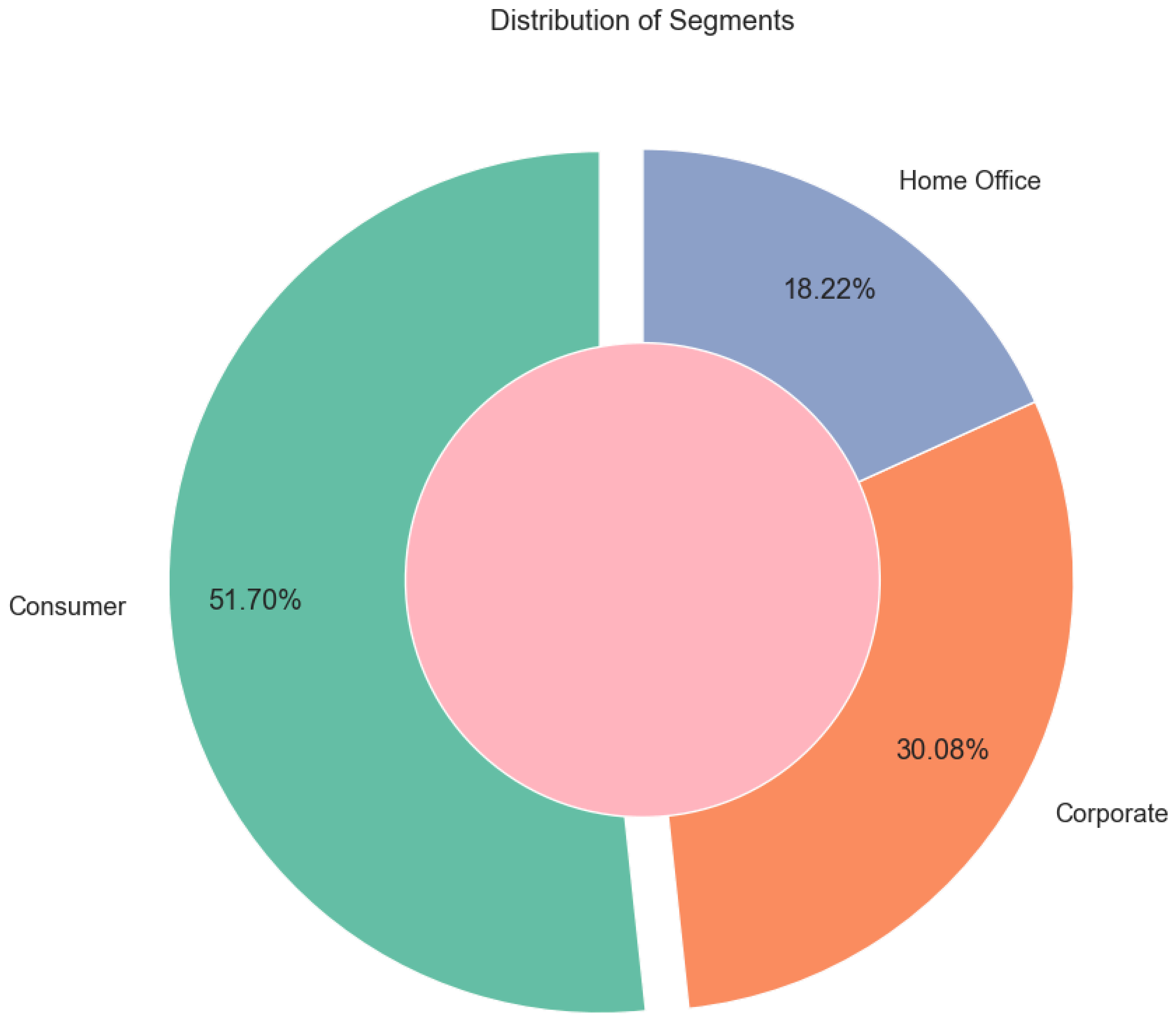
```
Out[52]: 0           Consumer
         1          Corporate
         2           Consumer
         3        Home Office
         4           Consumer
                       ...
         51285      Corporate
         51286       Consumer
         51287    Home Office
         51288    Home Office
         51289       Consumer
         Name: Segment, Length: 51290, dtype: object
```

```
In [53]: print(sales_data['Segment'].unique())
         print(sales_data['Segment'].nunique())
```

```
['Consumer' 'Corporate' 'Home Office']
3
```

```
In [58]: # Set the font scale for better readability
         sns.set(font_scale=1.2)

         # Get the unique values and their counts for the Segment column
```

```
segment_counts = sales_data['Segment'].value_counts()

# Define explode values
explode = [0.1 if seg == 'Consumer' else 0 for seg in segment_counts.index]

# Plotting the pie chart
plt.figure(figsize=(10, 10))
plt.pie(x=segment_counts, labels=segment_counts.index, colors=sns.color_palette('Set2'), startangle=90, autopct='%1.2f%%', pctdistance=0.80, explode=explode)

# Add a hole in the pie
hole = plt.Circle((0, 0), 0.55, facecolor='lightpink')
plt.gcf().gca().add_artist(hole)

plt.title('Distribution of Segments')
plt.show()
```



City Column

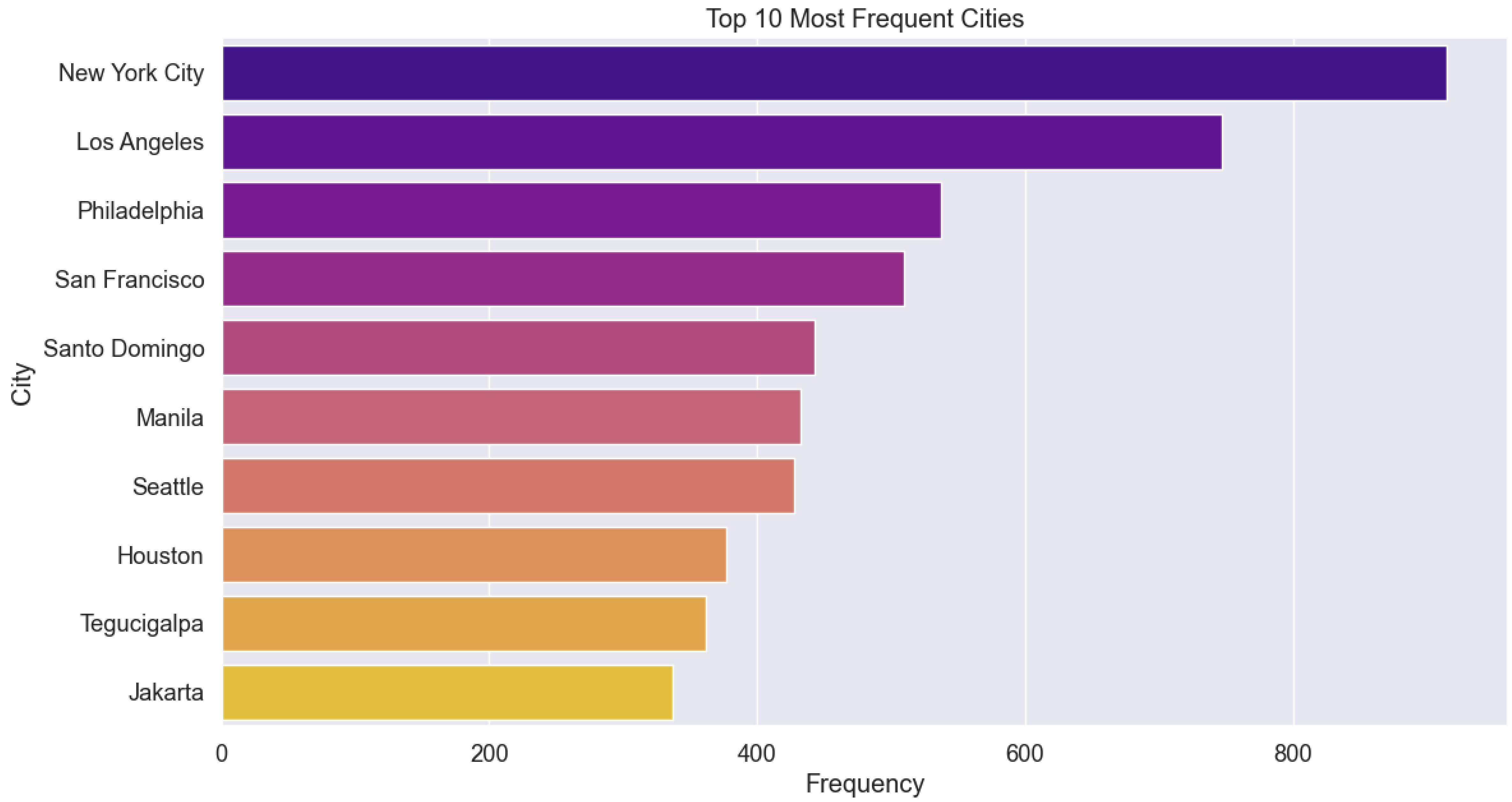
```
In [59]: sales_data['City']
```

```
Out[59]: 0        New York City
         1           Wollongong
         2             Brisbane
         3               Berlin
         4                Dakar
                      ...
         51285             Kure
         51286          Houston
         51287           Oxnard
         51288         Valinhos
         51289         Tipitapa
         Name: City, Length: 51290, dtype: object
```

```
In [60]: print(sales_data['City'].unique())
         print(sales_data['City'].nunique())
```

```
['New York City' 'Wollongong' 'Brisbane' ... 'Abilene' 'Felahiye'
 'Victoria Falls']
3636
```

```
In [62]: # Getting the unique values and their counts for the City column
         city_counts = sales_data['City'].value_counts()

         # Plotting the count plot
         plt.figure(figsize=(13, 7))
         sns.countplot(y='City', data=sales_data, order=city_counts.index[:10], palette='plasma')
         plt.title('Top 10 Most Frequent Cities')
         plt.xlabel('Frequency')
         plt.ylabel('City')
         plt.show()
```



State Column

```
In [63]: sales_data['State']
```

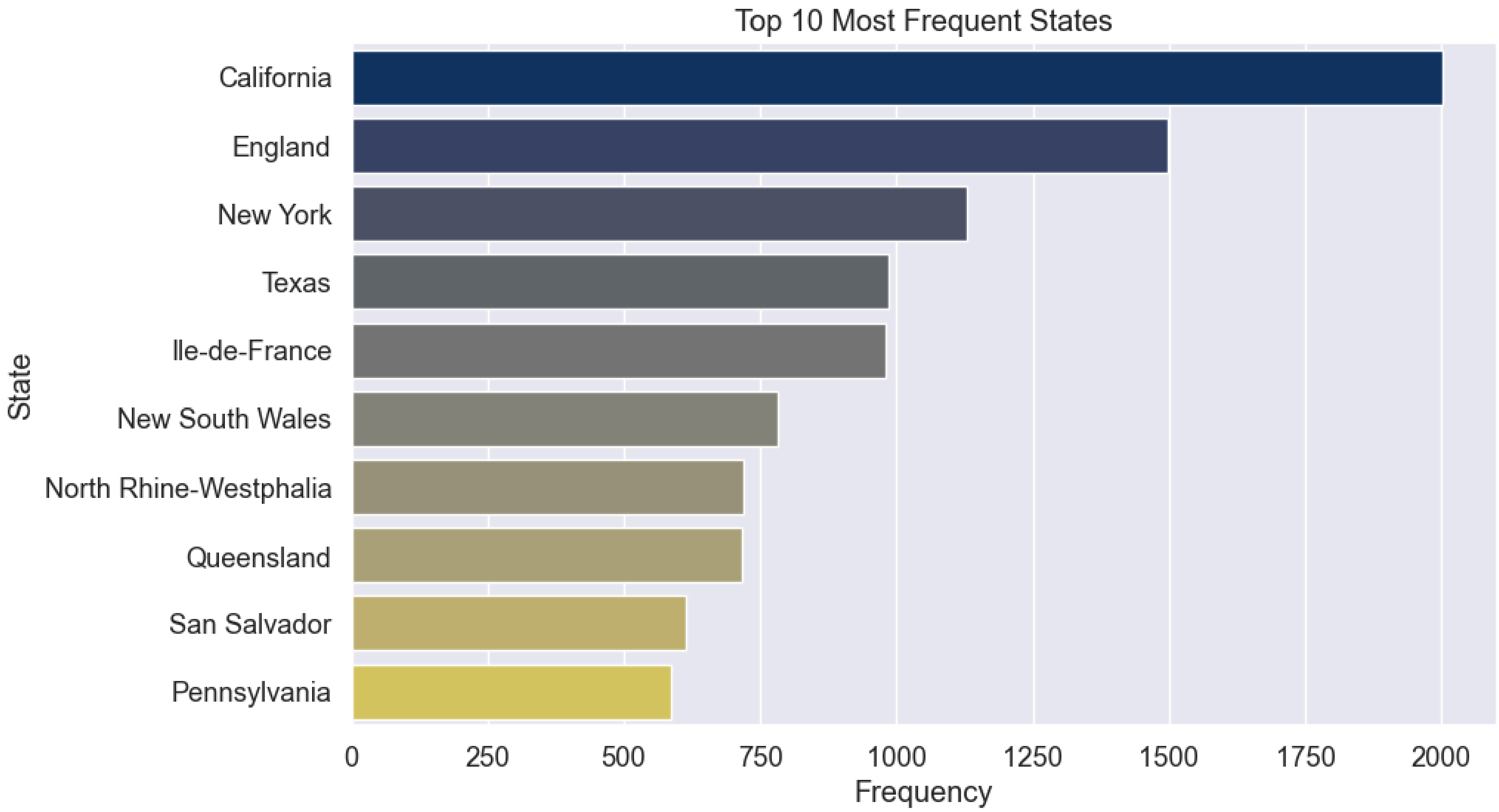
```
Out[63]: 0                New York
         1         New South Wales
         2              Queensland
         3                  Berlin
         4                   Dakar
                           ...
         51285           Hiroshima
         51286               Texas
         51287          California
         51288           São Paulo
         51289             Managua
         Name: State, Length: 51290, dtype: object
```

```
In [64]: print(sales_data['State'].unique())
         print(sales_data['State'].nunique())
```

```
['New York' 'New South Wales' 'Queensland' ... 'Manicaland' 'Kabarole'
 'Matabeleland North']
1094
```

