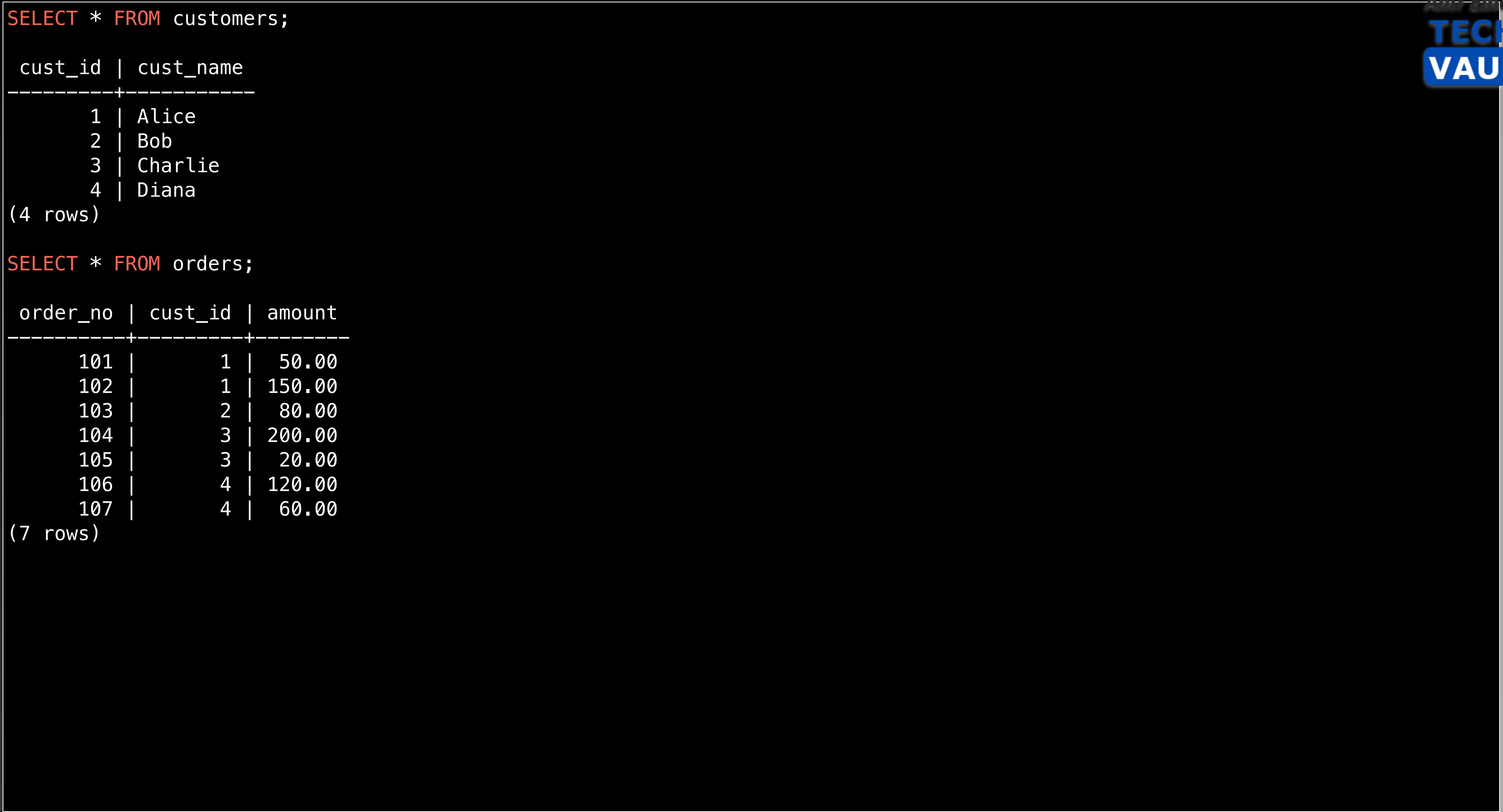
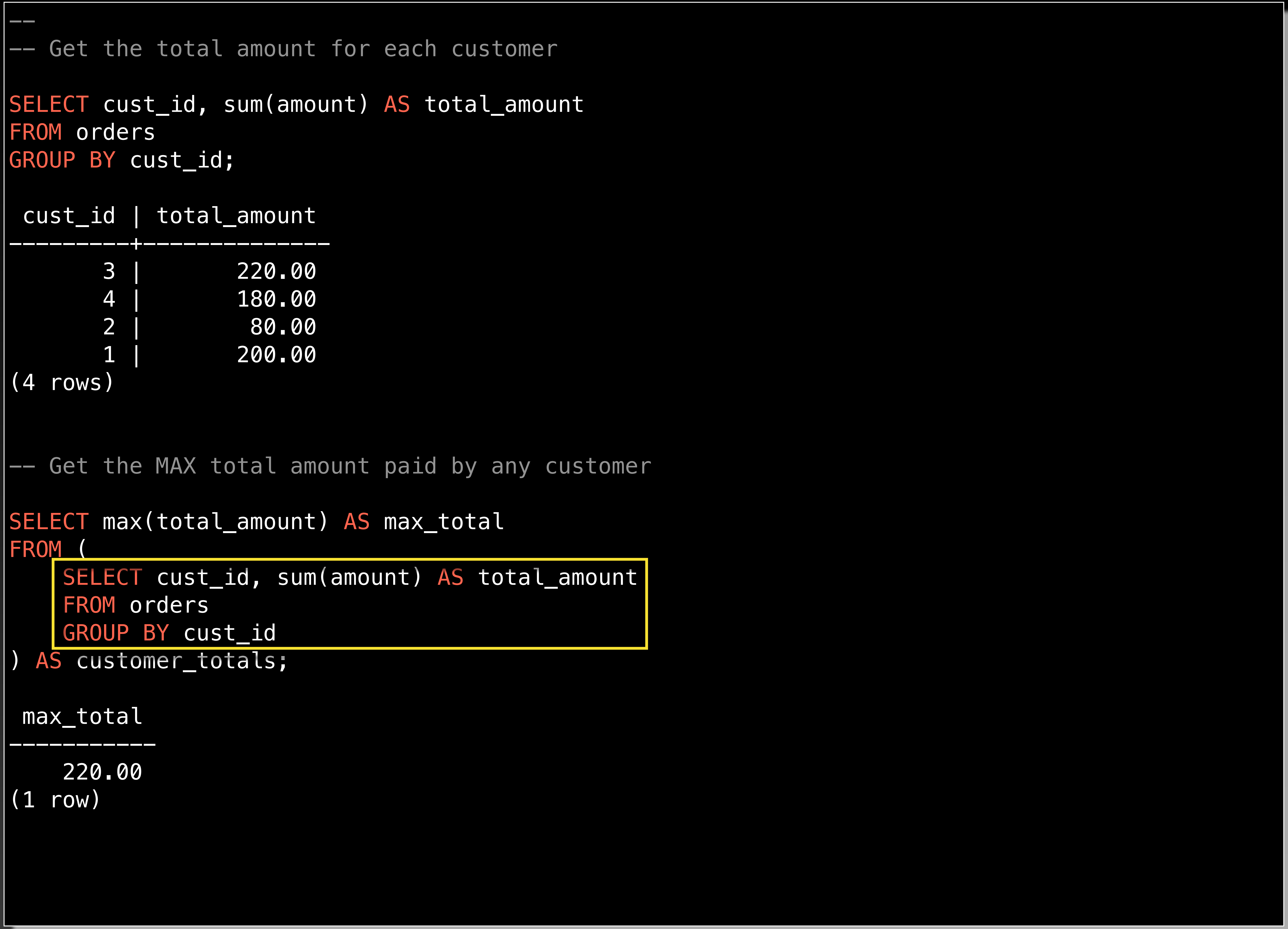
TECH VAULT

