Import Libraries

```
import pyodbc  # For SQL Use
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

SQL Connection

```

# Set up the database connection
conn = pyodbc.connect(
    "Driver={SQL Server};"
    "Server=MONIKA;"
    "Database=dannys_diner;"
    "Trusted_Connection=yes;"
)
```

Create Cursor and Fetch List Of Tables

```
cursor = conn.cursor()

# Get a list of all tables in the database
tables_query = "SELECT name FROM sys.tables"
cursor.execute(tables_query)

# Fetch the results
tables = cursor.fetchall()

# Process the results
table_list = [table[0] for table in tables]
print(table_list)
```

```
['sales', 'menu', 'members']
```

Data Exploration

```
sales= pd.read_sql_query('select * from sales',conn)
sales
```

```
   customer_id  order_date  product_id
0            A  2021-01-01           1
1            A  2021-01-01           2
2            A  2021-01-07           2
```

```
3             A  2021-01-10          3
4             A  2021-01-11          3
5             A  2021-01-11          3
6             B  2021-01-01          2
7             B  2021-01-02          2
8             B  2021-01-04          1
9             B  2021-01-11          1
10            B  2021-01-16          3
11            B  2021-02-01          3
12            C  2021-01-01          3
13            C  2021-01-01          3
14            C  2021-01-07          3

menu= pd.read_sql_query('select * from menu',conn)
menu

   product_id product_name  price
0           1        sushi     10
1           2        curry     15
2           3        ramen     12

members= pd.read_sql_query('select * from members',conn)
members

  customer_id   join_date
0           A  2021-01-07
1           B  2021-01-09
```

Data Type Of Each Column From Each Table

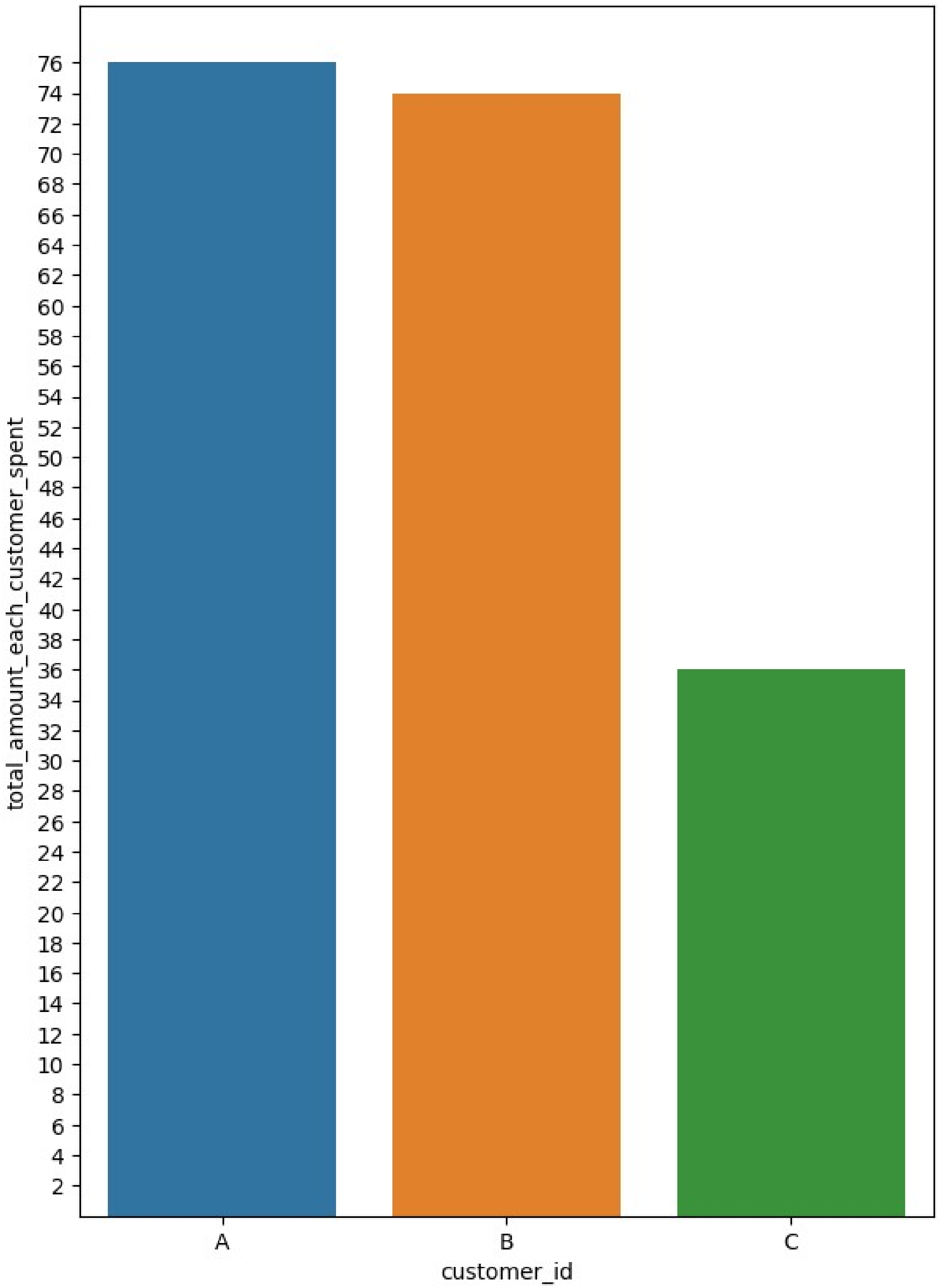
```
cursor.execute("SELECT c.name AS ColumnName, t.name AS DataType,
ta.name AS TableName \
                FROM sys.columns c \
                INNER JOIN sys.types t ON c.user_type_id =
t.user_type_id \
                INNER JOIN sys.tables ta ON c.object_id =
ta.object_id")