In [65]:

```
state_counts = sales_data['State'].value_counts()

# Plotting the count plot
plt.figure(figsize=(10, 6))
sns.countplot(y='State', data=sales_data, order=state_counts.index[:10], palette='cividis')
plt.title('Top 10 Most Frequent States')
plt.xlabel('Frequency')
plt.ylabel('State')
plt.show()
```



Country Column

In [66]:

```
sales_data['Country']
```

Out[66]:

```
0        United States
1            Australia
2            Australia
3              Germany
4              Senegal
             ...
51285            Japan
51286    United States
51287    United States
51288           Brazil
51289        Nicaragua
Name: Country, Length: 51290, dtype: object
```

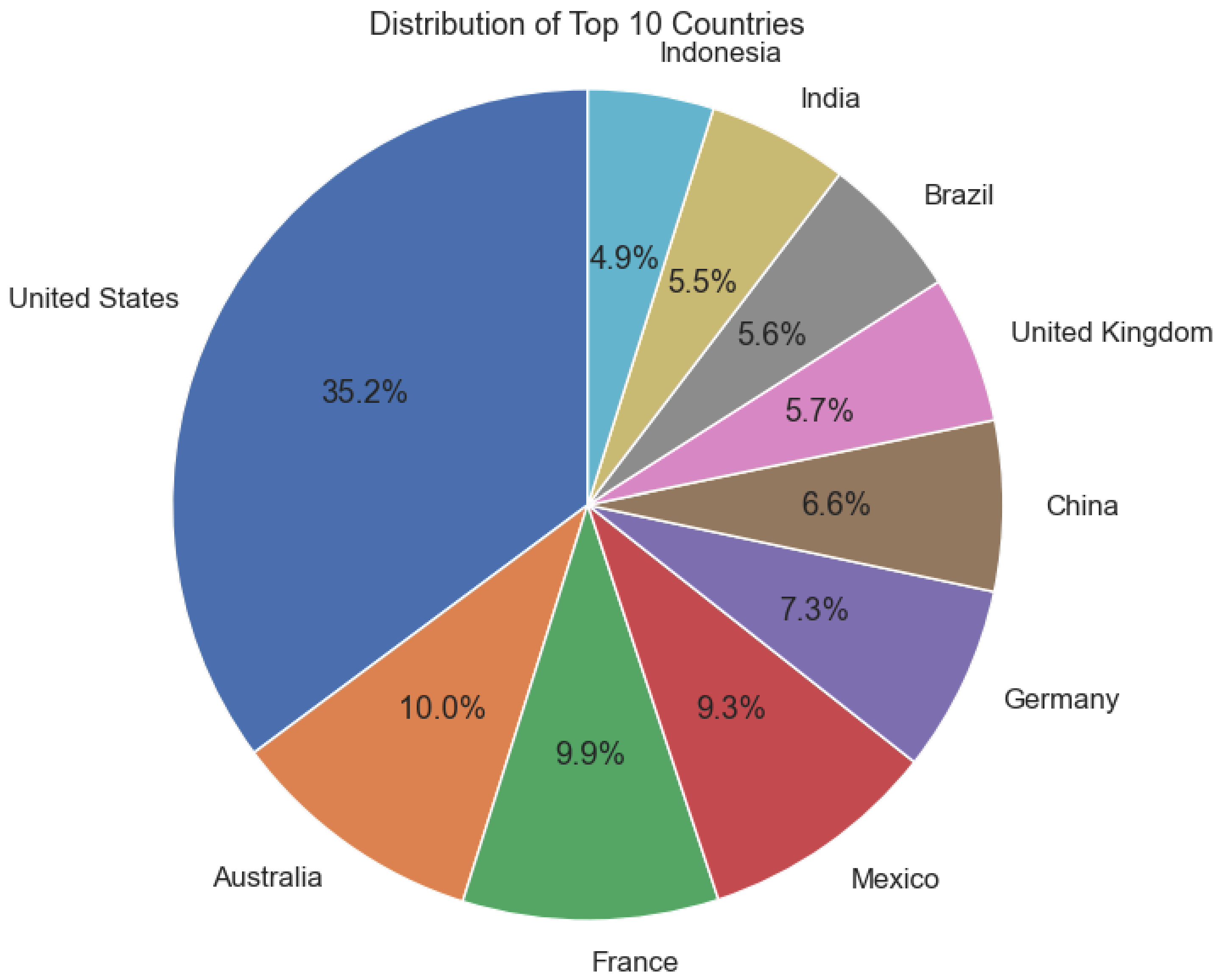
In [67]:

```
print(sales_data['Country'].unique())
print(sales_data['Country'].nunique())
```

```
['United States' 'Australia' 'Germany' 'Senegal' 'New Zealand'
 'Afghanistan' 'Saudi Arabia' 'Brazil' 'China' 'France' 'Italy' 'Tanzania'
 'Poland' 'United Kingdom' 'Mexico' 'El Salvador' 'Taiwan' 'India'
 'Dominican Republic' 'Democratic Republic of the Congo' 'Indonesia'
 'Uruguay' 'Iran' 'Mozambique' 'Bangladesh' 'Spain' 'Ukraine' 'Nicaragua'
 'Morocco' 'Canada' 'Philippines' 'Austria' 'Colombia' 'Netherlands'
 'Malaysia' 'Ecuador' 'Thailand' 'Somalia' 'Guatemala' 'Belarus'
 'Cambodia' 'South Africa' 'Japan' 'Russia' 'Egypt' 'Azerbaijan'
 'Lithuania' 'Argentina' 'Lesotho' 'Vietnam' 'Cuba' 'Romania' 'Turkey'
 'Cameroon' 'Hungary' 'Singapore' 'Angola' 'Belgium' 'Pakistan' 'Finland'
 'Ghana' 'Zambia' 'Iraq' 'Liberia' 'Georgia' 'Switzerland' 'Albania'
 'Chad' 'Montenegro' 'Namibia' 'Portugal' 'Madagascar' 'Sweden'
 'Myanmar (Burma)' 'Jamaica' 'Qatar' 'Republic of the Congo' 'Norway'
 'Algeria' 'South Korea' 'Nigeria' 'Estonia' "Cote d'Ivoire" 'Honduras'
 'Paraguay' 'Czech Republic' 'Central African Republic' 'Benin' 'Bolivia'
 'Chile' 'Martinique' 'Syria' 'Lebanon' 'Kenya' 'Mali' 'Libya' 'Venezuela'
 'Trinidad and Tobago' 'Ireland' 'Bulgaria' 'Panama' 'Israel' 'Haiti'
 'Barbados' 'Slovenia' 'Togo' 'Mauritania' 'Guinea' 'Rwanda' 'Denmark'
 'Niger' 'Papua New Guinea' 'Mongolia' 'Sudan' 'Peru' 'Sierra Leone'
 'Bosnia and Herzegovina' 'Guinea-Bissau' 'Djibouti' 'Tunisia' 'Croatia'
 'Hong Kong' 'Nepal' 'Guadeloupe' 'Kyrgyzstan' 'Zimbabwe' 'Uzbekistan'
 'South Sudan' 'Gabon' 'Bahrain' 'Yemen' 'Jordan' 'United Arab Emirates'
 'Moldova' 'Swaziland' 'Turkmenistan' 'Kazakhstan' 'Ethiopia' 'Uganda'
 'Slovakia' 'Sri Lanka' 'Tajikistan' 'Burundi' 'Macedonia' 'Eritrea'
 'Equatorial Guinea' 'Armenia']
147
```

In [74]:

```
country_counts = sales_data['Country'].value_counts().head(10)

# Plotting the pie chart
plt.figure(figsize=(13, 7))
sns.set(font_scale=1.1)
sns.color_palette("magma")
plt.pie(country_counts, labels=country_counts.index, autopct='%2.1f%%', startangle=90)
plt.title('Distribution of Top 10 Countries')
plt.axis('equal')  # Equal aspect ratio ensures that pie is drawn as a circle.
plt.show()
```



Market Column

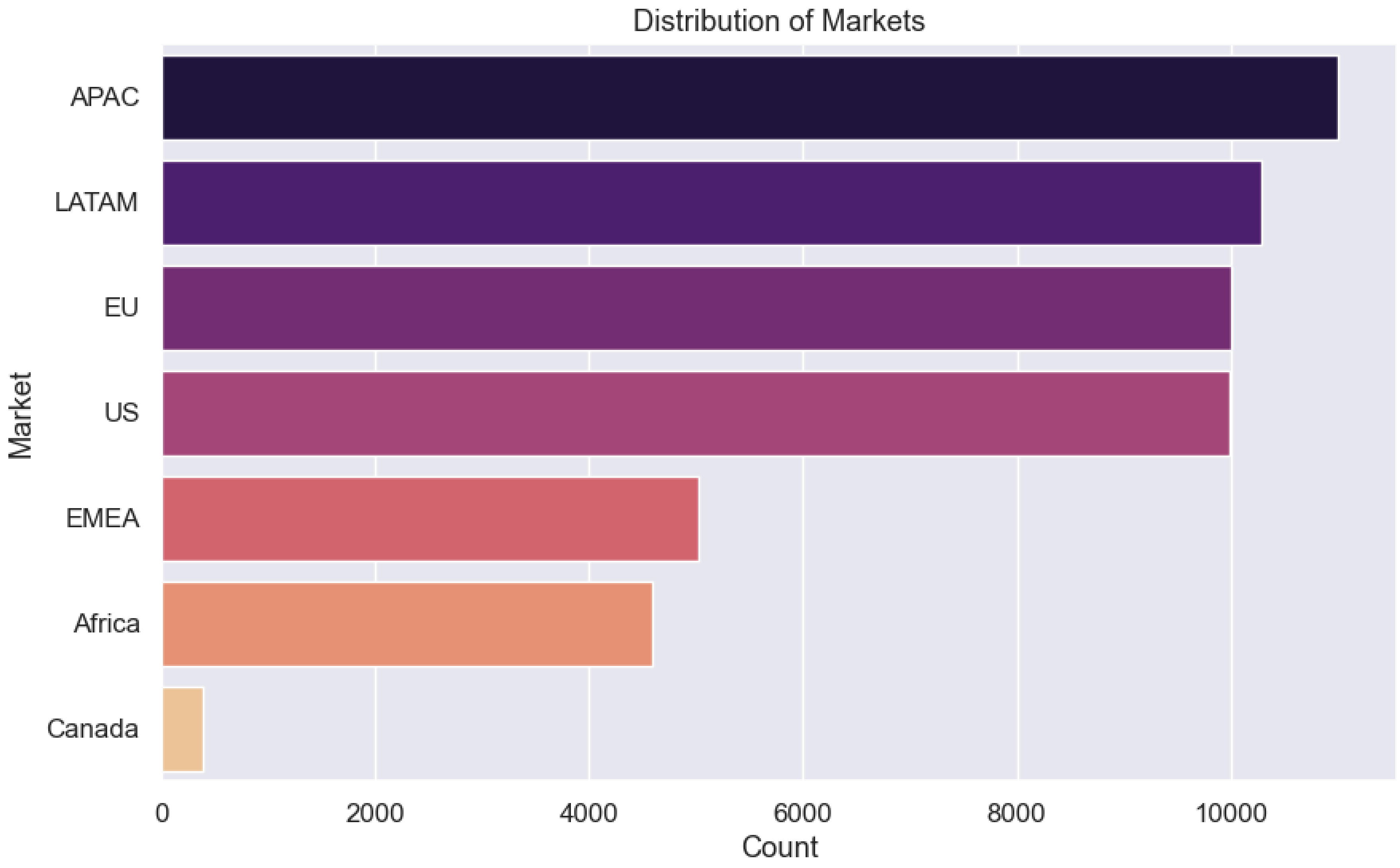
In [75]:
```
sales_data['Market']
```

Out[75]:
```
0            US
1          APAC
2          APAC
3            EU
4        Africa
          ...
51285      APAC
51286        US
51287        US
51288     LATAM
51289     LATAM
Name: Market, Length: 51290, dtype: object
```

In [76]:
```
print(sales_data['Market'].unique())
print(sales_data['Market'].nunique())
```

```
['US' 'APAC' 'EU' 'Africa' 'EMEA' 'LATAM' 'Canada']
7
```

In [77]:
```
plt.figure(figsize=(10, 6))
sns.countplot(data=sales_data, y='Market', order=sales_data['Market'].value_counts().index, palette='magma')
plt.title('Distribution of Markets')
plt.xlabel('Count')
plt.ylabel('Market')
plt.show()
```