COMMON TABLE EXPRESSIONS VS SUBQUERIES

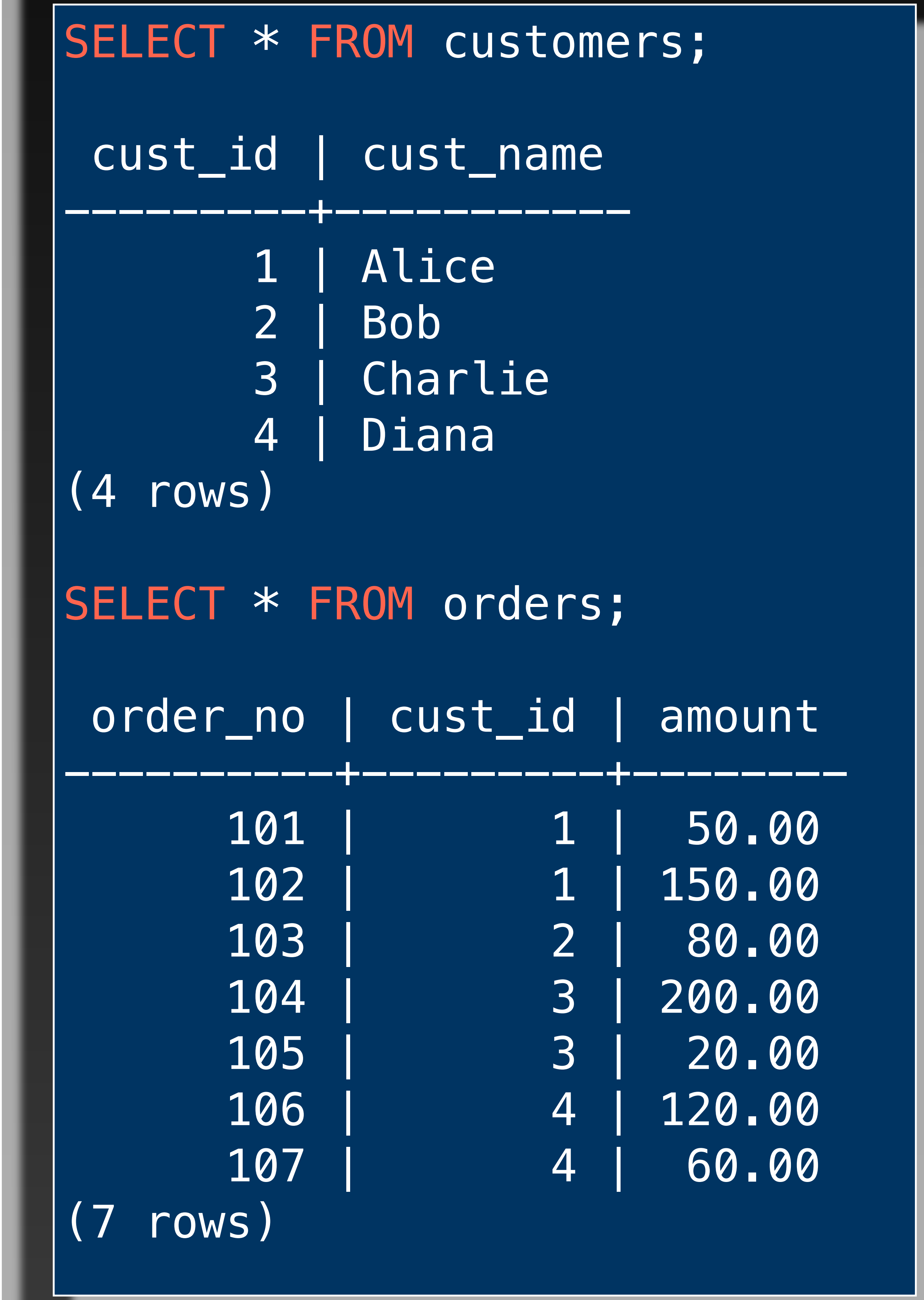
AMR ELHELW



```
SELECT * FROM customers;

 cust_id | cust_name
---------+-----------
       1 | Alice
       2 | Bob
       3 | Charlie
       4 | Diana
(4 rows)

SELECT * FROM orders;

 order_no | cust_id | amount
----------+---------+--------
      101 |       1 |  50.00
      102 |       1 | 150.00
      103 |       2 |  80.00
      104 |       3 | 200.00
      105 |       3 |  20.00
      106 |       4 | 120.00
      107 |       4 |  60.00
(7 rows)
```



```
--
-- Get the total amount for each customer

SELECT cust_id, sum(amount) AS total_amount
FROM orders
GROUP BY cust_id;

 cust_id | total_amount
---------+--------------
       3 |       220.00
       4 |       180.00
       2 |        80.00
       1 |       200.00
(4 rows)


-- Get the MAX total amount paid by any customer

SELECT max(total_amount) AS max_total
FROM (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
) AS customer_totals;

 max_total
-----------
    220.00
(1 row)
```



```
SELECT * FROM customers;

 cust_id | cust_name
---------+-----------
       1 | Alice
       2 | Bob
       3 | Charlie
       4 | Diana
(4 rows)

SELECT * FROM orders;

 order_no | cust_id | amount
----------+---------+--------
      101 |       1 |  50.00
      102 |       1 | 150.00
      103 |       2 |  80.00
      104 |       3 | 200.00
      105 |       3 |  20.00
      106 |       4 | 120.00
      107 |       4 |  60.00
(7 rows)
```

```
-- Find all orders with an amount greater than the average order amount

-- (Step 1) Get average order amount

SELECT avg(amount) AS avg_amount
FROM orders;

-- (Step 2) Get all orders greater than that amount

SELECT order_no, amount
FROM orders
WHERE amount > (
    SELECT avg(amount) AS avg_amount
    FROM orders
);

 order_no | amount
----------+--------
      102 | 150.00
      104 | 200.00
      106 | 120.00
(3 rows)
```

```
      avg_amount
---------------------
 97.1428571428571429
(1 row)
```

```
SELECT * FROM customers;

 cust_id | cust_name
---------+-----------
       1 | Alice
       2 | Bob
       3 | Charlie
       4 | Diana
(4 rows)

SELECT * FROM orders;

 order_no | cust_id | amount
----------+---------+--------
      101 |       1 |  50.00
      102 |       1 | 150.00
      103 |       2 |  80.00
      104 |       3 | 200.00
      105 |       3 |  20.00
      106 |       4 | 120.00
      107 |       4 |  60.00
(7 rows)
```

```
-- Find all customers who do not have any orders over $100

-- (Step 1) Get customers who HAVE orders over $100

SELECT cust_id
FROM orders
WHERE amount > 100;
```

```
 cust_id
---------
       1
       3
       4
(3 rows)
```

```
-- (Step 2) Find customers who are NOT in that list

SELECT cust_id, cust_name
FROM customers
WHERE cust_id NOT IN (
    SELECT cust_id
    FROM orders
    WHERE amount > 100
);

 cust_id | cust_name
---------+-----------
       2 | Bob
(1 row)
```

```
SELECT * FROM customers;

 cust_id | cust_name
---------+-----------
       1 | Alice
       2 | Bob
       3 | Charlie
       4 | Diana
(4 rows)

SELECT * FROM orders;

 order_no | cust_id | amount
----------+---------+--------
      101 |       1 |  50.00
      102 |       1 | 150.00
      103 |       2 |  80.00
      104 |       3 | 200.00
      105 |       3 |  20.00
      106 |       4 | 120.00
      107 |       4 |  60.00
(7 rows)
```

```
-- Find customers whose total amount is greater than the average total amount across customers

-- (Step 1) customer_totals
SELECT cust_id, sum(amount) AS total_amount
FROM orders
GROUP BY cust_id;

-- (Step 2) customer_average
SELECT avg(total_amount) AS avg_total
FROM (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
) AS customer_totals;

-- (Step 3) final result
SELECT cust_id, total_amount
FROM <customer_totals>
WHERE total_amount > <customer_average>;
```

```
 cust_id | total_amount
---------+--------------
       3 |       220.00
       4 |       180.00
       2 |        80.00
       1 |       200.00
(4 rows)
```

```
      avg_total
---------------------
 170.0000000000000000
(1 row)
```

```
SELECT * FROM customers;

 cust_id | cust_name
---------+-----------
       1 | Alice
       2 | Bob
       3 | Charlie
       4 | Diana
(4 rows)

SELECT * FROM orders;

 order_no | cust_id | amount
----------+---------+--------
      101 |       1 |  50.00
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      104 |       3 | 200.00
      105 |       3 |  20.00
      106 |       4 | 120.00
      107 |       4 |  60.00
(7 rows)
```
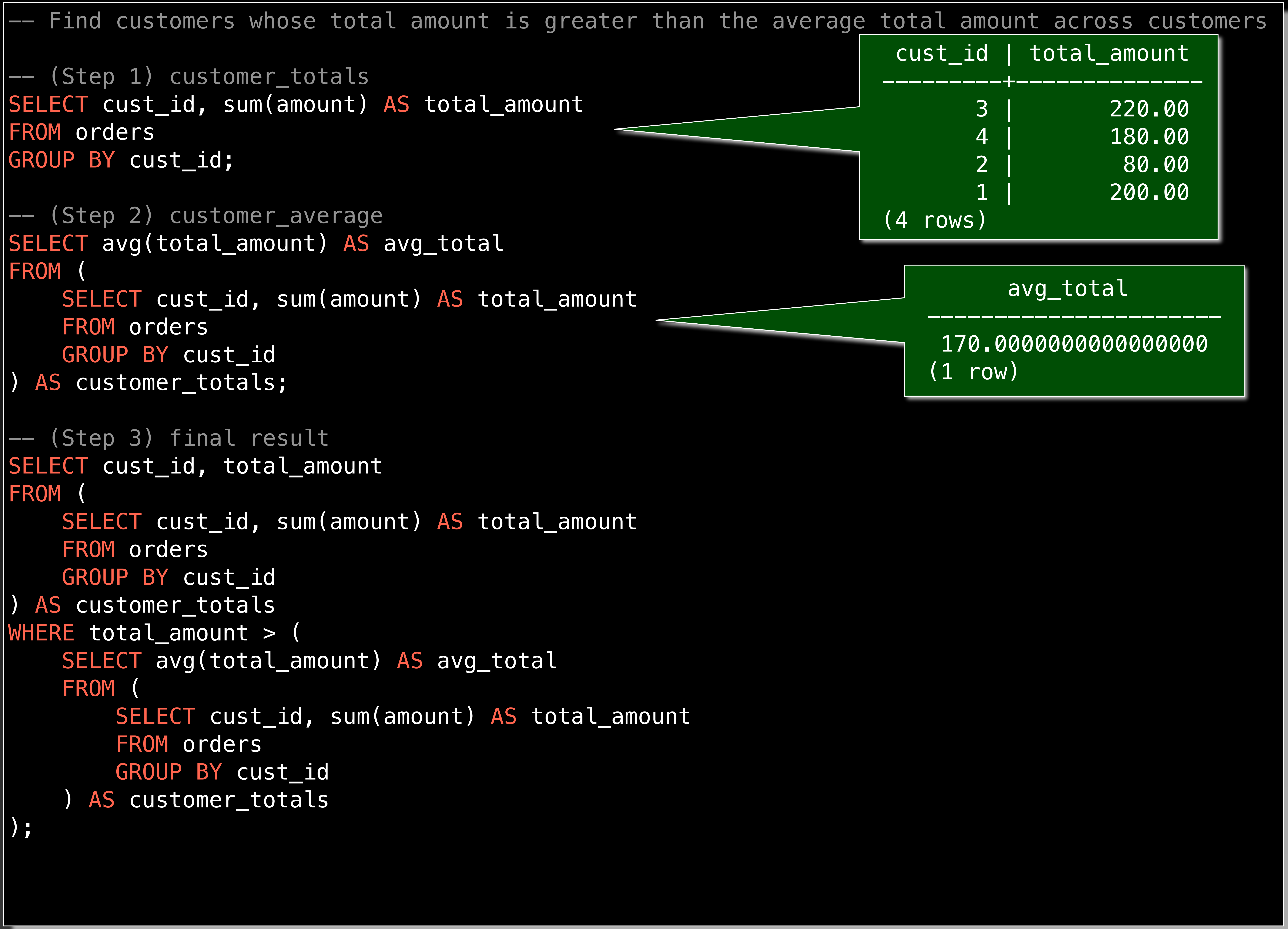



```sql
-- Find customers whose total amount is greater than the average total amount across customers

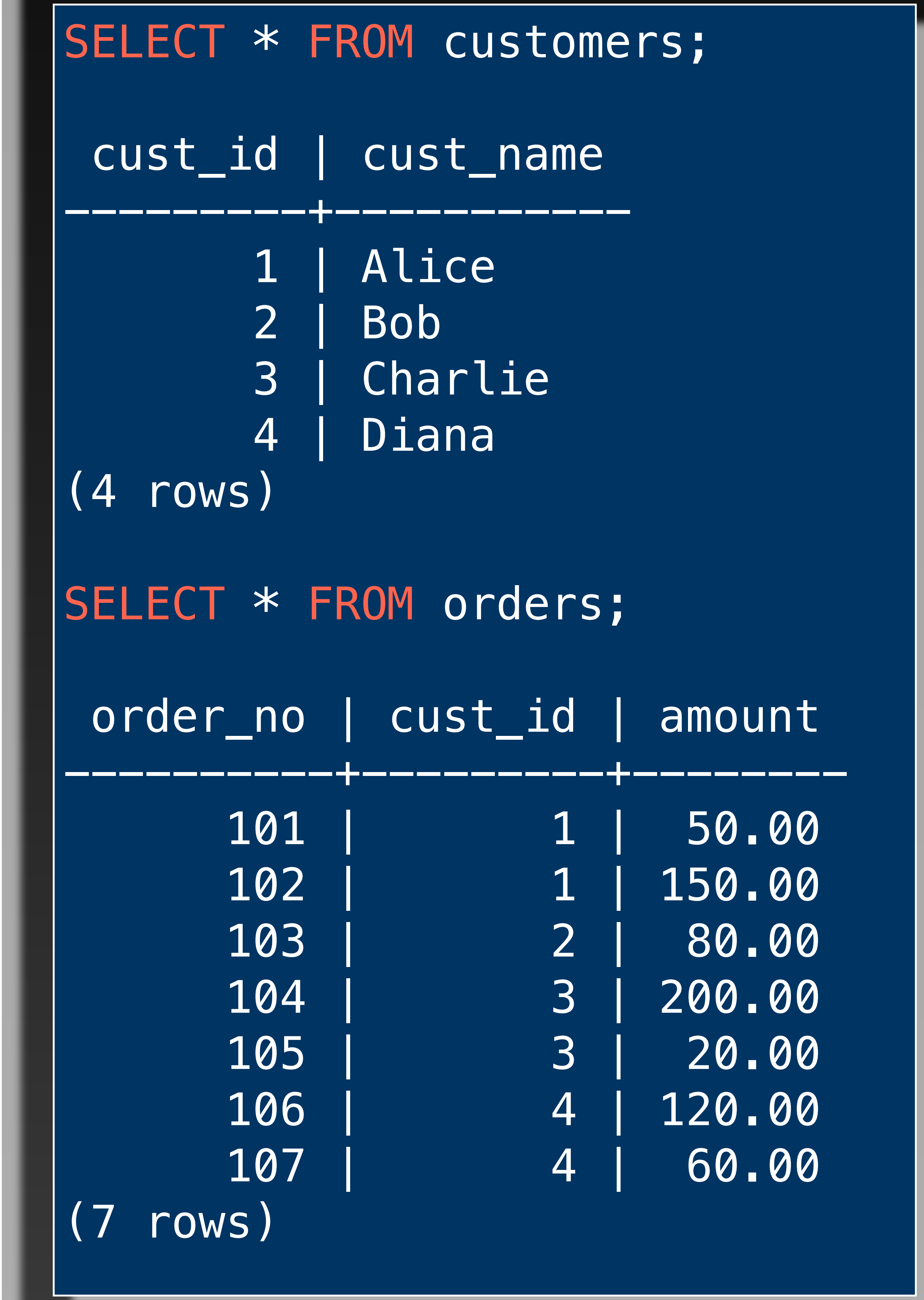
-- (Step 1) customer_totals
SELECT cust_id, sum(amount) AS total_amount
FROM orders
GROUP BY cust_id;

-- (Step 2) customer_average
SELECT avg(total_amount) AS avg_total
FROM (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
) AS customer_totals;

-- (Step 3) final result
SELECT cust_id, total_amount
FROM (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
) AS customer_totals
WHERE total_amount > (
    SELECT avg(total_amount) AS avg_total
    FROM (
        SELECT cust_id, sum(amount) AS total_amount
        FROM orders
        GROUP BY cust_id
    ) AS customer_totals
);
```

```
 cust_id | total_amount
---------+--------------
       3 |       220.00
       4 |       180.00
       2 |        80.00
       1 |       200.00
(4 rows)
```

```
      avg_total
----------------------
 170.0000000000000000
(1 row)
```