# Fetch the results
columns = cursor.fetchall()

for column in columns:
    column_name= column.ColumnName
    data_type= column.DataType
    table_name= column.TableName

    print(f"Column Name:{column_name}, Data Type:{data_type}, Table
Name:{table_name}")
```

```
Column Name:customer_id, Data Type:varchar, Table Name:sales
Column Name:order_date, Data Type:date, Table Name:sales
Column Name:product_id, Data Type:int, Table Name:sales
Column Name:product_id, Data Type:int, Table Name:menu
Column Name:product_name, Data Type:varchar, Table Name:menu
Column Name:price, Data Type:int, Table Name:menu
Column Name:customer_id, Data Type:varchar, Table Name:members
Column Name:join_date, Data Type:date, Table Name:members
```

EDA And Visualization

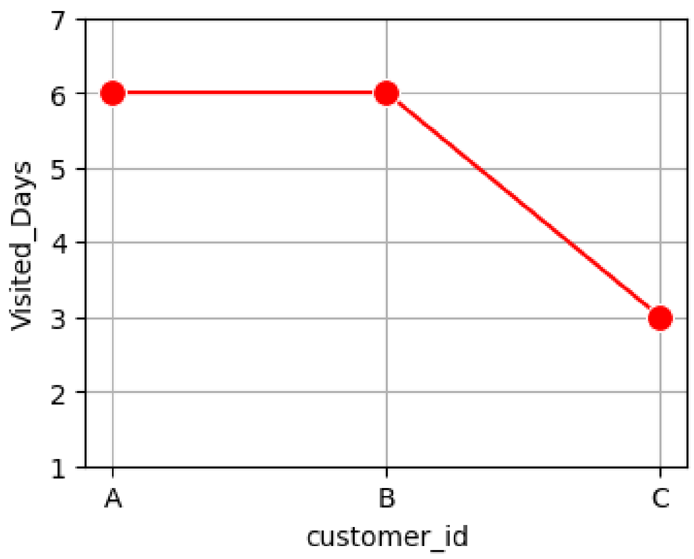
1. What is the total amount each customer spent at the restaurant?