Region Column

In [78]:
```
sales_data['Region']
```

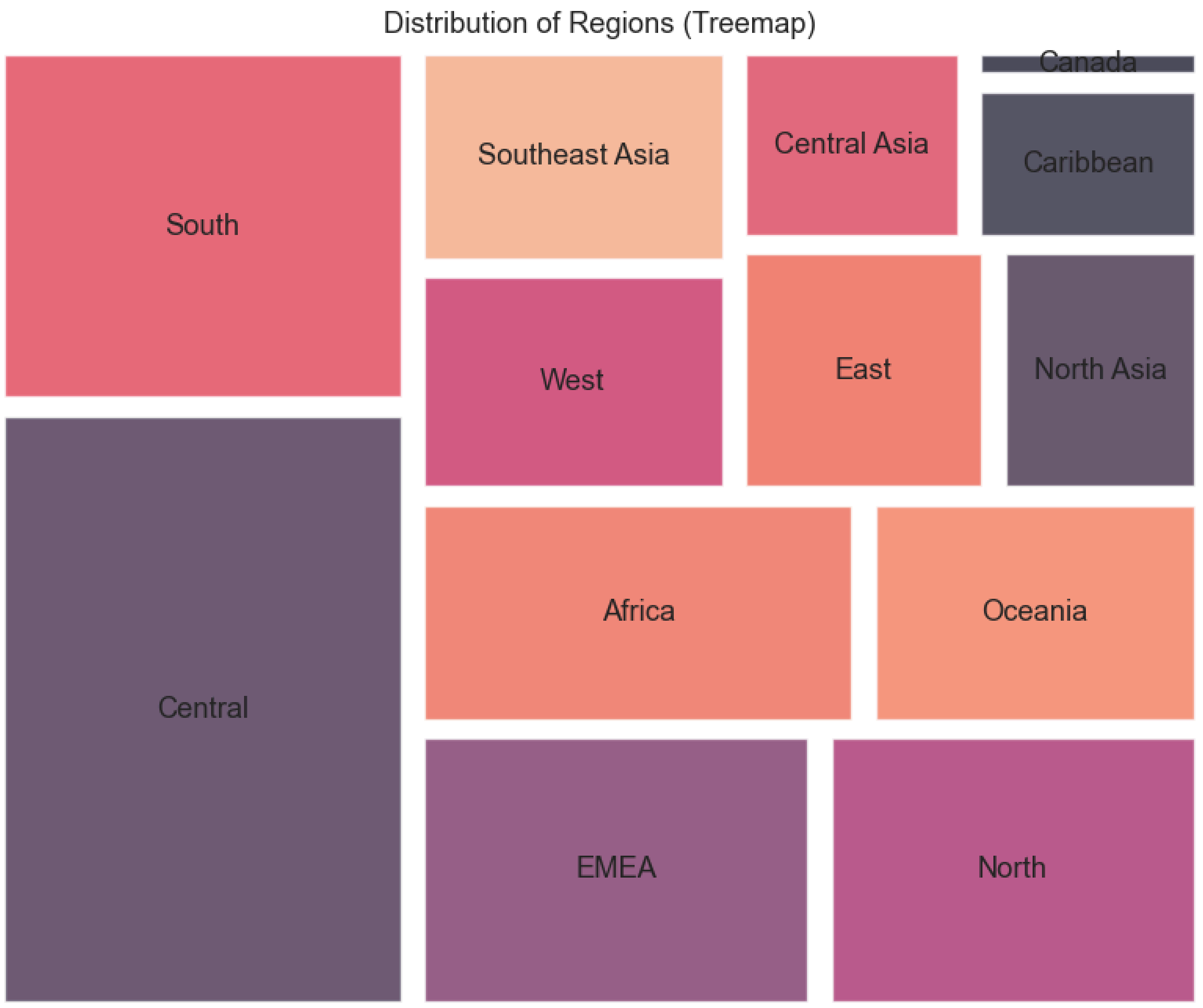
Out[78]:
```
0             East
1          Oceania
2          Oceania
3          Central
4           Africa
            ...   
51285   North Asia
51286      Central
51287         West
51288        South
51289      Central
Name: Region, Length: 51290, dtype: object
```

In [79]:
```
print(sales_data['Region'].unique())
print(sales_data['Region'].nunique())
```

```
['East' 'Oceania' 'Central' 'Africa' 'West' 'South' 'Central Asia' 'EMEA'
 'North Asia' 'North' 'Caribbean' 'Southeast Asia' 'Canada']
13
```

In [80]:
```
# Get the counts for each region
region_counts = sales_data['Region'].value_counts()
```

```
# Create a squarify plot
plt.figure(figsize=(10, 8))
squarify.plot(sizes=region_counts, label=region_counts.index, alpha=0.7, pad=True)
plt.title('Distribution of Regions (Treemap)')
plt.axis('off')  # Turn off axis
plt.show()
```



Product ID Column

```
In [81]: sales_data['Product ID']
```

Out[81]:

```
0         TEC-AC-10003033
1         FUR-CH-10003950
2         TEC-PH-10004664
3         TEC-PH-10004583
4        TEC-SHA-10000501
               ...
51285     OFF-FA-10000746
51286     OFF-AP-10002906
51287     OFF-EN-10001219
51288     OFF-BI-10000806
51289     OFF-PA-10004155
Name: Product ID, Length: 51290, dtype: object
```

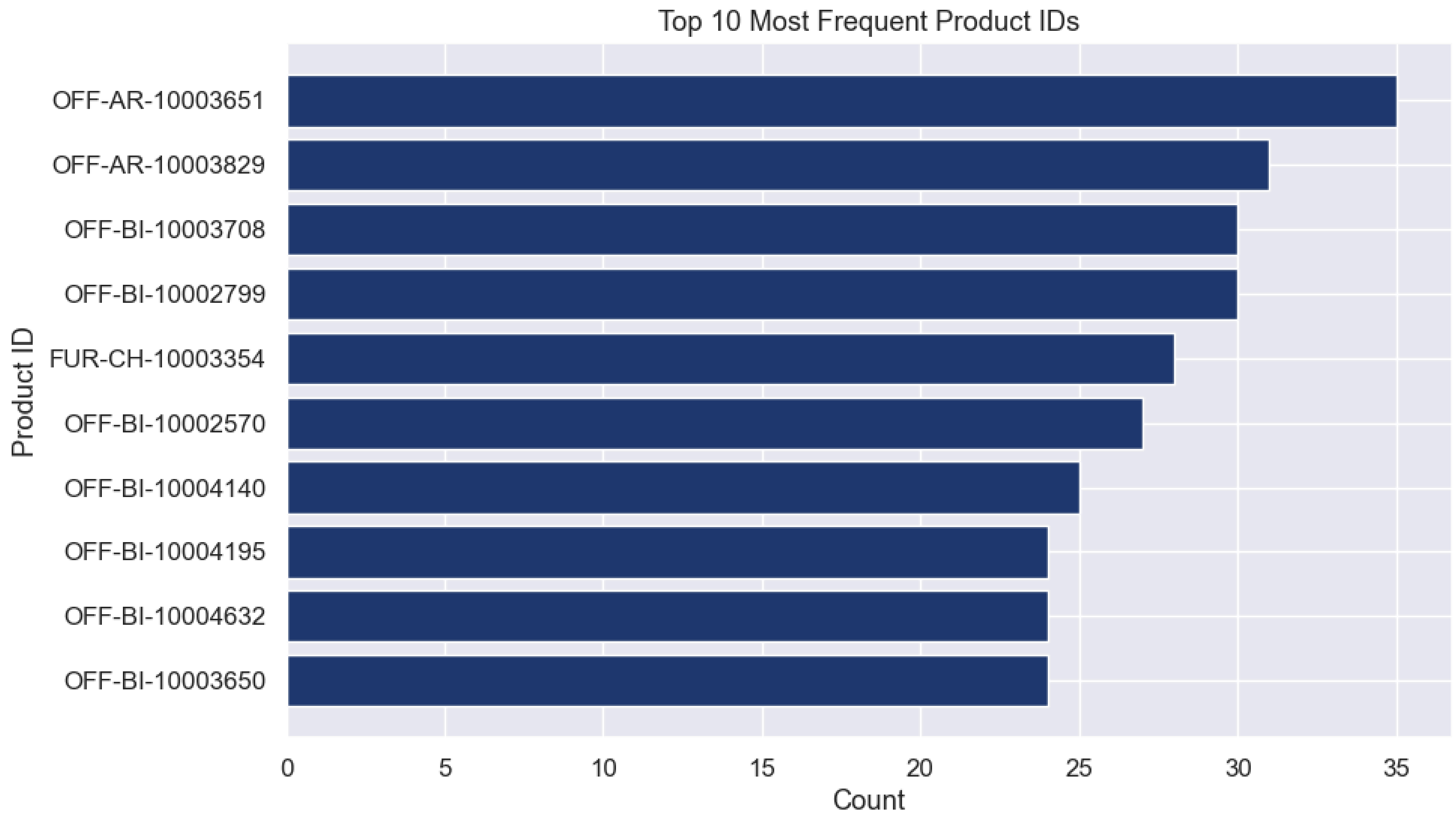
In [82]:

```python
print(sales_data['Product ID'].unique())
print(sales_data['Product ID'].nunique())
```

```
['TEC-AC-10003033' 'FUR-CH-10003950' 'TEC-PH-10004664' ...
 'OFF-BI-10002510' 'FUR-ADV-10002329' 'OFF-AP-10002203']
10292
```

In [84]:

```python
# Define the number of top product IDs to consider
top_n = 10

# Get the top N most frequent product IDs and their counts
top_product_ids = sales_data['Product ID'].value_counts().head(top_n)
product_counts = top_product_ids.values
product_ids = top_product_ids.index

# Set Seaborn's color palette
sns.set_palette("cividis")

# Create the bar plot
plt.figure(figsize=(10, 6))
plt.barh(product_ids, product_counts)
plt.xlabel('Count')
plt.ylabel('Product ID')
plt.title(f'Top {top_n} Most Frequent Product IDs')
plt.gca().invert_yaxis()  # Invert y-axis to have the highest count on top
plt.show()
```



Category Column

In [85]:

```
sales_data['Category']
```

Out[85]:

```
0             Technology
1              Furniture
2             Technology
3             Technology
4             Technology
              ...       
51285    Office Supplies
51286    Office Supplies
51287    Office Supplies
51288    Office Supplies
51289    Office Supplies
Name: Category, Length: 51290, dtype: object
```

In [86]:

```
print(sales_data['Category'].unique())
print(sales_data['Category'].nunique())
```

```
['Technology' 'Furniture' 'Office Supplies']
3
```

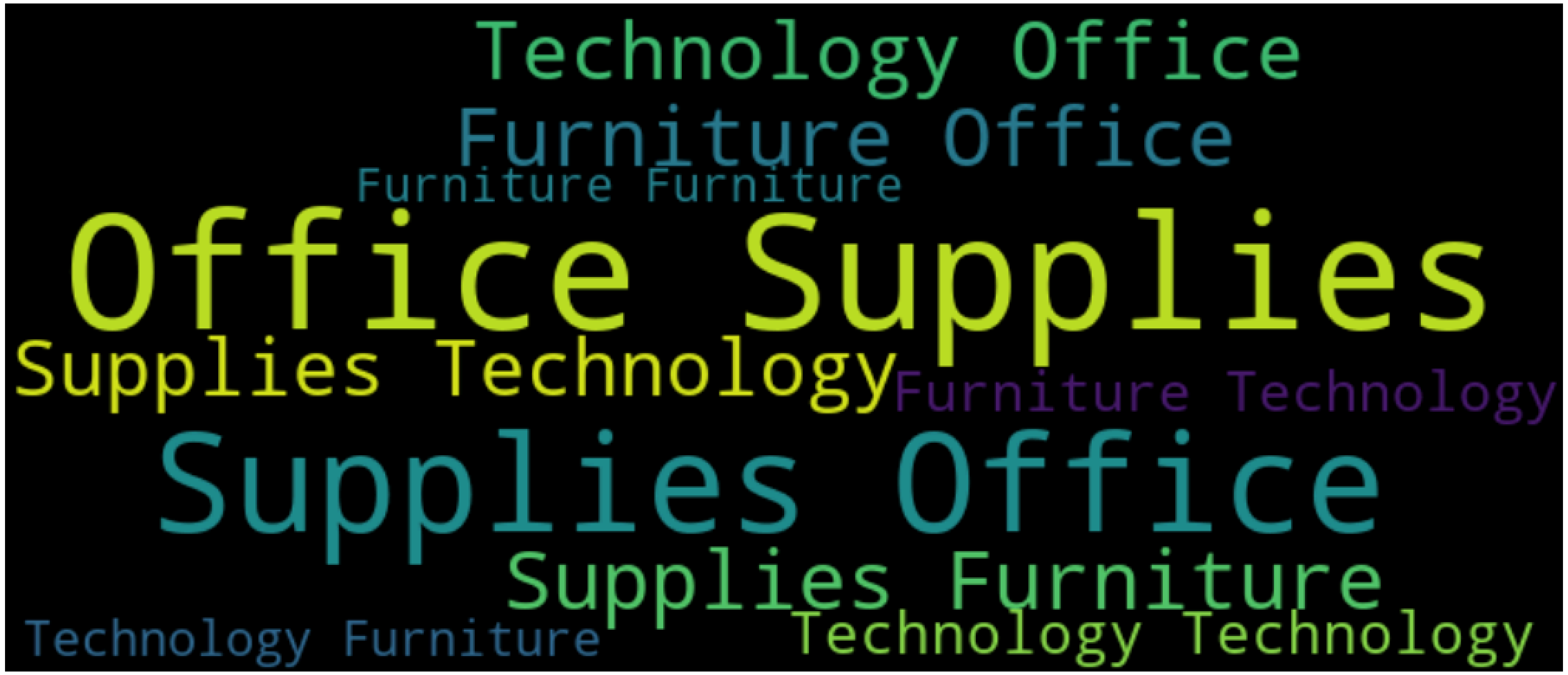
In [92]:

```
! pip install wordcloud
from wordcloud import WordCloud

# Concatenate all categories into a single string
categories_text = ' '.join(sales_data['Category'])
```

```
# Generate word cloud
wordcloud = WordCloud(width=700, height=300, background_color='black').generate(categories_text)

# Display the word cloud
plt.figure(figsize=(13, 7))
plt.imshow(wordcloud, interpolation='bilinear')
plt.title('Word Cloud of Categories')
plt.axis('off')
plt.show()
```

```
Requirement already satisfied: wordcloud in d:\anaconda\lib\site-packages (1.9.3)
Requirement already satisfied: numpy>=1.6.1 in d:\anaconda\lib\site-packages (from wordcloud) (1.24.3)
Requirement already satisfied: pillow in d:\anaconda\lib\site-packages (from wordcloud) (10.2.0)
Requirement already satisfied: matplotlib in d:\anaconda\lib\site-packages (from wordcloud) (3.7.2)
Requirement already satisfied: contourpy>=1.0.1 in d:\anaconda\lib\site-packages (from matplotlib->wordcloud) (1.0.5)
Requirement already satisfied: cycler>=0.10 in d:\anaconda\lib\site-packages (from matplotlib->wordcloud) (0.11.0)
Requirement already satisfied: fonttools>=4.22.0 in d:\anaconda\lib\site-packages (from matplotlib->wordcloud) (4.25.0)
Requirement already satisfied: kiwisolver>=1.0.1 in d:\anaconda\lib\site-packages (from matplotlib->wordcloud) (1.4.4)
Requirement already satisfied: packaging>=20.0 in d:\anaconda\lib\site-packages (from matplotlib->wordcloud) (23.1)
Requirement already satisfied: pyparsing<3.1,>=2.3.1 in d:\anaconda\lib\site-packages (from matplotlib->wordcloud) (3.0.9)
Requirement already satisfied: python-dateutil>=2.7 in d:\anaconda\lib\site-packages (from matplotlib->wordcloud) (2.8.2)
Requirement already satisfied: six>=1.5 in d:\anaconda\lib\site-packages (from python-dateutil>=2.7->matplotlib->wordcloud) (1.16.0)
```

