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

data = pd.read_csv('sales_data.csv')
data.head()
```

```
        Date      Product Region  Quantity Sold  Unit Price  Total
Sales   \
0  2023-01-01  Smartwatch   West              6       64.09
384.54
1  2023-01-02      Camera   West             27      379.07
10234.89
2  2023-01-03    Keyboard  North              8      459.29
3674.32
3  2023-01-04  Headphones   East              2      435.81
871.62
4  2023-01-05     Monitor  South             12      484.03
5808.36

      Month
0   January
1   January
2   January
3   January
4   January
```

```python
# Ensure "Date" is in datetime format
data['Date'] = pd.to_datetime(data['Date'])


# Extract month and year for grouping
data['Month'] = data['Date'].dt.month_name()

sales_by_month = data.groupby('Month')['Total Sales'].sum()
best_month = sales_by_month.idxmax()
best_month_sales = sales_by_month.max()
print(f"The best month for sales is {best_month} with total sales of $
{best_month_sales:.2f}.")
```

```
The best month for sales is January with total sales of $264770.06.
```

```python
plt.figure(figsize=(10, 6))
sales_by_month = sales_by_month.sort_index(key=lambda x:
pd.to_datetime(x, format='%B'))
sales_by_month.plot(kind='bar', color='purple', edgecolor='black')
plt.title('Total Sales by Month')
plt.xlabel('Month')
plt.ylabel('Total Sales ($)')
plt.xticks(rotation=45)
```

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

Total Sales by Month
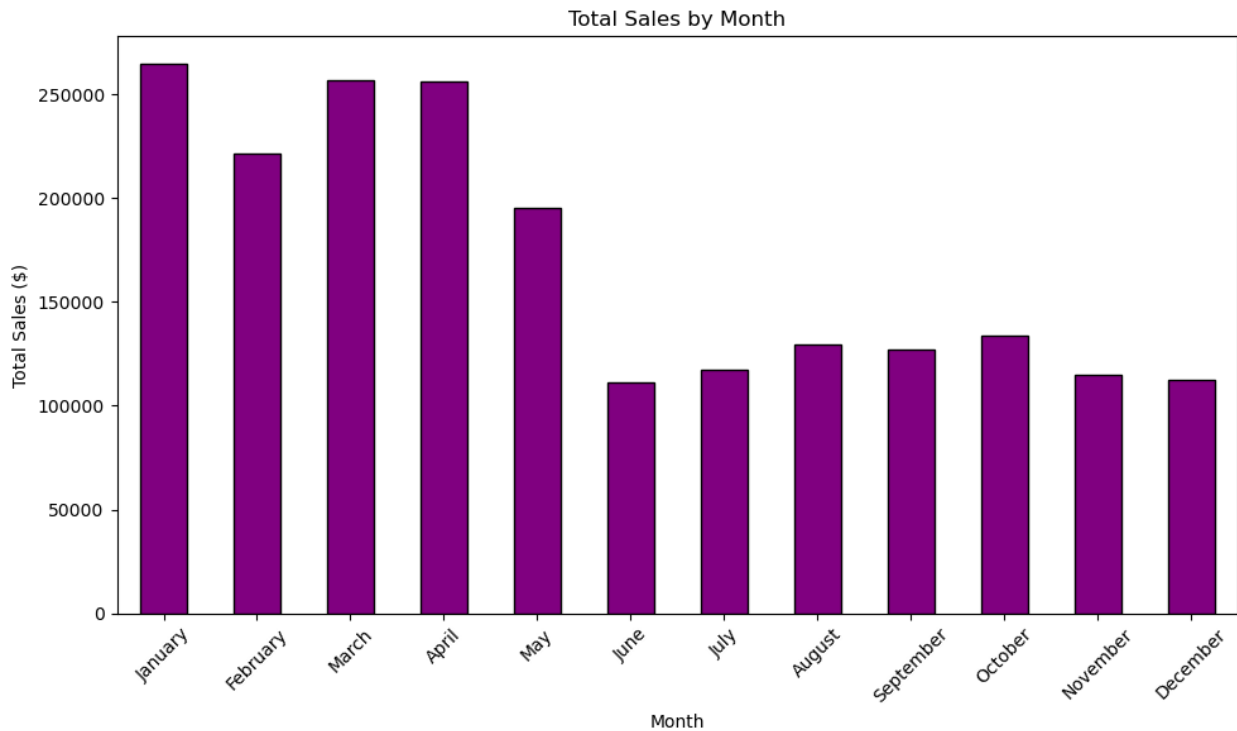