```
Total_Amt_Each_Spent=pd.read_sql_query('SELECT s.customer_id, 
SUM(m.price) as total_amount_each_customer_spent \
                                   FROM sales as s\
                                   JOIN menu as m\
                                   ON s.product_id = m.product_id \
                                   GROUP BY s.customer_id',conn)
Total_Amt_Each_Spent

  customer_id  total_amount_each_customer_spent
0           A                                76
1           B                                74
2           C                                36

plt.figure(figsize= (7,10))
sns.barplot(data= Total_Amt_Each_Spent,x= 
Total_Amt_Each_Spent['customer_id'],
            y= 'total_amount_each_customer_spent')

plt.yticks(np.arange(2,78,2))
plt.show()
```



1. How many days has each customer visited the restaurant?

```
Visited_Days=pd.read_sql_query('''SELECT customer_id, count(*) as 
Visited_Days
                  FROM sales
                  GROUP BY customer_id
                  ''',conn)
Visited_Days

  customer_id  Visited_Days
0           A             6
1           B             6
2           C             3

plt.figure(figsize= (4,3))
sns.lineplot(data=Visited_Days,x= Visited_Days['customer_id'],y= 
Visited_Days['Visited_Days'],
             marker='o', markersize=10, color= 'red')
plt.yticks(np.arange(1,8,1))
plt.grid()
plt.show()
```



1. What was the first item from the menu purchased by each customer?

```
First_Purchase= pd.read_sql_query('''SELECT 
customer_id,order_date,product_name as first_Purchase
FROM(SELECT s.customer_id,m.product_name,s.order_date, ROW_NUMBER()
OVER(PARTITION BY s.customer_id ORDER BY s.order_date ASC) as rn
FROM sales s
JOIN menu m
ON m.product_id=s.product_id) subquery
WHERE rn=1''',conn)

First_Purchase
```

```
  customer_id  order_date first_Purchase
0           A  2021-01-01          sushi
1           B  2021-01-01          curry
2           C  2021-01-01          ramen

df= pd.DataFrame(First_Purchase)
df

  customer_id  order_date first_Purchase
0           A  2021-01-01          sushi
1           B  2021-01-01          curry
2           C  2021-01-01          ramen
```

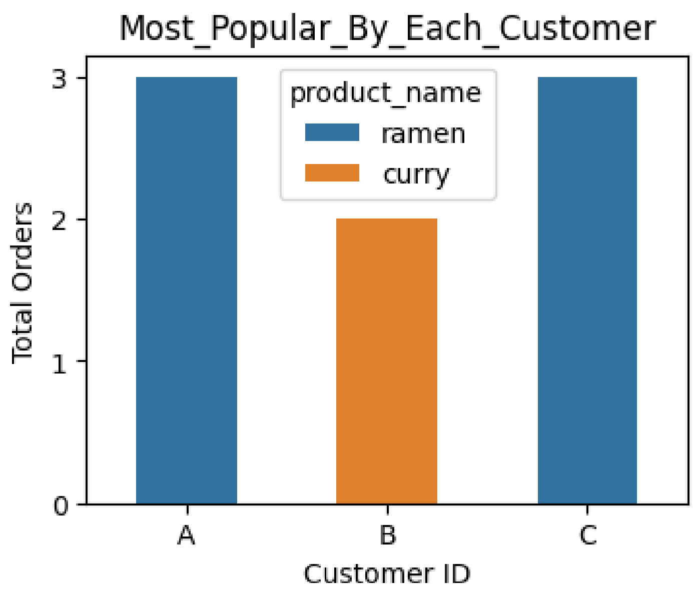
1. What is the most purchased item on the menu and how many times was it purchased by all customers?