Word Cloud of Categories



Sub Category Column

```
In [93]: sales_data['Sub-Category']
```

Out[93]:

```
0        Accessories
1             Chairs
2             Phones
3             Phones
4            Copiers
            ...
51285      Fasteners
51286     Appliances
51287      Envelopes
51288        Binders
51289          Paper
Name: Sub-Category, Length: 51290, dtype: object
```

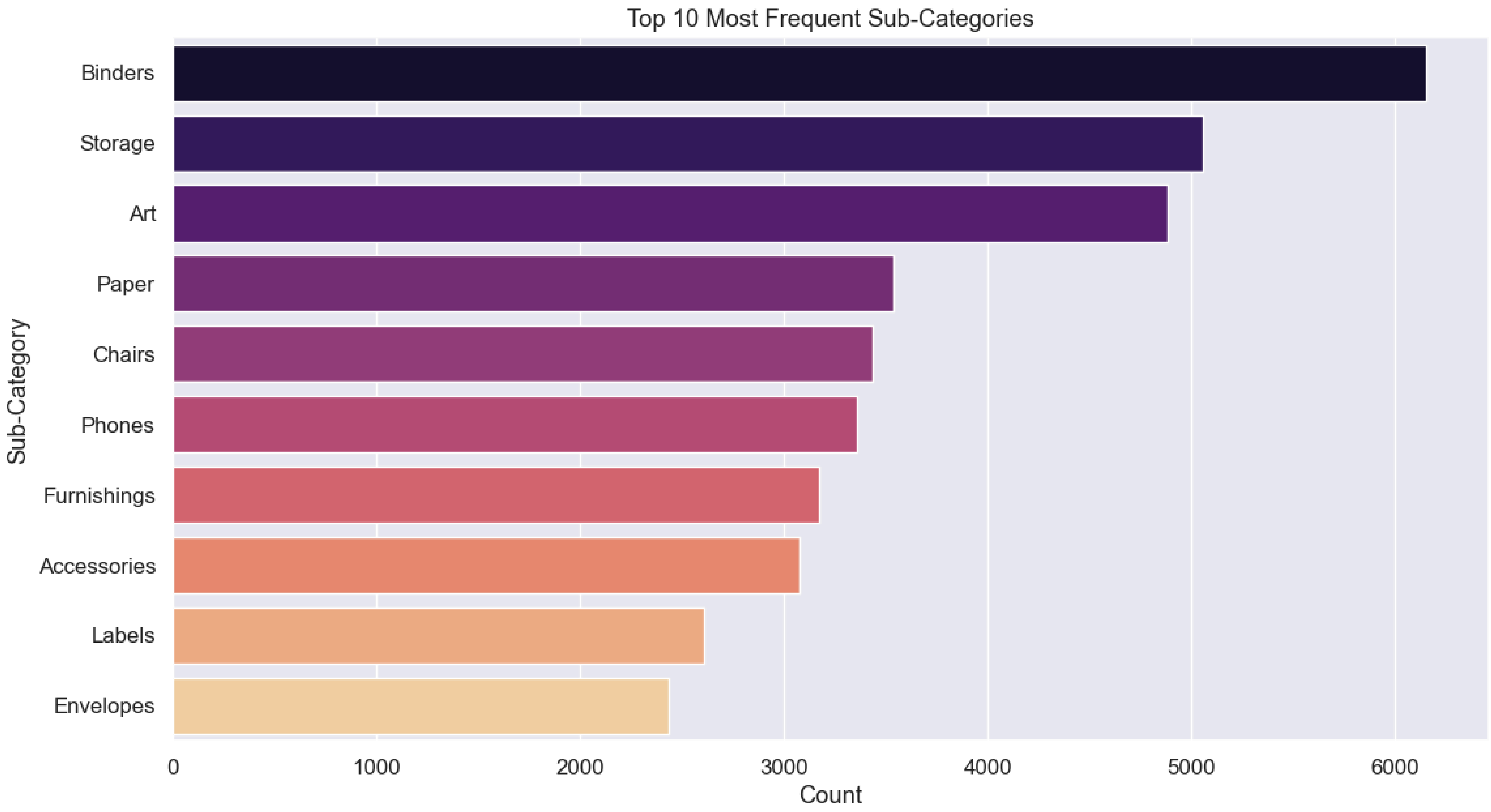
In [94]:

```
print(sales_data['Sub-Category'].unique())
print(sales_data['Sub-Category'].nunique())
```

```
['Accessories' 'Chairs' 'Phones' 'Copiers' 'Tables' 'Binders' 'Supplies'
 'Appliances' 'Machines' 'Bookcases' 'Storage' 'Furnishings' 'Art' 'Paper'
 'Envelopes' 'Fasteners' 'Labels']
17
```

In [95]:

```
# Get the top 10 most frequent sub-categories and their counts
top_subcategories = sales_data['Sub-Category'].value_counts().head(10)

# Create the vertical bar plot
plt.figure(figsize=(13, 7))
sns.barplot(x=top_subcategories.values, y=top_subcategories.index, palette='magma')
plt.xlabel('Count')
plt.ylabel('Sub-Category')
plt.title('Top 10 Most Frequent Sub-Categories')
plt.show()
```



Product Name

In [96]:
```
sales_data['Product Name']
```

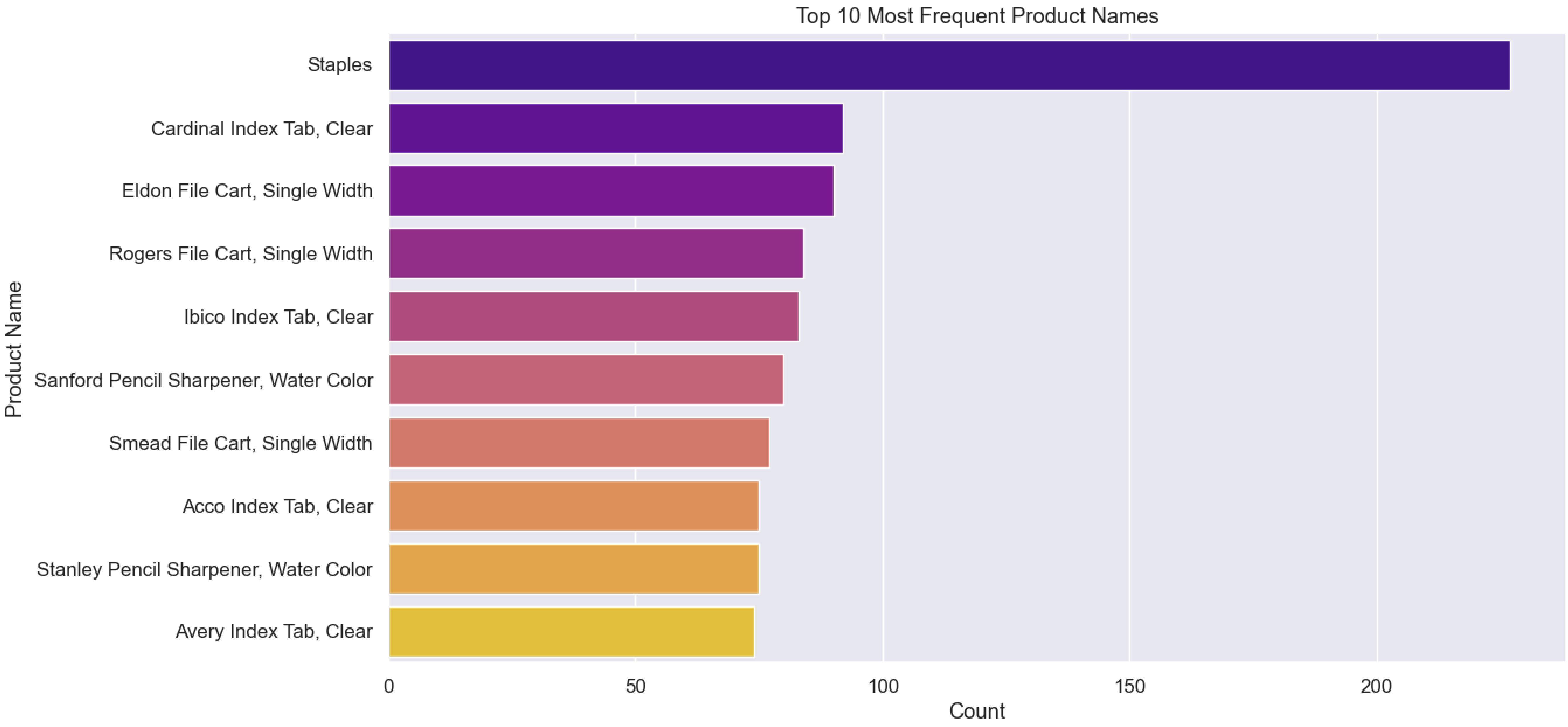
Out[96]:
```
0        Plantronics CS510 - Over-the-Head monaural Wir...
1                Novimex Executive Leather Armchair, Black
2                        Nokia Smart Phone, with Caller ID
3                           Motorola Smart Phone, Cordless
4                           Sharp Wireless Fax, High-Speed
                               ...                        
51285                        Advantus Thumb Tacks, 12 Pack
51286    Hoover Replacement Belt for Commercial Guardsm...
51287         #10- 4 1/8" x 9 1/2" Security-Tint Envelopes
51288                               Acco Index Tab, Economy
51289                Eaton Computer Printout Paper, 8.5 x 11
Name: Product Name, Length: 51290, dtype: object
```

In [97]:
```
print(sales_data['Product Name'].unique())
print(sales_data['Product Name'].nunique())
```

```
['Plantronics CS510 - Over-the-Head monaural Wireless Headset System'
 'Novimex Executive Leather Armchair, Black'
 'Nokia Smart Phone, with Caller ID' ...
 'Kleencut Forged Office Shears by Acme United Corporation'
 'Holmes Visible Mist Ultrasonic Humidifier with 2.3-Gallon Output per Day, Replacement Filter'
 'Eureka Disposable Bags for Sanitaire Vibra Groomer I Upright Vac']
3788
```

In [98]:

```python
# Get the top 10 most frequent product names and their counts
top_product_names = sales_data['Product Name'].value_counts().head(10)

# Create the horizontal bar plot
plt.figure(figsize=(13, 7))
sns.barplot(x=top_product_names.values, y=top_product_names.index, palette='plasma')
plt.xlabel('Count')
plt.ylabel('Product Name')
plt.title('Top 10 Most Frequent Product Names')
plt.show()
```



Sales Column

In [99]:

```python
sales_data['Sales']
```

Out[99]:

```
0        2309.650
1        3709.395
2        5175.171
3        2892.510
4        2832.960
           ...   
51285      65.100
51286       0.444
51287      22.920
51288      13.440
51289      61.380
Name: Sales, Length: 51290, dtype: float64
```

In [100…

```
print(sales_data['Sales'].unique())
print(sales_data['Sales'].nunique())
```

```
[2.309650e+03 3.709395e+03 5.175171e+03 ... 1.624000e+00 5.364000e+00
 4.440000e-01]
24988
```

Quantity Column

In [101…

```
sales_data['Quantity']
```

Out[101]:

```
0        7
1        9
2        9
3        5
4        8
        ..
51285    5
51286    1
51287    3
51288    2
51289    3
Name: Quantity, Length: 51290, dtype: int64
```