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      105 |       3 |  20.00
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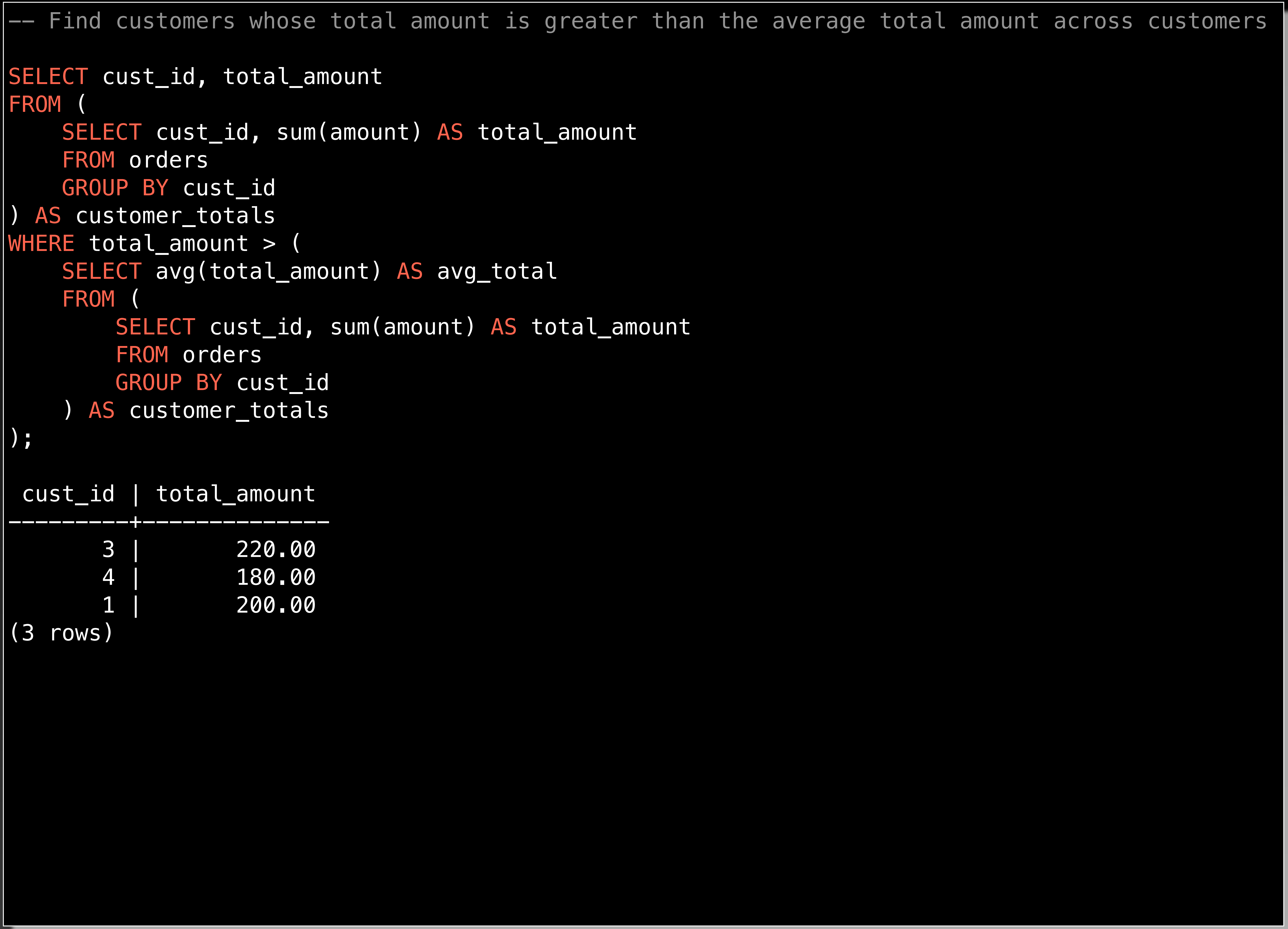
      107 |       4 |  60.00
(7 rows)
```



