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

```
#Load Datasets
Customers = pd.read_csv('/content/Customers.csv')
Products = pd.read_csv('/content/Products.csv')
Transactions = pd.read_csv('/content/Transactions.csv')
```

```
#Preview Datasets
Customers.head()
Products.head()
Transactions.head()
```

	TransactionID	CustomerID	ProductID	TransactionDate	Quantity	TotalValue	Price
0	T00001	C0199	P067	2024-08-25 12:38:23	1	300.68	300.68
1	T00112	C0146	P067	2024-05-27 22:23:54	1	300.68	300.68
2	T00166	C0127	P067	2024-04-25 07:38:55	1	300.68	300.68
3	T00272	C0087	P067	2024-03-26 22:55:37	2	601.36	300.68
4	T00363	C0070	P067	2024-03-21 15:10:10	3	902.04	300.68

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

```
#Checking Missing Values
Customers.isnull().sum()
Products.isnull().sum()
Transactions.isnull().sum()
```

	0
TransactionID	0
CustomerID	0
ProductID	0
TransactionDate	0
Quantity	0
TotalValue	0
Price	0

dtype: int64

```
Customers.info()
Products.info()
Transactions.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 4 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   CustomerID    200 non-null    object
 1   CustomerName  200 non-null    object
 2   Region        200 non-null    object
 3   SignupDate    200 non-null    object
dtypes: object(4)
memory usage: 6.4+ KB
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100 entries, 0 to 99
Data columns (total 4 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   ProductID    100 non-null    object
 1   ProductName  100 non-null    object
 2   Category     100 non-null    object
 3   Price        100 non-null    float64
```

```
dtypes: float64(1), object(3)
memory usage: 3.3+ KB
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 7 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   TransactionID    1000 non-null   object 
 1   CustomerID       1000 non-null   object 
 2   ProductID        1000 non-null   object 
 3   TransactionDate  1000 non-null   object 
 4   Quantity         1000 non-null   int64  
 5   TotalValue       1000 non-null   float64
 6   Price            1000 non-null   float64
dtypes: float64(2), int64(1), object(4)
memory usage: 54.8+ KB
```

```
Customers.describe()
Products.describe()
Transactions.describe()
```

	Quantity	TotalValue	Price
count	1000.000000	1000.000000	1000.00000
mean	2.537000	689.995560	272.55407
std	1.117981	493.144478	140.73639
min	1.000000	16.080000	16.08000
25%	2.000000	295.295000	147.95000
50%	3.000000	588.880000	299.93000
75%	4.000000	1011.660000	404.40000
max	4.000000	1991.040000	497.76000

```
Customers.columns
```

```
Index(['TransactionID', 'CustomerID', 'ProductID', 'TransactionDate',
       'Quantity', 'TotalValue', 'Price'],
      dtype='object')
```

```
Products.columns
```

```
Index(['ProductID', 'ProductName', 'Category', 'Price'], dtype='object')
```

```
Transactions.columns
```

```
Index(['TransactionID', 'CustomerID', 'ProductID', 'TransactionDate',
       'Quantity', 'TotalValue', 'Price'],
      dtype='object')
```

```
# Parse date columns
Customers['SignupDate'] = pd.to_datetime(Customers['SignupDate'])
Transactions['TransactionDate'] = pd.to_datetime(Transactions['TransactionDate'])
```

```
# Summary statistics
print(Customers.describe(include='all'))
print(Products.describe(include='all'))
print(Transactions.describe())
```

```
        CustomerID      CustomerName         Region           SignupDate
count          200               200            200                  200
unique         200               200              4                  NaN
top          C0001  Lawrence Carroll  South America                  NaN
freq             1                 1             59                  NaN
mean           NaN               NaN            NaN  2023-07-19 08:31:12
min            NaN               NaN            NaN  2022-01-22 00:00:00
25%            NaN               NaN            NaN  2022-09-26 12:00:00
50%            NaN               NaN            NaN  2023-08-31 12:00:00
75%            NaN               NaN            NaN  2024-04-12 12:00:00
max            NaN               NaN            NaN  2024-12-28 00:00:00
```