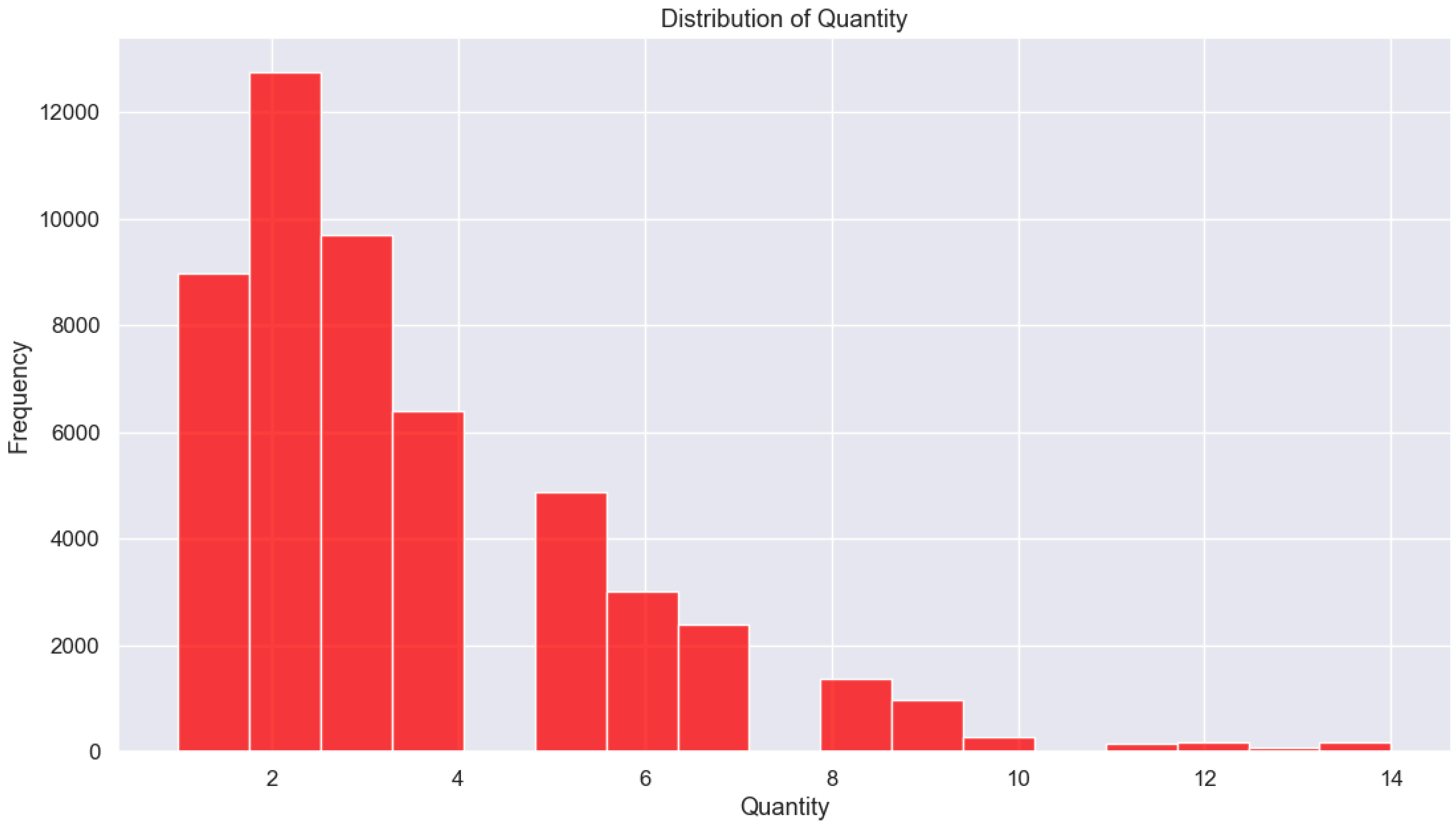
In [102…

```
print(sales_data['Quantity'].unique())
print(sales_data['Quantity'].nunique())
```

```
[ 7  9  5  8  4  6 13 12 14 10  2 11  3  1]
14
```

In [103…

```
# Create the histogram
plt.figure(figsize=(13, 7))
sns.histplot(sales_data['Quantity'], bins=17, color='red')
plt.xlabel('Quantity')
plt.ylabel('Frequency')
plt.title('Distribution of Quantity')
plt.grid(True)
plt.show()
```



Discount

```
In [104…  sales_data['Discount']
```

```
Out[104]: 0        0.0
          1        0.1
          2        0.1
          3        0.1
          4        0.0
                  ...
          51285    0.0
          51286    0.8
          51287    0.0
          51288    0.0
          51289    0.0
          Name: Discount, Length: 51290, dtype: float64
```

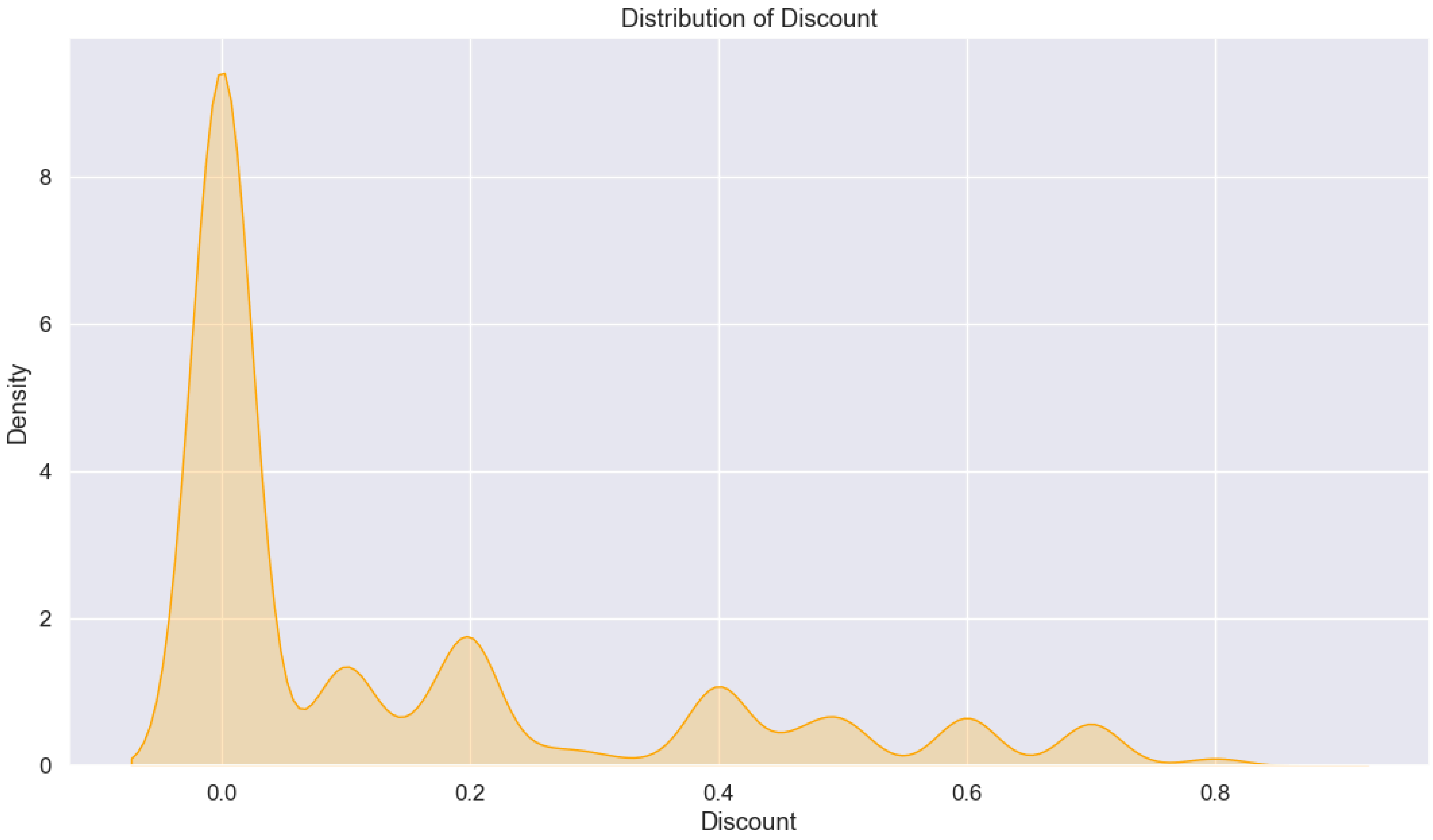
```
In [105…  print(sales_data['Discount'].unique())
          print(sales_data['Discount'].nunique())
```

```
[0.    0.1   0.2   0.4   0.15  0.3   0.5   0.17  0.47  0.25  0.002 0.07
 0.32  0.27  0.7   0.35  0.6   0.65  0.8   0.57  0.37  0.402 0.55  0.202
 0.45  0.602 0.85 ]
27
```

In [106…

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

# Create the KDE plot
plt.figure(figsize=(13, 7))
sns.kdeplot(sales_data['Discount'], shade=True, color='orange')
plt.xlabel('Discount')
plt.ylabel('Density')
plt.title('Distribution of Discount')
plt.grid(True)
plt.show()
```

```
C:\Users\Ayush\AppData\Local\Temp\ipykernel_9496\3728037380.py:6: FutureWarning:

`shade` is now deprecated in favor of `fill`; setting `fill=True`.
This will become an error in seaborn v0.14.0; please update your code.

  sns.kdeplot(sales_data['Discount'], shade=True, color='orange')
```



Profit Column

In [107…

```
sales_data['Profit']
```

Out[107]:

```
0        762.1845
1       -288.7650
2        919.9710
3        -96.5400
4        311.5200
           ...   
51285      4.5000
51286     -1.1100
51287     11.2308
51288      2.4000
51289      1.8000
Name: Profit, Length: 51290, dtype: float64
```

In [108…

```
print(sales_data['Profit'].unique())
print(sales_data['Profit'].nunique())
```

```
[ 762.1845 -288.765   919.971  ...   -4.466    -6.456   -49.572 ]
27085
```

Shipping Cost

In [109…

```
sales_data['Shipping Cost']
```

Out[109]:

```
0        933.570
1        923.630
2        915.490
3        910.160
4        903.040
          ...   
51285      0.010
51286      0.010
51287      0.010
51288      0.003
51289      0.002
Name: Shipping Cost, Length: 51290, dtype: float64
```

In [110…

```
print(sales_data['Shipping Cost'].unique())
print(sales_data['Shipping Cost'].nunique())
```

```
[9.3357e+02 9.2363e+02 9.1549e+02 ... 1.0000e-02 3.0000e-03 2.0000e-03]
16936
```

Order Priority

In [111…

```
sales_data['Order Priority']
```

Out[111]:

```
0        Critical
1        Critical
2          Medium
3          Medium
4        Critical
           ...   
51285      Medium
51286      Medium
51287        High
51288      Medium
51289        High
Name: Order Priority, Length: 51290, dtype: object
```

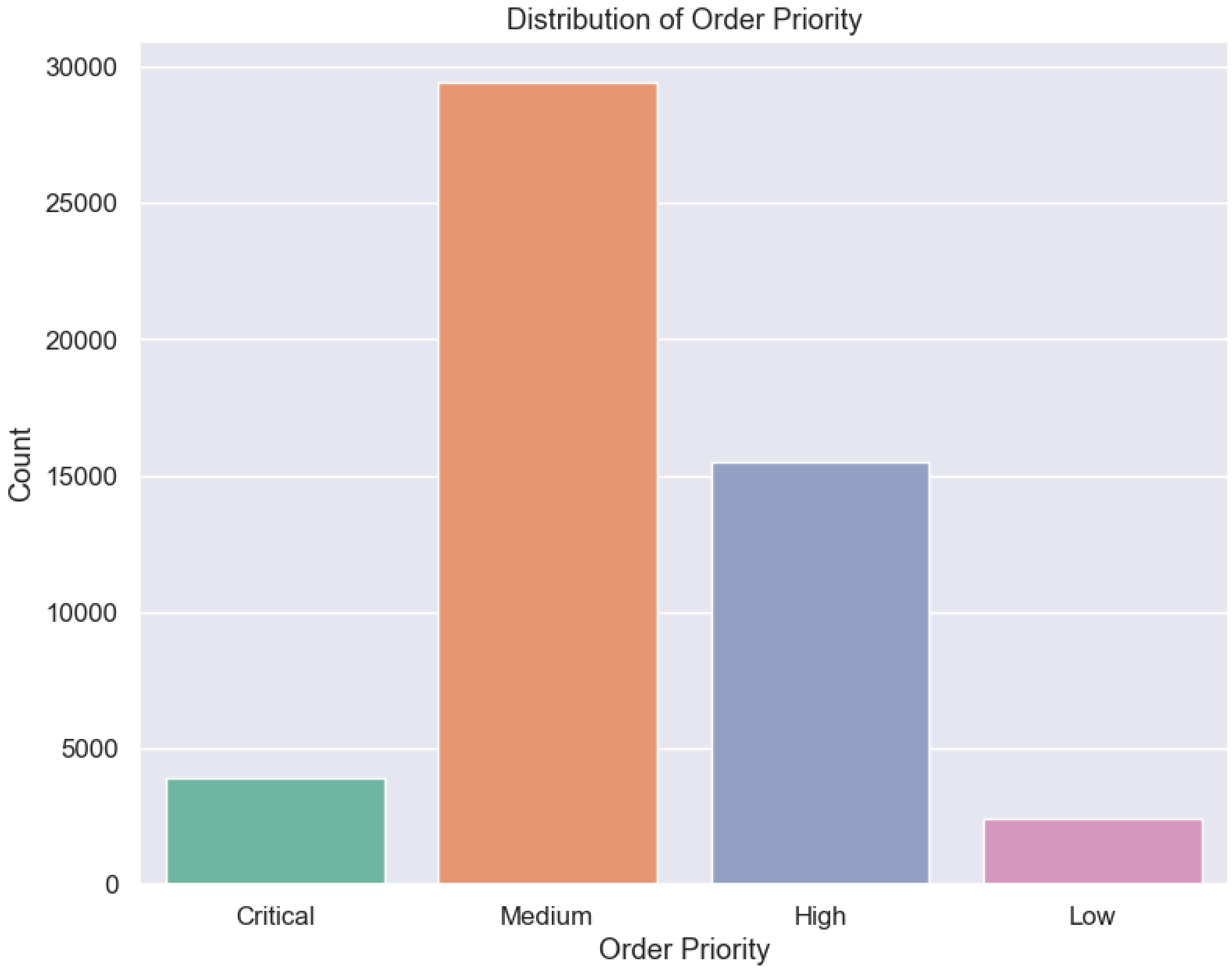
In [112…

```
print(sales_data['Order Priority'].unique())
print(sales_data['Order Priority'].nunique())
```

```
['Critical' 'Medium' 'High' 'Low']
4
```

In [114…

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

# Create the count plot
plt.figure(figsize=(9, 7))
sns.countplot(x='Order Priority', data=sales_data, palette='Set2')
plt.xlabel('Order Priority')
plt.ylabel('Count')
plt.title('Distribution of Order Priority')
plt.show()
```