```
-- Find customers whose total amount is greater than the average total amount across customers

SELECT cust_id, total_amount
FROM (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
) AS customer_totals
WHERE total_amount > (
    SELECT avg(total_amount) AS avg_total
    FROM (
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    ) AS customer_totals
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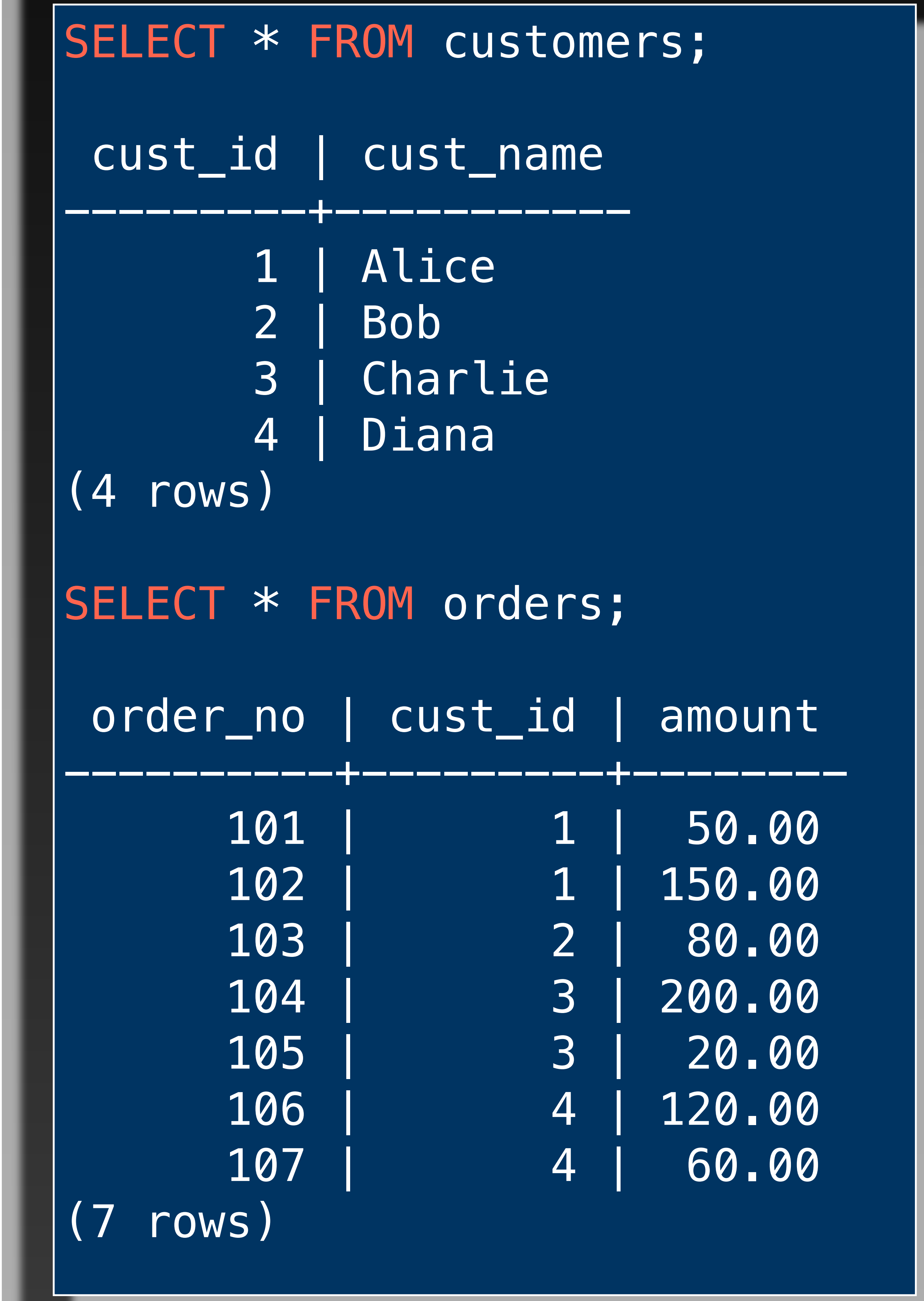