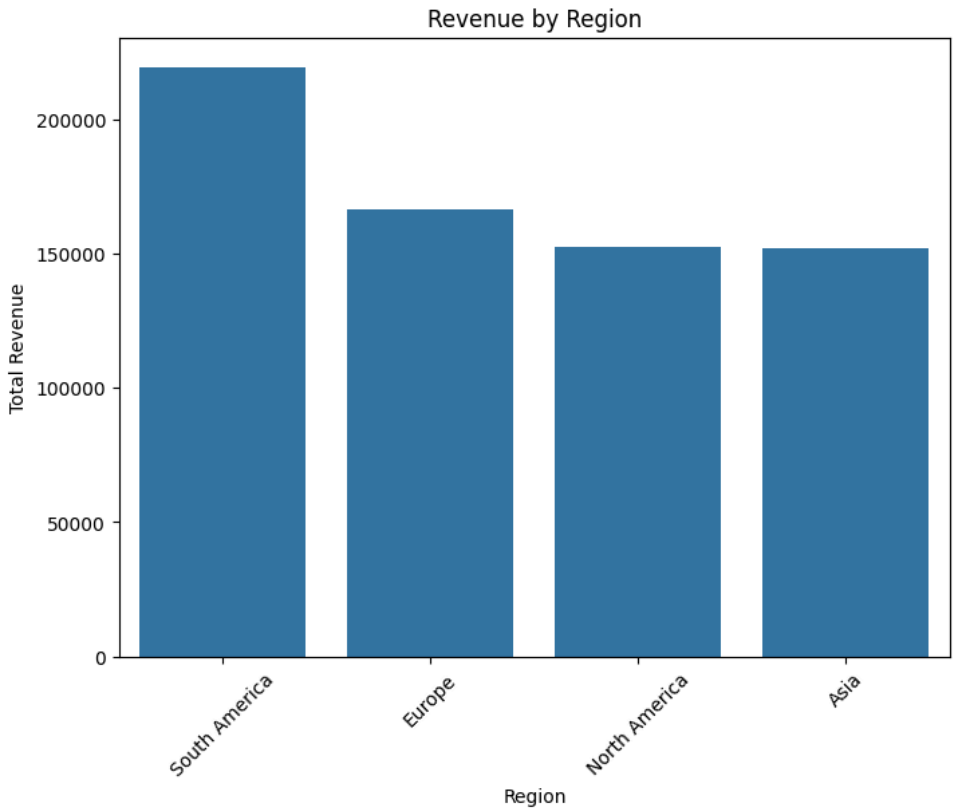
```
       ProductID            ProductName Category       Price
count        100                    100      100  100.000000
unique       100                     66        4         NaN
top         P001  ActiveWear Smartwatch    Books         NaN
freq           1                      4       26         NaN
mean         NaN                    NaN      NaN  267.551700
std          NaN                    NaN      NaN  143.219383
min          NaN                    NaN      NaN   16.080000
25%          NaN                    NaN      NaN  147.767500
50%          NaN                    NaN      NaN  292.875000
75%          NaN                    NaN      NaN  397.090000
max          NaN                    NaN      NaN  497.760000
                     TransactionDate     Quantity   TotalValue       Price
count                           1000  1000.000000  1000.000000  1000.00000
mean   2024-06-23 15:33:02.768999936     2.537000   689.995560   272.55407
min              2023-12-30 15:29:12     1.000000    16.080000    16.08000
25%        2024-03-25 22:05:34.500000     2.000000   295.295000   147.95000
50%        2024-06-26 17:21:52.500000     3.000000   588.880000   299.93000
75%              2024-09-19 14:19:57     4.000000  1011.660000   404.40000
max              2024-12-28 11:00:00     4.000000  1991.040000   497.76000
std                              NaN     1.117981   493.144478   140.73639
```

```
# Merge datasets
data = pd.merge(Transactions, Customers, on='CustomerID')
data = pd.merge(data, Products, on='ProductID')
```

```
# Revenue by Region
region_revenue = data.groupby('Region')['TotalValue'].sum().sort_values(ascending=False)
print(region_revenue)
```

```
Region
South America    219352.56
Europe           166254.63
North America    152313.40
Asia             152074.97
Name: TotalValue, dtype: float64
```

```
# Visualize revenue by region
plt.figure(figsize=(8, 6))
sns.barplot(x=region_revenue.index, y=region_revenue.values)
plt.title('Revenue by Region')
plt.xlabel('Region')
plt.ylabel('Total Revenue')
plt.xticks(rotation=45)
plt.show()
```




```
# EDA: Best-Selling Products
best_selling_products = data.groupby('ProductName')['Quantity'].sum().sort_values(ascending=False).head(10)
print("\nTop 10 Best-Selling Products:")
print(best_selling_products)
```

