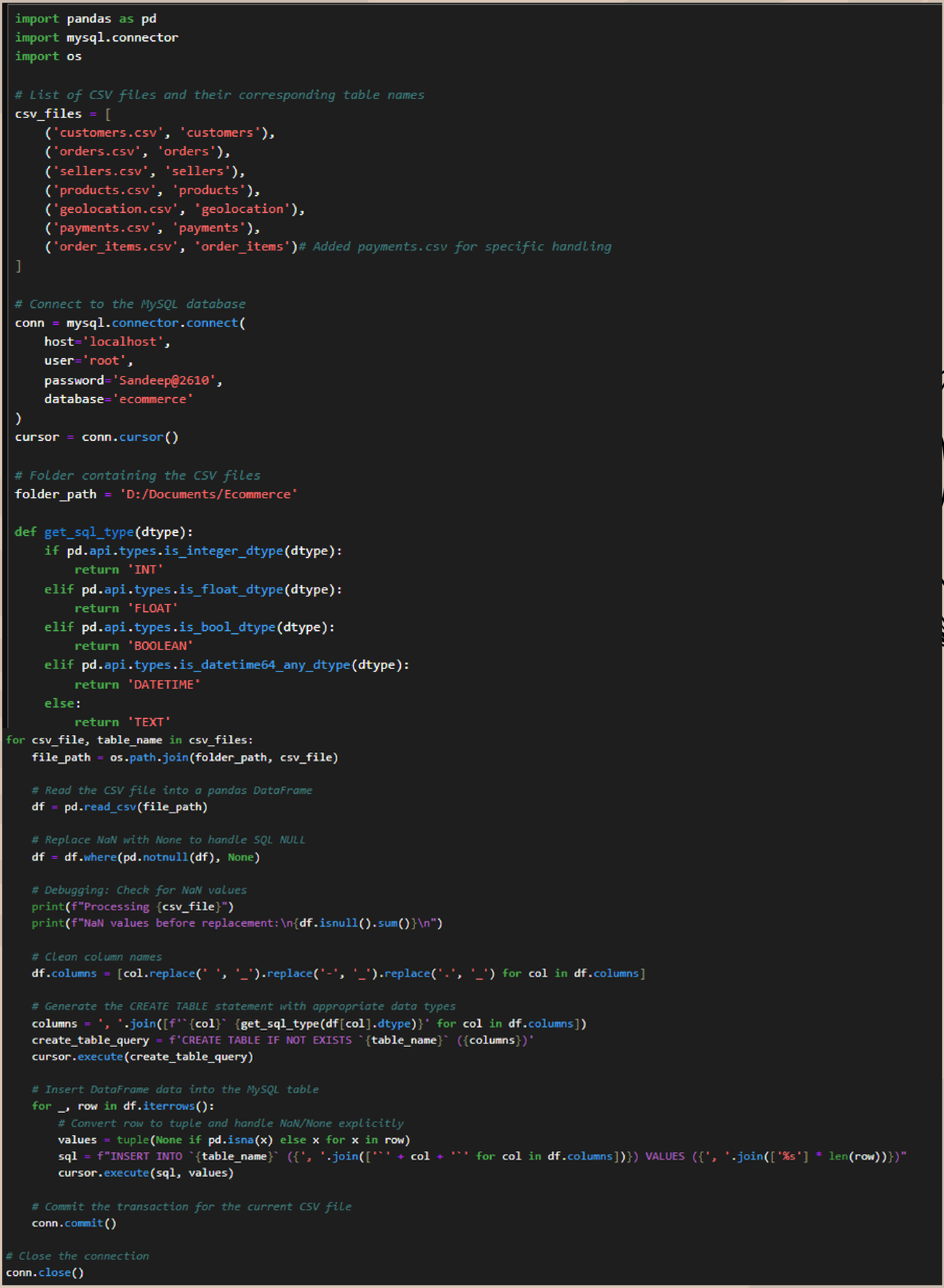
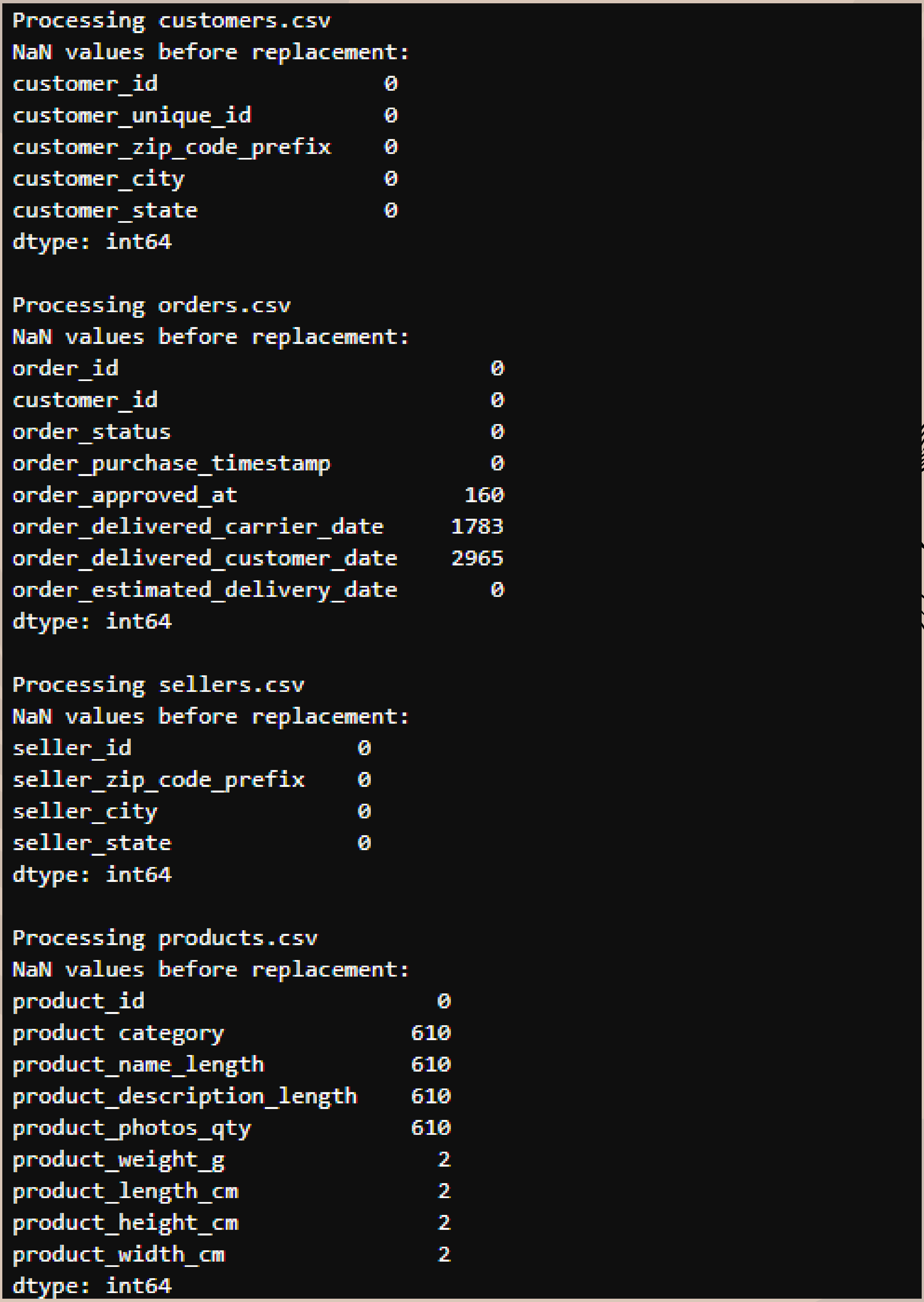
Ecommerce Report

Queries

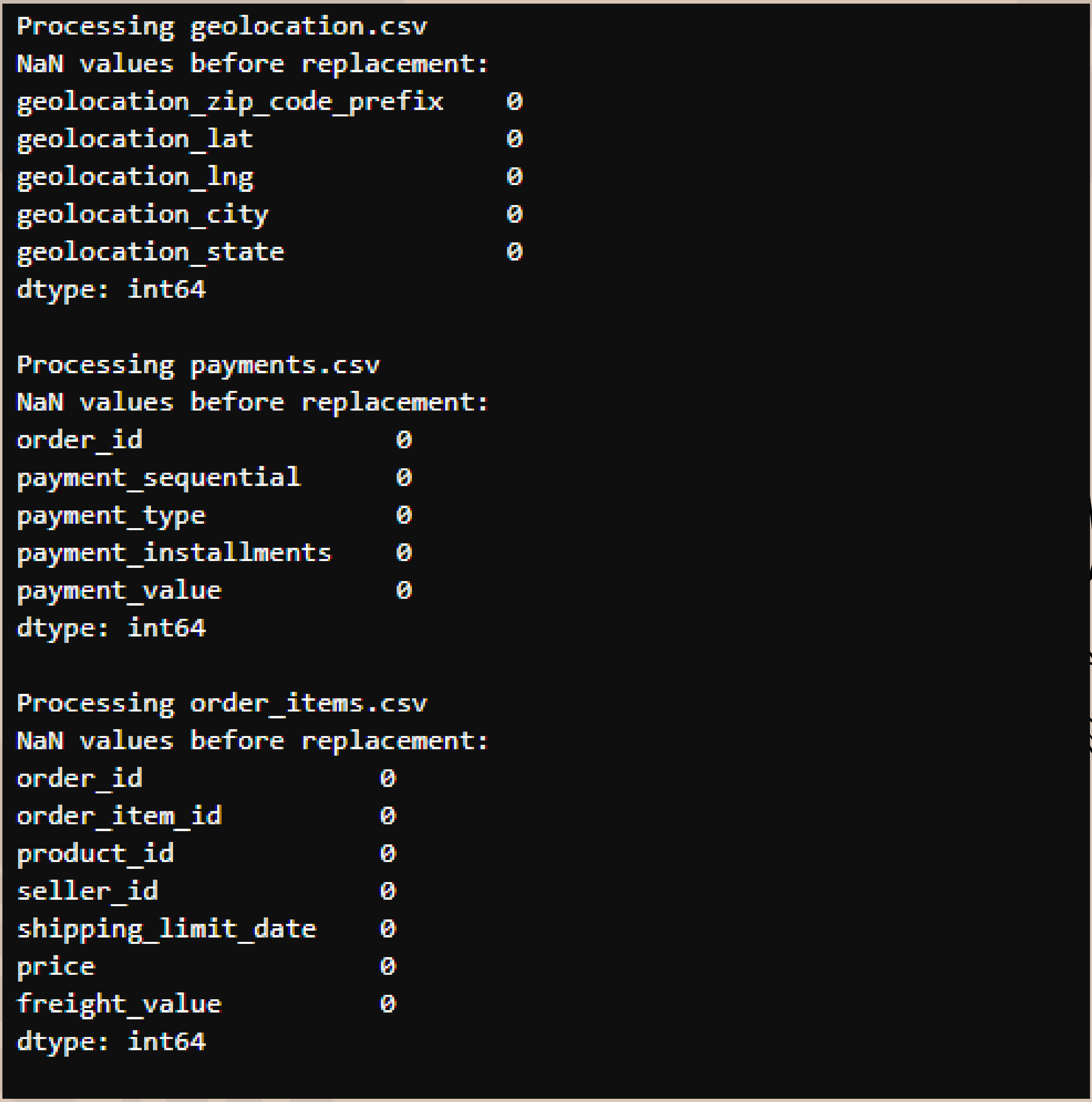
- List all unique cities where customers are located.
- Count the number of orders placed in 2017.
- Find the total sales per category.
- Calculate the percentage of orders that were paid in installments.
- Count the number of customers from each state.
- Calculate the number of orders per month in 2018.
- Find the average number of products per order, grouped by customer city.
- Calculate the percentage of total revenue contributed by each product category.
- Identify the correlation between product price and the number of times a product has been purchased.
- Calculate the total revenue generated by each seller, and rank them by revenue.
- Calculate the moving average of order values for each customer over their order history.
- Calculate the cumulative sales per month for each year.
- Calculate the year-over-year growth rate of total sales.
- Calculate the retention rate of customers, defined as the percentage of customers who make another purchase within 6 months of their first purchase.
- Identify the top 3 customers who spent the most money in each year.