Deriving Some Insights from Datasets

In [115…

```
sales_data.columns
```

Out[115]:

```
Index(['Row ID', 'Order ID', 'Order Date', 'Ship Date', 'Ship Mode',
       'Customer ID', 'Customer Name', 'Segment', 'City', 'State', 'Country',
       'Postal Code', 'Market', 'Region', 'Product ID', 'Category',
       'Sub-Category', 'Product Name', 'Sales', 'Quantity', 'Discount',
       'Profit', 'Shipping Cost', 'Order Priority'],
      dtype='object')
```

Total Sales

In [116…

```
total_sales = sales_data['Sales'].sum()
print("Total Sales:", total_sales)
```

```
Total Sales: 12642501.909880001
```

In [117…

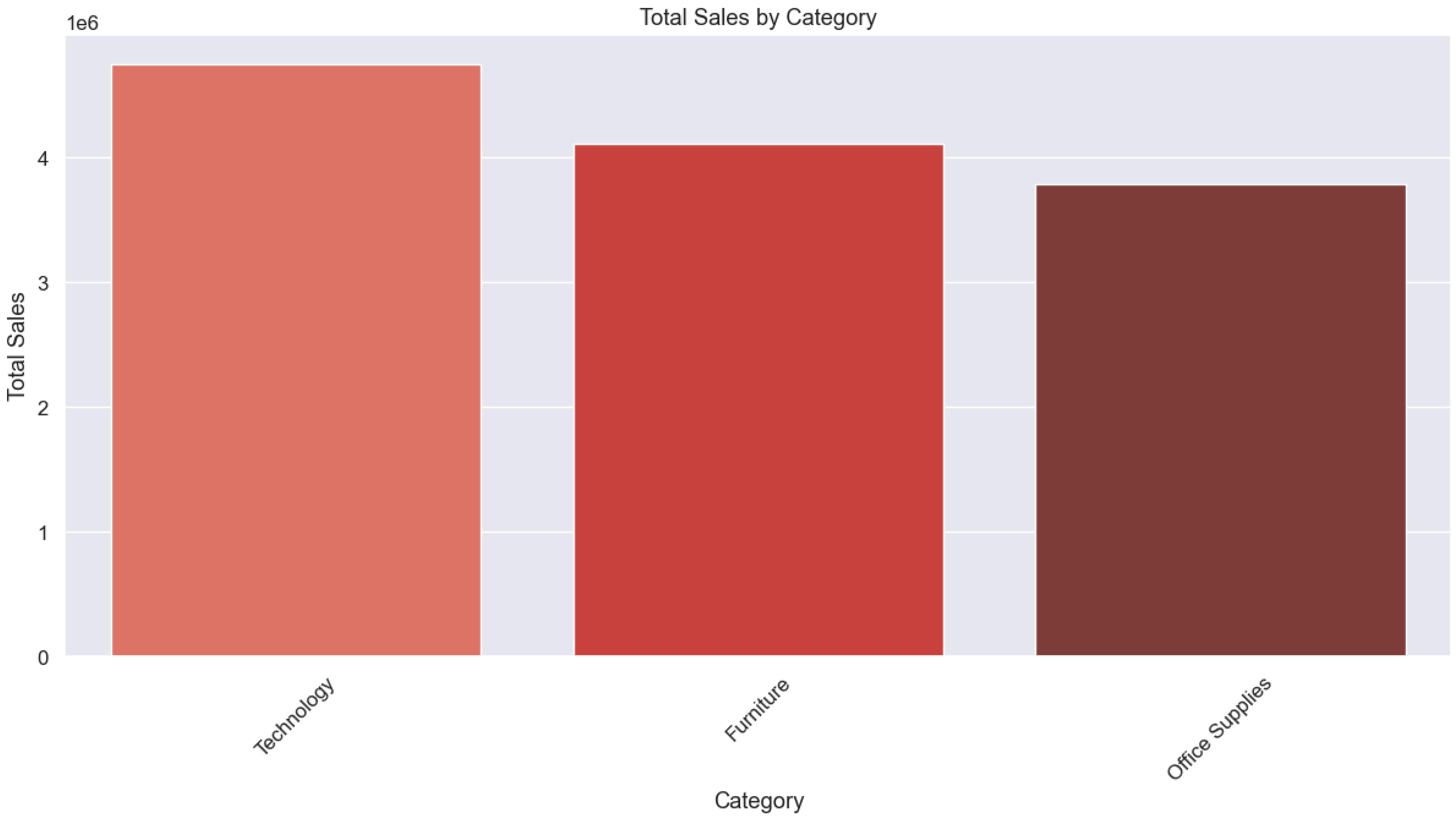
```
# Calculating total sales and round to 2 decimal places
total_sales = round(sales_data['Sales'].sum(), 2)
print("Total Sales:", total_sales)
```

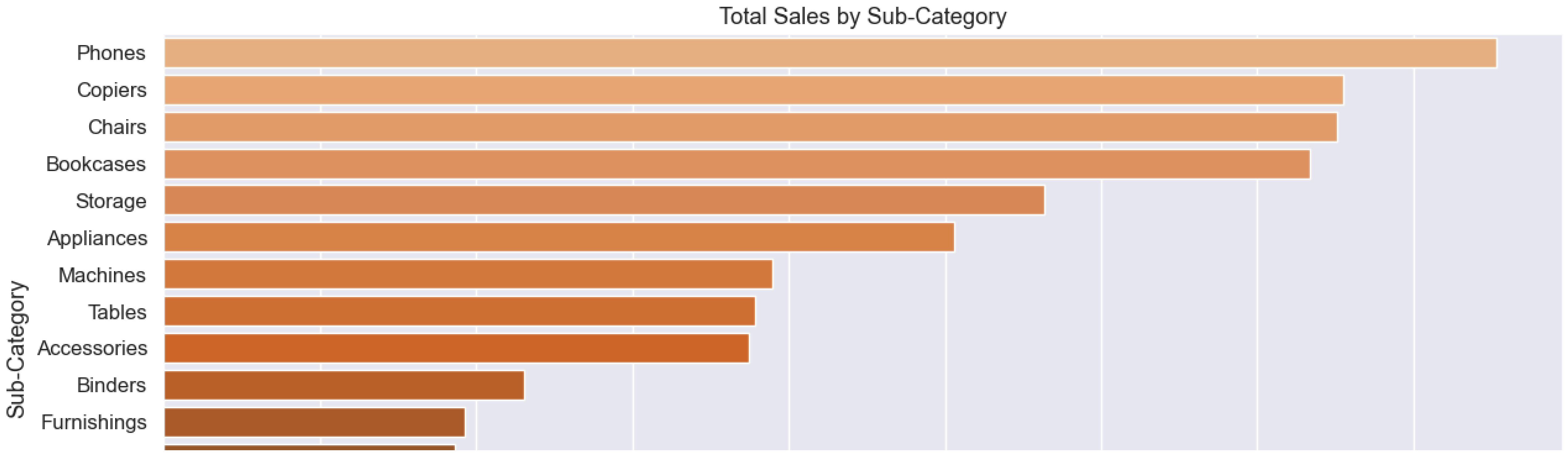
```
Total Sales: 12642501.91
```

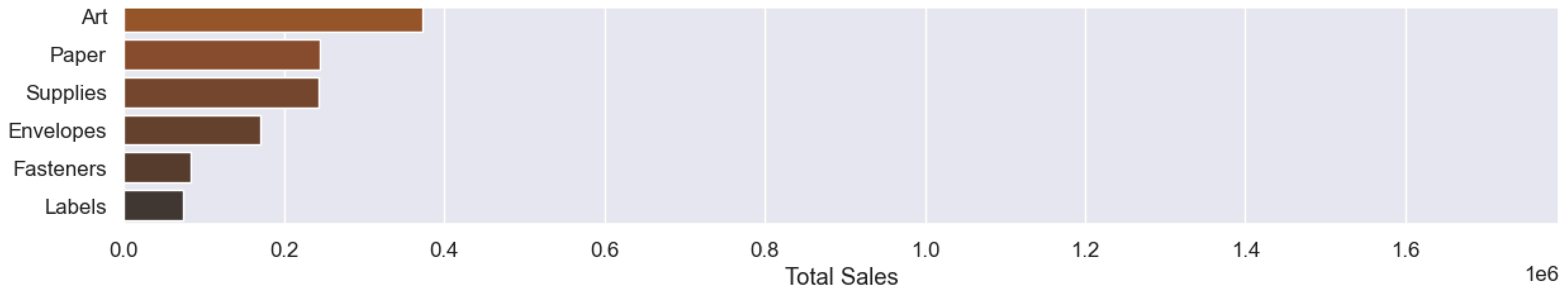
Total Sales by Category & Sub Category

In [123…

```
total_sales_by_category = sales_data.groupby('Category')['Sales'].sum().reset_index().sort_values(by='Sales', ascending=False)

# Group the data by 'Sub-Category' and calculate total sales for each sub-category
total_sales_by_subcategory = sales_data.groupby(['Category', 'Sub-Category'])['Sales'].sum().reset_index().sort_values(by='Sales', ascending=False)

# Plotting
fig, axes = plt.subplots(2, 1, figsize=(13, 13))

# Plot for Total Sales by Category
sns.barplot(x='Category', y='Sales', data=total_sales_by_category, ax=axes[0], palette='Reds_d')
axes[0].set_title('Total Sales by Category')
axes[0].set_xlabel('Category')
axes[0].set_ylabel('Total Sales')
axes[0].tick_params(axis='x', rotation=45)

# Plot for Total Sales by Sub-Category
sns.barplot(x='Sales', y='Sub-Category', data=total_sales_by_subcategory, ax=axes[1], palette='Oranges_d')
axes[1].set_title('Total Sales by Sub-Category')
axes[1].set_xlabel('Total Sales')
axes[1].set_ylabel('Sub-Category')

plt.tight_layout()
plt.show()
```


Total Sales by Category
1e6
Total Sales
0
1
2
3
4
Technology
Furniture
Office Supplies
Category

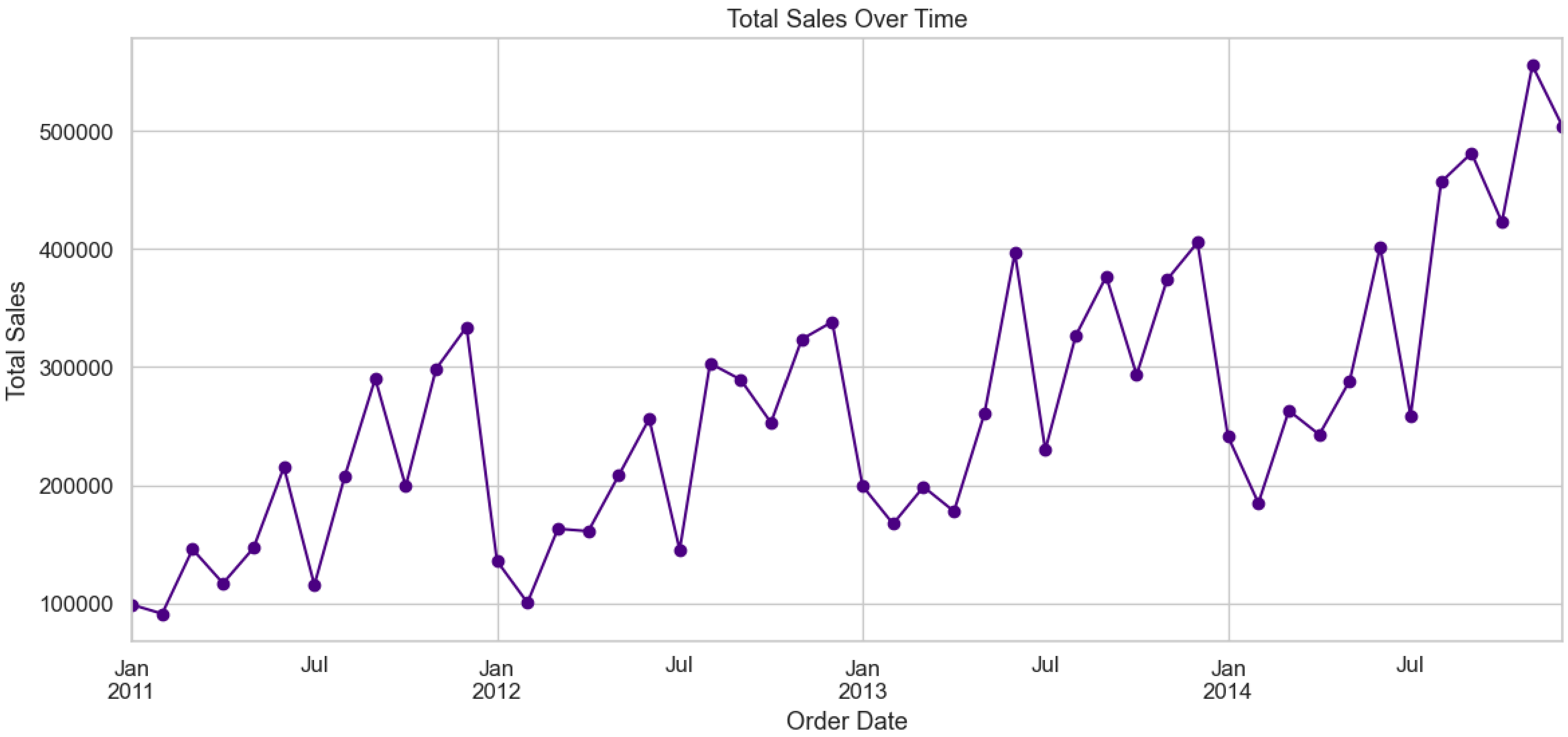

Total Sales by Sub-Category
Sub-Category
Phones
Copiers
Chairs
Bookcases
Storage
Appliances
Machines
Tables
Accessories
Binders
Furnishings

