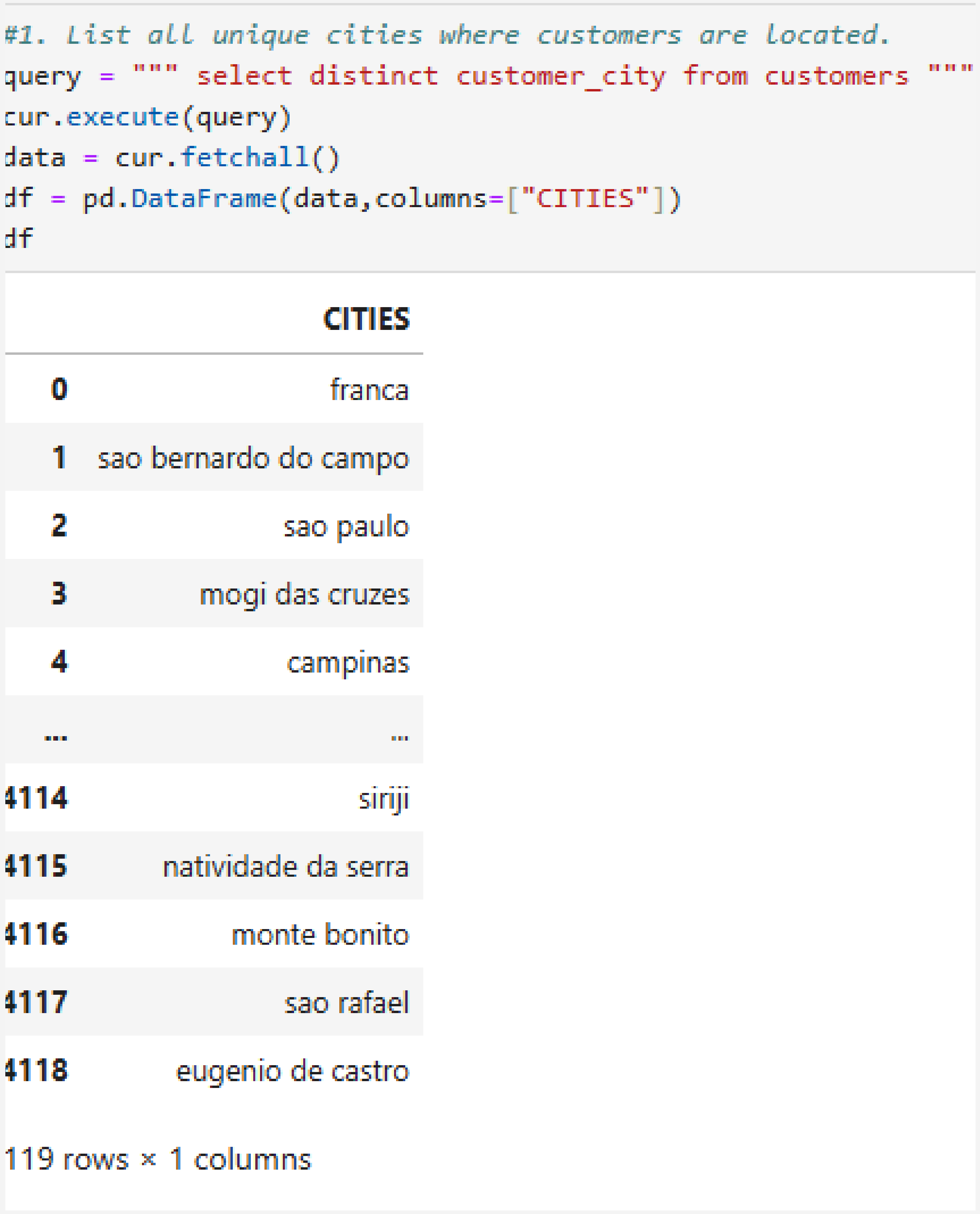
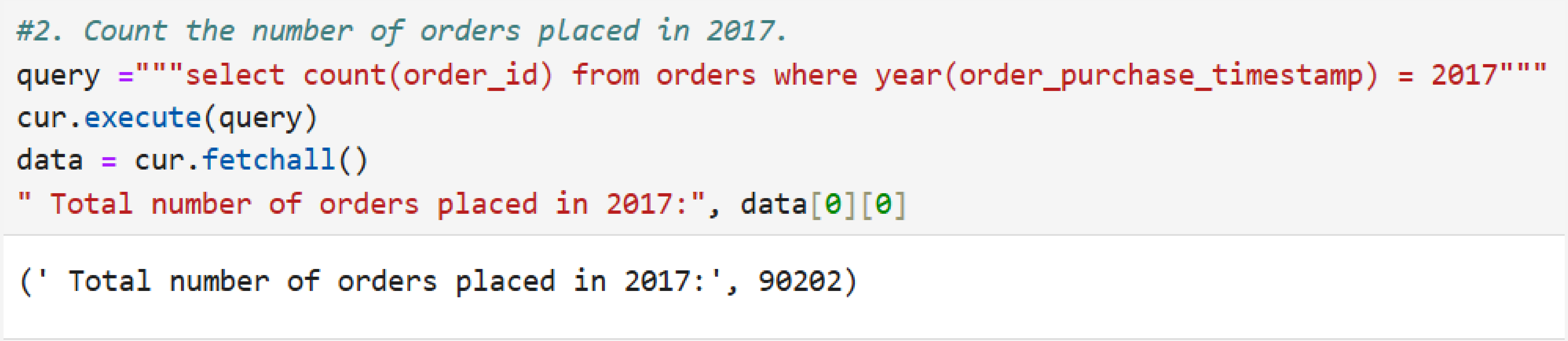


```python
#1. List all unique cities where customers are located.
query = """ select distinct customer_city from customers """
cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data,columns=["CITIES"])
df
```