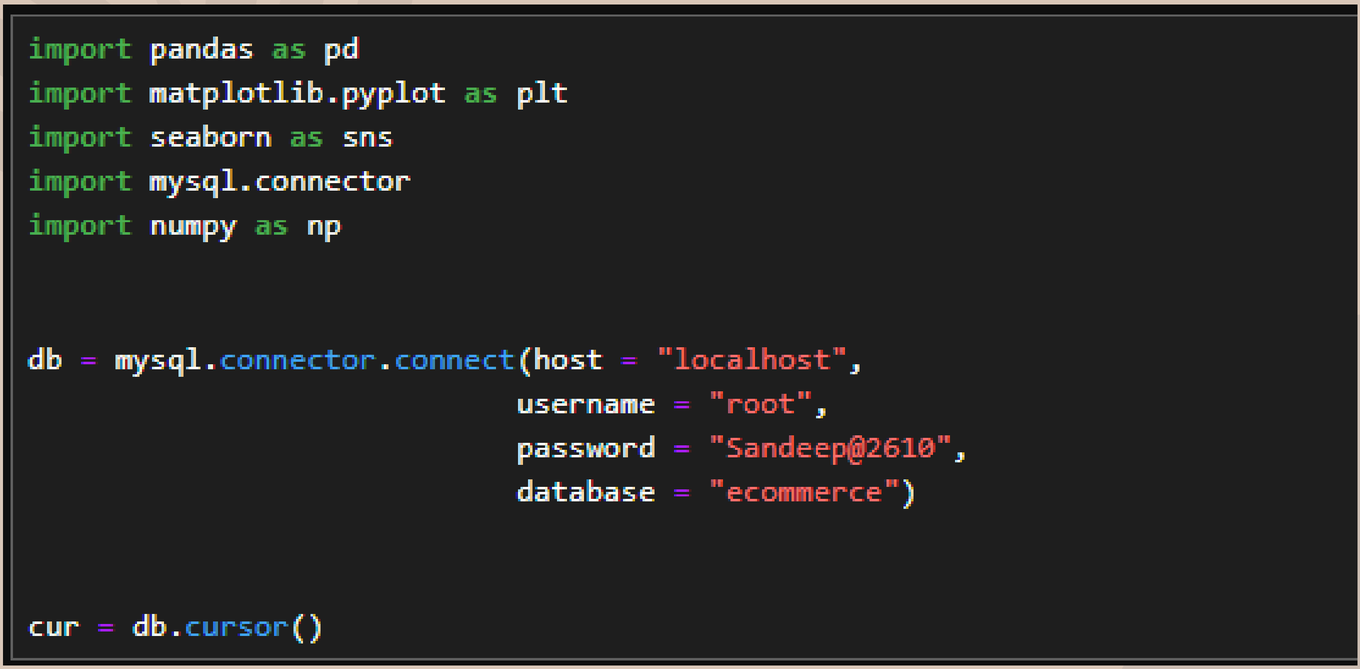
```python
import pandas as pd
import mysql.connector
import os

# List of CSV files and their corresponding table names
csv_files = [
    ('customers.csv', 'customers'),
    ('orders.csv', 'orders'),
    ('sellers.csv', 'sellers'),
    ('products.csv', 'products'),
    ('geolocation.csv', 'geolocation'),
    ('payments.csv', 'payments'),
    ('order_items.csv', 'order_items')# Added payments.csv for specific handling
]

# Connect to the MySQL database
conn = mysql.connector.connect(
    host='localhost',
    user='root',
    password='Sandeep@2610',
    database='ecommerce'
)
cursor = conn.cursor()

# Folder containing the CSV files
folder_path = 'D:/Documents/Ecommerce'

def get_sql_type(dtype):
    if pd.api.types.is_integer_dtype(dtype):
        return 'INT'
    elif pd.api.types.is_float_dtype(dtype):
        return 'FLOAT'
    elif pd.api.types.is_bool_dtype(dtype):
        return 'BOOLEAN'
    elif pd.api.types.is_datetime64_any_dtype(dtype):
        return 'DATETIME'
    else:
        return 'TEXT'
for csv_file, table_name in csv_files:
    file_path = os.path.join(folder_path, csv_file)

    # Read the CSV file into a pandas DataFrame
    df = pd.read_csv(file_path)

    # Replace NaN with None to handle SQL NULL
    df = df.where(pd.notnull(df), None)

    # Debugging: Check for NaN values
    print(f"Processing {csv_file}")
    print(f"NaN values before replacement:\n{df.isnull().sum()}\n")

    # Clean column names
    df.columns = [col.replace(' ', '_').replace('-', '_').replace('.', '_') for col in df.columns]

    # Generate the CREATE TABLE statement with appropriate data types
    columns = ', '.join([f'`{col}` {get_sql_type(df[col].dtype)}' for col in df.columns])
    create_table_query = f'CREATE TABLE IF NOT EXISTS `{table_name}` ({columns})'
    cursor.execute(create_table_query)

    # Insert DataFrame data into the MySQL table
    for _, row in df.iterrows():
        # Convert row to tuple and handle NaN/None explicitly
        values = tuple(None if pd.isna(x) else x for x in row)
        sql = f"INSERT INTO `{table_name}` ({', '.join(['`' + col + '`' for col in df.columns])}) VALUES ({', '.join(['%s'] * len(row))})"
        cursor.execute(sql, values)

    # Commit the transaction for the current CSV file
    conn.commit()

# Close the connection
conn.close()
```



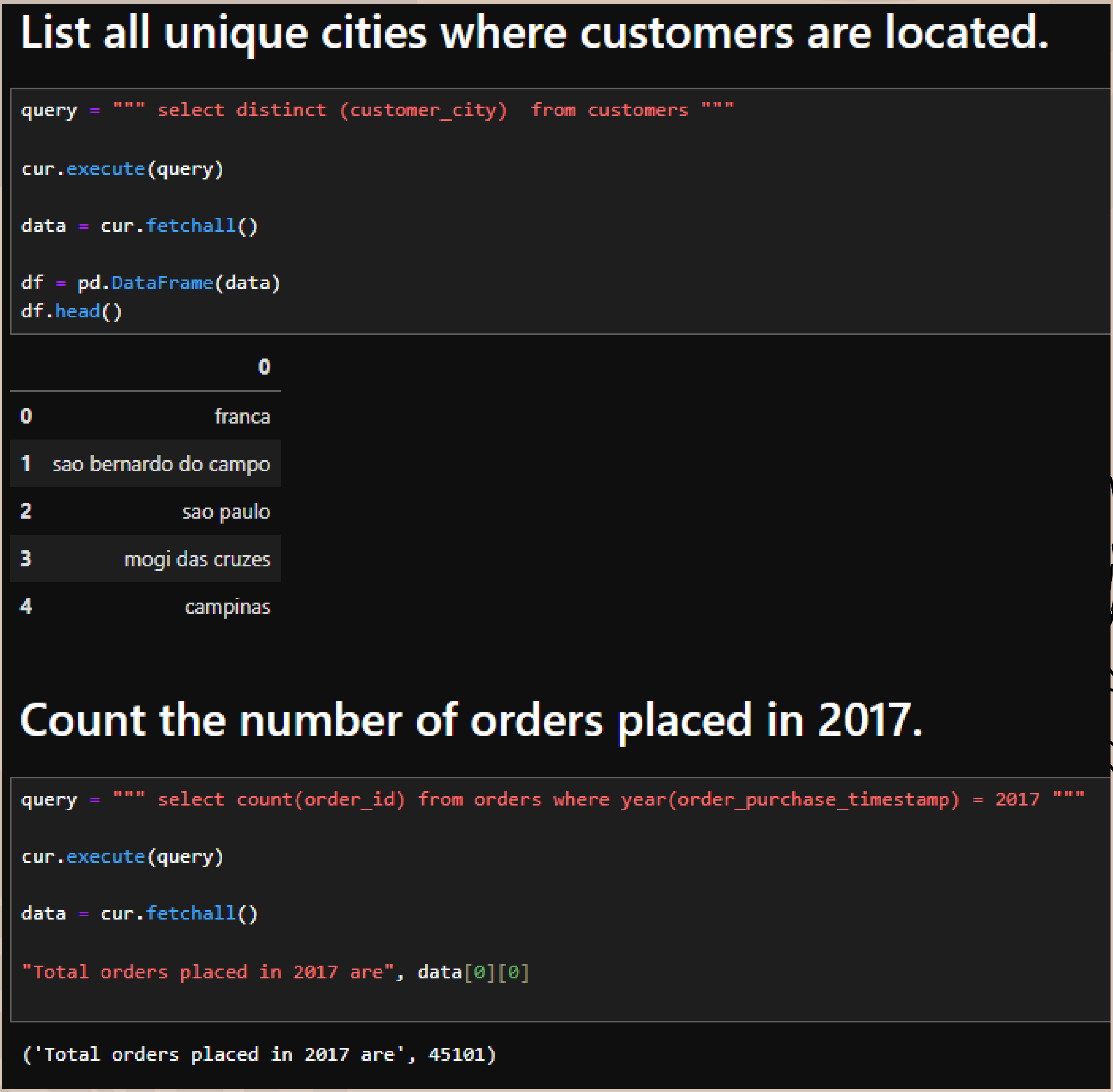
```
Processing customers.csv
NaN values before replacement:
customer_id                 0
customer_unique_id          0
customer_zip_code_prefix    0
customer_city               0
customer_state              0
dtype: int64

Processing orders.csv
NaN values before replacement:
order_id                            0
customer_id                         0
order_status                        0
order_purchase_timestamp            0
order_approved_at                 160
order_delivered_carrier_date     1783
order_delivered_customer_date    2965
order_estimated_delivery_date       0
dtype: int64

Processing sellers.csv
NaN values before replacement:
seller_id                 0
seller_zip_code_prefix    0
seller_city               0
seller_state              0
dtype: int64

Processing products.csv
NaN values before replacement:
product_id                      0
product category              610
product_name_length           610
product_description_length    610
product_photos_qty            610
product_weight_g                2
product_length_cm               2
product_height_cm               2
product_width_cm                2
dtype: int64
```



```
Processing geolocation.csv
NaN values before replacement:
geolocation_zip_code_prefix    0
geolocation_lat                0
geolocation_lng                0
geolocation_city               0
geolocation_state              0
dtype: int64

Processing payments.csv
NaN values before replacement:
order_id                0
payment_sequential      0
payment_type            0
payment_installments    0
payment_value           0
dtype: int64

Processing order_items.csv
NaN values before replacement:
order_id               0
order_item_id          0
product_id             0
seller_id              0
shipping_limit_date    0
price                  0
freight_value          0
dtype: int64
```