```
Most_Purchased_item= pd.read_sql_query('''SELECT TOP 1
m.product_name,m.product_id,count(*) as Total_Purchase
FROM sales as s
JOIN menu as m
ON m.product_id=s.product_id
GROUP BY m.product_name,m.product_id
ORDER BY Total_Purchase DESC''',conn)

Most_Purchased_item

  product_name  product_id  Total_Purchase
0        ramen           3               8
```

1. Which item was the most popular for each customer?

```
Most_Popular_By_Each_Customer= pd.read_sql_query('''SELECT
customer_id,product_name,product_id, Total_Orders
FROM ( SELECT s.customer_id,m.product_name,m.product_id, count (*) as
Total_Orders,
ROW_NUMBER() OVER(PARTITION BY s.customer_id ORDER BY count(*) DESC)
as rn
FROM sales as s
JOIN menu as m
ON m.product_id=s.product_id
GROUP BY s.customer_id,m.product_name,m.product_id) as subquery
WHERE rn= 1''',conn)
Most_Popular_By_Each_Customer

  customer_id product_name  product_id  Total_Orders
0           A        ramen           3             3
1           B        curry           2             2
2           C        ramen           3             3

plt.figure(figsize= (4,3))
# Create a bar plot
```

```
sns.barplot(x='customer_id', y='Total_Orders', hue='product_name',
            data=Most_Popular_By_Each_Customer,dodge=False, width=
0.5)

# Add labels and title
plt.xlabel('Customer ID')
plt.ylabel('Total Orders')
plt.yticks(range(0,4))
plt.xticks()
plt.title('Most_Popular_By_Each_Customer')

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



1. Which item was purchased first by the customer after they became a member?

```
First_Item_After_Membership= pd.read_sql_query('''SELECT
t.customer_id, first_purchase_date,m.product_name
FROM(SELECT s.customer_id,MIN(order_date) as first_purchase_date
FROM sales as s
JOIN menu as m
ON s.product_id = m.product_id
JOIN members as mem
ON s.customer_id = mem.customer_id
Where s.order_date > mem.join_date
GROUP BY s.customer_id) as t
JOIN sales AS s ON t.customer_id = s.customer_id AND
t.first_purchase_date = s.order_date
JOIN menu AS m ON s.product_id = m.product_id;''',conn)

First_Item_After_Membership
```

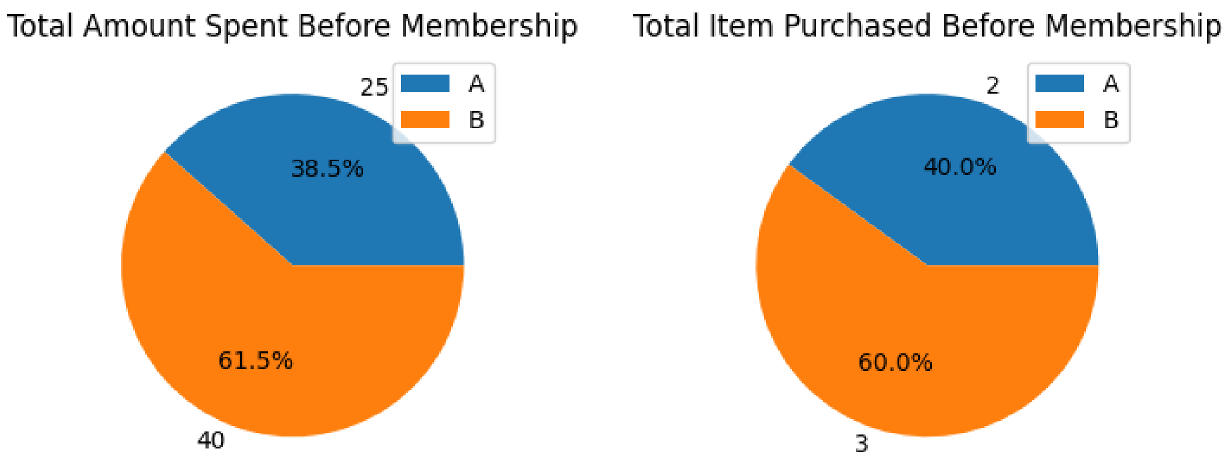
```
  customer_id first_purchase_date product_name
0           A          2021-01-10        ramen
1           B          2021-01-11        sushi
```