```
# Sales by Region and Product
region_product_sales = data.groupby(['Region', 'Product'])['Total
Sales'].sum().unstack()
print(region_product_sales)
```

Product \ Region	Camera	Headphones	Keyboard	Laptop	Monitor	Mouse
East	44269.35	46724.80	55554.82	46328.52	44645.10	73708.33
North	21458.83	32504.22	39291.04	63921.03	38667.18	62482.97
South	40980.53	78190.12	55193.42	64445.66	62820.80	19867.82
West	85964.92	51951.32	61721.46	67533.93	86347.30	45955.55

Product Region	Printer	Smartphone	Smartwatch	Tablet
East	44323.46	79321.39	37241.76	18610.54
North	78757.80	44204.17	43292.34	39570.97
South	40617.56	44841.31	45105.92	4859.65
West	34717.46	60875.44	86202.09	48075.85

```python
# Heatmap of Sales by Region and Product
plt.figure(figsize=(12, 8))
sns.heatmap(region_product_sales, annot=True, fmt=".2f",
cmap="YlGnBu", cbar=True)
plt.title('Sales by Region and Product')
plt.xlabel('Product')
plt.ylabel('Region')
plt.show()
```


Sales by Region and Product
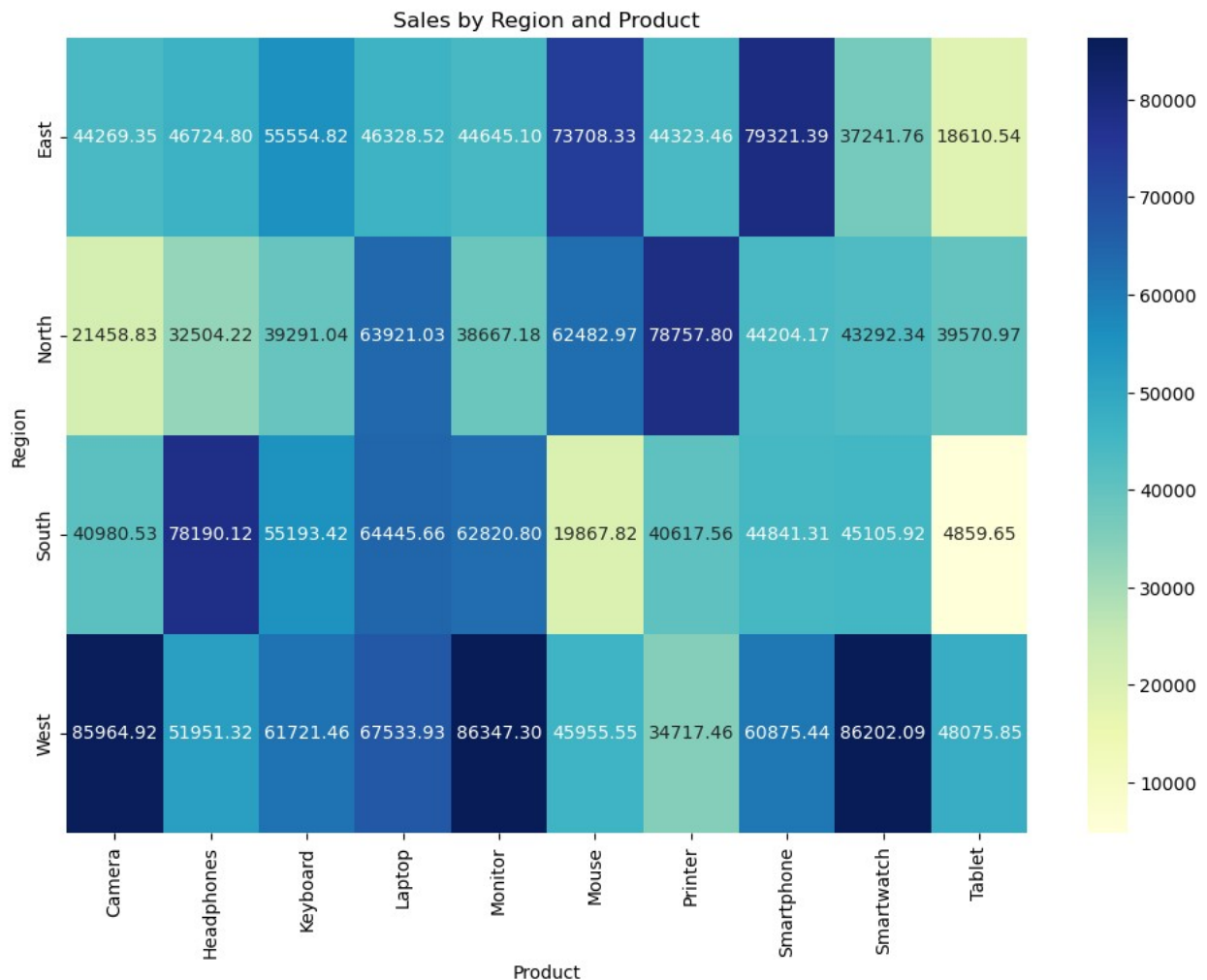
```python
# Correlation Between Quantity and Total Sales
plt.figure(figsize=(8, 5))
sns.scatterplot(data=data, x='Quantity Sold', y='Total Sales',
hue='Region', palette='tab10')
plt.title('Quantity Sold vs. Total Sales')
plt.xlabel('Quantity Sold')
plt.ylabel('Total Sales ($)')
plt.legend(title='Region')
plt.grid()
```

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


Quantity Sold vs. Total Sales
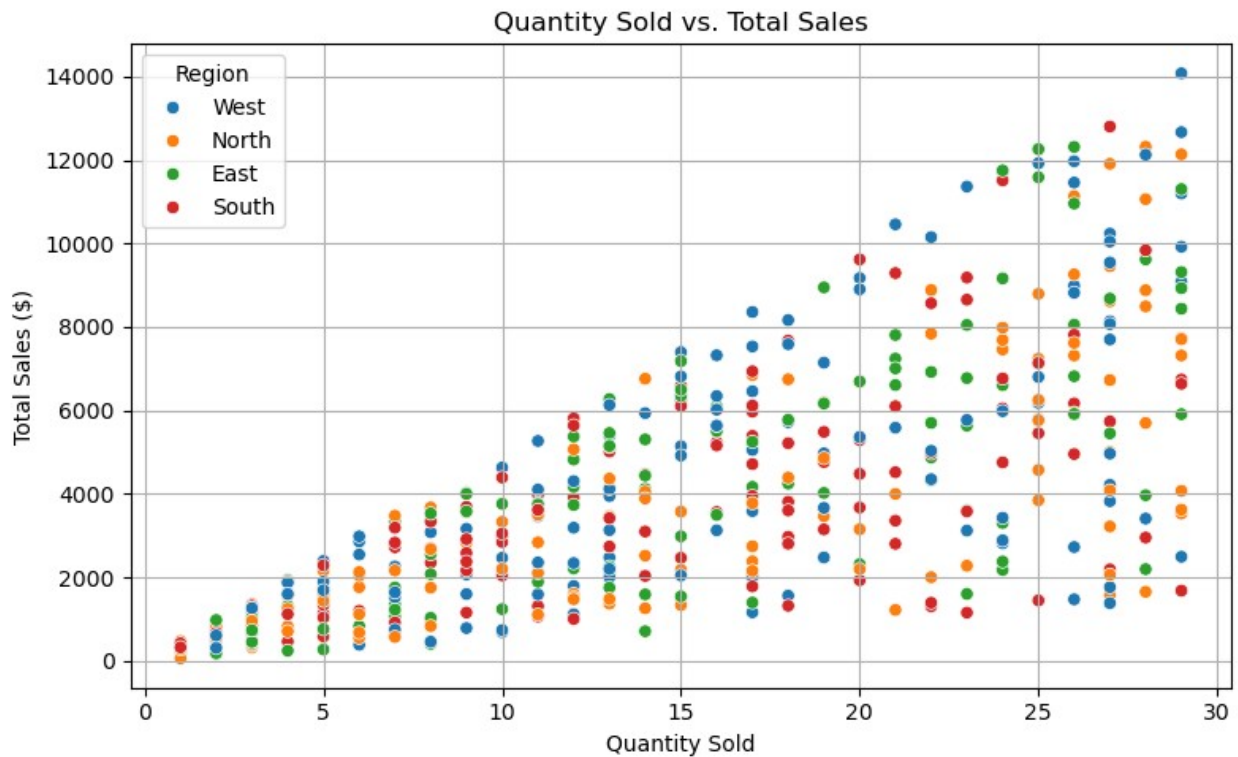
```
# 1. Top 5 Products by Total Sales
top_products = data.groupby('Product')['Total
Sales'].sum().sort_values(ascending=False).head(5)
print("Top 5 Products by Sales:")
print(top_products)
```