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



db = mysql.connector.connect(host = "localhost",
                            username = "root",
                            password = "Sandeep@2610",
                            database = "ecommerce")



cur = db.cursor()
```



List all unique cities where customers are located.

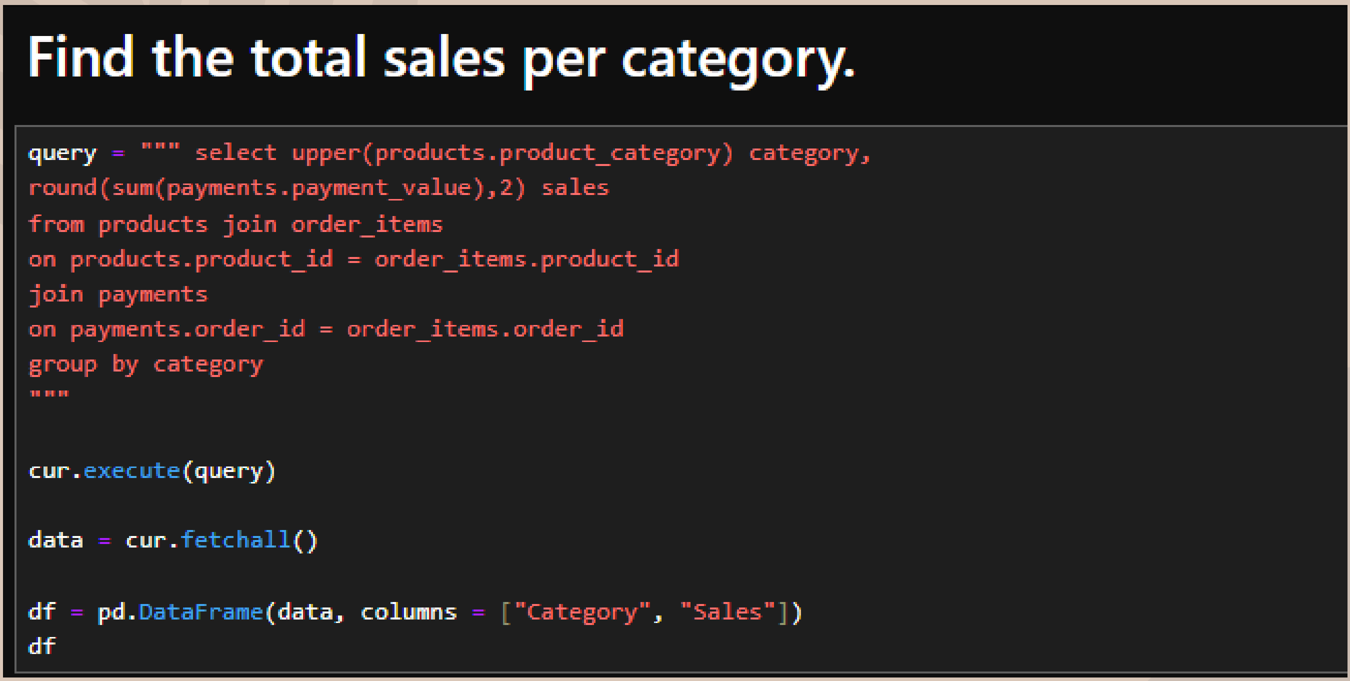
```
query = """ select distinct (customer_city)  from customers """

cur.execute(query)

data = cur.fetchall()

df = pd.DataFrame(data)
df.head()
```

	0
0	franca
1	sao bernardo do campo
2	sao paulo
3	mogi das cruzes
4	campinas

Count the number of orders placed in 2017.

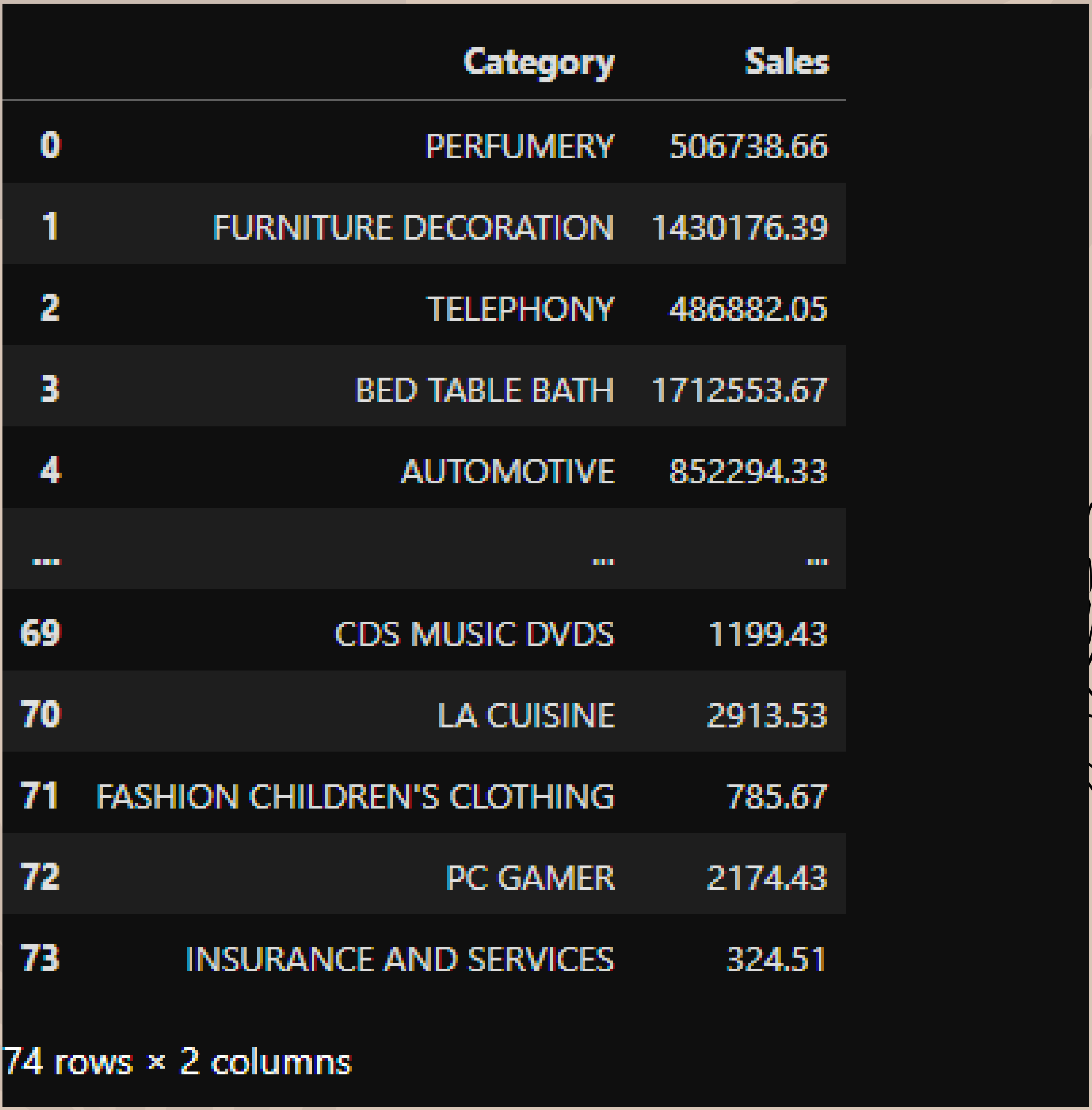
```
query = """ select count(order_id) from orders where year(order_purchase_timestamp) = 2017 """

cur.execute(query)

data = cur.fetchall()

"Total orders placed in 2017 are", data[0][0]
```

```
('Total orders placed in 2017 are', 45101)
```



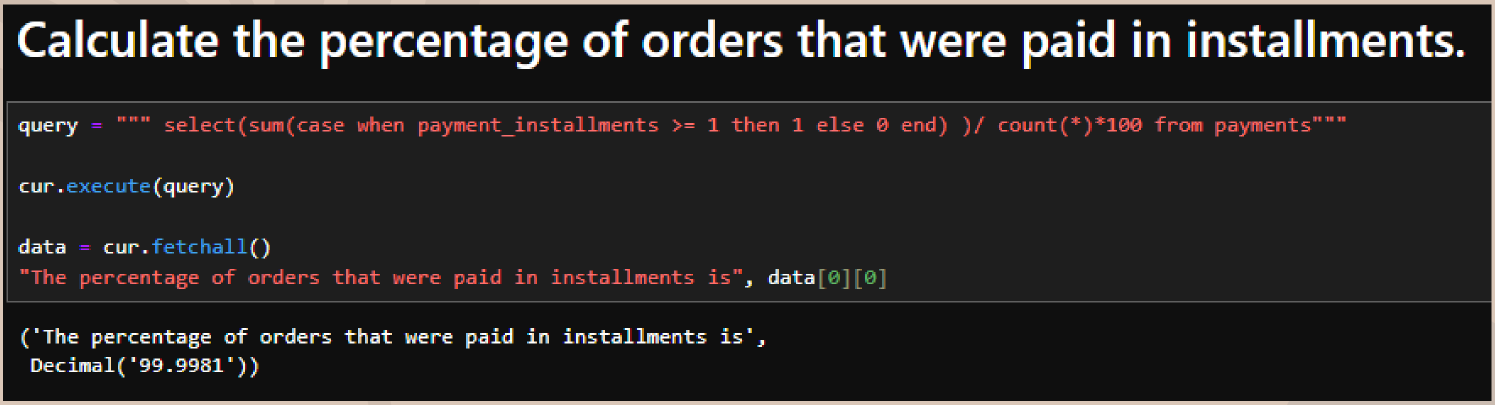
Find the total sales per category.