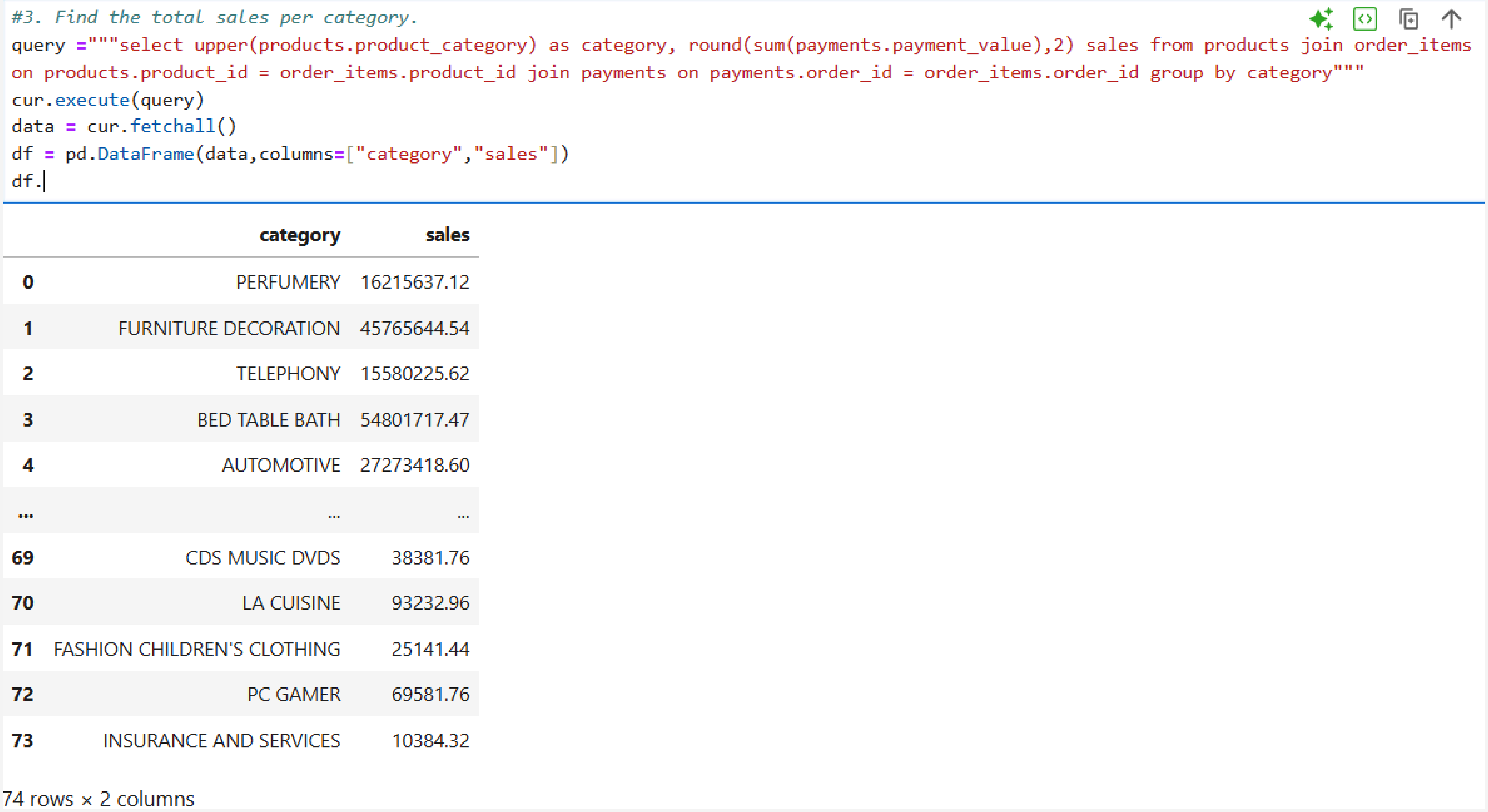
	CITIES
0	franca
1	sao bernardo do campo
2	sao paulo
3	mogi das cruzes
4	campinas
...	...
4114	siriji
4115	natividade da serra
4116	monte bonito
4117	sao rafael
4118	eugenio de castro