```
Top 5 Products by Sales:
Product
Laptop         242229.14
Monitor        232480.38
Smartphone     229242.31
Smartwatch     211842.11
Keyboard       211760.74
Name: Total Sales, dtype: float64
```

```
# Plot top products
plt.figure(figsize=(8, 5))
top_products.plot(kind='bar', color='skyblue', edgecolor='black')
plt.title('Top 5 Products by Sales')
plt.xlabel('Product')
plt.ylabel('Total Sales ($)')
plt.xticks(rotation=45)
```

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


Top 5 Products by Sales
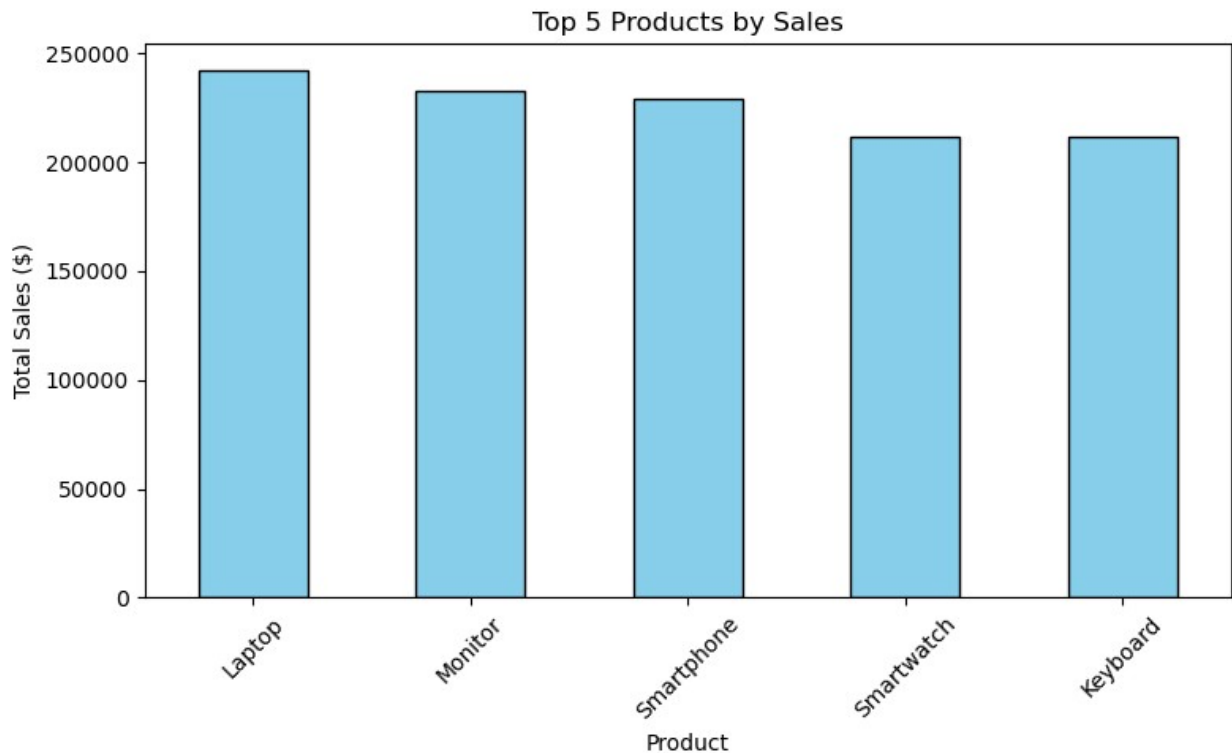
```
#Region with Highest Sales
sales_by_region = data.groupby('Region')['Total Sales'].sum()
best_region = sales_by_region.idxmax()
print(f"The region with the highest sales is {best_region}.")
```

The region with the highest sales is West.