```
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
```



	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
...	...	...
69	CDS MUSIC DVDS	1199.43
70	LA CUISINE	2913.53
71	FASHION CHILDREN'S CLOTHING	785.67
72	PC GAMER	2174.43
73	INSURANCE AND SERVICES	324.51

74 rows × 2 columns

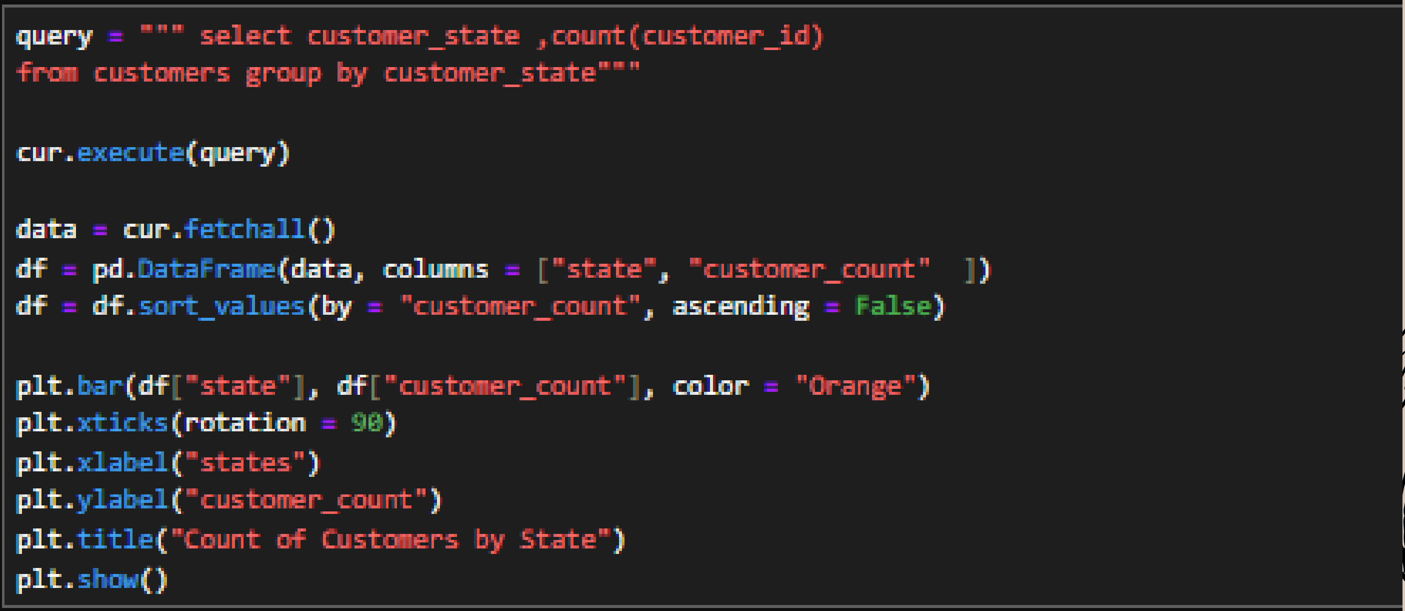


Calculate the percentage of orders that were paid in installments.

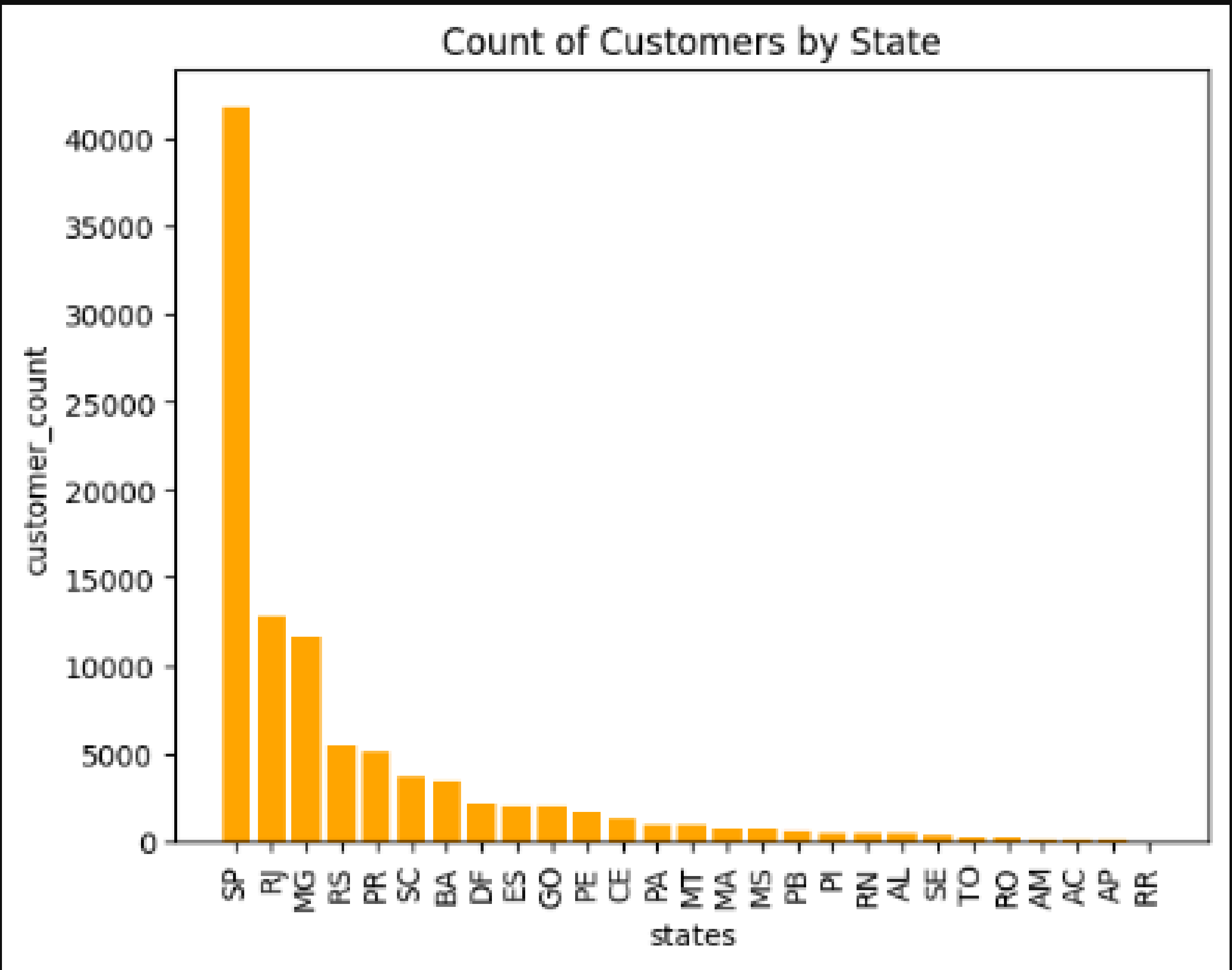
```
query = """ select(sum(case when payment_installments >= 1 then 1 else 0 end) )/ count(*)*100 from payments"""

cur.execute(query)