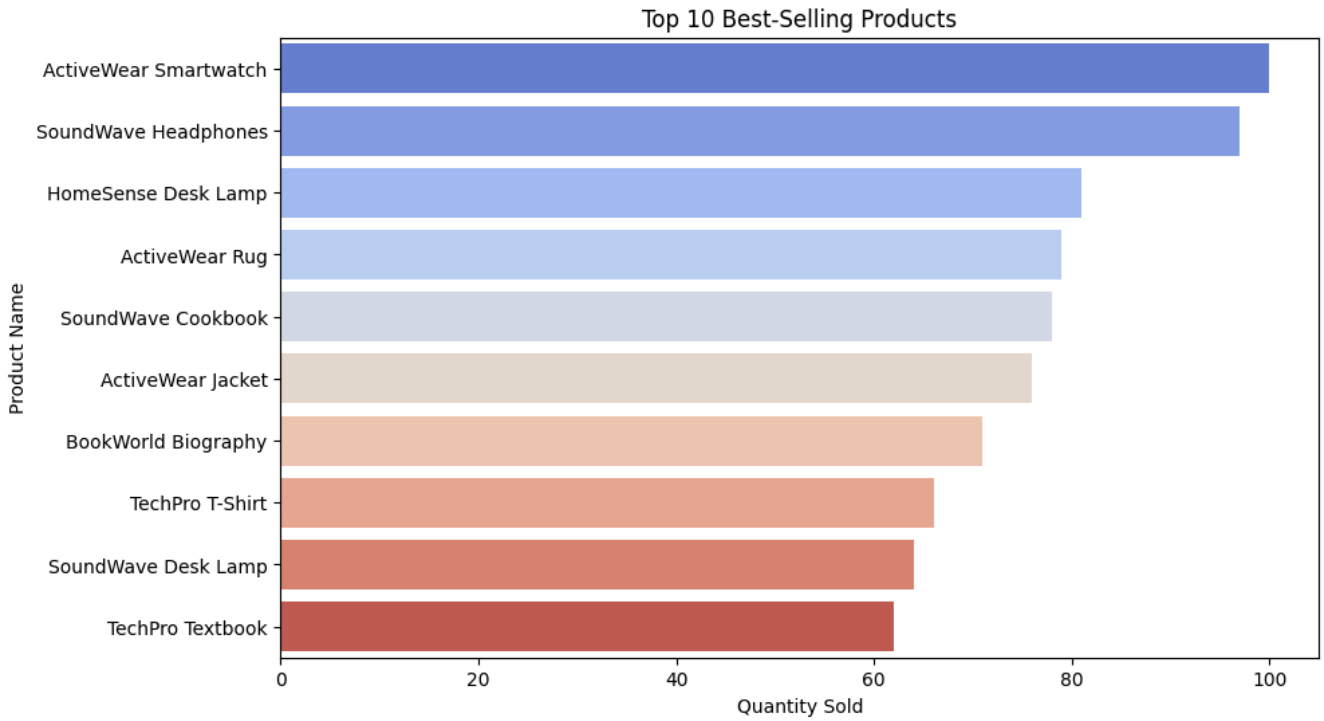
```
Top 10 Best-Selling Products:
ProductName
ActiveWear Smartwatch    100
SoundWave Headphones      97
HomeSense Desk Lamp       81
ActiveWear Rug            79
SoundWave Cookbook        78
ActiveWear Jacket         76
BookWorld Biography       71
TechPro T-Shirt           66
SoundWave Desk Lamp       64
TechPro Textbook          62
Name: Quantity, dtype: int64
```

```
# Visualization: Best-Selling Products
plt.figure(figsize=(10, 6))
sns.barplot(x=best_selling_products.values, y=best_selling_products.index, palette='coolwarm')
plt.title('Top 10 Best-Selling Products')
plt.xlabel('Quantity Sold')
plt.ylabel('Product Name')
plt.show()
```

```
<ipython-input-16-2701de8880f9>:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `y` variable to `hue` and set `legen

  sns.barplot(x=best_selling_products.values, y=best_selling_products.index, palette='coolwarm')
```




```
# EDA: Monthly Revenue Trends
data['Month'] = data['TransactionDate'].dt.to_period('M')
monthly_revenue = data.groupby('Month')['TotalValue'].sum()
```

```
# Visualization: Monthly Revenue Trends
plt.figure(figsize=(12, 6))
monthly_revenue.plot(kind='line', marker='o', color='teal')
plt.title('Monthly Revenue Trends')
plt.xlabel('Month')
plt.ylabel('Total Revenue')
plt.grid()
plt.show()
```


```
# EDA: Customer Lifetime Value (CLV)
customer_clv = data.groupby('CustomerID')['TotalValue'].sum().sort_values(ascending=False)
top_10_percent_customers = customer_clv[:int(len(customer_clv) * 0.1)].sum()
total_revenue = customer_clv.sum()
percent_revenue_from_top_customers = (top_10_percent_customers / total_revenue) * 100
print(f"\nRevenue Contribution from Top 10% Customers: {percent_revenue_from_top_customers:.2f}%")
```

```
Revenue Contribution from Top 10% Customers: 19.11%
```

```
# EDA: Signup Trends
signup_trends = Customers.groupby(Customers['SignupDate'].dt.to_period('M')).size()
```

```
# Visualization: Signup Trends
plt.figure(figsize=(12, 6))
signup_trends.plot(kind='bar', color='orange')
plt.title('Monthly Signup Trends')
plt.xlabel('Month')
plt.ylabel('Number of Signups')
plt.grid()
plt.show()
```