119 rows × 1 columns



```python
#2. 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 number of orders placed in 2017:", data[0][0]
```

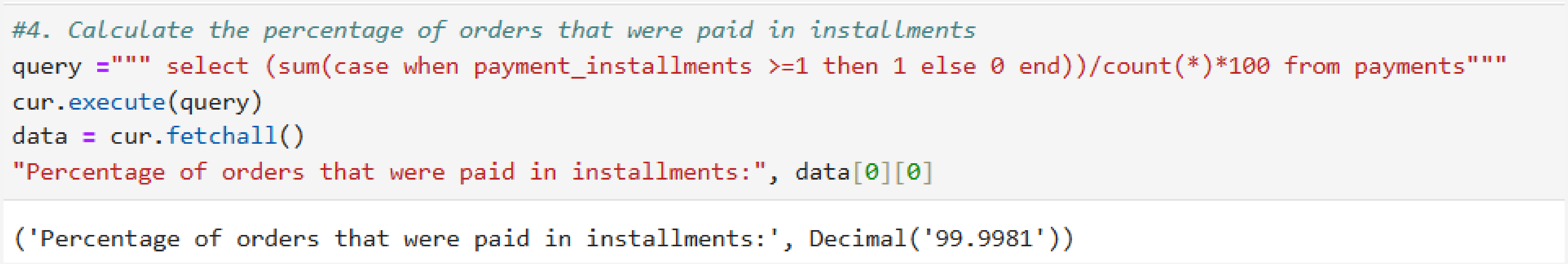
```
(' Total number of orders placed in 2017:', 90202)
```



```
#3. Find the total sales per category.
query ="""select upper(products.product_category) as 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	16215637.12
1	FURNITURE DECORATION	45765644.54
2	TELEPHONY	15580225.62
3	BED TABLE BATH	54801717.47
4	AUTOMOTIVE	27273418.60
...	...	...
69	CDS MUSIC DVDS	38381.76
70	LA CUISINE	93232.96
71	FASHION CHILDREN'S CLOTHING	25141.44
72	PC GAMER	69581.76
73	INSURANCE AND SERVICES	10384.32

74 rows × 2 columns

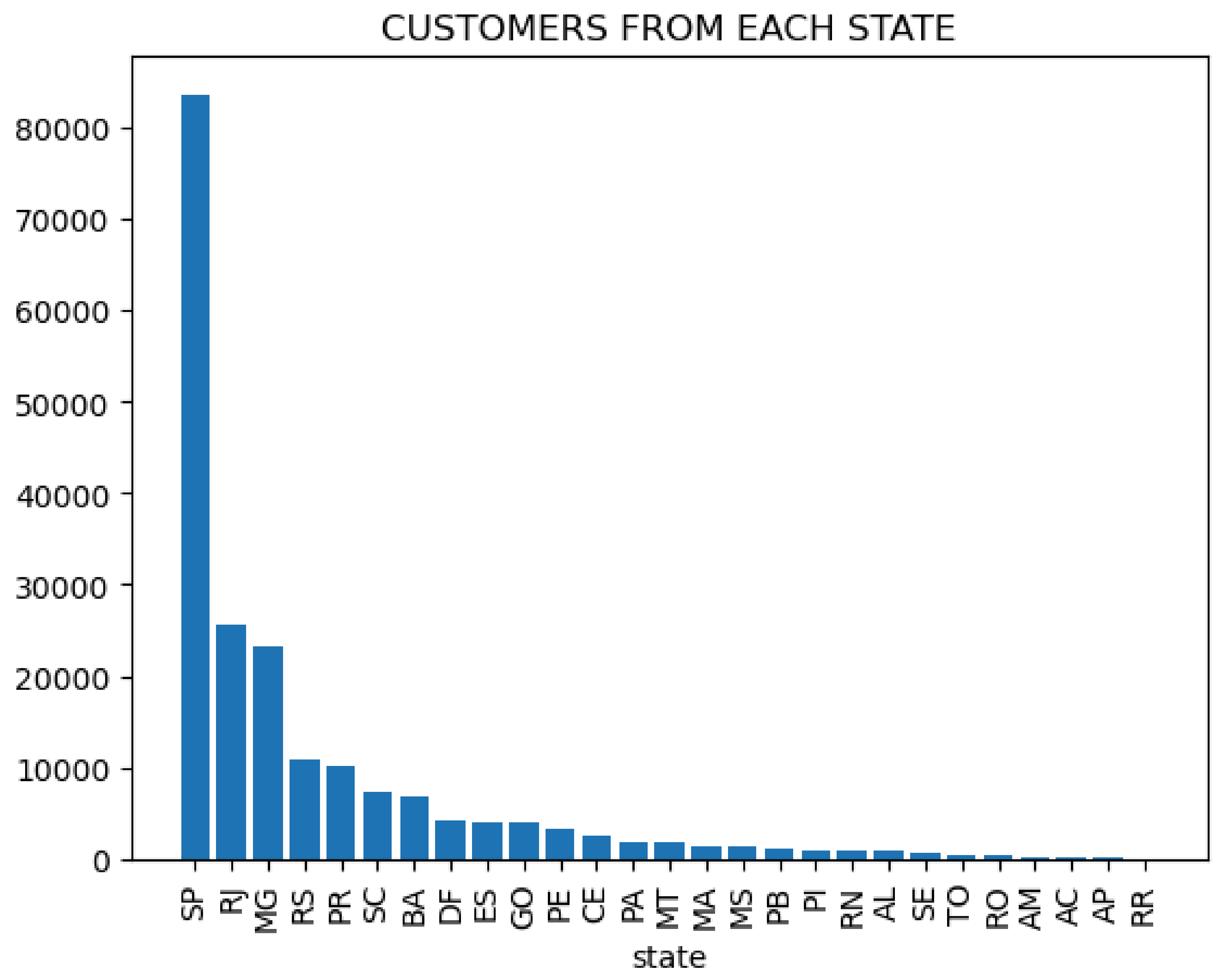


```python
#4. Calculate the percentage of orders that were paid in installments
query =""" select (sum(case when payment_installments >=1 then 1 else 0 end))/count(*)*100 from payments"""
cur.execute(query)
data = cur.fetchall()
"Percentage of orders that were paid in installments:", data[0][0]
```

```
('Percentage of orders that were paid in installments:', Decimal('99.9981'))
```

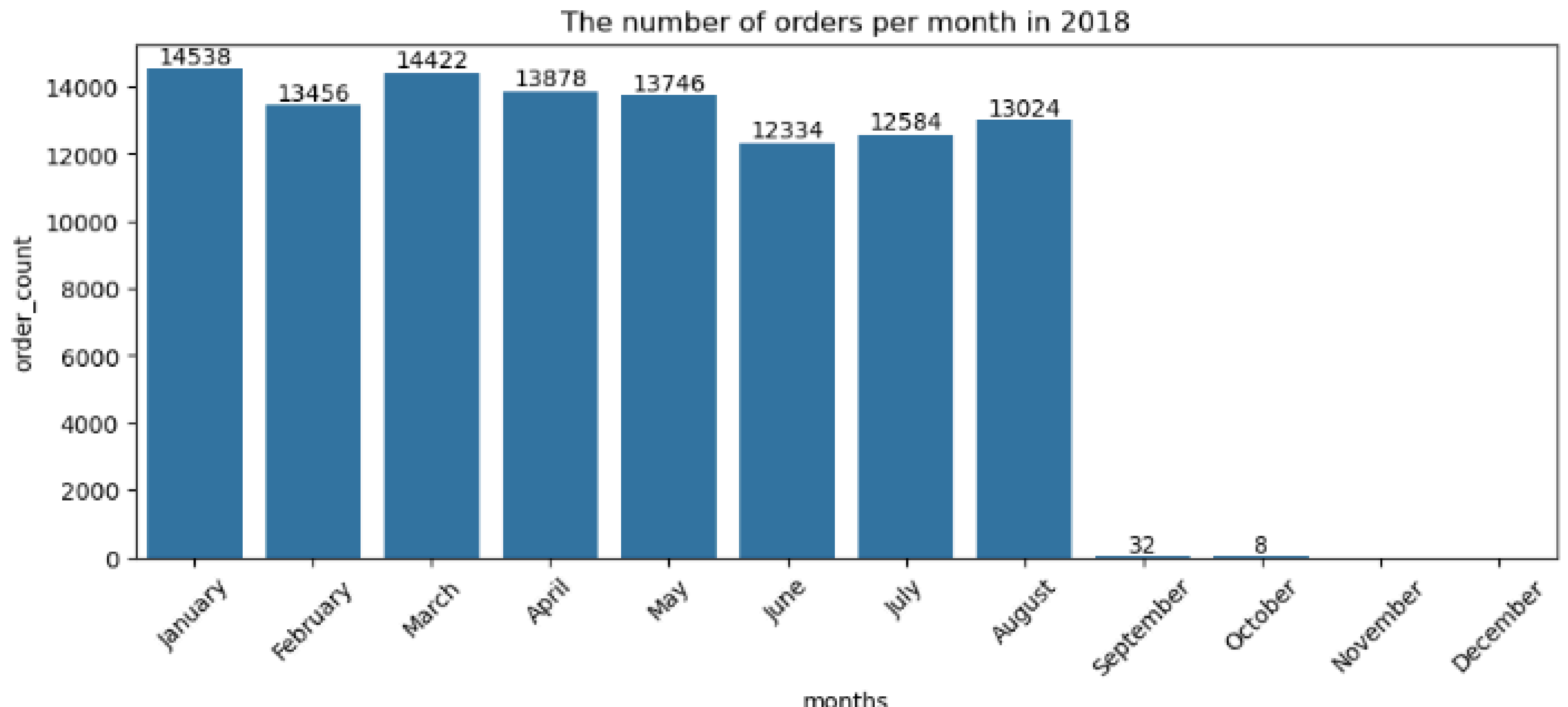
```
#5. Count the number of customers from each state.
query ="""select customer_state,count(customer_id) from customers group by customer_State"""
cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data, columns = ["state","customer_count"])
df = df.sort_values(by="customer_count",ascending = False)
plt.bar(df["state"],df["customer_count"])
plt.title("CUSTOMERS FROM EACH STATE")
plt.xlabel("state")
plt.xticks(rotation = 90)
plt.figure(figsize =(9,10))
plt.show
```

```
<function matplotlib.pyplot.show(close=None, block=None)>
```



```
#6. Calculate the number of orders per month in 2018.
query = """ SELECT MONTHNAME(order_purchase_timestamp) AS months,
       COUNT(order_id) AS `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", "November", "December"
]
plt.figure(figsize =(11,4))
ax = sns.barplot(x= df["months"],y= df["order_count"], data = df, order = o)
plt.xticks(rotation = 45)
ax.bar_label(ax.containers[0])
plt.title("The number of orders per month in 2018")
plt.show
```

```
<function matplotlib.pyplot.show(close=None, block=None)>
```



```
#7.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) AS average_orders
FROM customers
JOIN count_per_order
    ON customers.customer_id = count_per_order.customer_id
GROUP BY customers.customer_city;"""


cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data,columns=["city","average order"])
df.head()
```

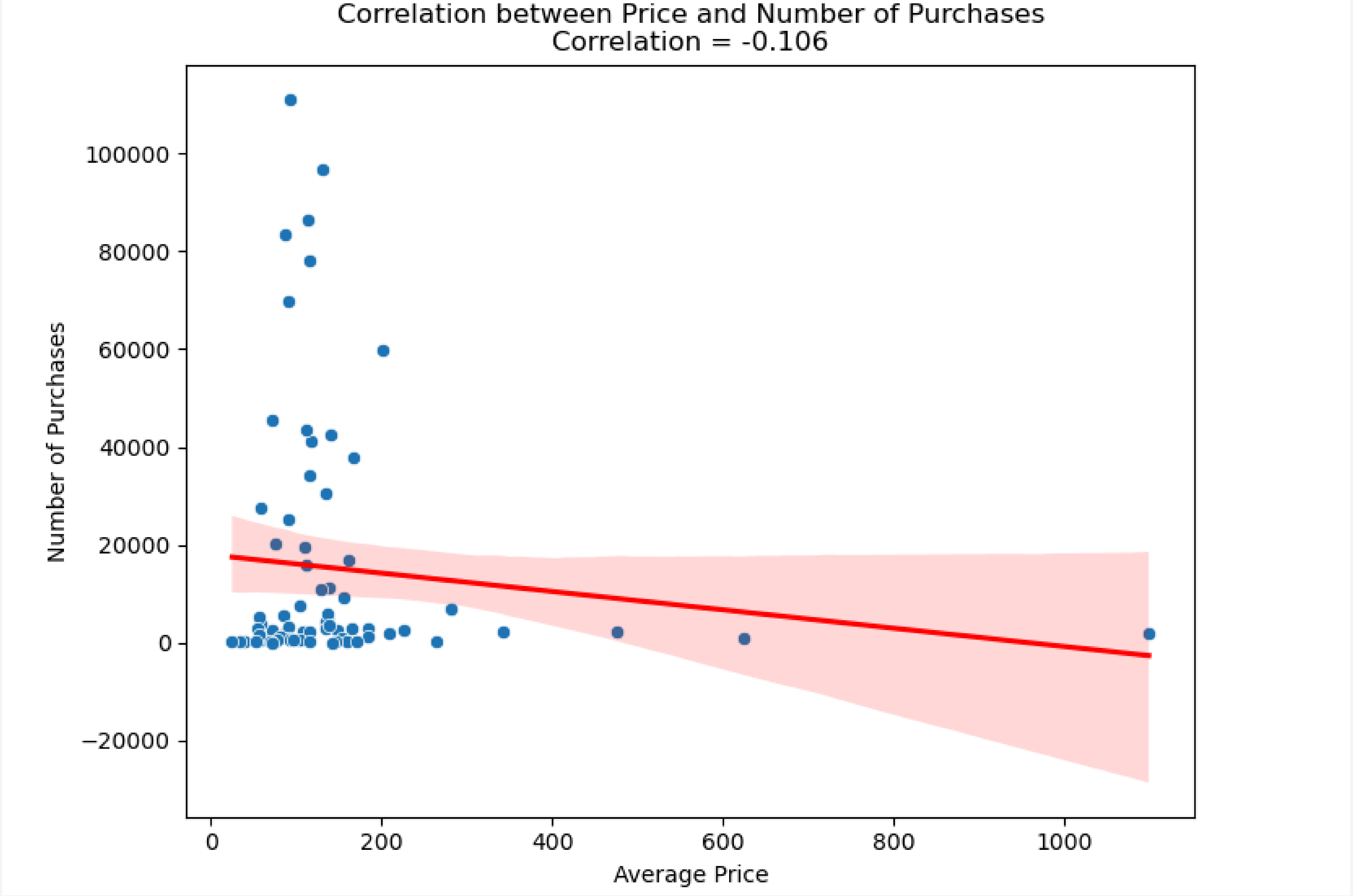
	city	average order
0	sao paulo	11.56
1	sao jose dos campos	11.38
2	porto alegre	11.75
3	indaial	11.15
4	treze tilias	12.73

```python
#Calculate the percentage of total revenue contributed by each product category.
query = """SELECT
    UPPER(products.product_category) AS category,
    ROUND((SUM(payments.payment_value)/(SELECT SUM(payment_value) FROM payments))*100, 2) AS 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"])
df.head()
```

	category	percentage
0	BED TABLE BATH	106.98
1	HEALTH BEAUTY	103.53
2	COMPUTER ACCESSORIES	99.03
3	FURNITURE DECORATION	89.34
4	WATCHES PRESENT	89.28

```python
#9. 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) AS total_products, ROUND(AVG(order_items.price), 2) AS average_price
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=["product_category","total_products","average_price"])
array1 = df["total_products"]
array2 = df["average_price"]
a = np.corrcoef([array1,array2])
print(f"THE CORRELATION BETWEEN NUMBER OF PRICE AND the number of times a product has been purchased IS {a[0][1]}")
plt.figure(figsize=(8,6))
sns.scatterplot(x='average_price', y='total_products', data=df)
sns.regplot(x='average_price', y='total_products', data=df, scatter=False, color='red')
plt.title(f'Correlation between Price and Number of Purchases\nCorrelation = {a[0][1]:.3f}')
plt.xlabel('Average Price')
plt.ylabel('Number of Purchases')
plt.show()
```

```
THE CORRELATION BETWEEN NUMBER OF PRICE AND the number of times a product has been purchased IS -0.10631514167157564
```

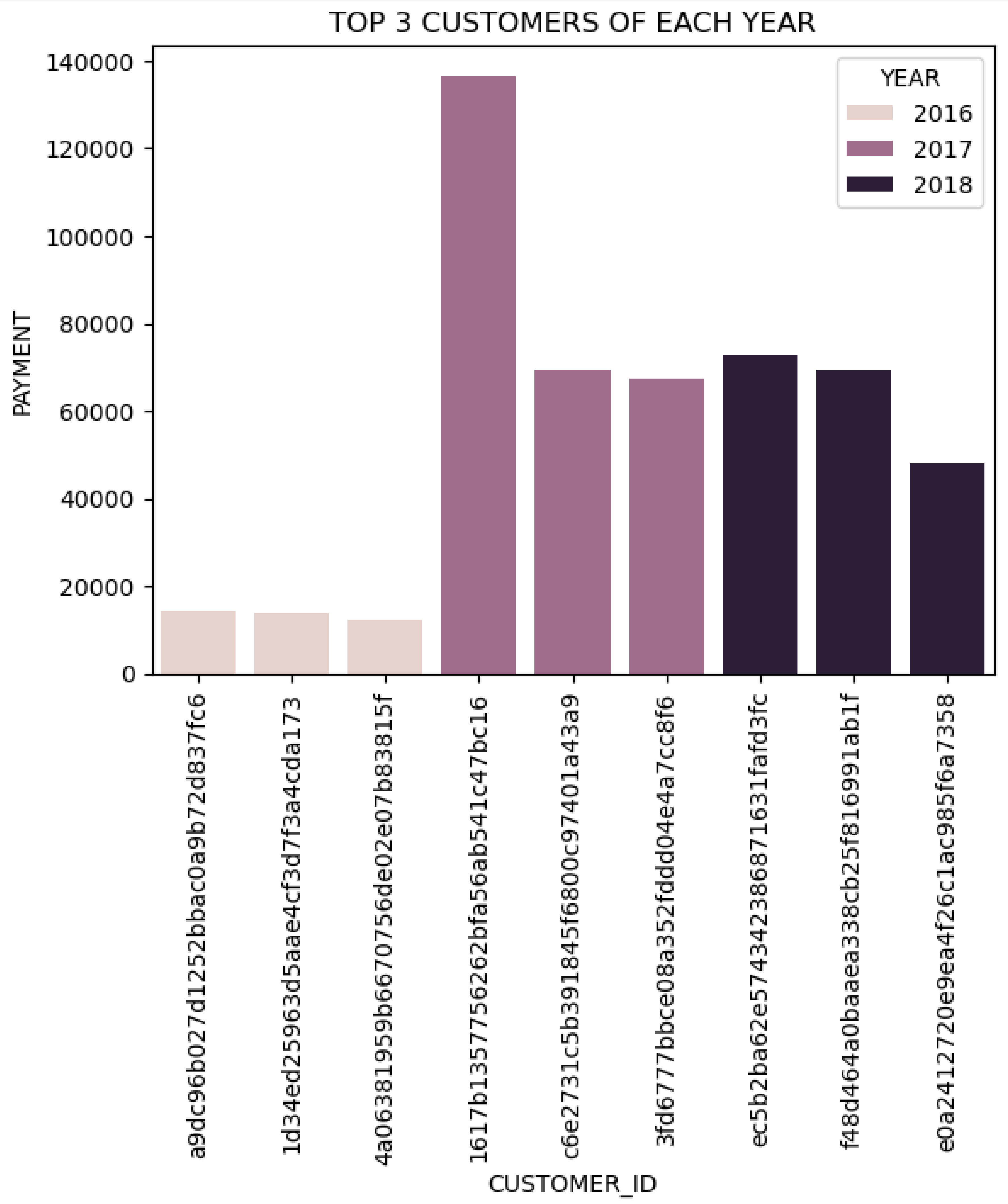

Correlation between Price and Number of Purchases
Correlation = -0.106
Number of Purchases
Average Price
100000
80000
60000
40000
20000
0
−20000
0
200
400
600
800
1000

```python
#10.Calculate the total revenue generated by each seller, and rank them by revenue.

query =  """select * , dense_rank() over (order by revenue desc) as rnk from (select order_items.seller_id,
round(sum(payments.payment_value),2) 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
```

	seller_id	revenue	Rank
0	7c67e1448b00f6e969d365cea6b010ab	12679172.68	1
1	1025f0e2d44d7041d6cf58b6550e0bfa	7705551.00	2
2	4a3ca9315b744ce9f8e9374361493884	7531131.74	3
3	1f50f920176fa81dab994f9023523100	7256335.50	4
4	53243585a1d6dc2643021fd1853d8905	7122577.01	5
...	...	...	...
3090	ad14615bdd492b01b0d97922e87cb87f	480.25	3076
3091	702835e4b785b67a084280efca355756	464.00	3077
3092	4965a7002cca77301c82d3f91b82e1a9	409.00	3078
3093	77128dec4bec4878c37ab7d6169d6f26	380.50	3079
3094	cf6f6bc4df3999b9c6440f124fb2f687	305.50	3080

3095 rows × 3 columns

```
#11. Identify the top 3 customers who spent the most money in each year.
query = """Select year,customer_id, payment,rnk from
(SELECT year(orders.order_purchase_timestamp) year ,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) rnk
from orders
join payments on orders.order_id = payments.order_id
group by year(orders.order_purchase_timestamp),orders.customer_id) as a
where rnk <=3"""
cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data,columns=["YEAR","CUSTOMER_ID","PAYMENT","RANK"])
sns.barplot(y= "PAYMENT", x= "CUSTOMER_ID",hue = "YEAR",data = df)
plt.xticks(rotation = 90)
plt.title("TOP 3 CUSTOMERS OF EACH YEAR")
plt.show()
```


TOP 3 CUSTOMERS OF EACH YEAR
PAYMENT
0
20000
40000
60000
80000
100000
120000
140000
YEAR
2016
2017
2018
a9dc96b027d1252bbac0a9b72d837fc6
1d34ed25963d5aae4cf3d7f3a4cda173
4a06381959b6670756de02e07b83815f
1617b1357756262bfa56ab541c47bc16
c6e2731c5b391845f6800c97401a43a9
3fd6777bbce08a352fddd04e4a7cc8f6
ec5b2ba62e574342386871631fafd3fc
f48d464a0baaea338cb25f816991ab1f
e0a2412720e9ea4f26c1ac985f6a7358
CUSTOMER_ID