data = cur.fetchall()
"The percentage of orders that were paid in installments is", data[0][0]
```

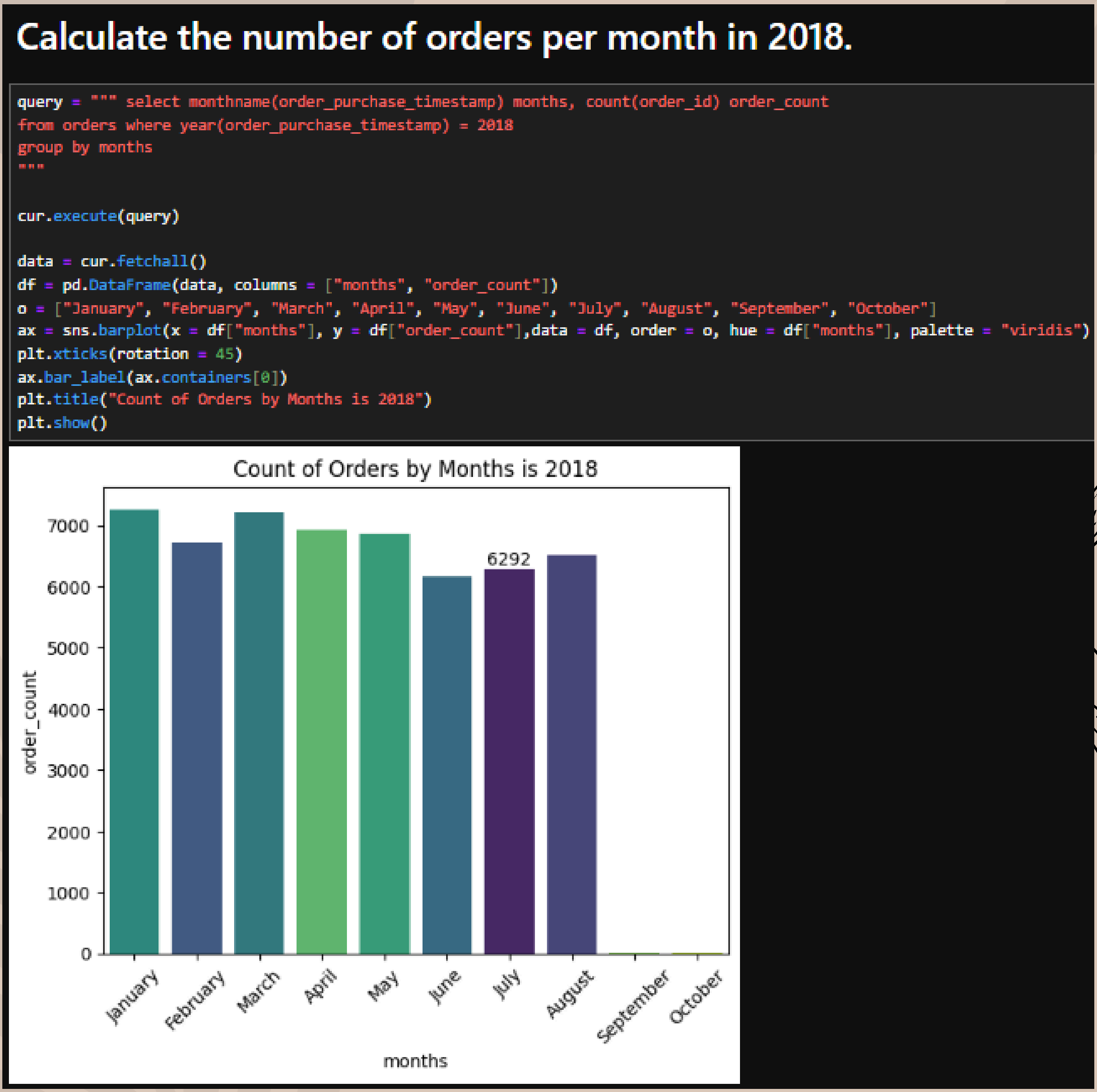
```
('The percentage of orders that were paid in installments is',
 Decimal('99.9981'))
```

Count the number of customers from each state.



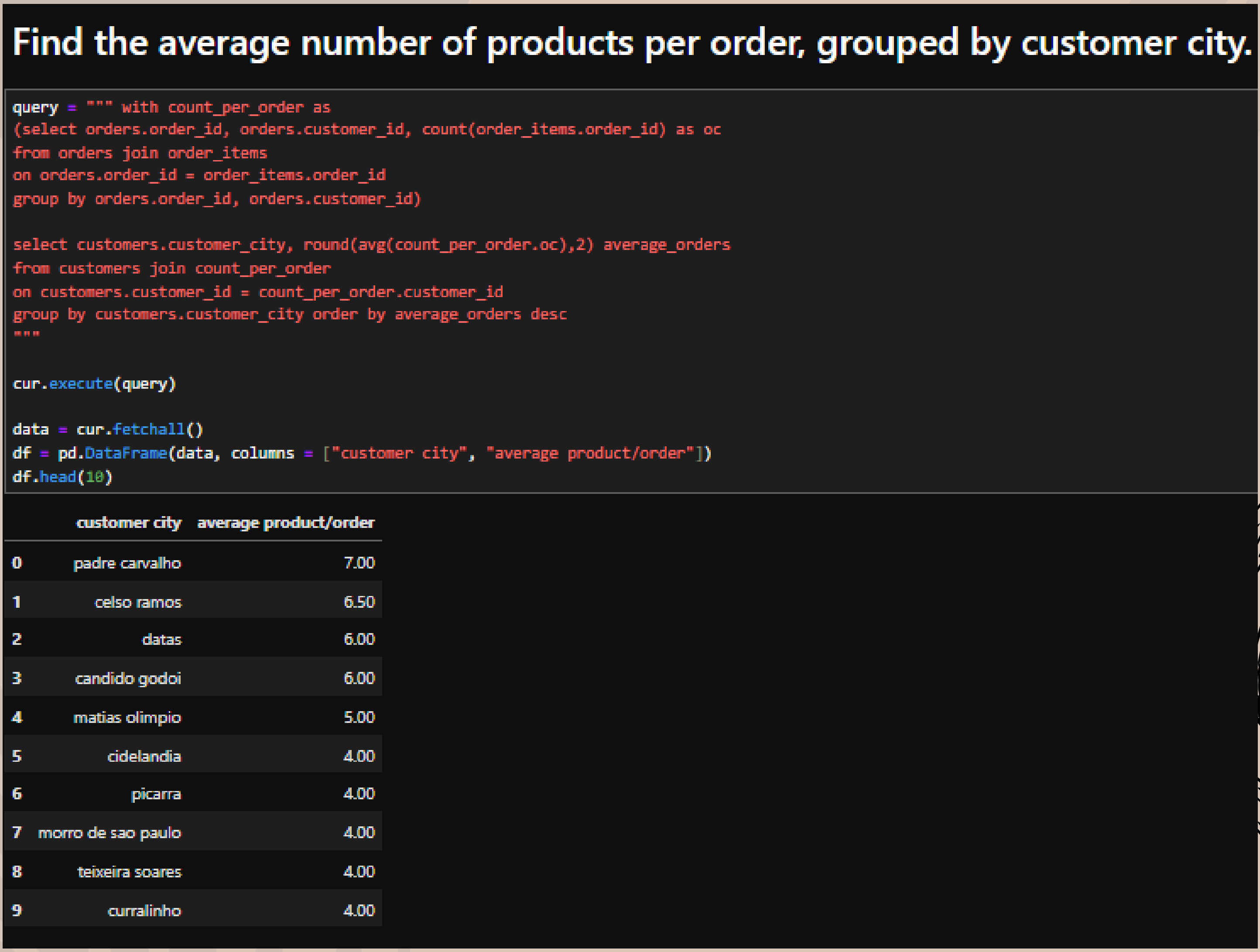
```
query = """ select customer_state ,count(customer_id)
from customers group by customer_state"""

cur.execute(query)

data = cur.fetchall()
df = pd.DataFrame(data, columns = ["state", "customer_count"  ])
df = df.sort_values(by = "customer_count", ascending = False)

plt.bar(df["state"], df["customer_count"], color = "Orange")
plt.xticks(rotation = 90)
plt.xlabel("states")
plt.ylabel("customer_count")
plt.title("Count of Customers by State")
plt.show()
```





Calculate the number of orders per month in 2018.

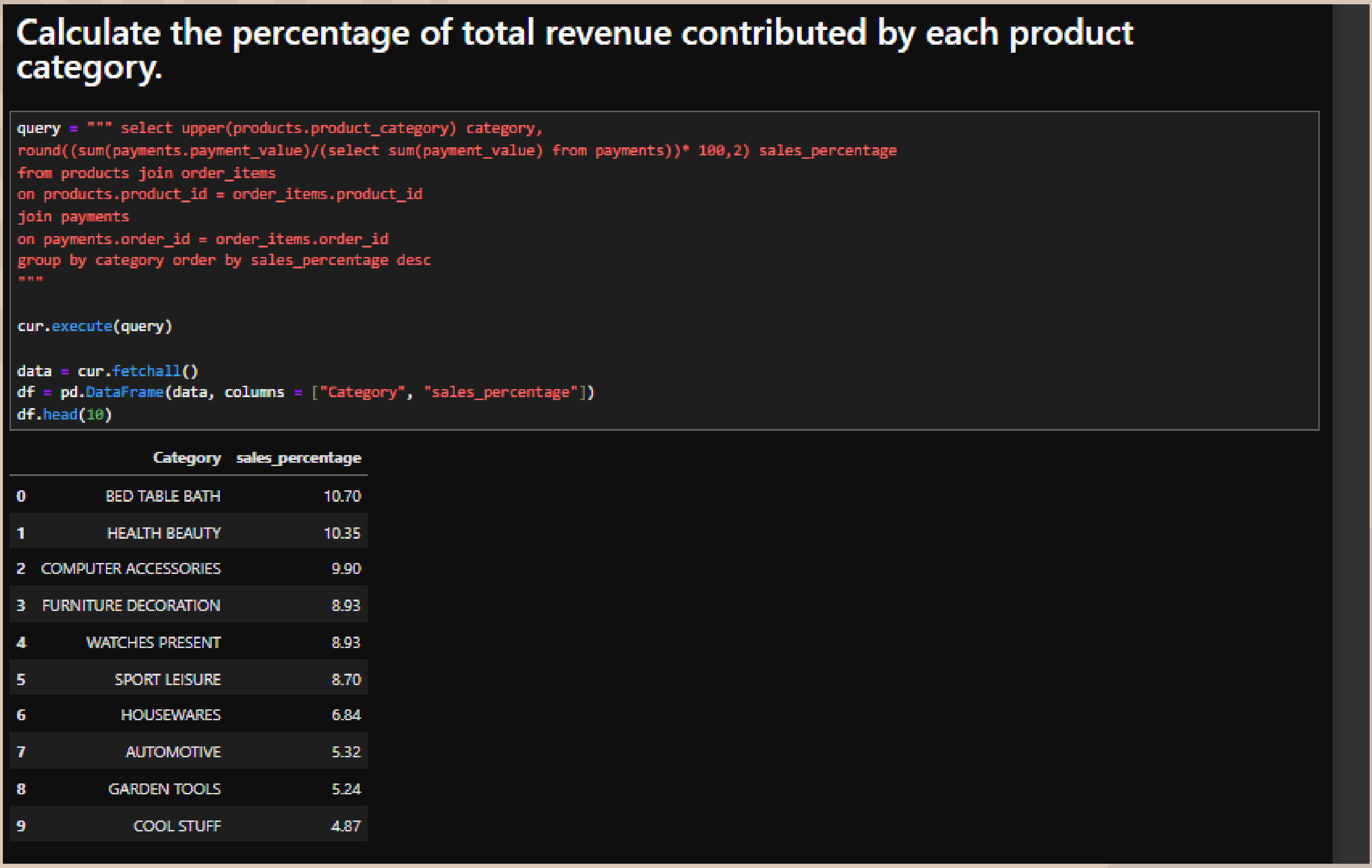
```
query = """ select monthname(order_purchase_timestamp) months, count(order_id) order_count
from orders where year(order_purchase_timestamp) = 2018
group by months
"""

cur.execute(query)

data = cur.fetchall()
df = pd.DataFrame(data, columns = ["months", "order_count"])
o = ["January", "February", "March", "April", "May", "June", "July", "August", "September", "October"]
ax = sns.barplot(x = df["months"], y = df["order_count"],data = df, order = o, hue = df["months"], palette = "viridis")
plt.xticks(rotation = 45)
ax.bar_label(ax.containers[0])
plt.title("Count of Orders by Months is 2018")
plt.show()
```



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

