Data Aggregation

In [4]:
```
import pandas as pd
import matplotlib.pyplot as plt
```

In [5]:
```
data = pd.read_csv("Retail_Sales_Data.csv")
```

In [6]:
```
#Explore the dataset
data.head()
```

Out[6]:

	invoice_no	customer_id	gender	age	category	quantity	price	payment_method	invoi
0	I138884	C241288	Female	28	Clothing	5	1500.40	Credit Card	
1	I317333	C111565	Male	21	Shoes	3	1800.51	Debit Card	12/
2	I127801	C266599	Male	20	Clothing	1	300.08	Cash	9
3	I173702	C988172	Female	66	Shoes	5	3000.85	Credit Card	16/
4	I337046	C189076	Female	53	Books	4	60.60	Cash	24/

In [12]:
```
data.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  object 
 9   shopping_mall   99457 non-null  object 
dtypes: float64(1), int64(2), object(7)
memory usage: 7.6+ MB
```

In [13]:
```
data.isnull().sum()
```

Out[13]:
```
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 [14]:
```
data.describe()
```

Out[14]:

	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 [15]:
```
unique_shopping_mall = data["shopping_mall"].unique()
unique_categories = data["category"].unique()
```

In [16]:
```
unique_shopping_mall
```

Out[16]:
```
array(['Kanyon', 'Forum Istanbul', 'Metrocity', 'Metropol AVM',
       'Istinye Park', 'Mall of Istanbul', 'Emaar Square Mall',
       'Cevahir AVM', 'Viaport Outlet', 'Zorlu Center'], dtype=object)
```

In [17]:
```
unique_categories
```

Out[17]:
```
array(['Clothing', 'Shoes', 'Books', 'Cosmetics', 'Food & Beverage',
       'Toys', 'Technology', 'Souvenir'], dtype=object)
```

In [18]:
```
transaction_count_by_shopping_mall = data["shopping_mall"].value_counts()
```