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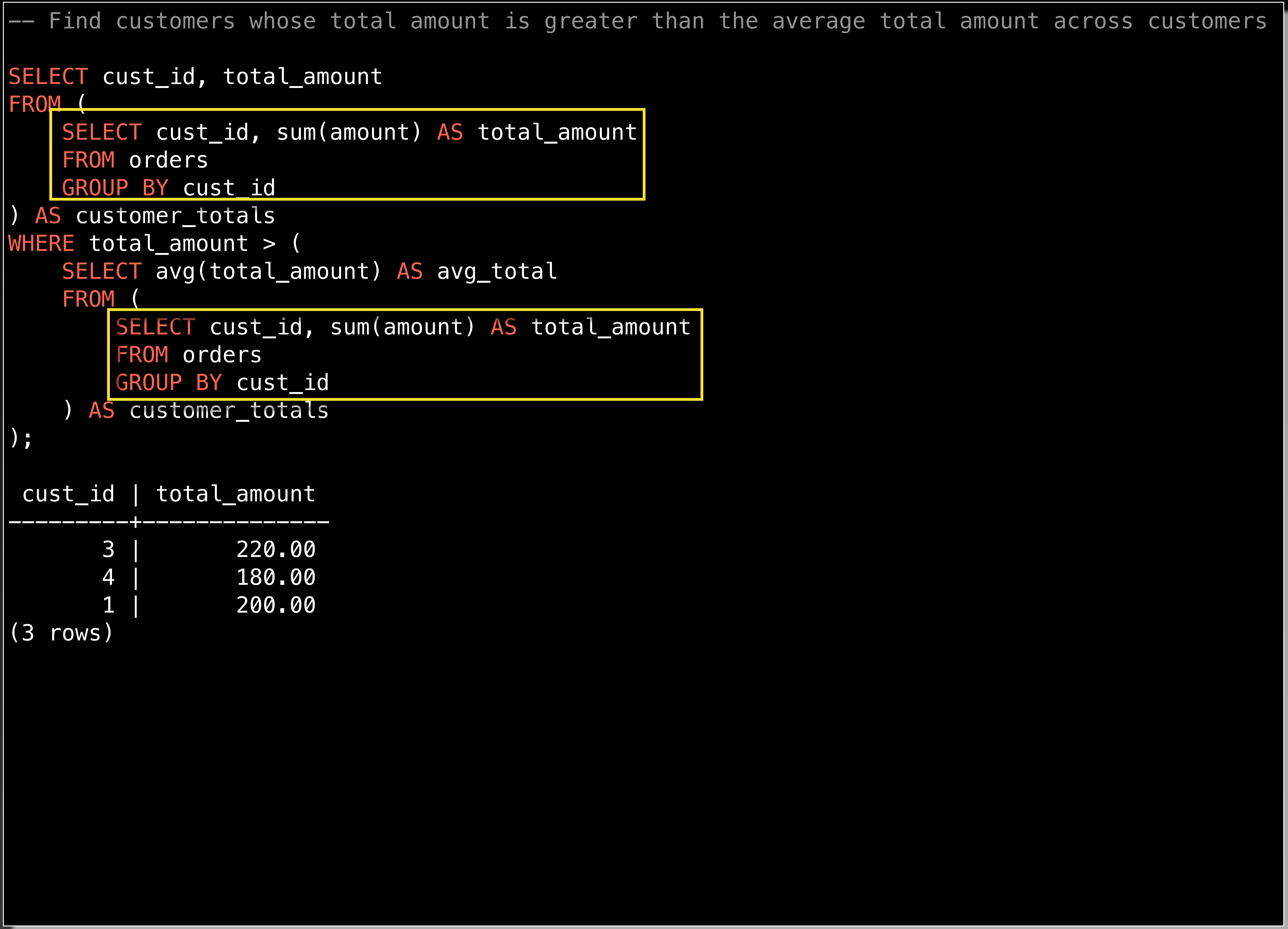
      104 |       3 | 200.00
      105 |       3 |  20.00
      106 |       4 | 120.00
      107 |       4 |  60.00
(7 rows)
```



```
-- Find customers whose total amount is greater than the average total amount across customers

SELECT cust_id, total_amount
FROM (
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    FROM orders
    GROUP BY cust_id
) AS customer_totals
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    SELECT avg(total_amount) AS avg_total
    FROM (
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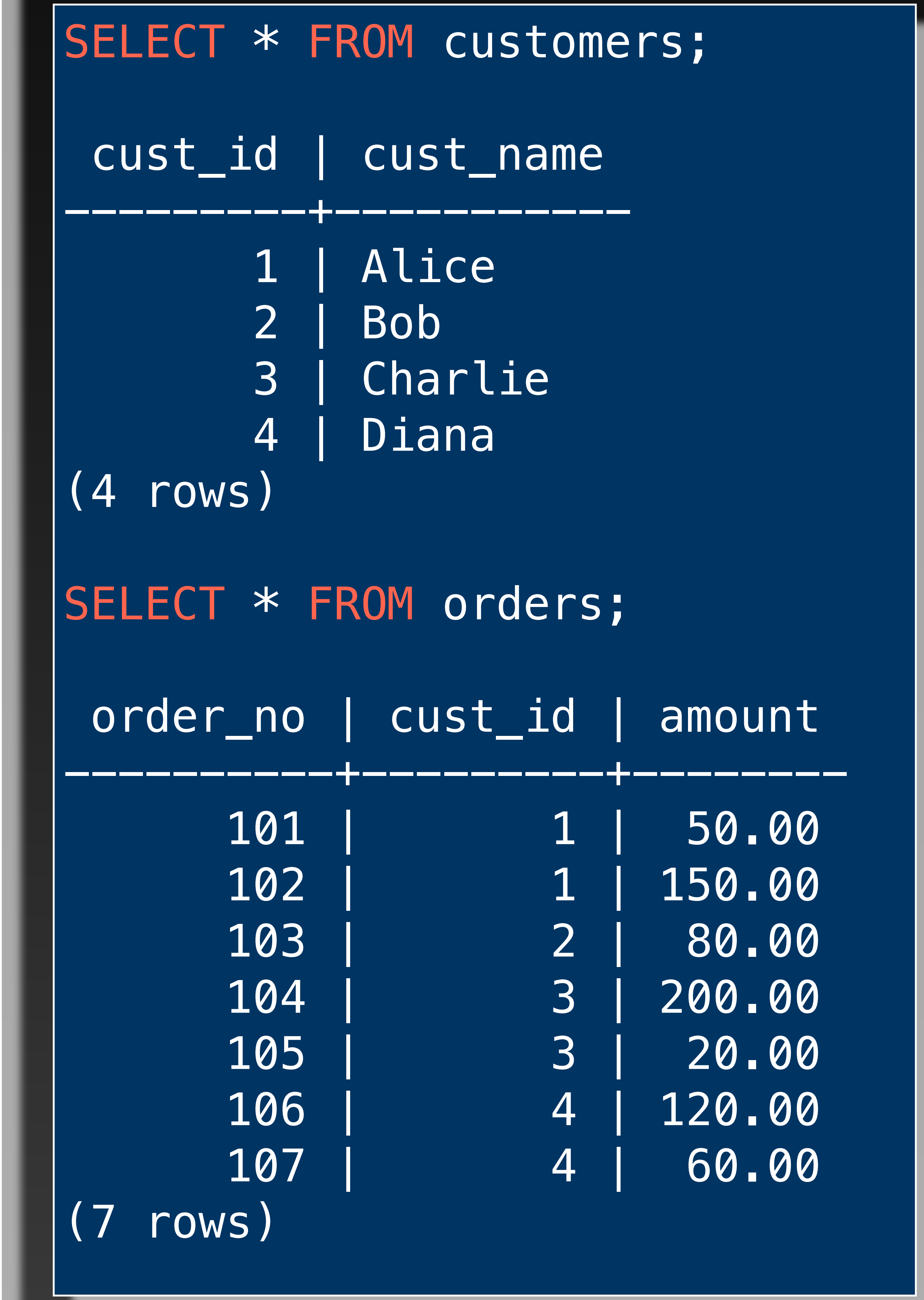

