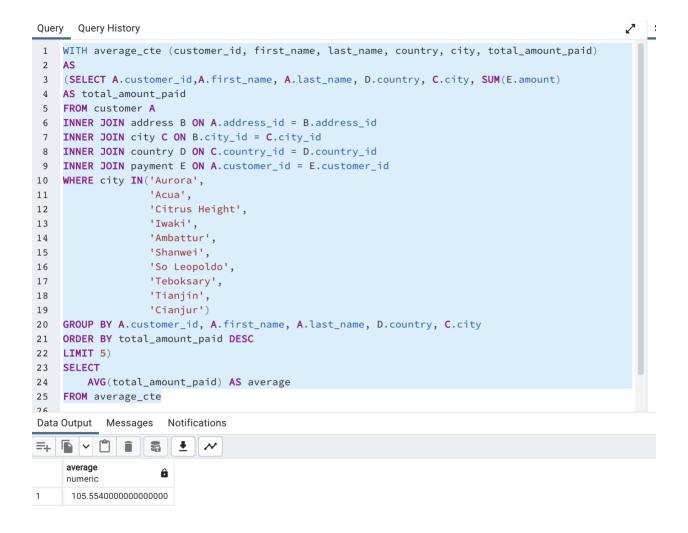
Step 1: Find the average amount paid by the top 5 customers.

1a.

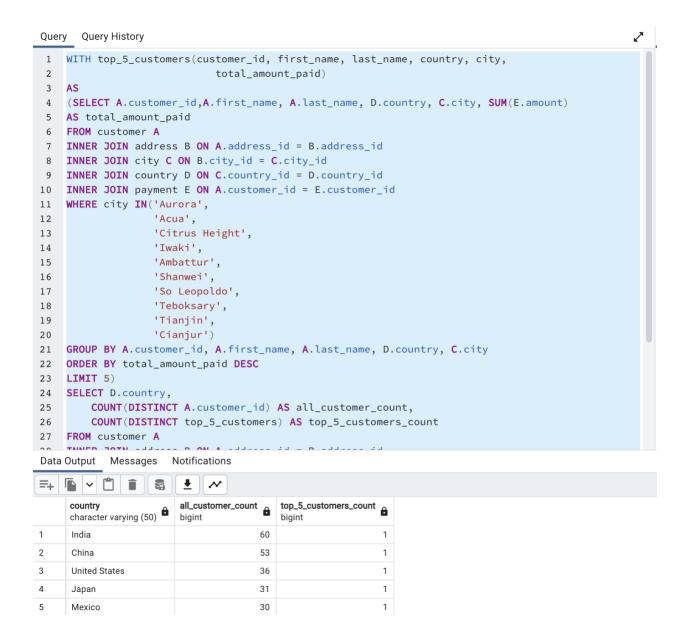
```
WITH average cte (customer id, first name, last name, country, city, total amount paid)
(SELECT A.customer_id, A.first_name, A.last_name, D.country, C.city, SUM(E.amount)
AS total amount paid
FROM customer A
INNER JOIN address B ON A.address_id = B.address_id
INNER JOIN city C ON B.city id = C.city id
INNER JOIN country D ON C.country id = D.country id
INNER JOIN payment E ON A.customer id = E.customer id
WHERE city IN('Aurora',
                      'Acua',
                      'Citrus Height',
                      'Iwaki',
                      'Ambattur',
                      'Shanwei',
                      'So Leopoldo',
                      'Teboksary',
                      'Tianjin',
                      'Cianjur')
GROUP BY A.customer id, A.first name, A.last name, D.country, C.city
ORDER BY total amount paid DESC
LIMIT 5)
SELECT
       AVG(total amount paid) AS average
FROM average cte
```



First, I copied the subquery. Then I set up the CTE as average_cte. I listed the same number of columns that was listed below. Then I used a SELECT statement to perform the average operation on the total amount paid. Lastly I referenced the CTE with a FROM clause.

1b. Step 2: Find out how many of the top 5 customers are based within each country.

```
INNER JOIN country D ON C.country_id = D.country_id
INNER JOIN payment E ON A.customer id = E.customer id
WHERE city IN('Aurora',
                      'Acua',
                      'Citrus Height',
                      'Iwaki',
                      'Ambattur',
                      'Shanwei',
                      'So Leopoldo',
                      'Teboksary',
                      'Tianjin',
                      'Cianjur')
GROUP BY A.customer id, A.first name, A.last name, D.country, C.city
ORDER BY total amount paid DESC
LIMIT 5)
SELECT D.country,
      COUNT(DISTINCT A.customer id) AS all customer count,
      COUNT(DISTINCT top_5_customers) AS top_5_customers_count
FROM customer A
INNER JOIN address B ON A.address id = B.address id
INNER JOIN city C ON B.city id = C.city id
INNER JOIN country D ON C.country_id = D.country_id
LEFT JOIN top 5 customers
ON A.customer_id = top_5_customers.customer_id
GROUP BY D.country
ORDER BY COUNT(A.customer id) DESC
LIMIT 5;
```



This was similar to the last one. I had to write the CTE as the outer querty. Then I had to create a join like was done with the subquery. Last I had to use a left join to find the top 5 customers and group them by country then order by counting customer ids.

2. #1a- The aggregate cost of the CTE was 64.49,

The cost for the statement with the subquery was 64.49 and the limit coast was 64.41 which was the same for the sort cost. There does not appear to be much difference between the two costs for this query.

#1b The cost of the CTE was 168.16. The cost for the subquery was 167.76. The subquery cost slightly less. There were other costs, but I am not sure what they were referencing. I though the CTE would be less cost, so I was surprised it was slightly higher.

3. The 1st one was not very difficult at all. I simply had to replace the outer query with the CTE. I did the same for the last one, but it took me some time to get the joins correct. I was surprised that I had to use the FROM for the customer table as this did not match the CTE name as was posted in the directions, but once it was in, it made sense. The syntax is a bit tricky, but I think using it more will make it easier.