```
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 product/order"])
df.head(10)
```

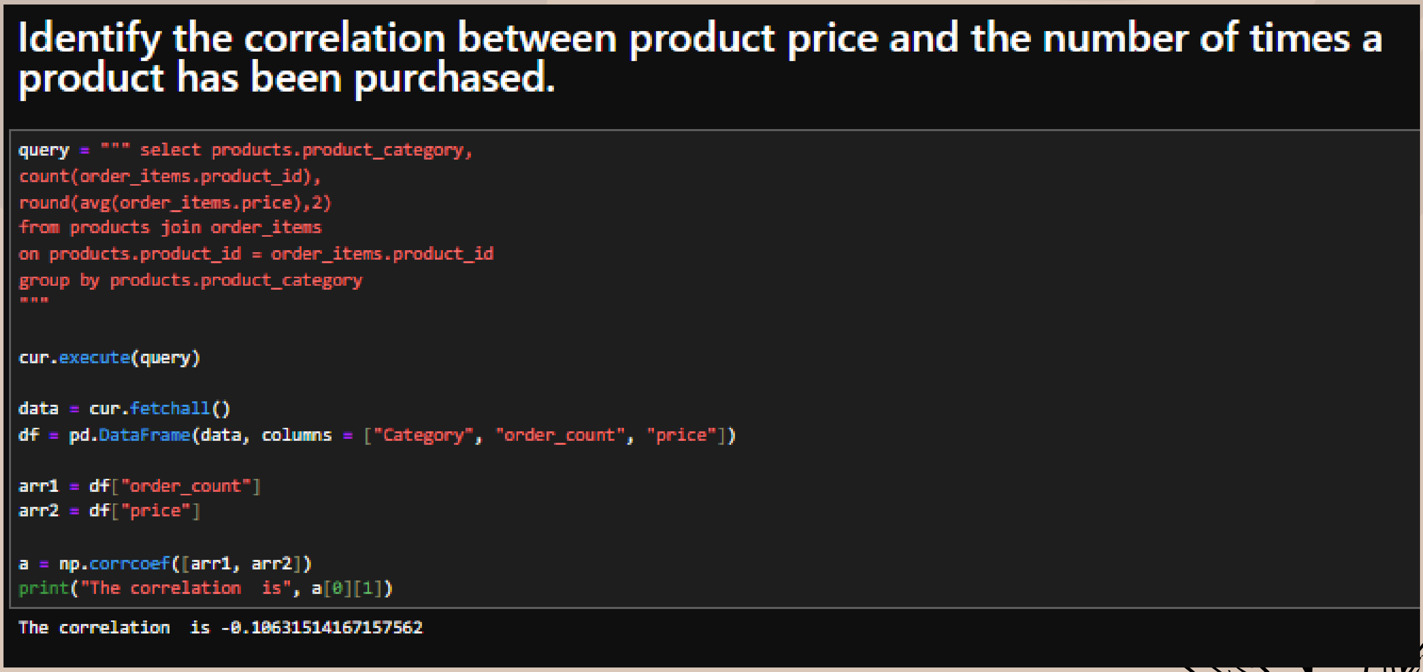
	customer city	average product/order
0	padre carvalho	7.00
1	celso ramos	6.50
2	datas	6.00
3	candido godoi	6.00
4	matias olimpio	5.00
5	cidelandia	4.00
6	picarra	4.00
7	morro de sao paulo	4.00
8	teixeira soares	4.00
9	curralinho	4.00



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

```
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", "sales_percentage"])
df.head(10)
```

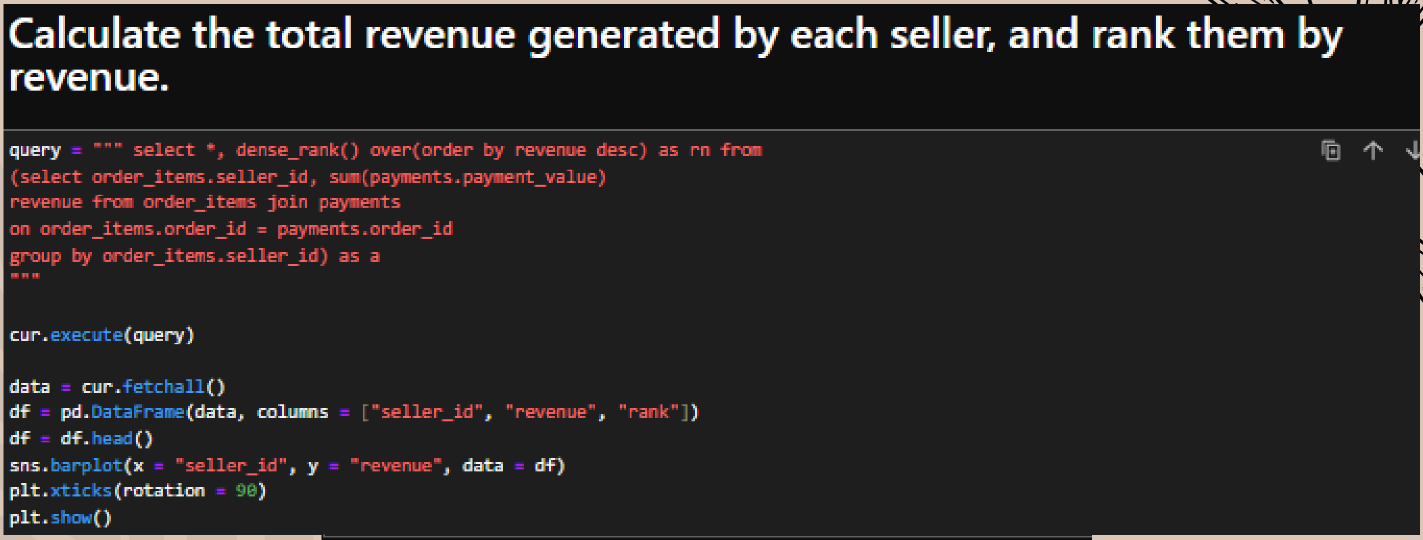
	Category	sales_percentage
0	BED TABLE BATH	10.70
1	HEALTH BEAUTY	10.35
2	COMPUTER ACCESSORIES	9.90
3	FURNITURE DECORATION	8.93
4	WATCHES PRESENT	8.93
5	SPORT LEISURE	8.70
6	HOUSEWARES	6.84
7	AUTOMOTIVE	5.32
8	GARDEN TOOLS	5.24
9	COOL STUFF	4.87



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

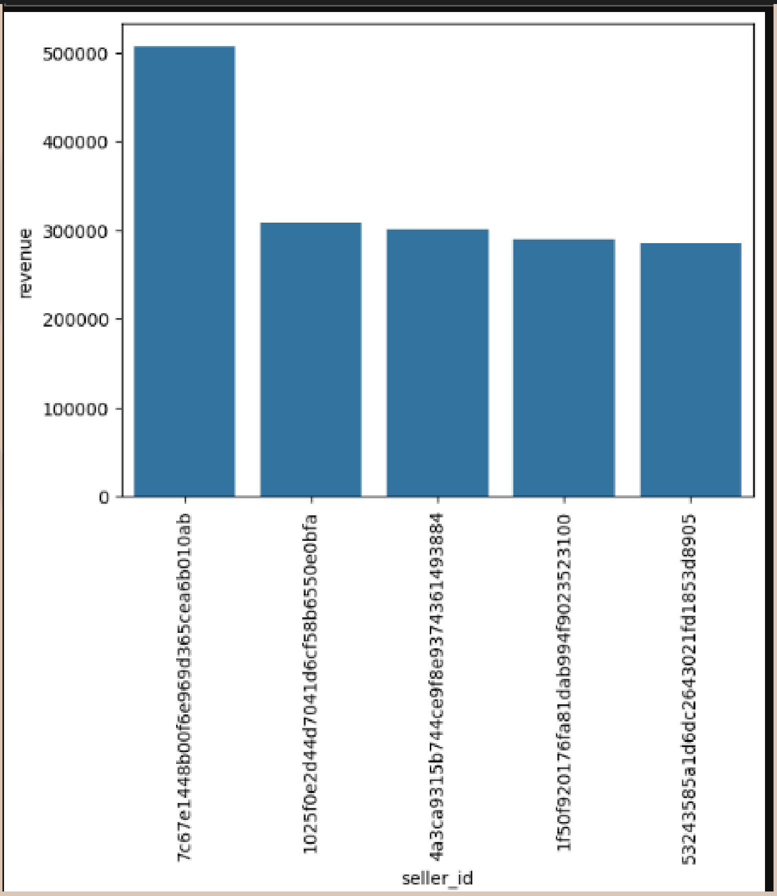
```
query = """ select products.product_category,
count(order_items.product_id),
round(avg(order_items.price),2)
from products join order_items
on products.product_id = order_items.product_id
group by products.product_category
"""

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 correlation  is", a[0][1])
```

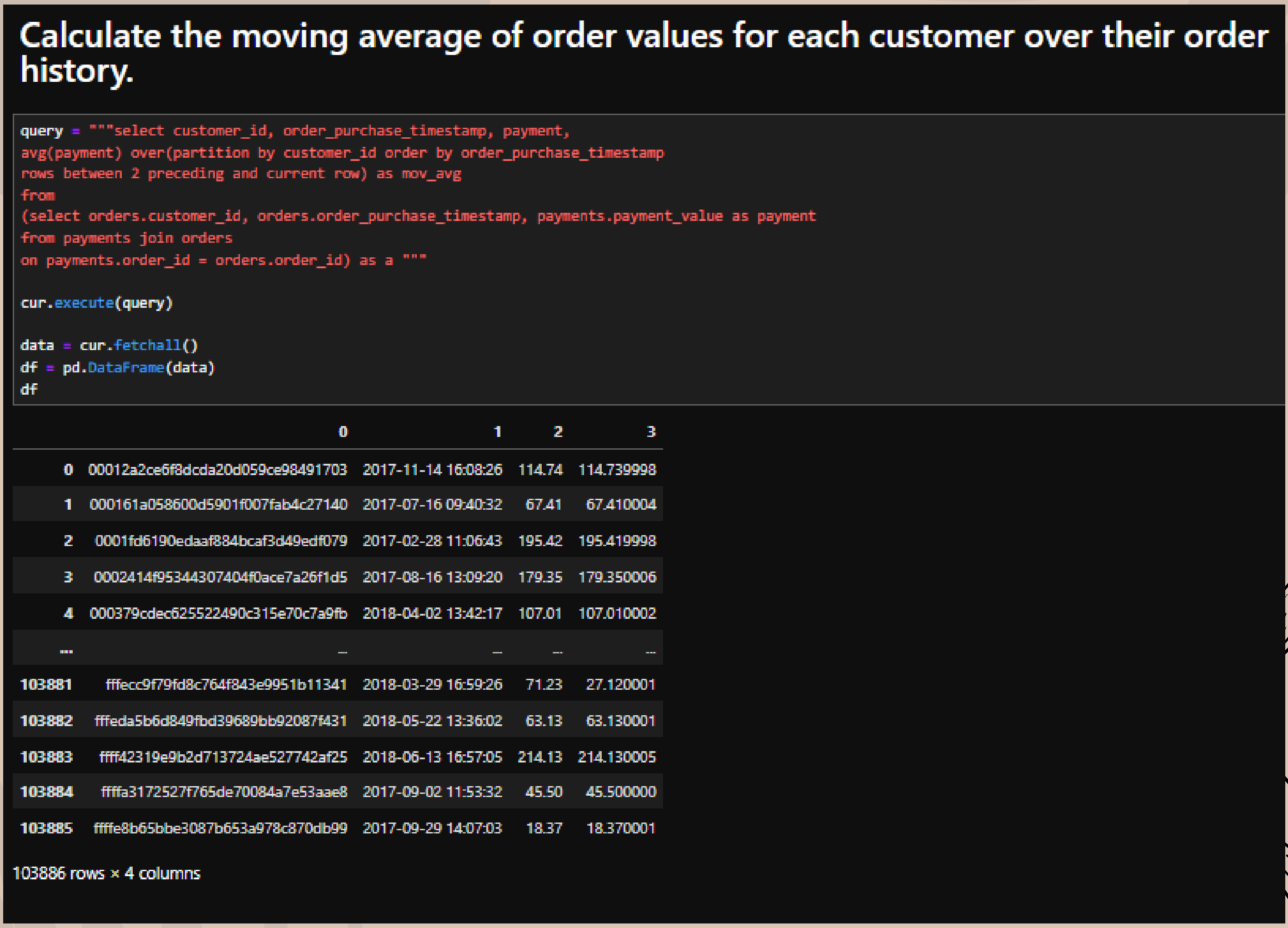
```
The correlation  is -0.10631514167157562
```



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