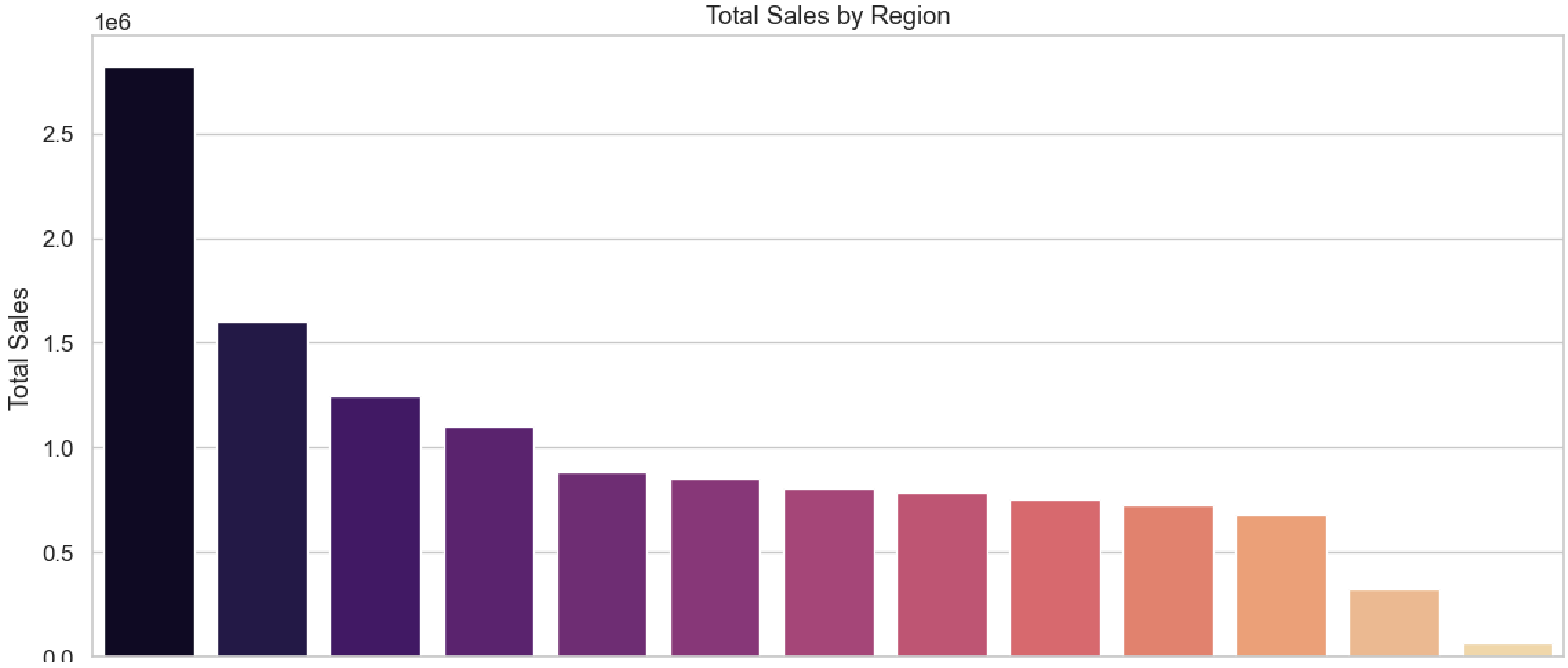


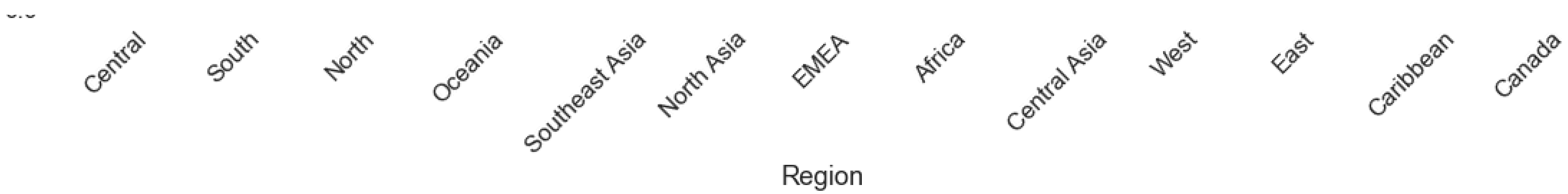
Total Sales over Time & Total Sales by Region

In [124…

```
sns.set_style("whitegrid")

# Plotting
fig, axes = plt.subplots(2, 1, figsize=(12, 12))

# Total Sales Over Time
sales_data['Order Date'] = pd.to_datetime(sales_data['Order Date'])  # Convert 'Order Date' to datetime
total_sales_over_time = sales_data.groupby(sales_data['Order Date'].dt.to_period('M'))['Sales'].sum()
total_sales_over_time.plot(ax=axes[0], marker='o', color='indigo')
axes[0].set_title('Total Sales Over Time')
axes[0].set_xlabel('Order Date')
axes[0].set_ylabel('Total Sales')

# Total Sales by Region
total_sales_by_region = sales_data.groupby('Region')['Sales'].sum().sort_values(ascending=False)
sns.barplot(x=total_sales_by_region.index, y=total_sales_by_region.values, ax=axes[1], palette='magma')
axes[1].set_title('Total Sales by Region')
axes[1].set_xlabel('Region')
axes[1].set_ylabel('Total Sales')
axes[1].tick_params(axis='x', rotation=45)  # Rotate x-axis labels

plt.tight_layout()
plt.show()
```


Total Sales Over Time
Total Sales
500000
400000
300000
200000
100000
Jan 2011
Jul
Jan 2012
Jul
Jan 2013
Jul
Jan 2014
Jul
Order Date

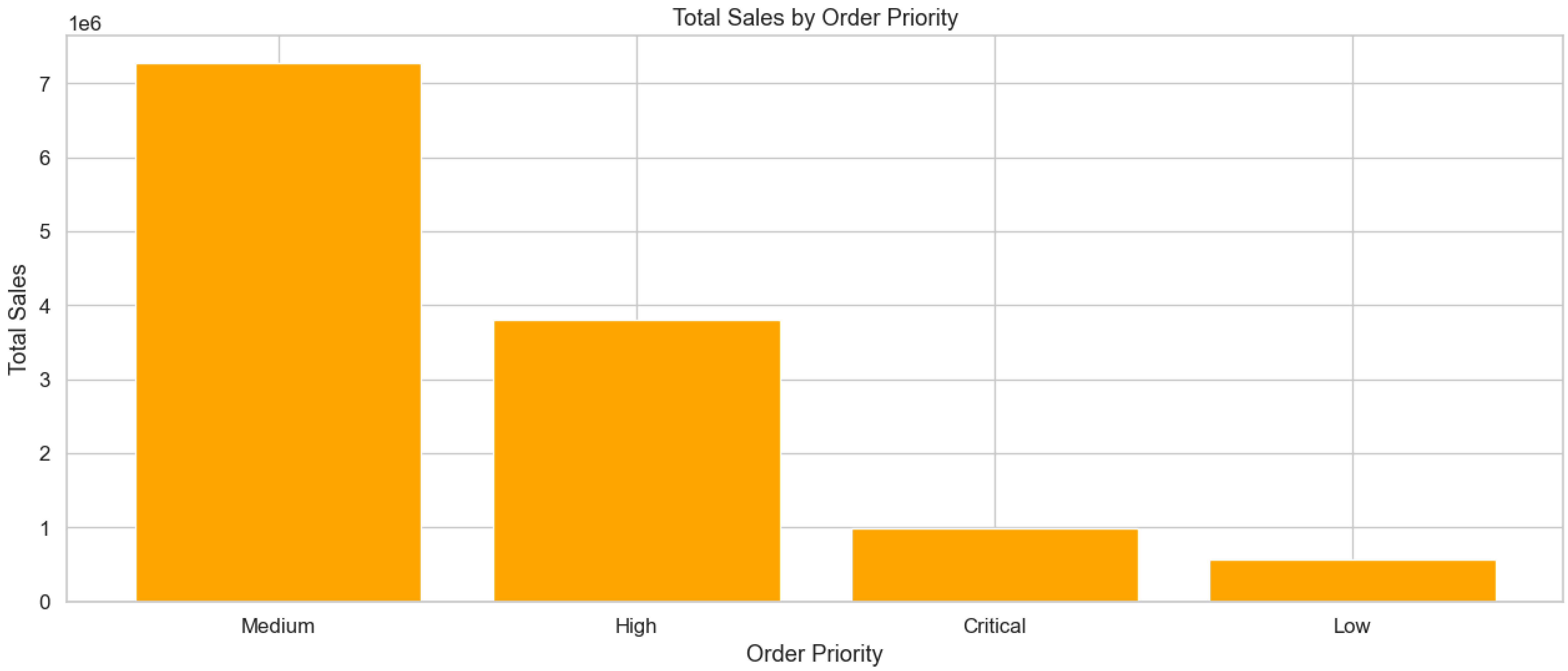

Total Sales by Region
1e6
Total Sales
2.5
2.0
1.5
1.0
0.5
0.0

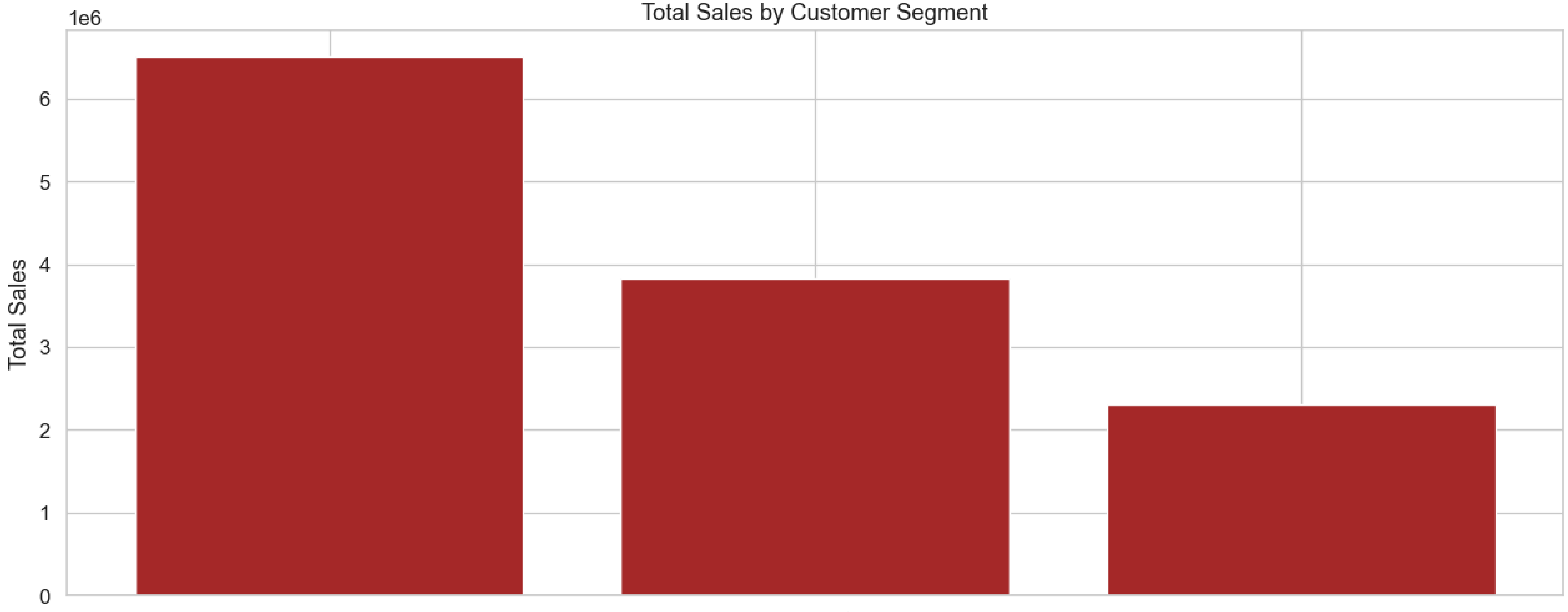


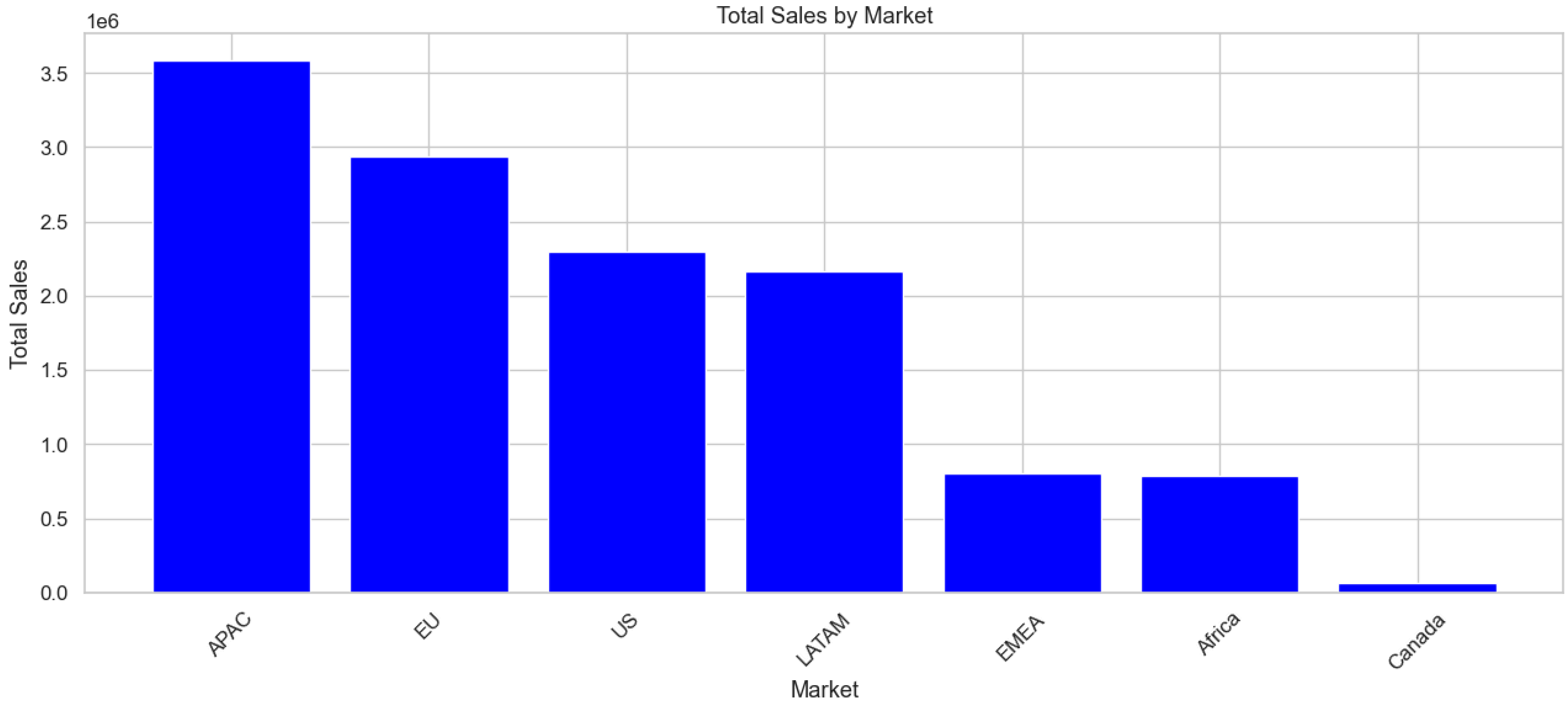
Total sales by Order Priority,Customer Segment and Market