1. Which item was purchased just before the customer became a member?

```
last_purchase_before_membership= pd.read_sql_query('''SELECT
customer_id, product_id, last_order, product_name
FROM (
    SELECT s.customer_id, s.product_id, MAX(s.order_date) AS
last_order, product_name,
    ROW_NUMBER() OVER (PARTITION BY s.customer_id ORDER BY
s.order_date DESC) AS rn
    FROM sales AS s
    JOIN menu AS m ON s.product_id = m.product_id
    JOIN members AS mm ON s.customer_id = mm.customer_id
    WHERE s.order_date < mm.join_date
    GROUP BY s.customer_id, s.product_id, product_name,order_date
) subquery
WHERE rn = 1;''',conn)

last_purchase_before_membership

  customer_id  product_id  last_order product_name
0           A           1  2021-01-01        sushi
1           B           1  2021-01-04        sushi
```

1. What is the total items and amount spent for each member before they became a member?

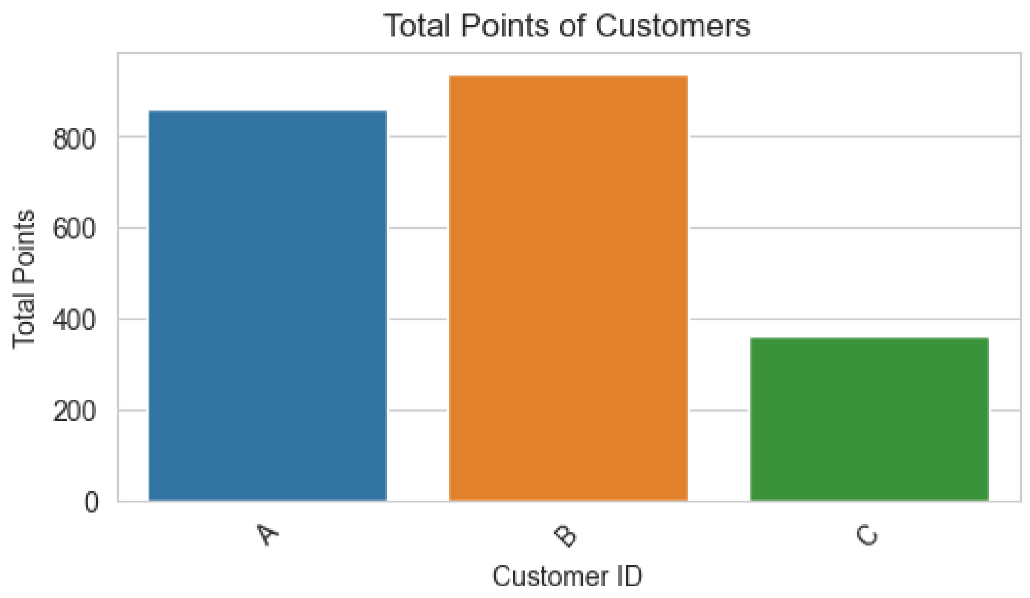
```
total_item_amtspent_before_membership=pd.read_sql_query('''SELECT
s.customer_id,COUNT(s.product_id) as total_items,SUM(m.price) as
total_spent
FROM sales s
JOIN menu m
ON s.product_id =m.product_id
JOIN members mm
ON s.customer_id=mm.customer_id
WHERE order_date<join_date
GROUP BY s.customer_id''',conn)

total_item_amtspent_before_membership

  customer_id  total_items  total_spent
0           A            2           25
1           B            3           40

plt.figure(figsize= (8,3))
plt.subplot(1, 2, 1)

plt.pie(data=total_item_amtspent_before_membership, x=
'total_spent',autopct='%1.1f%%',
        labels= total_item_amtspent_before_membership['total_spent'])
plt.title('Total Amount Spent Before Membership')
plt.legend(total_item_amtspent_before_membership['customer_id'],loc=1)

plt.subplot(1, 2, 2)
plt.pie(data=total_item_amtspent_before_membership, x=
'total_items',autopct='%1.1f%%',
        labels= total_item_amtspent_before_membership['total_items'])
plt.title('Total Item Purchased Before Membership')
plt.legend(total_item_amtspent_before_membership['customer_id'],loc=1)

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



1. If each $1 spent equates to 10 points and sushi has a 2x points multiplier - how many points would each customer have?

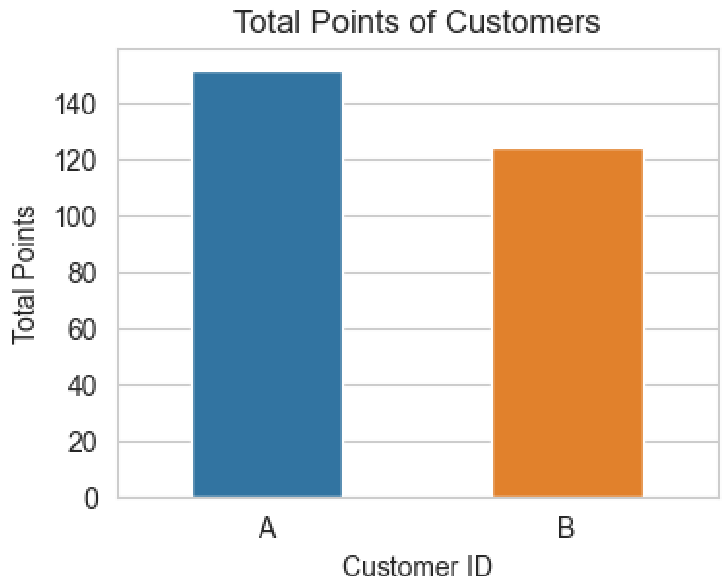
```
Total_points= pd.read_sql('''SELECT s.customer_id,SUM(CASE WHEN
m.product_name= 'sushi' Then 2*m.price ELSE m.price END)*10 AS
total_points
FROM sales s
JOIN menu m
ON s.product_id= m.product_id
GROUP BY customer_id''',conn)

Total_points


  customer_id  total_points
0           A           860
1           B           940
2           C           360
```

```
plt.figure(figsize= (6,3))

# Assuming you have a DataFrame named 'customer_points' with columns
'customer_id' and 'total_points'

# Create a bar plot
sns.barplot(x='customer_id', y='total_points', data=Total_points)

# Add labels and title
plt.xlabel('Customer ID')
plt.ylabel('Total Points')
plt.title('Total Points of Customers')

# Add some styling
sns.set_style('whitegrid')  # Set the style of the plot
plt.xticks(rotation=45)  # Rotate the x-axis labels if needed

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



1. In the first week after a customer joins the program (including their join date) they earn 2x points on all items, not just sushi - how many points do customer A and B have at the end of January?

```
Total_points=pd.read_sql_query('''SELECT s.customer_id,SUM(CASE WHEN
join_date<= DATEADD(DAY,6,join_date) THEN 2*m.price ELSE m.price
END)as Total_Points
FROM sales s
JOIN menu m
ON s.product_id =m.product_id
JOIN members mm
ON s.customer_id=mm.customer_id
WHERE YEAR(order_date)= 2021 AND MONTH(order_date)=1
GROUP BY s.customer_id''',conn)

Total_points

  customer_id  Total_Points
0           A           152
1           B           124

plt.figure(figsize=(4,3))
sns.barplot(data=Total_points, x='customer_id',
y='Total_Points',width=0.5)

# Add labels and title
plt.xlabel('Customer ID')
plt.ylabel('Total Points')
plt.title('Total Points of Customers')

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


Total Points of Customers
Total Points
A
B
Customer ID