In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
df = pd.read_csv("retail_sales_data.csv", parse_dates=['invoice_date'])
df.head()
```

```
C:\Users\lenovo\AppData\Local\Temp\ipykernel_22672\2264015570.py:1: UserWarning: Parsing dates in DD/MM/YYYY f
ormat when dayfirst=False (the default) was specified. This may lead to inconsistently parsed dates! Specify a
format to ensure consistent parsing.
  df = pd.read_csv("retail_sales_data.csv", parse_dates=['invoice_date'])
```

Out[2]:

	invoice_no	customer_id	gender	age	category	quantity	price	payment_method	invoice_date	shopping_mall
0	I138884	C241288	Female	28	Clothing	5	1500.40	Credit Card	2022-05-08	Kanyon
1	I317333	C111565	Male	21	Shoes	3	1800.51	Debit Card	2021-12-12	Forum Istanbul
2	I127801	C266599	Male	20	Clothing	1	300.08	Cash	2021-09-11	Metrocity
3	I173702	C988172	Female	66	Shoes	5	3000.85	Credit Card	2021-05-16	Metropol AVM
4	I337046	C189076	Female	53	Books	4	60.60	Cash	2021-10-24	Kanyon

In [3]:
```
df.describe()
```

Out[3]:

	age	quantity	price
count	99457.000000	99457.000000	99457.000000
mean	43.427089	3.003429	689.256321
std	14.990054	1.413025	941.184567
min	18.000000	1.000000	5.230000
25%	30.000000	2.000000	45.450000
50%	43.000000	3.000000	203.300000
75%	56.000000	4.000000	1200.320000
max	69.000000	5.000000	5250.000000

In [4]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 99457 entries, 0 to 99456
Data columns (total 10 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   invoice_no      99457 non-null  object
 1   customer_id     99457 non-null  object
 2   gender          99457 non-null  object
 3   age             99457 non-null  int64
 4   category        99457 non-null  object
 5   quantity        99457 non-null  int64
 6   price           99457 non-null  float64
 7   payment_method  99457 non-null  object
 8   invoice_date    99457 non-null  datetime64[ns]
 9   shopping_mall   99457 non-null  object
dtypes: datetime64[ns](1), float64(1), int64(2), object(6)
memory usage: 7.6+ MB
```

In [5]:
```
df.isna().sum()
```

Out[5]:
```
invoice_no        0
customer_id       0
gender            0
age               0
category          0
quantity          0
price             0
payment_method    0
invoice_date      0
shopping_mall     0
dtype: int64
```

In [6]:
```
df.isnull().sum()
```

Out[6]:
```
invoice_no        0
customer_id       0
gender            0
age               0
category          0
quantity          0
price             0
payment_method    0
invoice_date      0
shopping_mall     0
dtype: int64
```

In [7]:
```
df.drop(["invoice_no", "customer_id", "gender", "age", "payment_method"], axis=1, inplace=True)
df.head()
```

Out[7]:

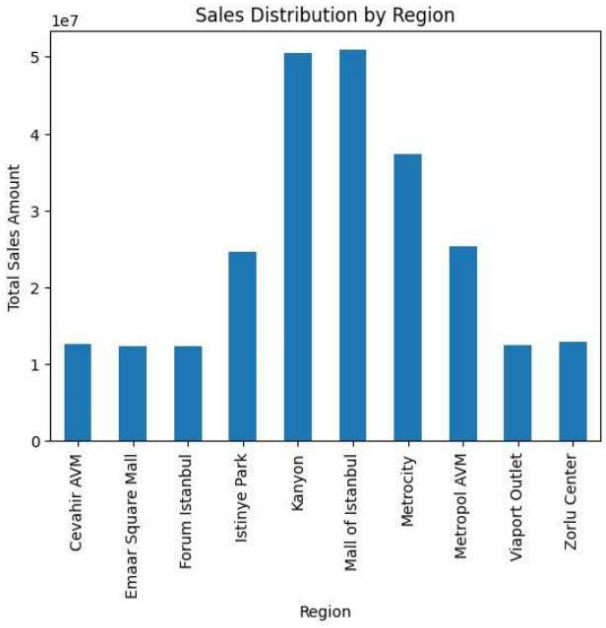
	category	quantity	price	invoice_date	shopping_mall
0	Clothing	5	1500.40	2022-05-08	Kanyon
1	Shoes	3	1800.51	2021-12-12	Forum Istanbul
2	Clothing	1	300.08	2021-09-11	Metrocity
3	Shoes	5	3000.85	2021-05-16	Metropol AVM
4	Books	4	60.60	2021-10-24	Kanyon

In [8]:
```
df['Sales'] = df['quantity']*df['price']
df.head()
```

Out[8]:

	category	quantity	price	invoice_date	shopping_mall	Sales
0	Clothing	5	1500.40	2022-05-08	Kanyon	7502.00
1	Shoes	3	1800.51	2021-12-12	Forum Istanbul	5401.53
2	Clothing	1	300.08	2021-09-11	Metrocity	300.08
3	Shoes	5	3000.85	2021-05-16	Metropol AVM	15004.25
4	Books	4	60.60	2021-10-24	Kanyon	242.40

In [9]:
```
# Group data by region and calculate total sales amount
region_sales = df.groupby("shopping_mall")["Sales"].sum()
region_sales.plot(kind="bar")
plt.title("Sales Distribution by Region")
plt.xlabel("Region")
plt.ylabel("Total Sales Amount")
plt.show()
```



In [13]:
```
print(f"The top-performing region is: {region_sales.idxmax()}")
```

```
The top-performing region is: Mall of Istanbul
```

In [14]:
```
#Stacked bar plot to compare sales amounts across regions and categories

region_category_sales = df.groupby(["shopping_mall", "category"])["Sales"].sum().unstack()

region_category_sales.plot(kind="bar", stacked=True)
plt.title("Sales Comparison by Region and Product Category")
plt.xlabel("Region")
plt.ylabel("Total Sales Amount")
plt.legend(title="Product Category")
plt.show()
```