```
#sales by region
plt.figure(figsize=(8, 5))
sales_by_region.plot(kind='bar', color='coral', edgecolor='black')
plt.title('Total Sales by Region')
plt.xlabel('Region')
plt.ylabel('Total Sales ($)')
plt.xticks(rotation=0)
plt.tight_layout()
plt.show()
```

Total Sales by Region
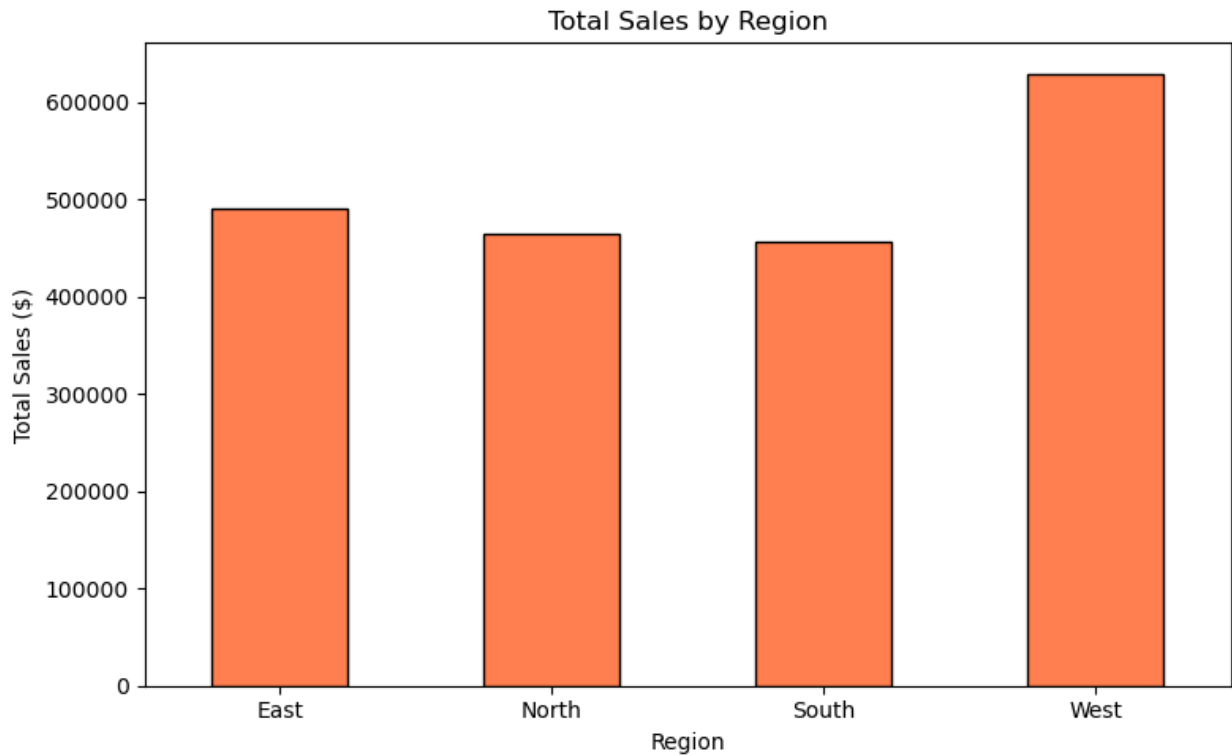
```python
#Monthly Trends for Top 3 Products
top_3_products = top_products.index[:3]
monthly_trends =
data[data['Product'].isin(top_3_products)].groupby(['Month',
'Product'])['Total Sales'].sum().unstack()