```
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()
sns.barplot(x = "seller_id", y = "revenue", data = df)
plt.xticks(rotation = 90)
plt.show()
```



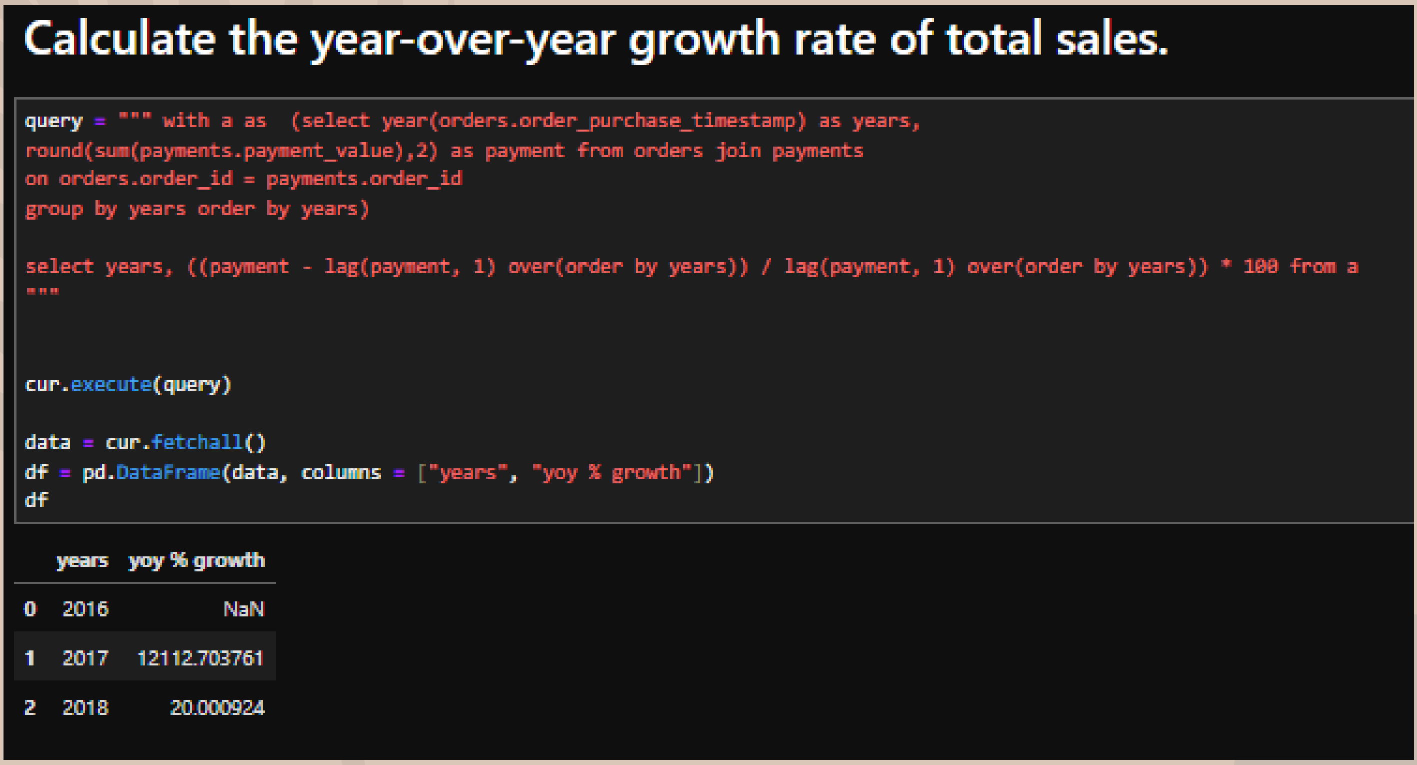


Calculate the moving average of order values for each customer over their order history.

```
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)
df
```

	0	1	2	3
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

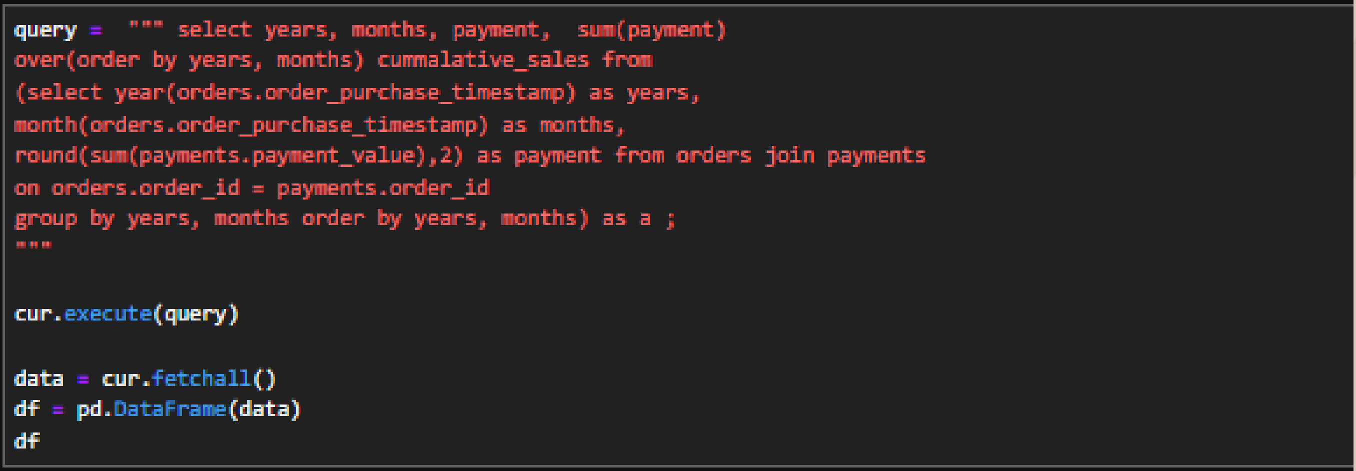


Calculate the year-over-year growth rate of total sales.

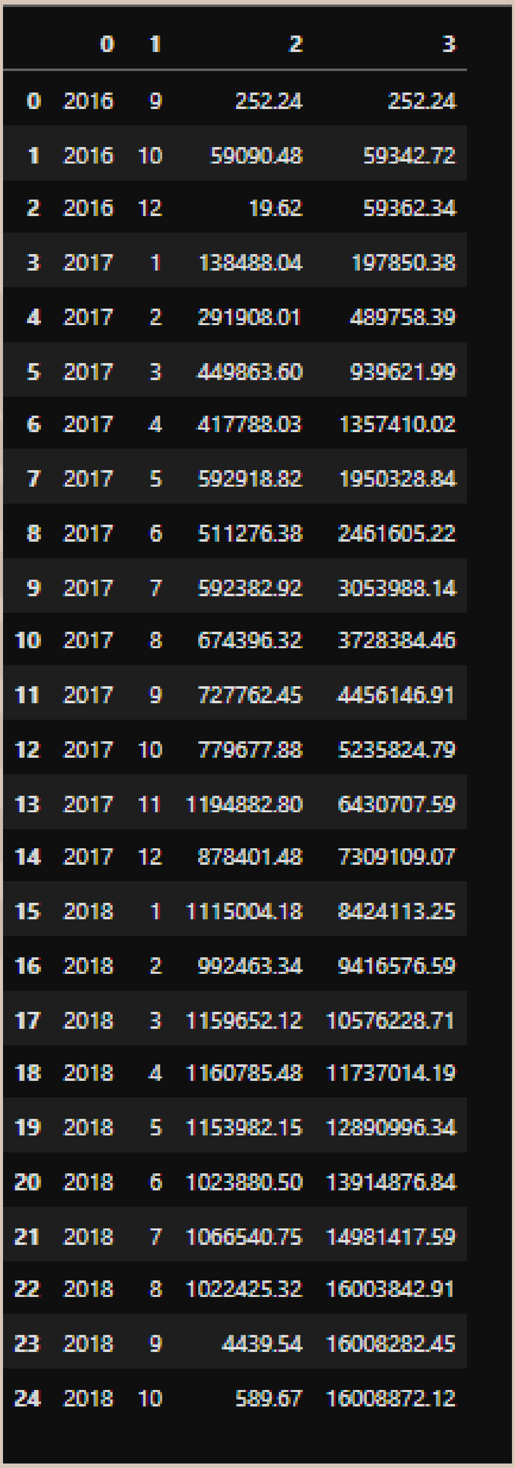
```
query = """ with a as  (select year(orders.order_purchase_timestamp) as years,
round(sum(payments.payment_value),2) as payment from orders join payments
on orders.order_id = payments.order_id
group by years order by years)

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 % growth"])
df
```

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

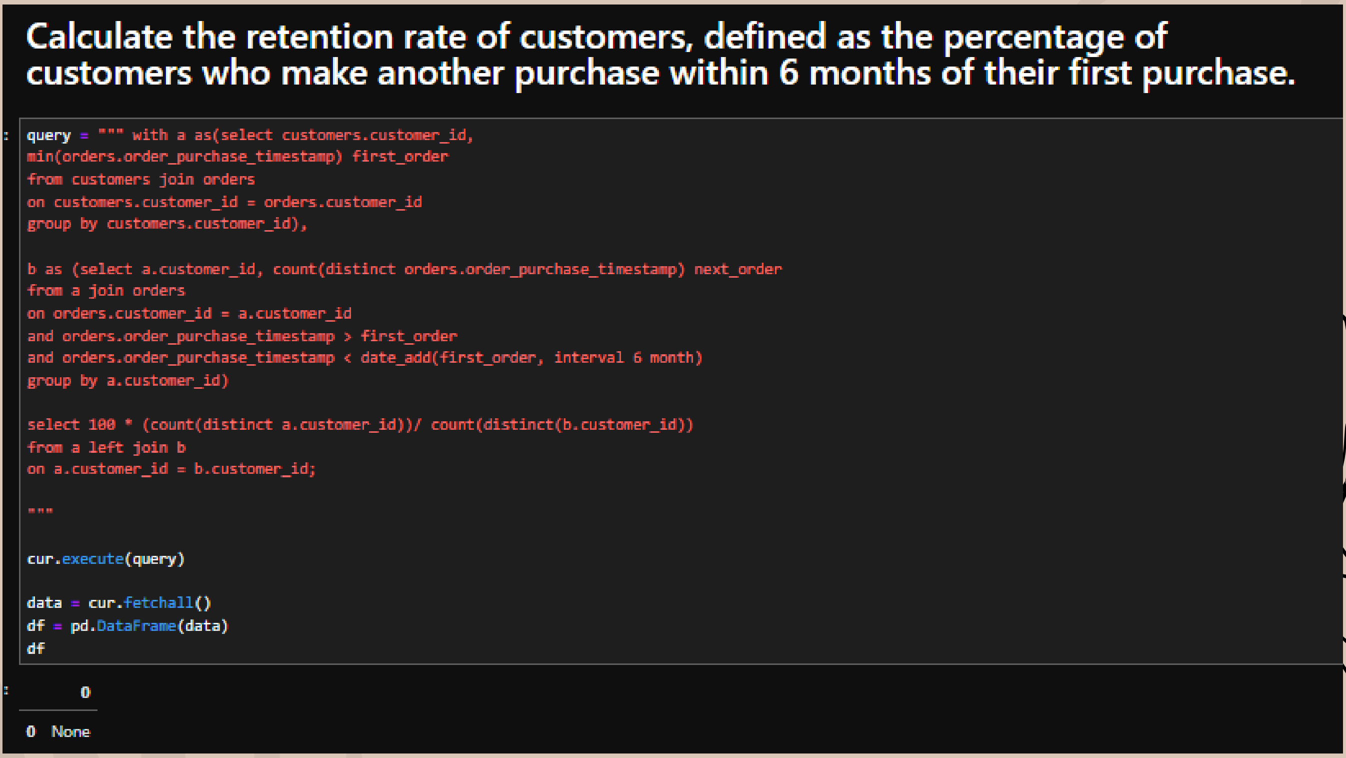
Calculate the cumulative sales per month for each year.



```
query =  """ select years, months, payment,  sum(payment)
over(order by years, months) cummalative_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)
df
```



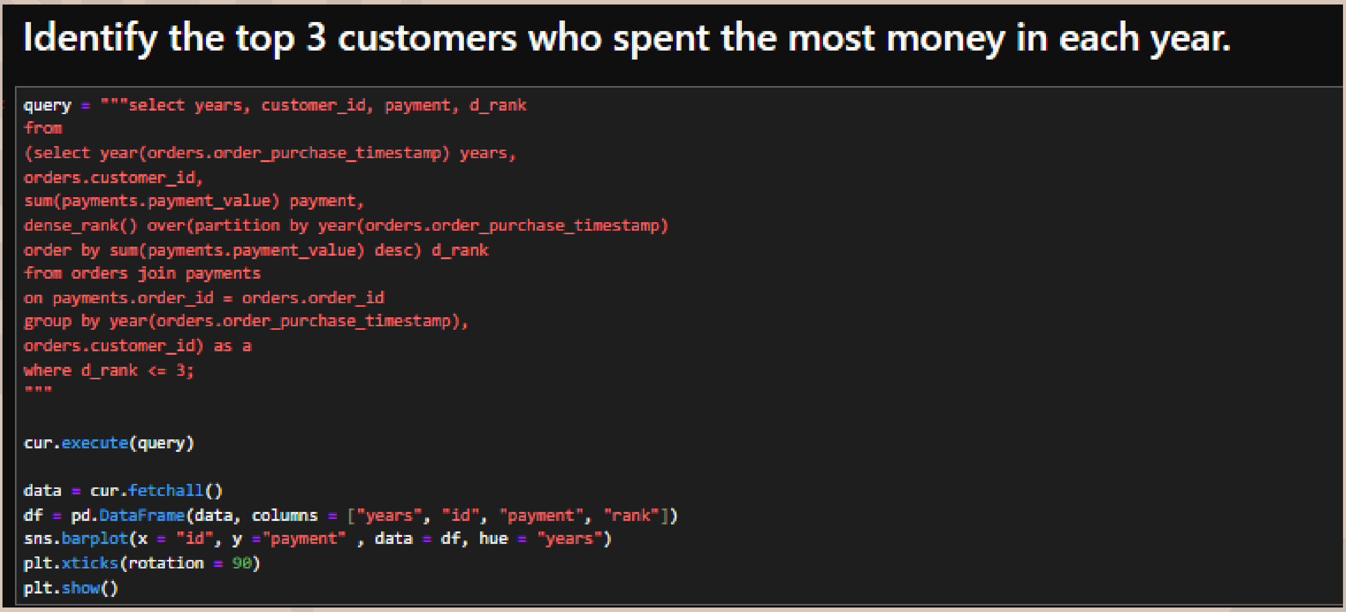
	0	1	2	3
0	2016	9	252.24	252.24
1	2016	10	59090.48	59342.72
2	2016	12	19.62	59362.34
3	2017	1	138488.04	197850.38
4	2017	2	291908.01	489758.39
5	2017	3	449863.60	939621.99
6	2017	4	417788.03	1357410.02
7	2017	5	592918.82	1950328.84
8	2017	6	511276.38	2461605.22
9	2017	7	592382.92	3053988.14
10	2017	8	674396.32	3728384.46
11	2017	9	727762.45	4456146.91
12	2017	10	779677.88	5235824.79
13	2017	11	1194882.80	6430707.59
14	2017	12	878401.48	7309109.07
15	2018	1	1115004.18	8424113.25
16	2018	2	992463.34	9416576.59
17	2018	3	1159652.12	10576228.71
18	2018	4	1160785.48	11737014.19
19	2018	5	1153982.15	12890996.34
20	2018	6	1023880.50	13914876.84
21	2018	7	1066540.75	14981417.59
22	2018	8	1022425.32	16003842.91
23	2018	9	4439.54	16008282.45
24	2018	10	589.67	16008872.12



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

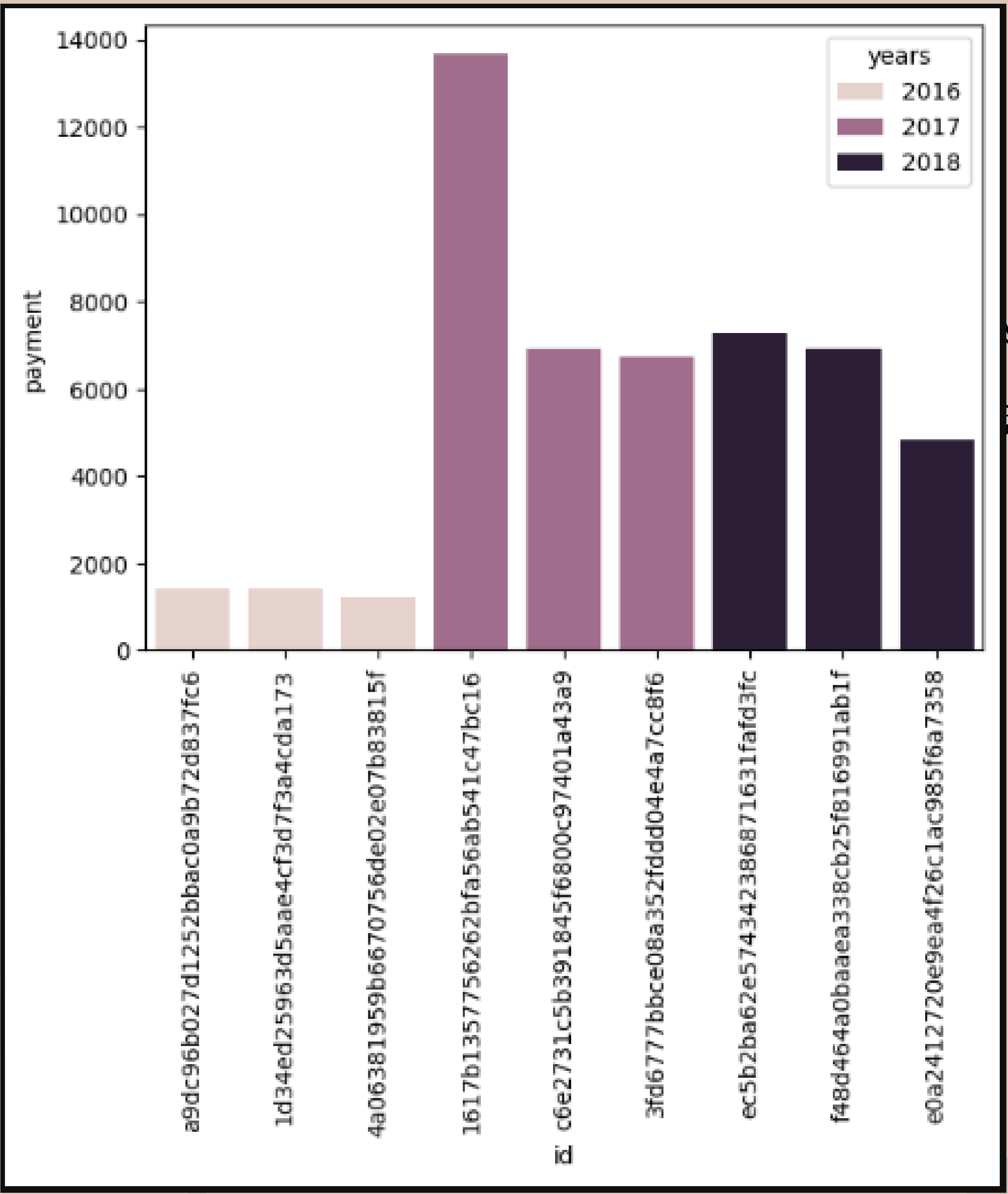
```
query = """ with a as(select customers.customer_id,
min(orders.order_purchase_timestamp) first_order
from customers join orders
on customers.customer_id = orders.customer_id
group by customers.customer_id),

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()
df = pd.DataFrame(data)
df
```

```
      0
0  None
```



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

```
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(orders.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 = ["years", "id", "payment", "rank"])
sns.barplot(x = "id", y ="payment" , data = df, hue = "years")
plt.xticks(rotation = 90)
plt.show()
```



years
2016
2017
2018
payment
14000
12000
10000
8000
6000
4000
2000
0
a9dc96b027d1252bbac0a9b72d837fc6
1d34ed25963d5aae4cf3d7f3a4cda173
4a06381959b6670756de02e07b83815f
1617b1357756262bfa56ab541c47bc16
c6e2731c5b391845f6800c97401a43a9
3fd6777bbce08a352fddd04e4a7cc8f6
ec5b2ba62e574342386871631fafd3fc
f48d464a0baaea338cb25f816991ab1f
e0a24127720e9ea4f26c1ac985f6a7358
id

Thank You