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(7 rows)
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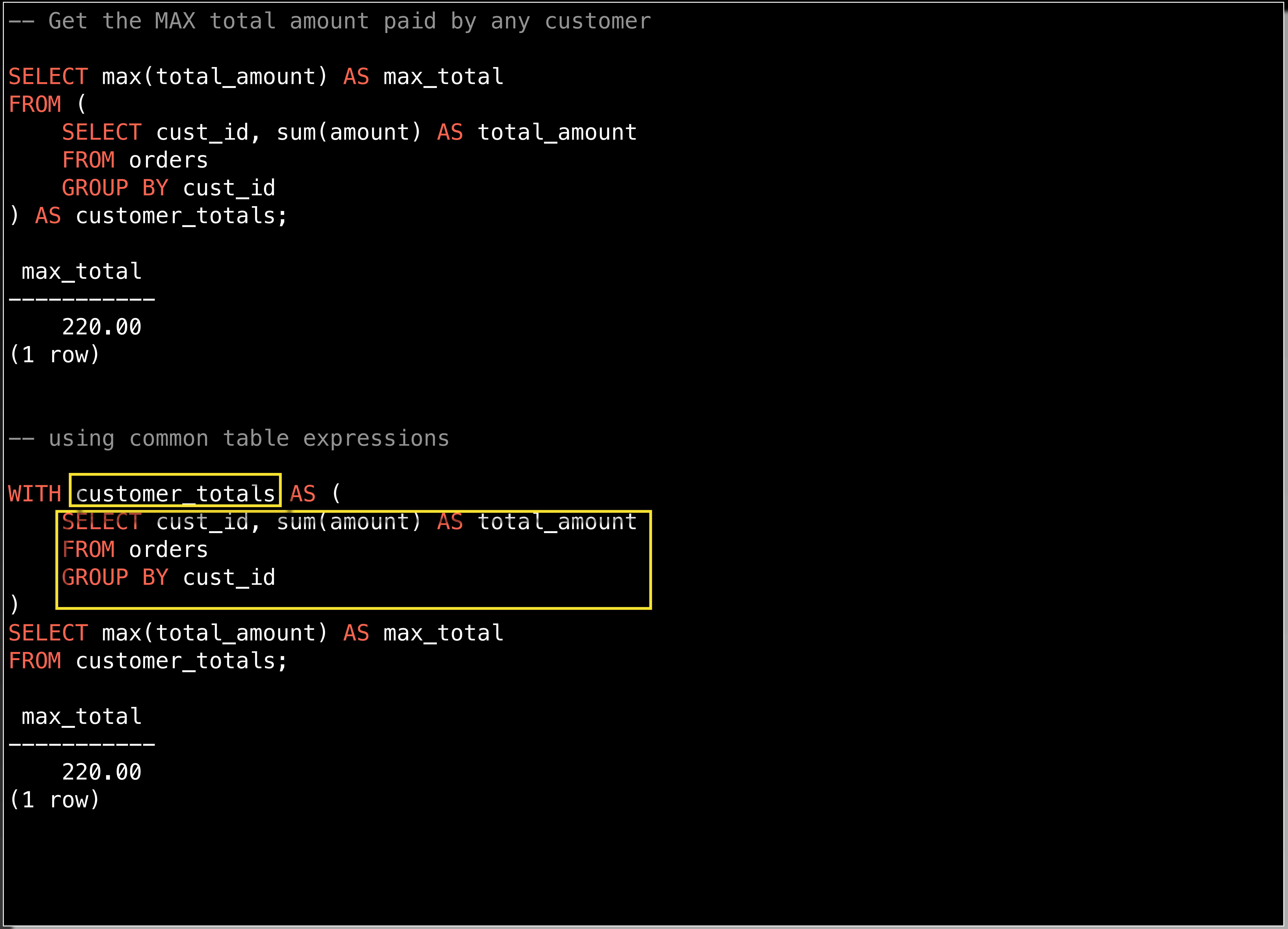


```
-- Get the MAX total amount paid by any customer

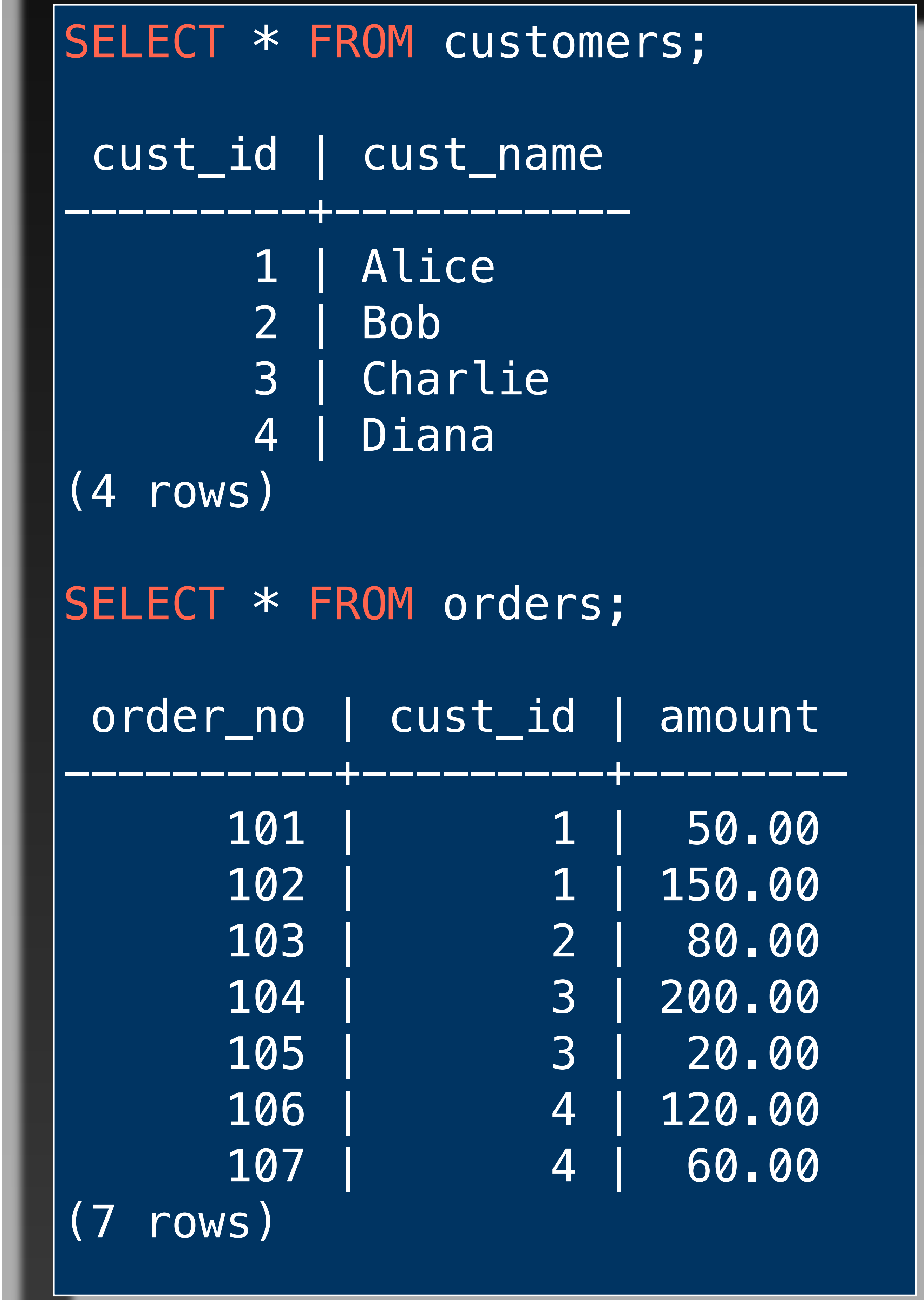
SELECT max(total_amount) AS max_total
FROM (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
) AS customer_totals;

 max_total
-----------
    220.00
(1 row)


-- using common table expressions

WITH customer_totals AS (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
)
SELECT max(total_amount) AS max_total
FROM customer_totals;

 max_total
-----------
    220.00
(1 row)
```