#Plot monthly trends
plt.figure(figsize=(12, 6))
monthly_trends.plot(kind='line', marker='o')
plt.title('Monthly Sales Trends for Top 3 Products')
plt.xlabel('Month')
plt.ylabel('Total Sales ($)')
plt.legend(title='Product')
plt.grid()
plt.tight_layout()
plt.show()

<Figure size 1200x600 with 0 Axes>
```

Monthly Sales Trends for Top 3 Products
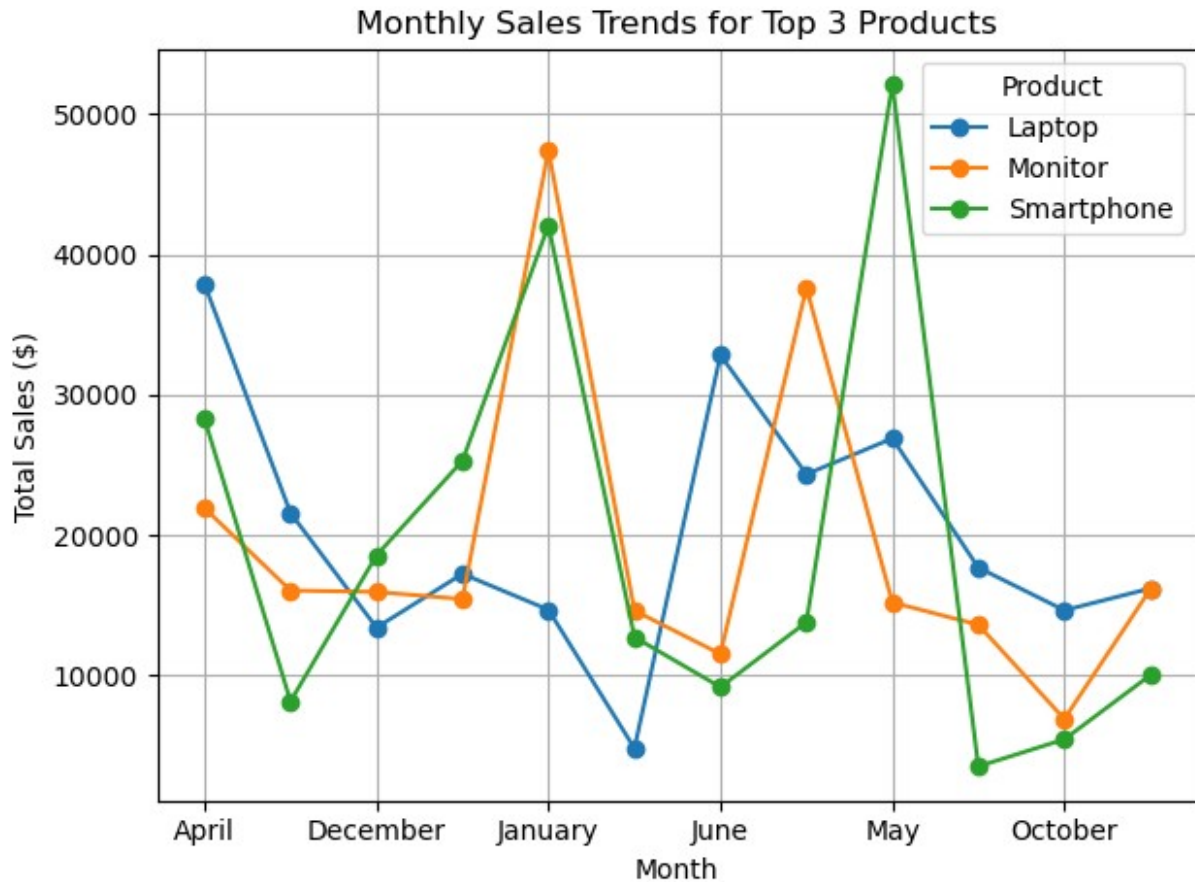

```python
#Profitability Analysis
profit_margin = 0.3
data['Profit'] = (data['Total Sales'] * profit_margin).round(2)

# Profit by Region
profit_by_region = data.groupby('Region')['Profit'].sum()
print("Profit by Region:")
print(profit_by_region)