In [11]:
```
transaction_count_by_shopping_mall
```

Out[11]:
```
Mall of Istanbul     19943
Kanyon               19823
Metrocity            15011
Metropol AVM         10161
Istinye Park          9781
Zorlu Center          5075
Cevahir AVM           4991
Forum Istanbul        4947
Viaport Outlet        4914
Emaar Square Mall     4811
Name: shopping_mall, dtype: int64
```

In [19]:
```
#Identify relevant variables
relevant_columns = ["shopping_mall", "price", "category"]
```

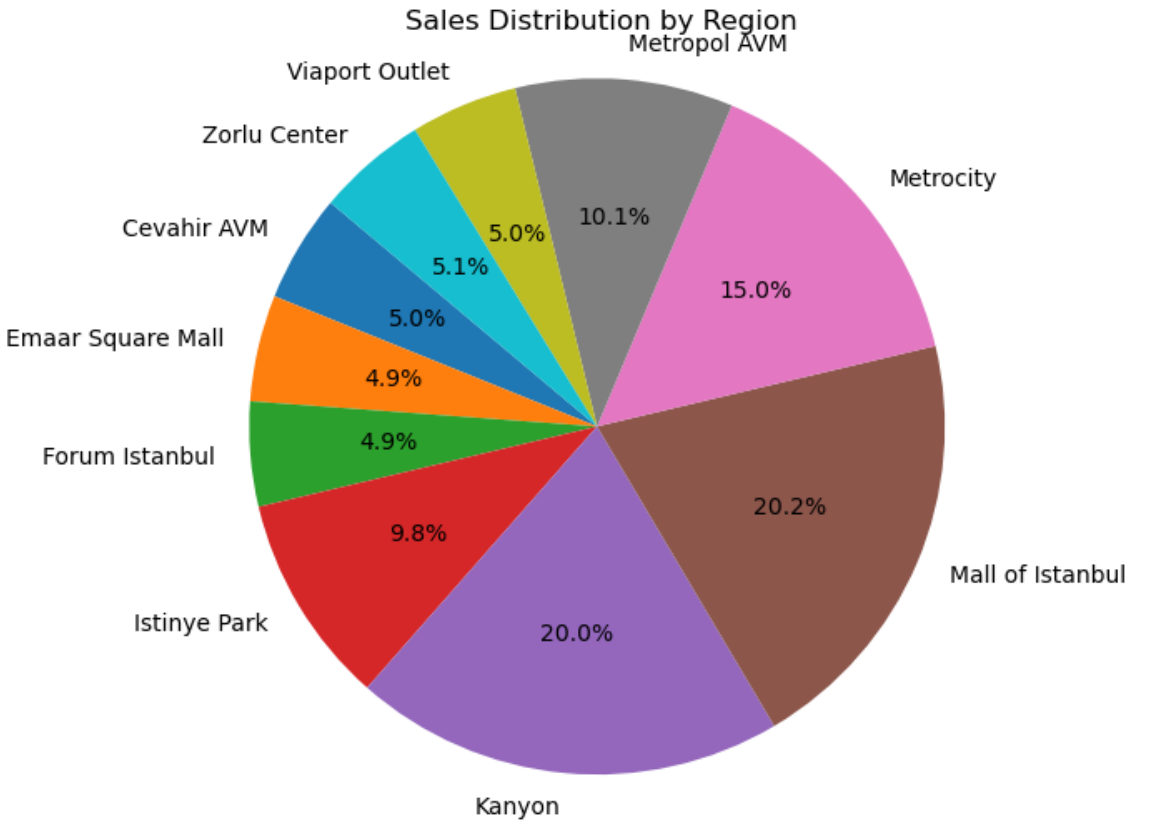
In [20]:
```
relevant_columns
```

Out[20]:
```
['shopping_mall', 'price', 'category']
```

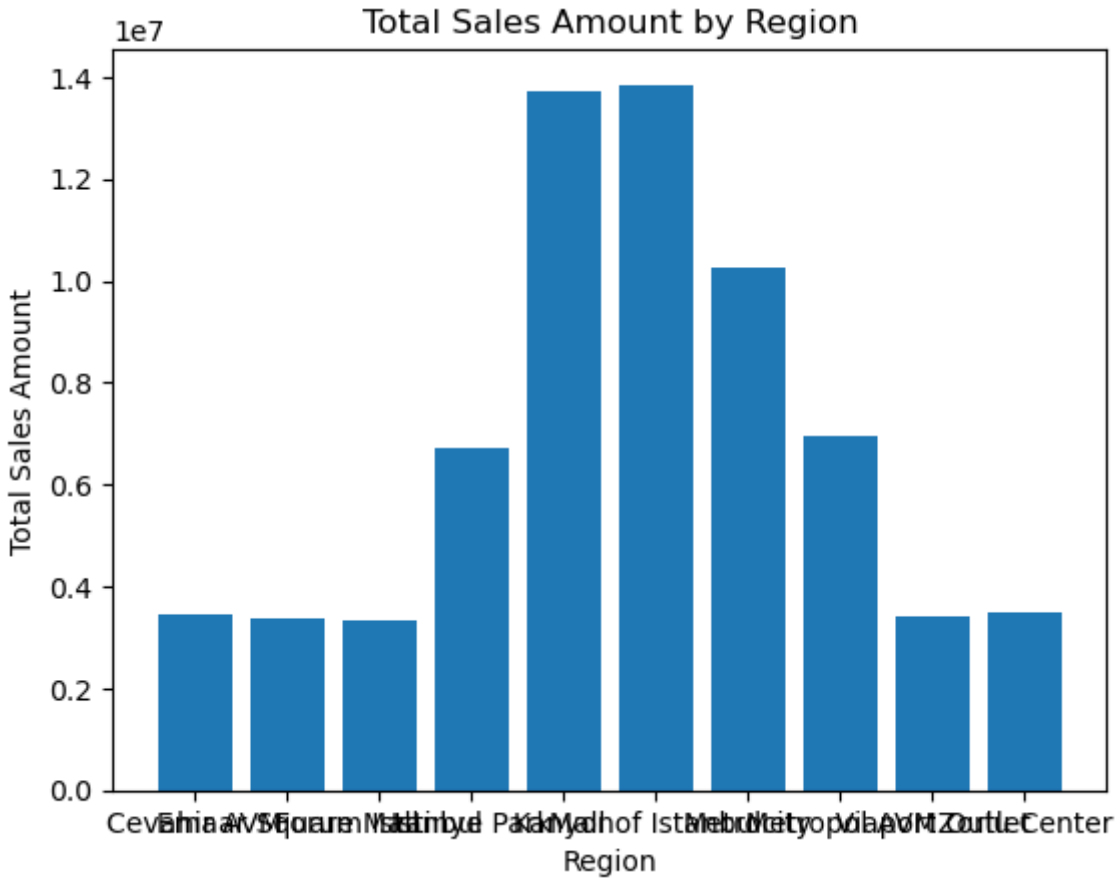
In [21]:
```
#Group by shopping mall and calculate total sales amount
sales_by_region = data.groupby("shopping_mall")["price"].sum()
sales_by_region
```

Out[21]:
```
shopping_mall
Cevahir AVM            3433671.84
Emaar Square Mall      3390408.31
Forum Istanbul         3336073.82
Istinye Park           6717077.54
Kanyon                13710755.24
Mall of Istanbul      13851737.62
Metrocity             10249980.07
Metropol AVM           6937992.99
Viaport Outlet         3414019.46
Zorlu Center           3509649.02
Name: price, dtype: float64
```

In [22]:
```
#Create a pie plot to visualize sales distribution by region
plt.figure(figsize=(6, 6))
plt.pie(sales_by_region, labels=sales_by_region.index, autopct="%1.1f%%", st
plt.title("Sales Distribution by Region")
plt.axis("equal")
plt.show()
```



In [25]:
```
plt.figure()
plt.bar(sales_by_region.index, sales_by_region.values)
plt.xlabel('Region')
plt.ylabel('Total Sales Amount')