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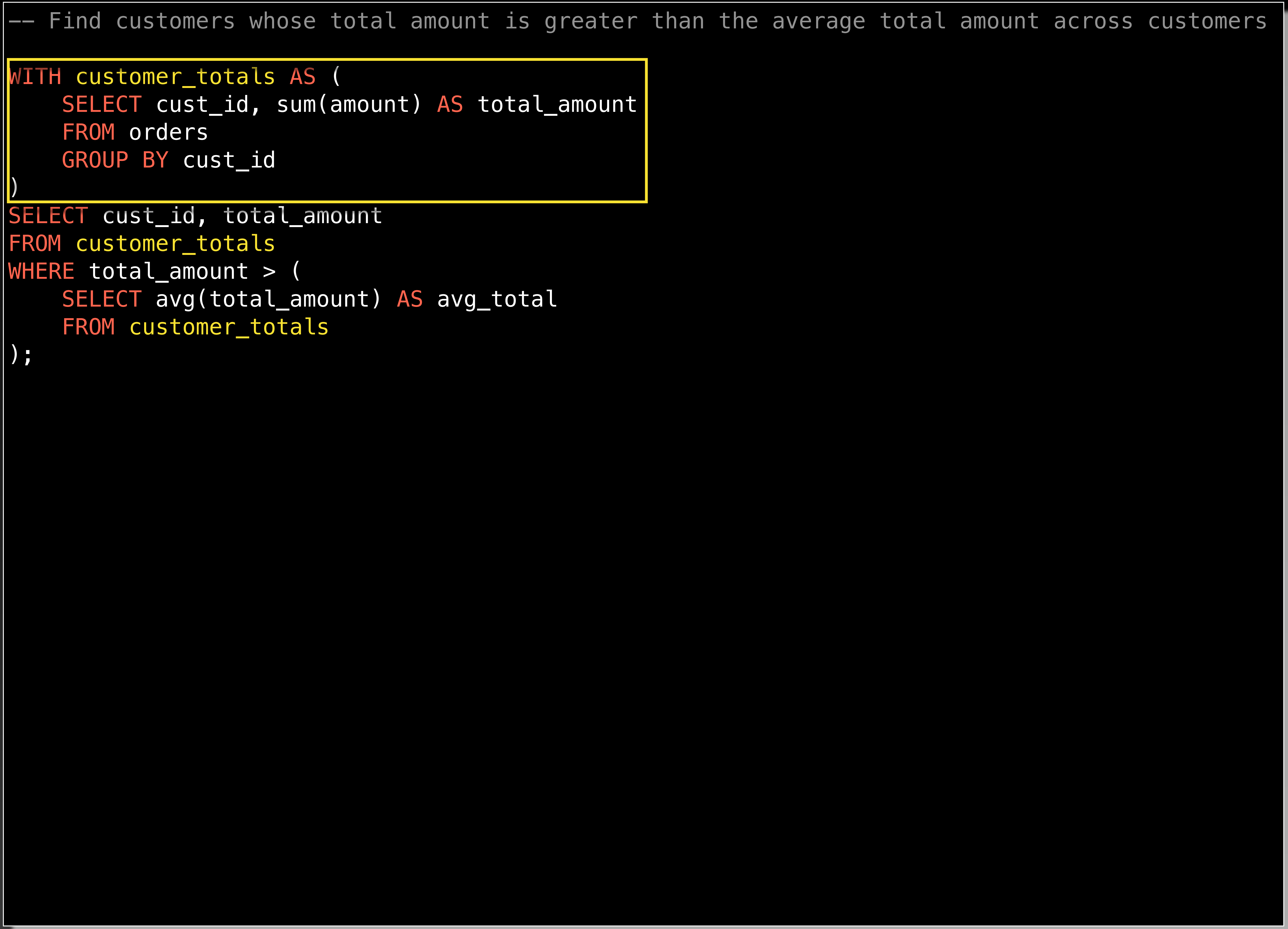
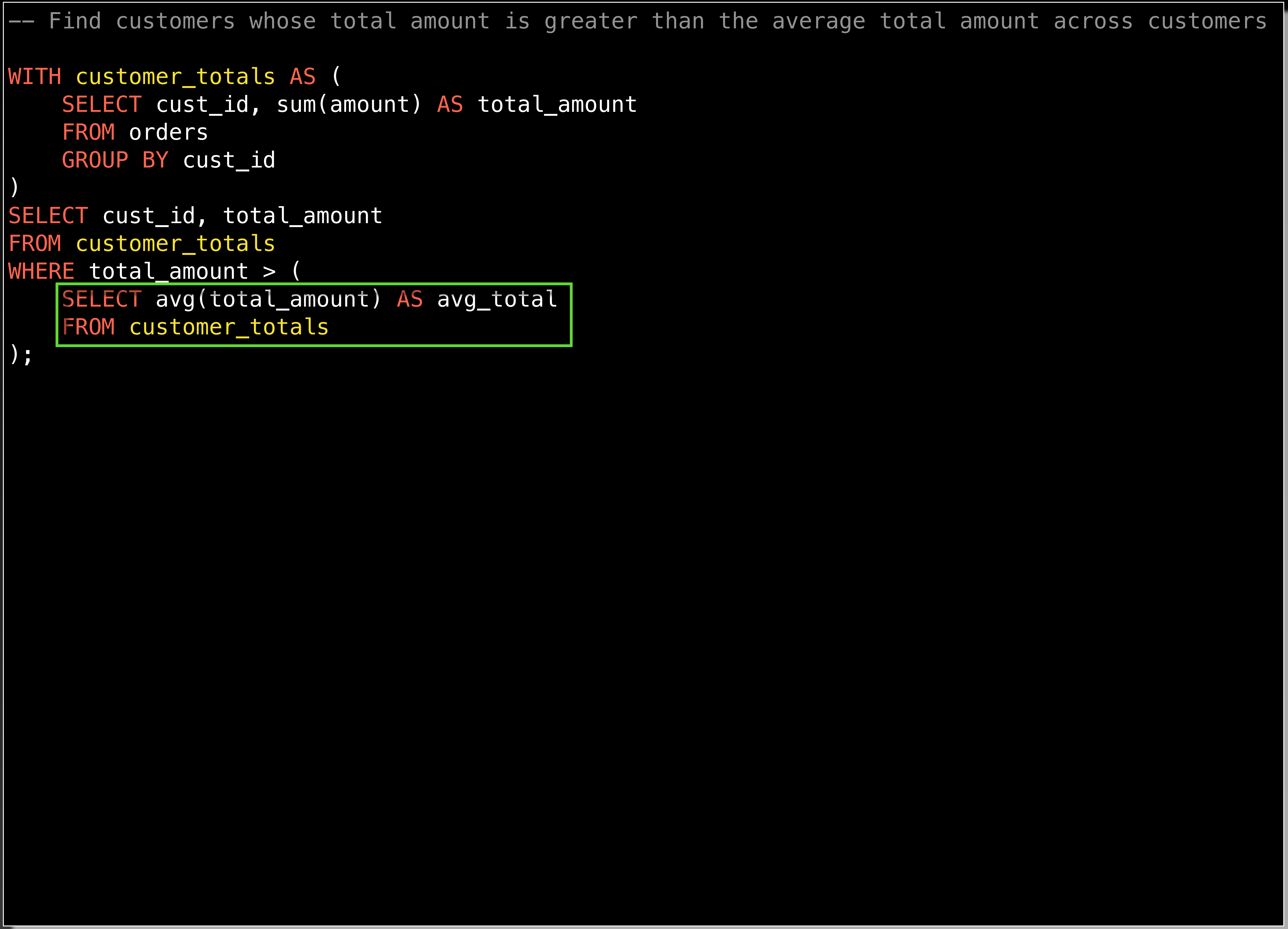
      104 |       3 | 200.00
      105 |       3 |  20.00
      106 |       4 | 120.00
      107 |       4 |  60.00
(7 rows)
```

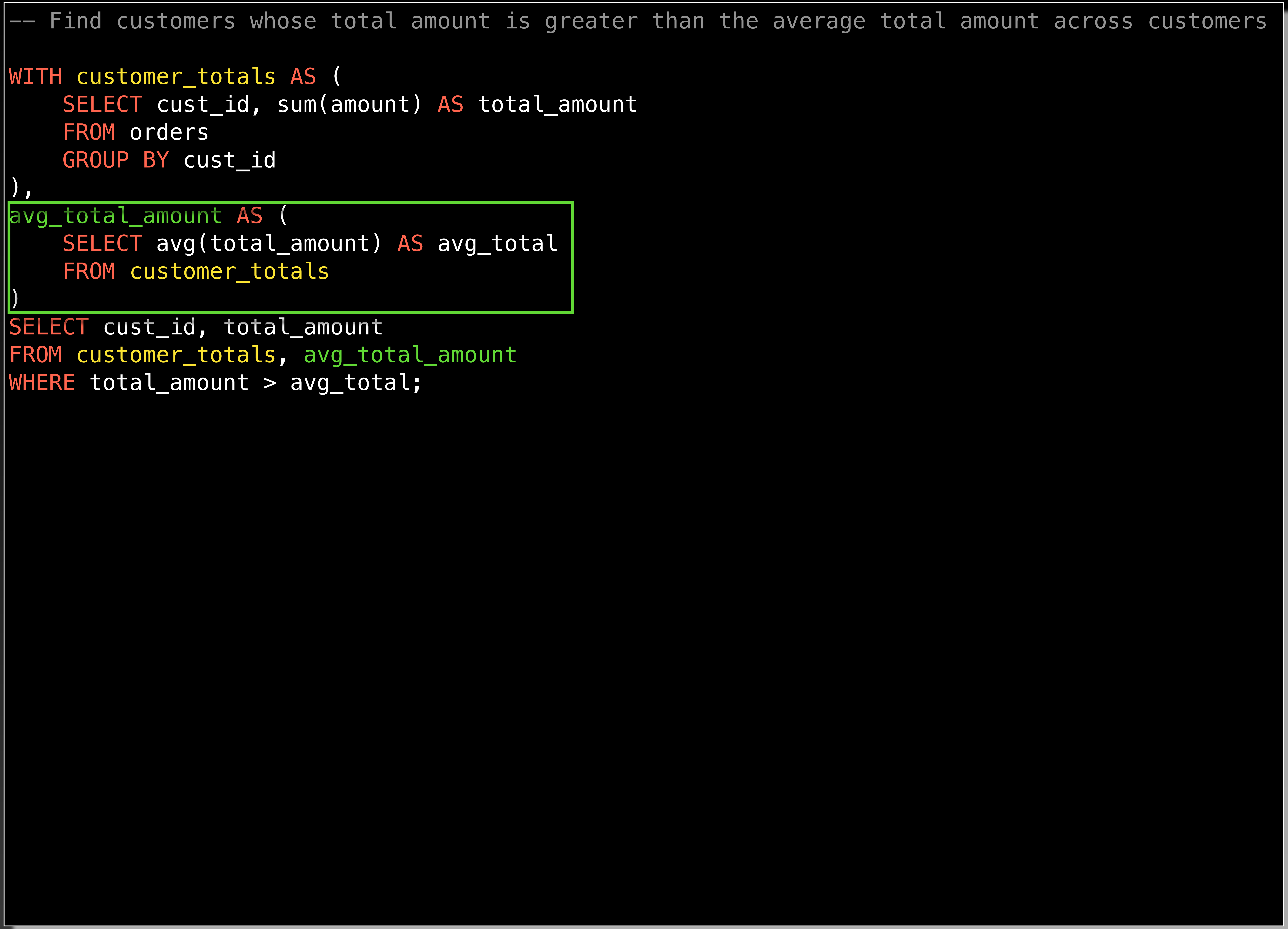
```sql
-- Find customers whose total amount is greater than the average total amount across customers