In [125…

```
sns.set_style("whitegrid")

# Plotting
fig, axes = plt.subplots(3, 1, figsize=(13, 17))

# Total Sales by Order Priority
total_sales_by_order_priority = sales_data.groupby('Order Priority')['Sales'].sum().sort_values(ascending=False)
axes[0].bar(total_sales_by_order_priority.index, total_sales_by_order_priority.values, color='orange')
axes[0].set_title('Total Sales by Order Priority')
axes[0].set_xlabel('Order Priority')
axes[0].set_ylabel('Total Sales')

# Total Sales by Customer Segment
total_sales_by_customer_segment = sales_data.groupby('Segment')['Sales'].sum().sort_values(ascending=False)
axes[1].bar(total_sales_by_customer_segment.index, total_sales_by_customer_segment.values, color='brown')
axes[1].set_title('Total Sales by Customer Segment')
axes[1].set_xlabel('Customer Segment')
axes[1].set_ylabel('Total Sales')

# Total Sales by Market
total_sales_by_market = sales_data.groupby('Market')['Sales'].sum().sort_values(ascending=False)
axes[2].bar(total_sales_by_market.index, total_sales_by_market.values, color='blue')
axes[2].set_title('Total Sales by Market')
axes[2].set_xlabel('Market')
axes[2].set_ylabel('Total Sales')
axes[2].tick_params(axis='x', rotation=45)  # Rotate x-axis labels

plt.tight_layout()
plt.show()
```


Total Sales by Order Priority
1e6
Total Sales
0
1
2
3
4
5
6
7
Medium
High
Critical
Low
Order Priority


Total Sales by Customer Segment
1e6
Total Sales
0
1
2
3
4
5
6



Best Selling Products

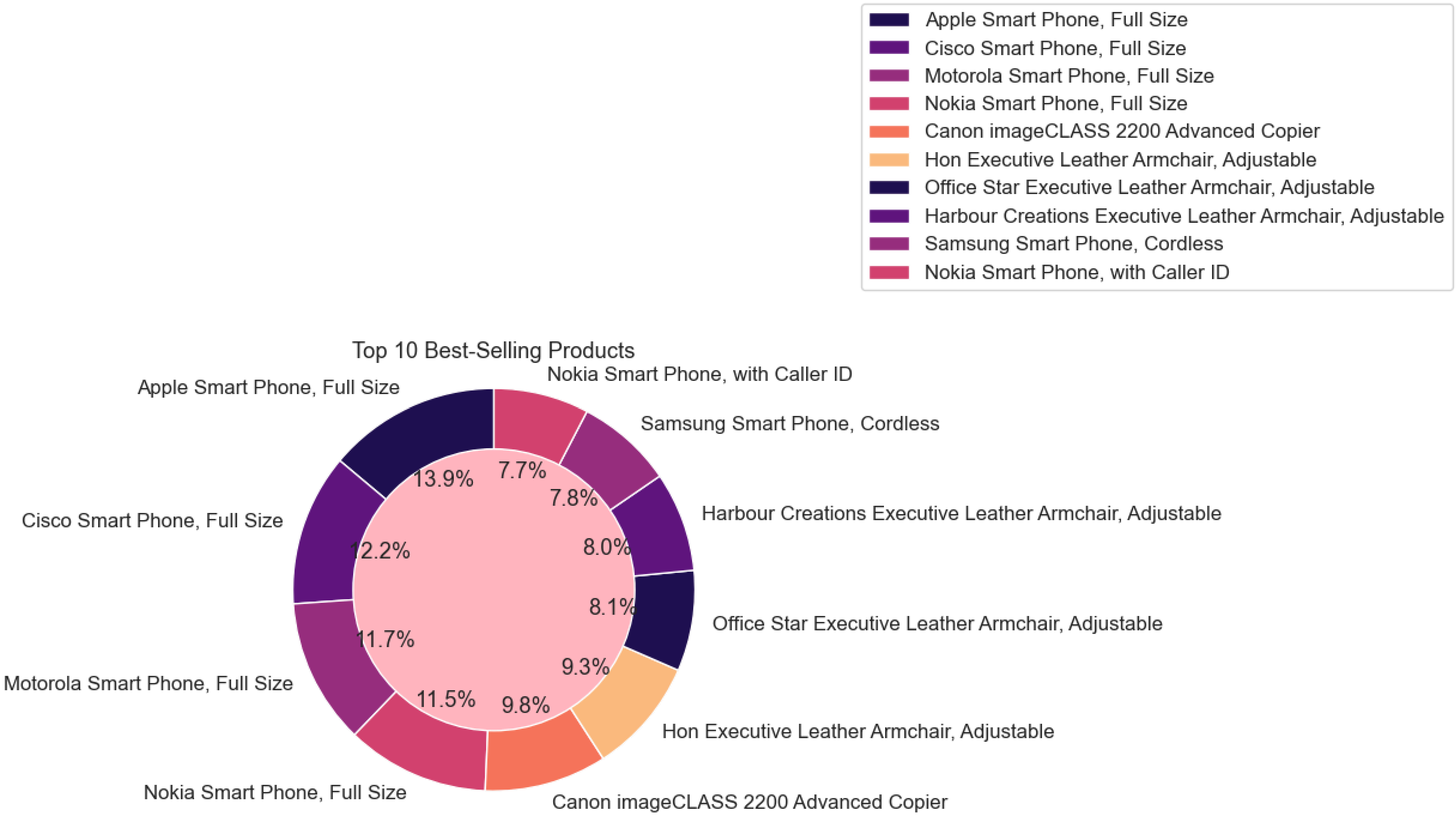
In [126…

```
total_sales_by_product = sales_data.groupby('Product Name')['Sales'].sum().sort_values(ascending=False)

# Identifying the best-selling products (top 10)
best_selling_products = total_sales_by_product.head(10)

# Displaying the best-selling products
print("Top 10 Best-Selling Products:")
print(best_selling_products)
```

```
Top 10 Best-Selling Products:
Product Name
Apple Smart Phone, Full Size                                86935.7786
Cisco Smart Phone, Full Size                                76441.5306
Motorola Smart Phone, Full Size                             73156.3030
Nokia Smart Phone, Full Size                                71904.5555
Canon imageCLASS 2200 Advanced Copier                       61599.8240
Hon Executive Leather Armchair, Adjustable                  58193.4841
Office Star Executive Leather Armchair, Adjustable          50661.6840
Harbour Creations Executive Leather Armchair, Adjustable    50121.5160
Samsung Smart Phone, Cordless                               48653.4600
Nokia Smart Phone, with Caller ID                           47877.7857
Name: Sales, dtype: float64
```

In [128…

```python
# Define colors for the pie chart
colors = sns.color_palette('magma')[0:len(best_selling_products)]

# Plotting the donut chart
patches, texts, autotexts = plt.pie(best_selling_products, labels=best_selling_products.index, colors=colors, autopct='%1.1f%%', startangle=90)
plt.title('Top 10 Best-Selling Products')

# Draw a circle in the middle to create the donut shape
centre_circle = plt.Circle((0,0),0.70,fc='lightpink')
fig = plt.gcf()
fig.gca().add_artist(centre_circle)

# Create legend based on sales
sorted_labels = [label for _, label in sorted(zip(best_selling_products, best_selling_products.index), reverse=True)]
plt.legend(handles=patches, labels=sorted_labels, loc="center left", bbox_to_anchor=(1.1, 1.5))

# Equal aspect ratio ensures that pie is drawn as a circle
plt.axis('equal')
plt.show()
```

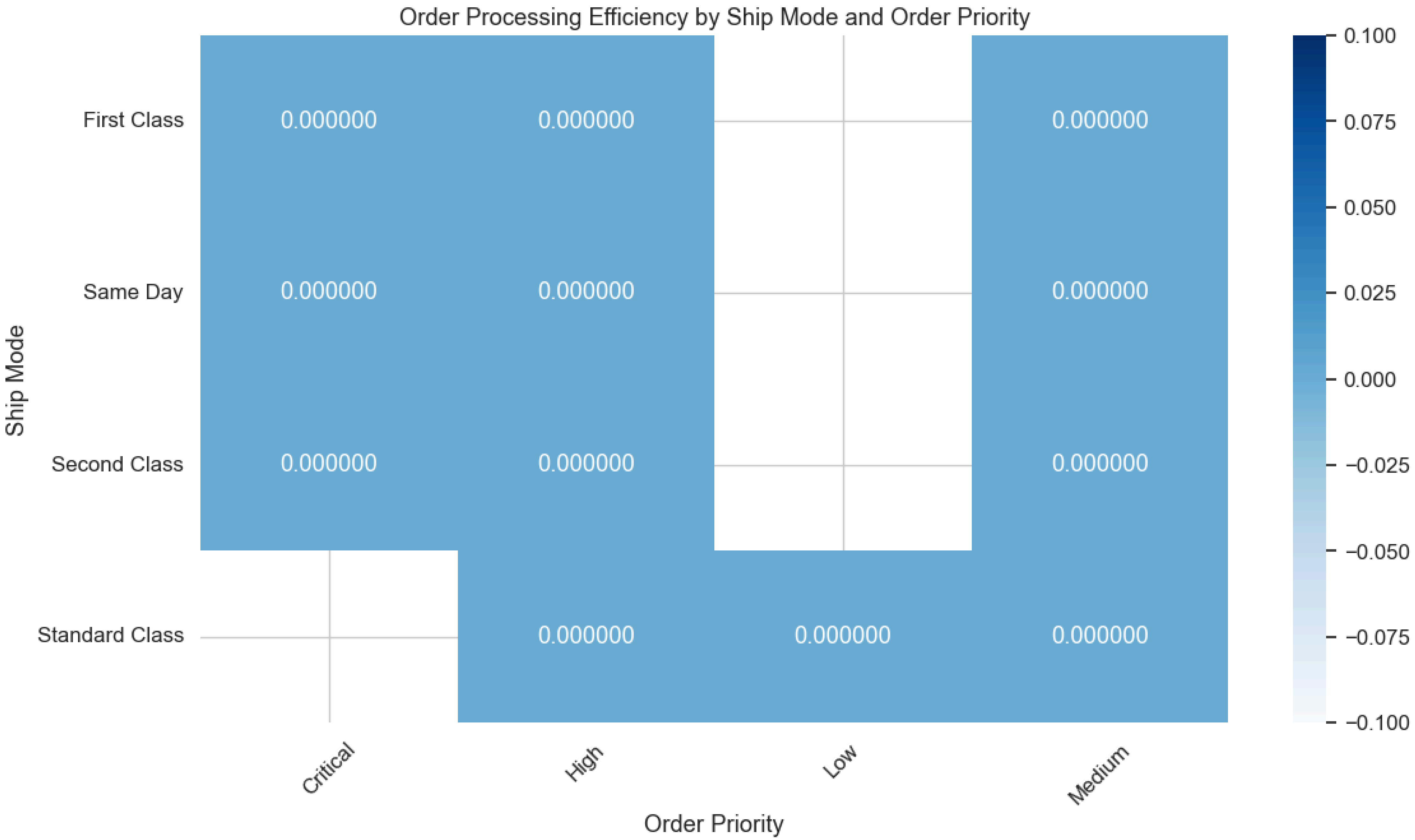


Order Processing Analysis

In [143…

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

# Assuming sales_data has columns 'Ship Mode' and 'Order Priority'
pivot_table = sales_data.pivot_table(index='Ship Mode', columns='Order Priority', values='order_processing_efficiency')


# Replace non-numeric values with zeros
order_processing_efficiency = order_processing_efficiency.fillna(0)

# Convert values to integers
order_processing_efficiency = order_processing_efficiency.astype(int)


# Plotting
```

```
plt.figure(figsize=(13, 7))
sns.heatmap(pivot_table, annot=True, cmap='Blues', fmt='f')
plt.title('Order Processing Efficiency by Ship Mode and Order Priority')
plt.xlabel('Order Priority')
plt.ylabel('Ship Mode')
plt.xticks(rotation=45)
plt.yticks(rotation=0)
plt.show()
```



In [ ]: