In [73]:
```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', 'geolocations'),  # Corrected the filename here
    ('payments.csv', 'payments'),
    ('order_items.csv', 'order_items')
]

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

# Folder containing the CSV files (use raw string or forward slashes)
folder_path = r"C:\Users\seshi\OneDrive\Desktop\Target Sales"  # Option 1: Raw string
# OR
# folder_path = "C:/Users/seshi/OneDrive/Desktop/Target Sales"  # Option 2: Forward sl

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)

    # Debugging: Check the file path
    print(f"Loading file from: {file_path}")

    # 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)

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

    # Generate the CREATE TABLE statement with appropriate data types
    columns = ', '.join([f'`{col}` {get_sql_type(df[col].dtype)}' for col in df.columr
    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():
        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.
        cursor.execute(sql, values)

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

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

```
Loading file from: C:\Users\seshi\OneDrive\Desktop\Target Sales\customers.csv
Loading file from: C:\Users\seshi\OneDrive\Desktop\Target Sales\orders.csv
Loading file from: C:\Users\seshi\OneDrive\Desktop\Target Sales\sellers.csv
Loading file from: C:\Users\seshi\OneDrive\Desktop\Target Sales\products.csv
Loading file from: C:\Users\seshi\OneDrive\Desktop\Target Sales\geolocation.csv
Loading file from: C:\Users\seshi\OneDrive\Desktop\Target Sales\payments.csv
Loading file from: C:\Users\seshi\OneDrive\Desktop\Target Sales\order_items.csv
```

In [74]:

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


db = mysql.connector.connect(host = "localhost",
                            username = "root",
                            password = "root",
                            database = "target")

cur = db.cursor()
```

List all unique cities where customers are located.

In [75]:

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

cur.execute(query)

data = cur.fetchall()

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

Out[75]:

	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

In [76]:
```
query = """ select count(order_id) from orders where year(order_purchase_timestamp) =

cur.execute(query)

data = cur.fetchall()

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

Out[76]:
```
('total orders placed in 2017 are', 180404)
```

Find the total sales per category

In [77]:
```
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[77]:

	Category	Sales
0	PERFUMERY	8107818.56
1	FURNITURE DECORATION	22882822.27
2	TELEPHONY	7790112.81
3	BED TABLE BATH	27400858.74
4	AUTOMOTIVE	13636709.30
...	...	...
69	CDS MUSIC DVDS	19190.88
70	LA CUISINE	46616.48
71	FASHION CHILDREN'S CLOTHING	12570.72
72	PC GAMER	34790.88
73	INSURANCE AND SERVICES	5192.16

74 rows × 2 columns

Calculate the percentage of orders that were paid in installments

In [78]:
```
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[78]:
```
('the percentage of orders that were paid in installments is',
 Decimal('99.9981'))
```

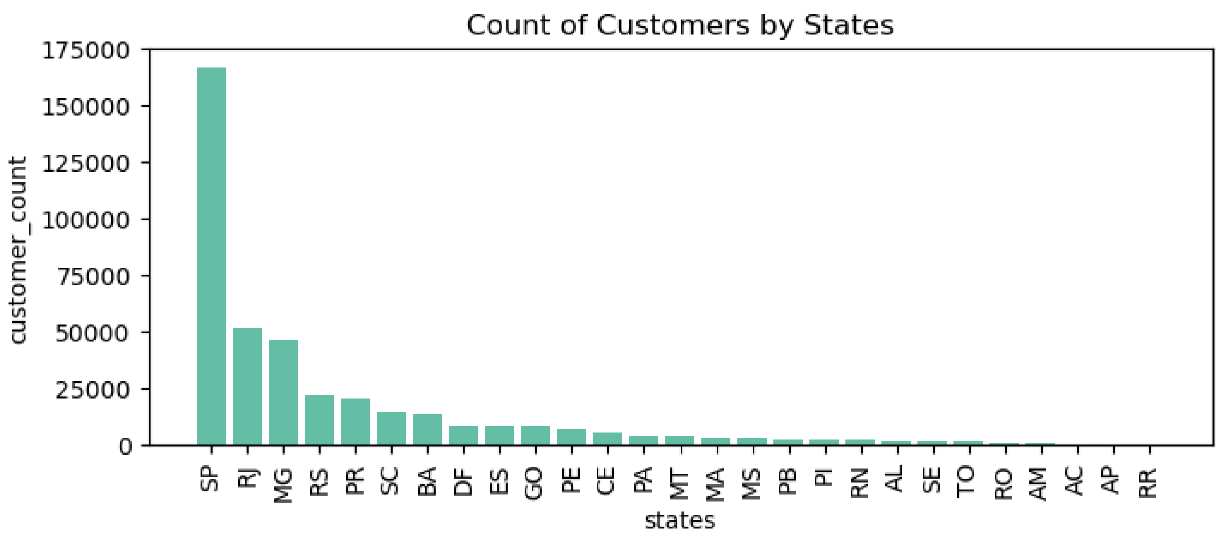
Count the number of customers from each state

In [79]:
```
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.figure(figsize = (8,3))
plt.bar(df["state"], df["customer_count"])
plt.xticks(rotation = 90)
plt.xlabel("states")
plt.ylabel("customer_count")
plt.title("Count of Customers by States")
plt.show()
```



Calculate the number of orders per month in 2018.

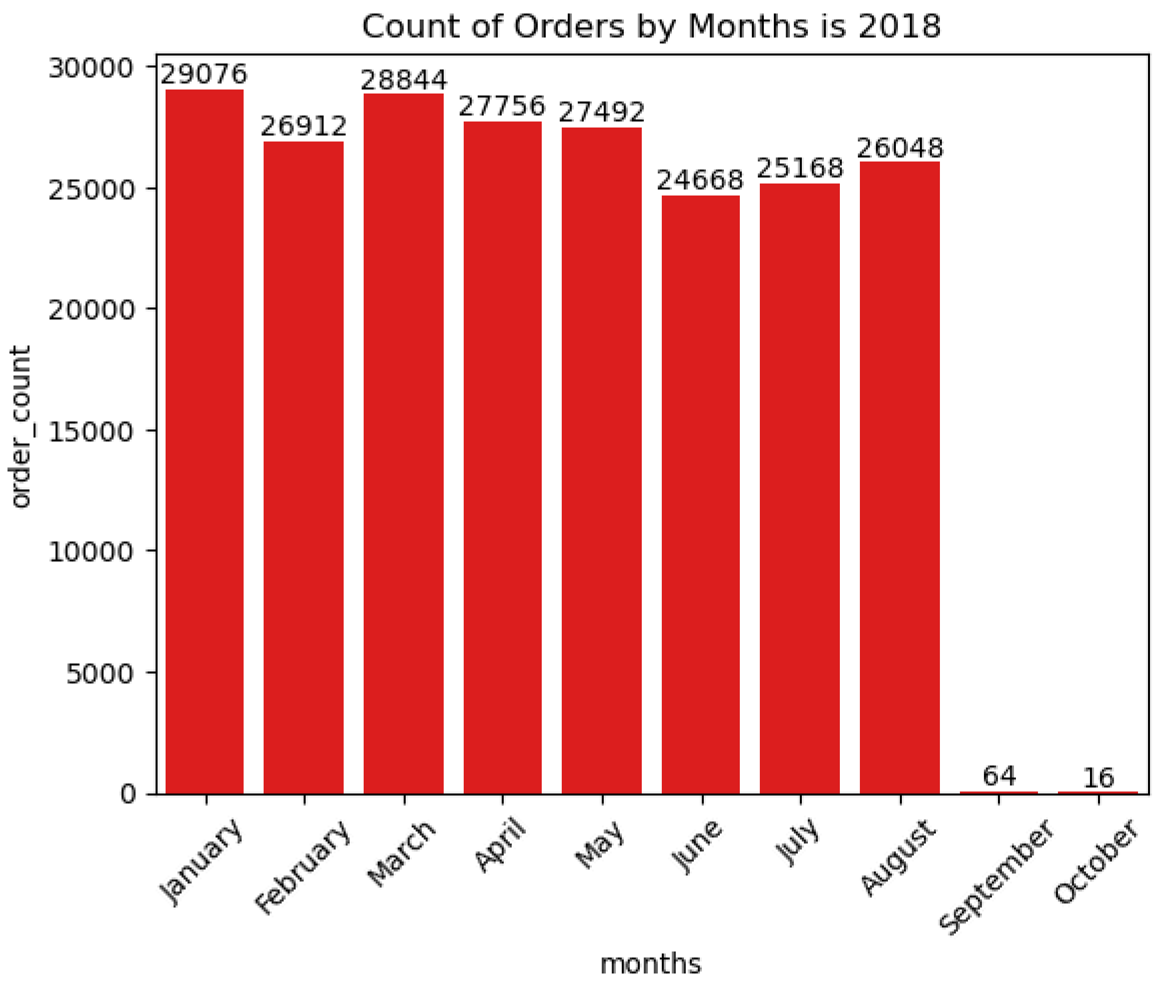
In [80]:
```
query = """ select monthname(order_purchase_timestamp) months, count(order_id) order_c
from orders where year(order_purchase_timestamp) = 2018
group by months
"""

cur.execute(query)

data = cur.fetchall()
df = pd.DataFrame(data, columns = ["months", "order_count"])
o = ["January", "February","March","April","May","June","July","August","September","O

ax = sns.barplot(x = df["months"],y =  df["order_count"], data = df, order = o, color
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

In [81]:

```
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[81]:

	customer city	average products/order
0	padre carvalho	56.00
1	celso ramos	52.00
2	datas	48.00
3	candido godoi	48.00
4	matias olimpio	40.00
5	cidelandia	32.00
6	curralinho	32.00
7	picarra	32.00
8	morro de sao paulo	32.00
9	teixeira soares	32.00

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

In [82]:

```
query = """select upper(products.product_category) category,
round((sum(payments.payment_value)/(select sum(payment_value) from payments))*100,2) s
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.head()
```

Out[82]:

	Category	percentage distribution
0	BED TABLE BATH	85.58
1	HEALTH BEAUTY	82.82
2	COMPUTER ACCESSORIES	79.22
3	FURNITURE DECORATION	71.47
4	WATCHES PRESENT	71.42

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

In [83]:

```
import numpy as np

cur = db.cursor()

# SQL query
query = """
    SELECT products.product_category,
           COUNT(order_items.product_id) AS order_count,
           ROUND(AVG(order_items.price), 2) AS avg_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()

# Creating a DataFrame
df = pd.DataFrame(data, columns=["Category", "order_count", "price"])


df["order_count"] = pd.to_numeric(df["order_count"])
df["price"] = pd.to_numeric(df["price"])

# Extracting the relevant columns
arr1 = df["order_count"]
arr2 = df["price"]

# Calculating the correlation
correlation_matrix = np.corrcoef(arr1, arr2)
correlation = correlation_matrix[0, 1]  # Get the correlation between order_count and

print("The correlation is:", correlation)
```

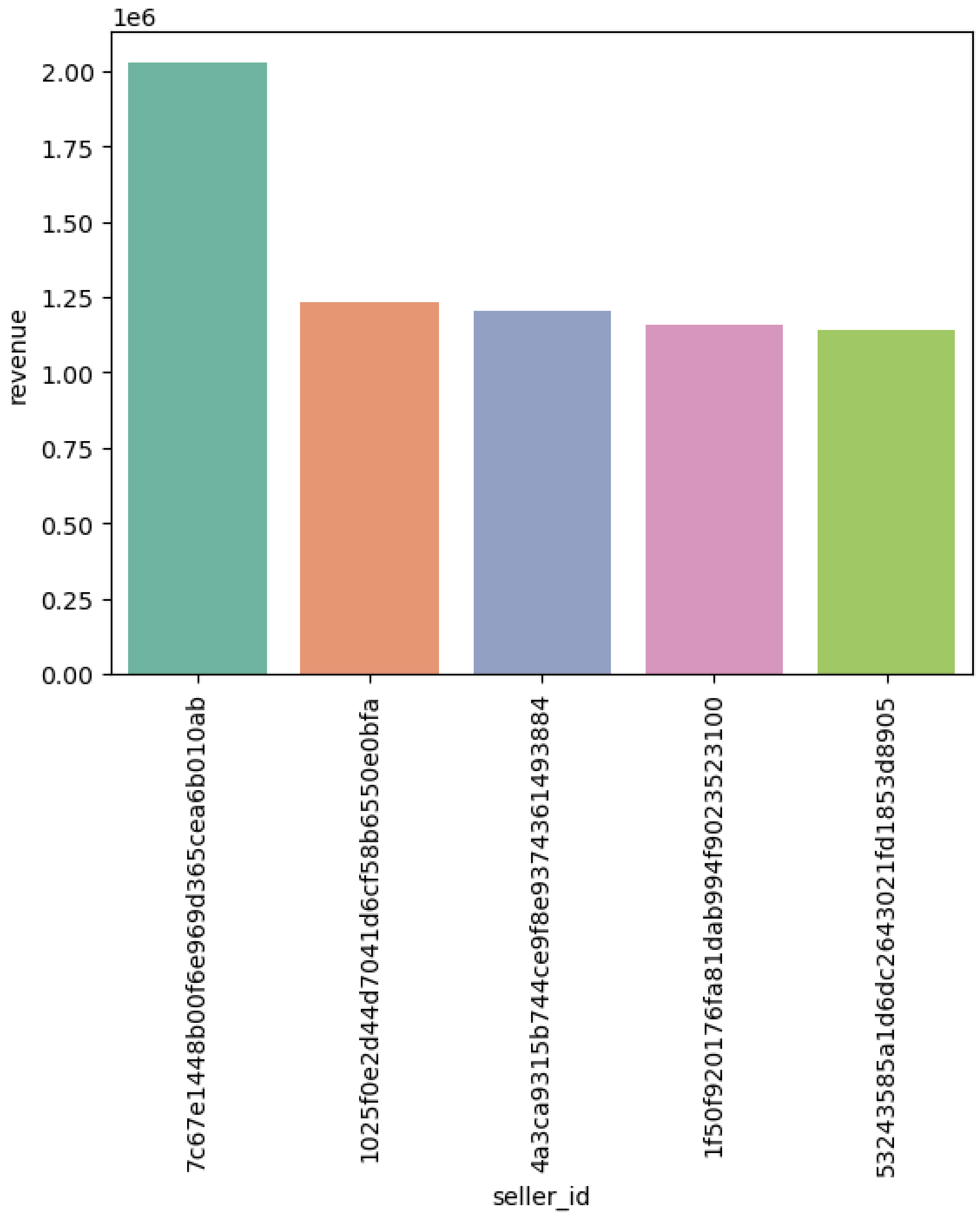
```
The correlation is: -0.10631514167157562
```

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

In [84]:
```
query = """ with revenue as (select order_items.seller_id,sum(payments.payment_value)
from order_items
join payments
on order_items.order_id = payments.order_id
group by order_items.seller_id)

select *, rank() over(order by revenue desc) as rn from revenue """

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

In [85]:
```
query = """with moving as (select orders.customer_id, orders.order_purchase_timestamp,
payments.payment_value as payment
from payments join orders
on payments.order_id = orders.order_id)

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 moving"""
```

```
cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data)
df
```

Out[85]:

	0	1	2	3
0	00012a2ce6f8dcda20d059ce98491703	2017-11-14 16:08:26	114.74	114.739998
1	00012a2ce6f8dcda20d059ce98491703	2017-11-14 16:08:26	114.74	114.739998
2	00012a2ce6f8dcda20d059ce98491703	2017-11-14 16:08:26	114.74	114.739998
3	00012a2ce6f8dcda20d059ce98491703	2017-11-14 16:08:26	114.74	114.739998
4	00012a2ce6f8dcda20d059ce98491703	2017-11-14 16:08:26	114.74	114.739998
...	...	...	...	...
831083	ffffe8b65bbe3087b653a978c870db99	2017-09-29 14:07:03	18.37	18.370001
831084	ffffe8b65bbe3087b653a978c870db99	2017-09-29 14:07:03	18.37	18.370001
831085	ffffe8b65bbe3087b653a978c870db99	2017-09-29 14:07:03	18.37	18.370001
831086	ffffe8b65bbe3087b653a978c870db99	2017-09-29 14:07:03	18.37	18.370001
831087	ffffe8b65bbe3087b653a978c870db99	2017-09-29 14:07:03	18.37	18.370001

831088 rows × 4 columns

In [ ]:

In [86]:

```
query = """with p as (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)

select  years , months,payment, sum(payment)
over(order by years,months) cumulative_sales
from p
"""
cur.execute(query)
data = cur.fetchall()
df = pd.DataFrame(data)
df
```

Out[86]:

	0	1	2	3
0	2016	9	2017.92	2.017920e+03
1	2016	10	472723.84	4.747418e+05
2	2016	12	156.96	4.748987e+05
3	2017	1	1107904.32	1.582803e+06
4	2017	2	2335264.08	3.918067e+06
5	2017	3	3598908.80	7.516976e+06
6	2017	4	3342304.24	1.085928e+07
7	2017	5	4743350.56	1.560263e+07
8	2017	6	4090211.04	1.969284e+07
9	2017	7	4739063.36	2.443191e+07
10	2017	8	5395170.56	2.982708e+07
11	2017	9	5822099.60	3.564918e+07
12	2017	10	6237423.04	4.188660e+07
13	2017	11	9559062.40	5.144566e+07
14	2017	12	7027211.84	5.847287e+07
15	2018	1	8920033.43	6.739291e+07
16	2018	2	7939706.72	7.533261e+07
17	2018	3	9277216.96	8.460983e+07
18	2018	4	9286283.85	9.389611e+07
19	2018	5	9231857.21	1.031280e+08
20	2018	6	8191044.01	1.113190e+08
21	2018	7	8532325.99	1.198513e+08
22	2018	8	8179402.57	1.280307e+08
23	2018	9	35516.32	1.280663e+08
24	2018	10	4717.36	1.280710e+08

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

In [87]:

```
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
```

Out[87]:

	years	yoy % growth
0	2016	NaN
1	2017	12112.703759
2	2018	20.000924

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

In [88]:

```
query = """WITH y AS (
    SELECT customers.customer_id,
           MIN(orders.order_purchase_timestamp) AS first_order
    FROM customers
    JOIN orders
      ON customers.customer_id = orders.customer_id
    GROUP BY customers.customer_id
),
z AS (
    SELECT y.customer_id,
           COUNT(DISTINCT orders.order_purchase_timestamp) AS next_order
    FROM y
    JOIN orders
      ON orders.customer_id = y.customer_id
     AND orders.order_purchase_timestamp > y.first_order
     AND orders.order_purchase_timestamp < DATE_ADD(y.first_order, INTERVAL 6 MONTH)
    GROUP BY y.customer_id
)
SELECT
    100 * (COUNT(DISTINCT z.customer_id) / COUNT(DISTINCT y.customer_id)) AS retentior
FROM y
LEFT JOIN z
  ON y.customer_id = z.customer_id;"""

cur.execute(query)
data = cur.fetchall()

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

df
```

Out[88]:

	retention_rate
0	0.0000

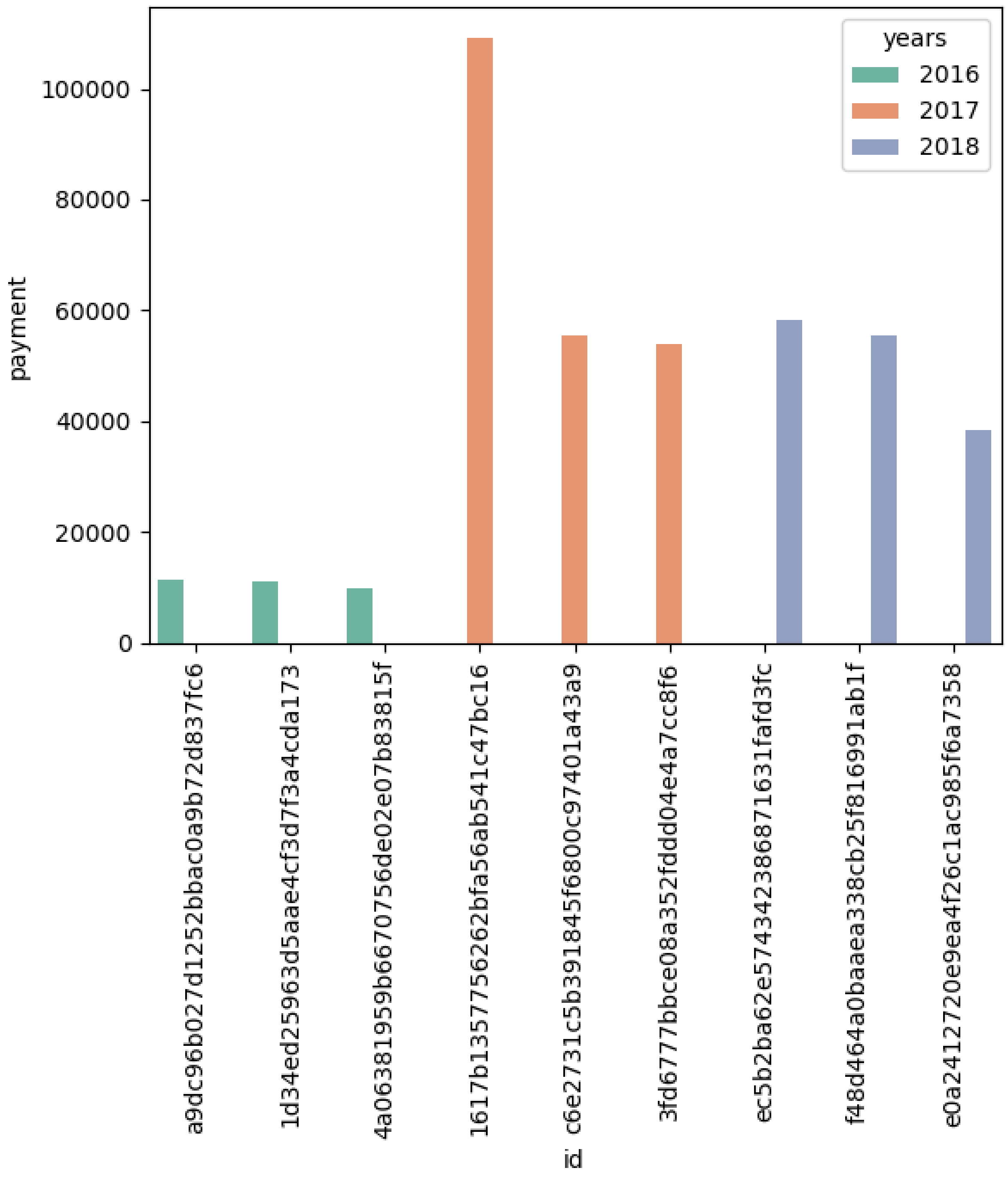
Identify the top 3 customers who spent the most money in each year

In [89]:

```
query = """select years, customer_id, payment, rn
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) rn
from orders join payments
on payments.order_id = orders.order_id
group by year(orders.order_purchase_timestamp),
orders.customer_id) as a
where rn <= 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
100000
80000
60000
40000
20000
0
a9dc96b027d1252bbac0a9b72d837fc6
1d34ed25963d5aae4cf3d7f3a4cda173
4a06381959b6670756de02e07b83815f
1617b1357756262bfa56ab541c47bc16
c6e2731c5b391845f6800c97401a43a9
3fd6777bbce08a352fddd04e4a7cc8f6
ec5b2ba62e574342386871631fafd3fc
f48d464a0baaea338cb25f816991ab1f
e0a24127720e9ea4f26c1ac985f6a7358
id