Profit by Region:
Region
East      147218.41
North     139245.20
South     137076.86
West      188803.56
Name: Profit, dtype: float64

# Plot profit by region
plt.figure(figsize=(8, 5))
profit_by_region.plot(kind='bar', color='pink', edgecolor='black')
plt.title('Profit by Region')
plt.xlabel('Region')
plt.ylabel('Profit ($)')
```
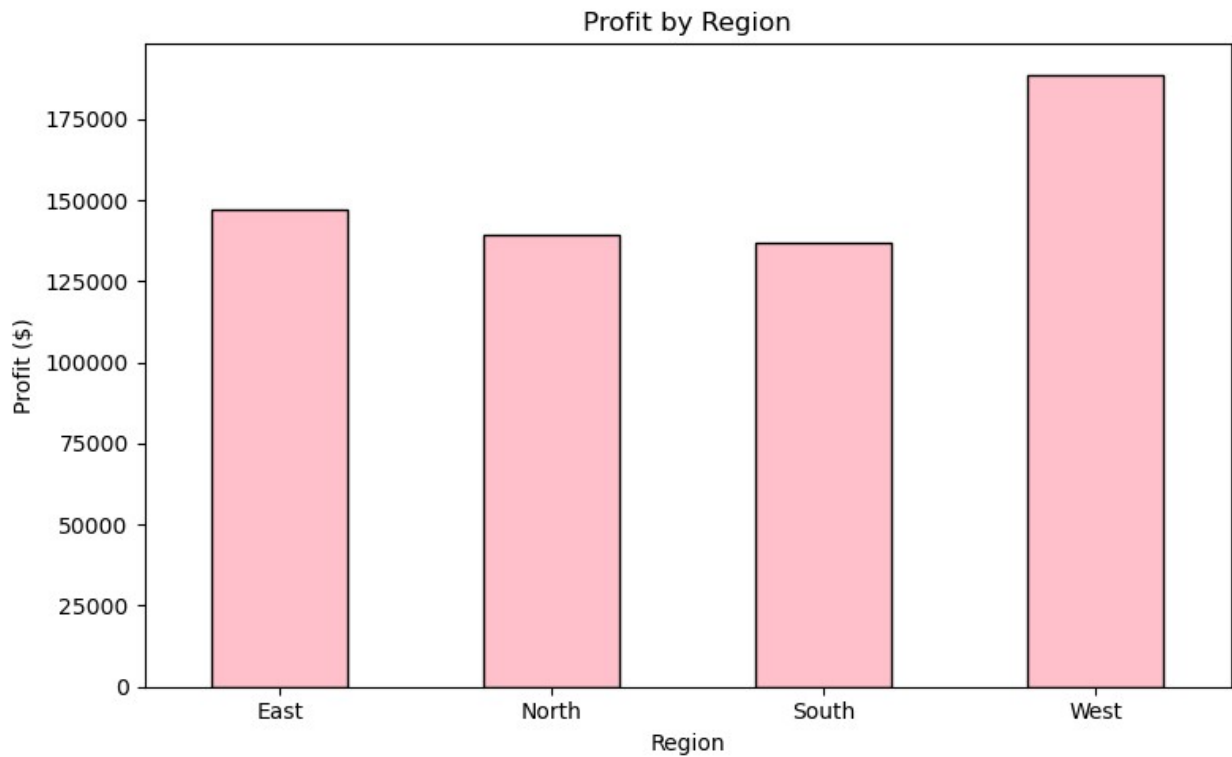
```
plt.xticks(rotation=0)
plt.tight_layout()
plt.show()
```

Profit by Region


```
# Customer Purchase Behavior (Quantity vs. Unit Price)
plt.figure(figsize=(8, 5))
sns.scatterplot(data=data, x='Unit Price', y='Quantity Sold',
hue='Region', palette='tab10')
plt.title('Customer Purchase Behavior: Quantity vs Unit Price')
plt.xlabel('Unit Price ($)')
plt.ylabel('Quantity Sold')
plt.legend(title='Region')
plt.grid()
plt.tight_layout()
plt.show()
```

Customer Purchase Behavior: Quantity vs Unit Price