plt.title('Total Sales Amount by Region')
plt.show()
```



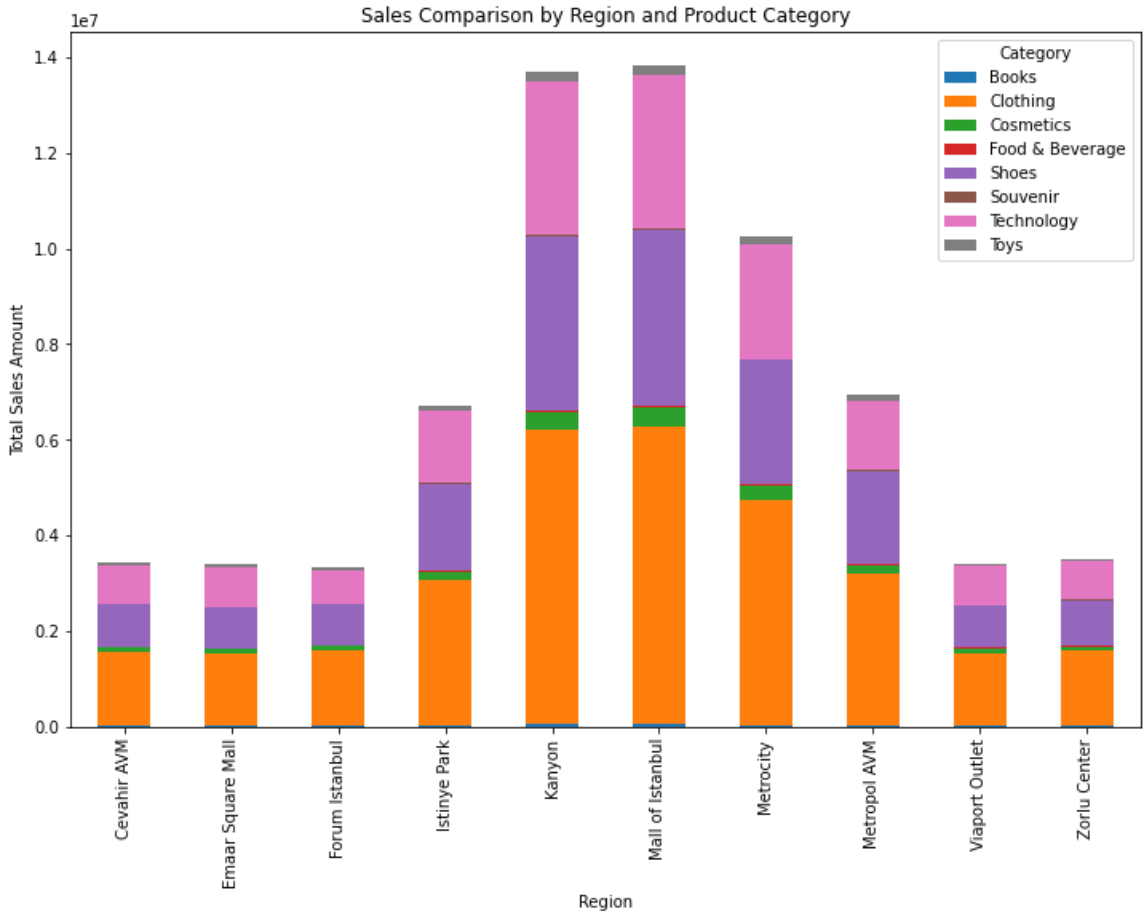
In [16]:
```
#Identify top-performing regions
top_regions = sales_by_region.sort_values(ascending=False).head(5)
print("Top-performing regions:")
print(top_regions)
```

```
Top-performing regions:
shopping_mall
Mall of Istanbul    13851737.62
Kanyon              13710755.24
Metrocity           10249980.07
Metropol AVM         6937992.99
Istinye Park         6717077.54
Name: price, dtype: float64
```

In [17]:
```
#Group by region of shopping mall and product category, calculate total sale
sales_by_region_category = data.groupby(["shopping_mall", "category"])["pric
sales_by_region_category
```

Out[17]:
```
shopping_mall  category
Cevahir AVM    Books                 11998.80
               Clothing            1554414.40
               Cosmetics             88394.84
               Food & Beverage       11992.39
               Shoes                884050.41
                                       ...
Zorlu Center   Food & Beverage       11589.68
               Shoes                953670.13
               Souvenir              8398.68
               Technology           803250.00
               Toys                  54691.84
Name: price, Length: 80, dtype: float64
```

In [18]:
```
#Create a stacked bar plot to compare sales across regions and categories
sales_by_region_category.unstack().plot(kind="bar", stacked=True, figsize=(1
plt.title("Sales Comparison by Region and Product Category")
plt.xlabel("Region")
plt.ylabel("Total Sales Amount")
plt.legend(title="Category")
plt.show()
```



In [ ]: