SQL+PYTHON PROJECT

Que 1- List all unique cities where customers are located.

```
In [2]: query = """select distinct customer_city from customers"""

        cur.execute(query)

        data = cur.fetchall()

        df = pd.DataFrame(data,columns = ["Customer city"])

        df
```

```
Out[2]:
```

	Customer city
0	franca
1	sao bernardo do campo
2	sao paulo
3	mogi das cruzes
4	campinas
...	...
4114	siriji
4115	natividade da serra
4116	monte bonito
4117	sao rafael

Que 2- Count the number of orders placed in 2017.

```
In [3]: query = """select count(order_id) from orders where year(order_purchase_timestamp) = 2017"""

        cur.execute(query)

        data = cur.fetchall()

        "Total order plased in 2017", data
```

```
Out[3]: ('Total order plased in 2017', [(45101,)])
```

Que 3 - Find the total sales per category.

```
In [4]: query = """select upper(products.product_category) category,
        round(sum(payments.payment_value),2) sales
        from products join order_items
        on products.product_id = order_items.product_id
        join payments
        on payments.order_id = order_items.order_id
        group by category
        """

        cur.execute(query)

        data = cur.fetchall()

        df = pd.DataFrame(data, columns = ["category" ,"sales"] )

        df
```

Out[4]:

	category	sales
0	PERFUMERY	506738.66
1	FURNITURE DECORATION	1430176.39
2	TELEPHONY	486882.05
3	BED TABLE BATH	1712553.67
4	AUTOMOTIVE	852294.33
...	...	...

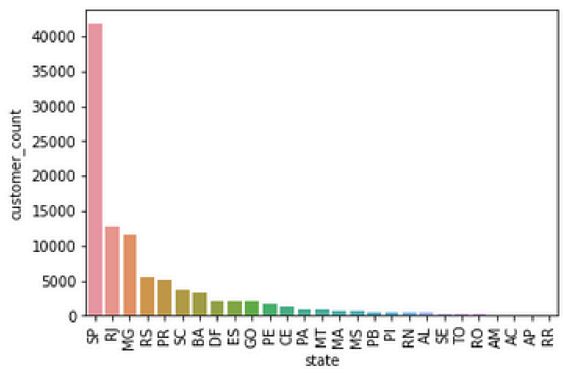
Que - 4 Calculate the percentage of orders that were paid in installments.

```
In [5]: query = """select (sum(case when payment_installments >= 1 then 1
        else 0 end))/count(*)*100 from payments """

        cur.execute(query)

        data = cur.fetchall()

        "the percentage of orders that were paid in installments is ",data[0][0]
```

```
Out[5]: ('the percentage of orders that were paid in installments is ',
         Decimal('99.9981'))
```

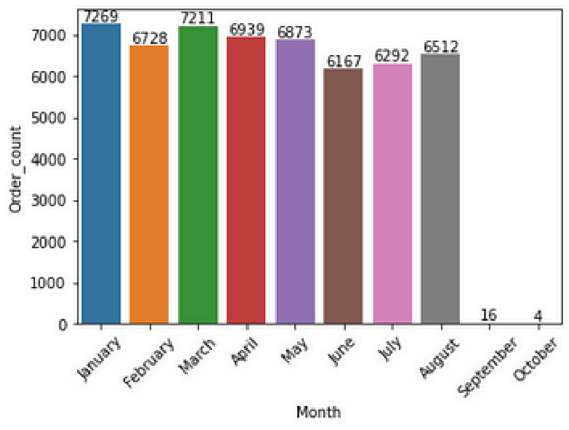
Que - 5 Count the number of customers from each state.

```
In [6]: query = """select customer_state, count(customer_id)
        from customers group by customer_state"""

        cur.execute(query)

        data = cur.fetchall()

        df = pd.DataFrame(data, columns = ["state", "customer_count"])

        df = df.sort_values(by = "customer_count", ascending = False)

        s = sns.barplot(x = df["state"], y = df["customer_count"])
        s.set_xticklabels(s.get_xticklabels(), rotation=90);
```



Que - 6 Calculate the number of orders per month in 2018.

```
In [7]: query = """select monthname(order_purchase_timestamp) month, count(order_id) order_count
        from orders where year(order_purchase_timestamp) = 2018
        group by month"""

        cur.execute(query)

        data = cur.fetchall()

        df = pd.DataFrame(data, columns = ["Month","Order_count"])

        o = ["January","February","March","April","May","June","July","August","September","October"]

        ax = sns.barplot(x = df["Month"], y = df["Order_count"], data = df, order = o)
        #plt.xticks(rotation = 45)

        ax.bar_label(ax.containers[0])

        ax.set_xticklabels(ax.get_xticklabels(), rotation= 45);
```



Que - 7 Find the average number of products per order, grouped by customer city.

In [8]:
```
query = """with count_per_order as
(select orders.order_id, orders.customer_id, count(order_items.order_id) as oc
from orders join order_items
on orders.order_id =  order_items.order_id
group by orders.order_id, orders.customer_id)


select customers.customer_city, round(avg(count_per_order.oc),2) average_orders
from customers join count_per_order
on customers.customer_id = count_per_order.customer_id
group by customers.customer_city order by average_orders desc;
"""

cur.execute(query)

data = cur.fetchall()

df = pd.DataFrame(data , columns =["customer_city","average_products/order"])


df.head(10)
```

Out[8]:

	customer_city	average_products/order
0	padre carvalho	7.00
1	celso ramos	6.50
2	datas	6.00
3	candido godoi	6.00
4	matias olimpio	5.00
5	cidelandia	4.00
6	picarra	4.00
7	morro de sao paulo	4.00
8	teixeira soares	4.00
9	curralinho	4.00

Que - 8 Calculate the percentage of total revenue contributed by each product category.

In [9]:
```
query = """select upper(products.product_category) category,
round((sum(payments.payment_value)/(select sum(payment_value) from payments))*100,2) sales_percentage
from products join order_items
on products.product_id = order_items.product_id
join payments
on payments.order_id = order_items.order_id
group by category order by sales_percentage  desc;
"""

cur.execute(query)

data = cur.fetchall()

df = pd.DataFrame(data , columns =["category","percentage_distribution"])


df
```

Out[9]:

	category	percentage_distribution
0	BED TABLE BATH	10.70
1	HEALTH BEAUTY	10.35
2	COMPUTER ACCESSORIES	9.90
3	FURNITURE DECORATION	8.93
4	WATCHES PRESENT	8.93
...	...	...

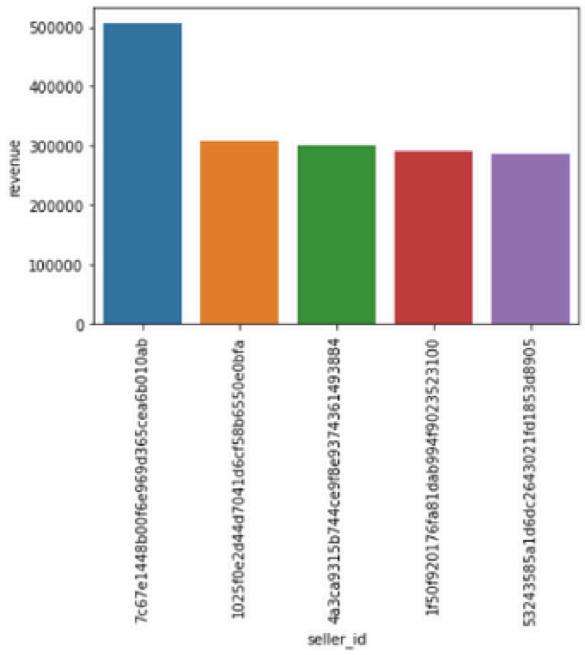
Que - 9 Identify the correlation between product price and the number of times a product has been purchased.

```
In [10]: query = """select products.product_category,
         count(order_items.product_id),
         round(avg(order_items.price),2)
         from products join order_items
         on products.product_id = order_items.product_id
         group by products.product_category;
         """

         cur.execute(query)

         data = cur.fetchall()

         df = pd.DataFrame(data , columns =["category","order_count","price"])


         arr1 = df["order_count"]
         arr2 = df["price"]

         a = np.corrcoef([arr1,arr2])
         print("The corelation is ", a [0][-1])
```

```
The corelation is  -0.10631514167157562
```

Que - 10 Calculate the total revenue generated by each seller, and rank them by revenue.

```
In [11]: query = """select *, dense_rank() over(order by revenue desc) as rn from
         (select order_items.seller_id, sum(payments.payment_value) revenue
         from order_items join payments
         on order_items.order_id = payments.order_id
         group by order_items.seller_id) as a
         """

         cur.execute(query)

         data = cur.fetchall()

         df = pd.DataFrame(data , columns =["seller_id","revenue","rank"])
         df = df.head()
         ax =sns.barplot(x = "seller_id", y = "revenue", data = df)
         ax.set_xticklabels(ax.get_xticklabels(), rotation= 90);
```



Que - 11 Calculate the moving average of order values for each customer over their order history.

In [12]:
```
query = """select customer_id, order_purchase_timestamp, payment,
 avg(payment) over(partition by customer_id order by order_purchase_timestamp
 rows between 2 preceding and current row) as mov_avg
 from
 (select orders.customer_id, orders.order_purchase_timestamp,
 payments.payment_value as payment
 from payments join orders
 on payments.order_id = orders.order_id) as a;
"""

cur.execute(query)

data = cur.fetchall()

df = pd.DataFrame(data , columns =["customer_id","order_purchase_timestamp","payment","mov_avg"])

df
```

Out[12]:

	customer_id	order_purchase_timestamp	payment	mov_avg
0	00012a2ce6f8dcda20d059ce98491703	2017-11-14 16:08:26	114.74	114.739998
1	000161a058600d5901f007fab4c27140	2017-07-16 09:40:32	67.41	67.410004
2	0001fd6190edaaf884bcaf3d49edf079	2017-02-28 11:06:43	195.42	195.419998
3	0002414f95344307404f0ace7a26f1d5	2017-08-16 13:09:20	179.35	179.350006
4	000379cdec625522490c315e70c7a9fb	2018-04-02 13:42:17	107.01	107.010002
...	...	...	...	...
103881	fffecc9f79fd8c764f843e9951b11341	2018-03-29 16:59:26	71.23	27.120001
103882	fffeda5b6d849fbd39689bb92087f431	2018-05-22 13:36:02	63.13	63.130001
103883	ffff42319e9b2d713724ae527742af25	2018-06-13 16:57:05	214.13	214.130005
103884	ffffa3172527f765de70084a7e53aae8	2017-09-02 11:53:32	45.50	45.500000
103885	ffffe8b65bbe3087b653a978c870db99	2017-09-29 14:07:03	18.37	18.370001

103886 rows × 4 columns

Que - 12 Calculate the cumulative sales per month for each year.

In [13]:
```
query = """select years , months , payment , sum(payment)
over(order by years , months) cumulative_sales from
(select year(orders.order_purchase_timestamp) as years,
month(orders.order_purchase_timestamp) as months,
round(sum(payments.payment_value),2) as payment from orders join payments
on orders.order_id = payments.order_id
group by years , months order by years , months) as a;;
"""

cur.execute(query)

data = cur.fetchall()

df = pd.DataFrame(data , columns =["years","months","payment","cumulative_sales"])

df
```

Out[13]:

	years	months	payment	cumulative_sales
0	2016	9	252.24	252.24
1	2016	10	59090.48	59342.72
2	2016	12	19.62	59362.34
3	2017	1	138488.04	197850.38
4	2017	2	291908.01	489758.39
5	2017	3	449863.60	939621.99
6	2017	4	417788.03	1357410.02
7	2017	5	592918.82	1950328.84
8	2017	6	511276.38	2461605.22
9	2017	7	592382.92	3053988.14
10	2017	8	674396.32	3728384.46

Que - 13 Calculate the year-over-year growth rate of total sales.

```
In [14]: query = """with a as (select year(orders.order_purchase_timestamp) as years,
round(sum(payments.payment_value),2) as payment from orders join payments
on orders.order_id = payments.order_id
group by years order by years)

select years , ((payment - lag(payment,1) over(order by years))/lag(payment,1) over(order by years))*100  from a;
"""

cur.execute(query)

data = cur.fetchall()

df = pd.DataFrame(data, columns = ["years","yoy % groth"])

df
```

Out[14]:

	years	yoy % groth
0	2016	NaN
1	2017	12112.703761
2	2018	20.000924

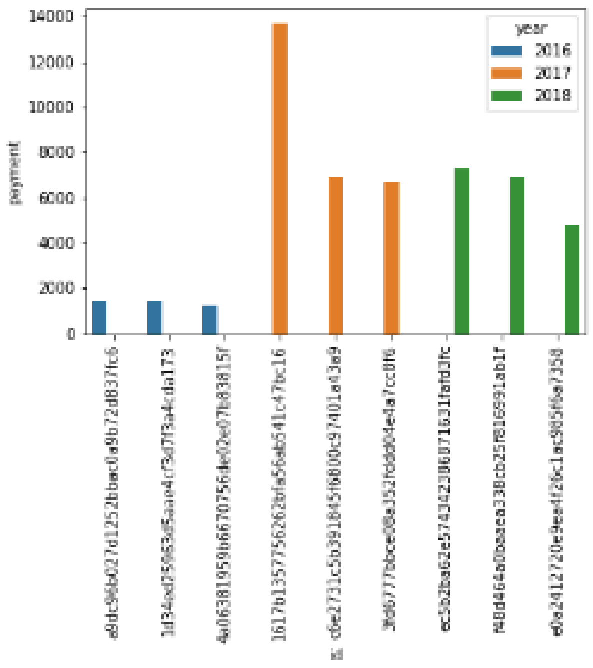
Que - 14 Calculate the retention rate of customers, defined as the percentage of customers who make another purchase within 6 months of their first purchase.

```
In [15]: query = """with a as (select customers.customer_id,
min(orders.order_purchase_timestamp) first_order
FROM customers JOIN orders
ON customers.customer_id = orders.customer_id
group by customers.customer_id),

b as (select a.customer_id, count(distinct orders.order_purchase_timestamp) next_order
from a join orders
on orders.customer_id = a.customer_id
and orders.order_purchase_timestamp > first_order
and orders.order_purchase_timestamp < date_add(first_order , interval 6 month)
group by a.customer_id)

select 100 * (count(distinct a.customer_id )/ count(distinct b.customer_id ))
from a left join b
on a.customer_id = b.customer_id;
"""

cur.execute(query)

data = cur.fetchall()

"There is no record in datadase so that result fond ",data
```

```
Out[15]: ('There is no record in datadase so that result fond ', [(None,)])
```

Que - 15 Identify the top 3 customers who spent the most money in each year.

```
In [16]: query = """select years, customer_id,payment, d_rank
         from
         (select year(orders.order_purchase_timestamp) years,
         orders.customer_id,
         sum(payments.payment_value) payment,
         dense_rank() over(partition by year(order_purchase_timestamp)
         order by sum(payments.payment_value) desc) d_rank
         from orders join payments
         on payments.order_id = orders.order_id
         group by year(orders.order_purchase_timestamp),
         orders.customer_id) as a
         where d_rank <= 3;

         """

         cur.execute(query)

         data = cur.fetchall()

         df = pd.DataFrame(data, columns = ["year","id","payment","d_rank"])

         ax = sns.barplot(x = "id", y = "payment", data = df, hue = "year")
         ax.set_xticklabels(ax.get_xticklabels(), rotation= 90);
```



THANK

YOU