SELECT cust_id, total_amount
FROM (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
) AS customer_totals
WHERE total_amount > (
    SELECT avg(total_amount) AS avg_total
    FROM (
        SELECT cust_id, sum(amount) AS total_amount
        FROM orders
        GROUP BY cust_id
    ) AS customer_totals
);
```



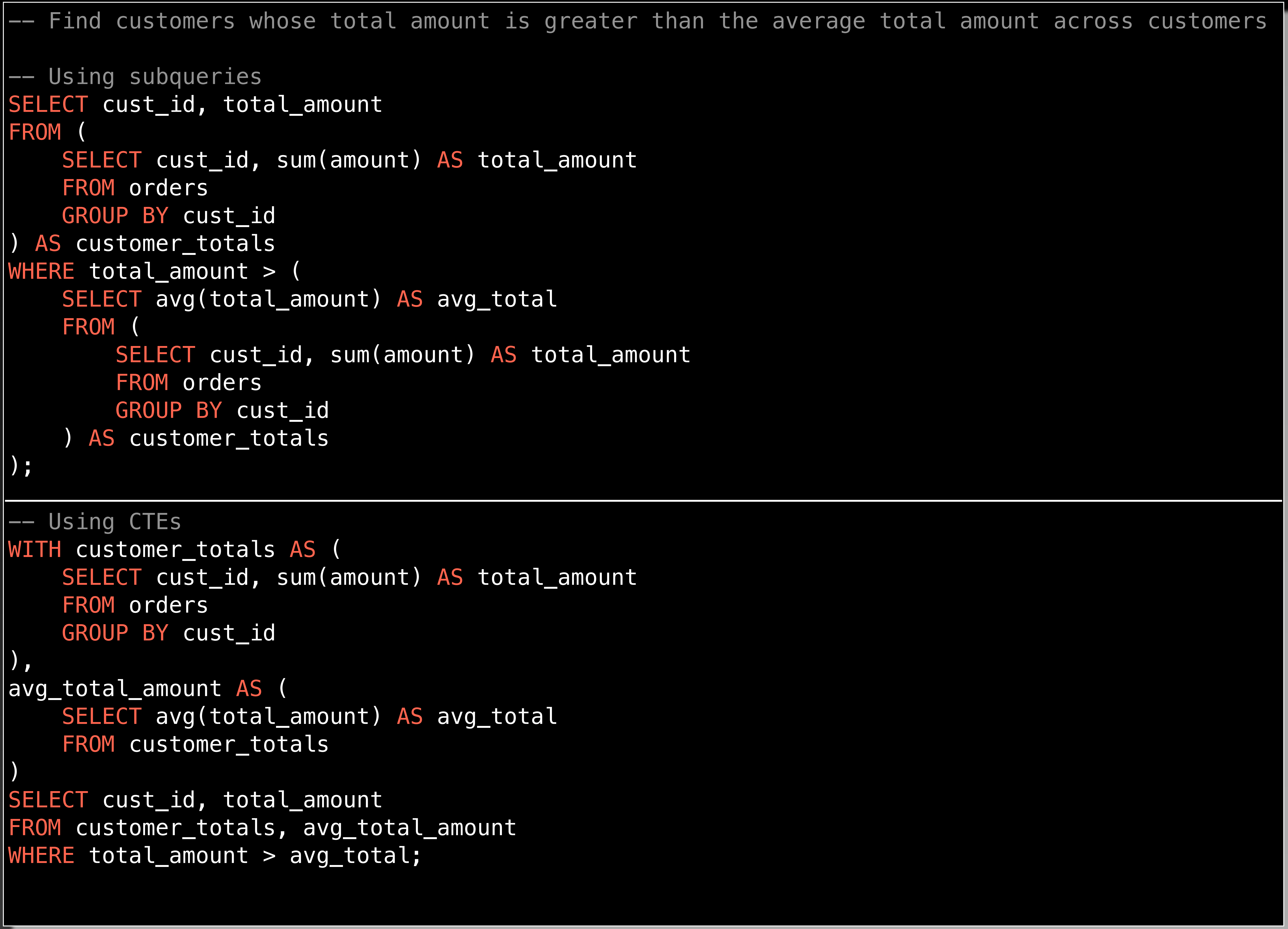
```sql
-- Find customers whose total amount is greater than the average total amount across customers

WITH customer_totals AS (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
)
SELECT cust_id, total_amount
FROM customer_totals
WHERE total_amount > (
    SELECT avg(total_amount) AS avg_total
    FROM customer_totals
);
```



```
-- Find customers whose total amount is greater than the average total amount across customers

WITH customer_totals AS (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
)
SELECT cust_id, total_amount
FROM customer_totals
WHERE total_amount > (
    SELECT avg(total_amount) AS avg_total
    FROM customer_totals
);
```



```
-- Find customers whose total amount is greater than the average total amount across customers

WITH customer_totals AS (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
),
avg_total_amount AS (
    SELECT avg(total_amount) AS avg_total
    FROM customer_totals
)
SELECT cust_id, total_amount
FROM customer_totals, avg_total_amount
WHERE total_amount > avg_total;
```



```sql
-- Find customers whose total amount is greater than the average total amount across customers

-- Using subqueries
SELECT cust_id, total_amount
FROM (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
) AS customer_totals
WHERE total_amount > (
    SELECT avg(total_amount) AS avg_total
    FROM (
        SELECT cust_id, sum(amount) AS total_amount
        FROM orders
        GROUP BY cust_id
    ) AS customer_totals
);
```

```sql
-- Using CTEs
WITH customer_totals AS (
    SELECT cust_id, sum(amount) AS total_amount
    FROM orders
    GROUP BY cust_id
),
avg_total_amount AS (
    SELECT avg(total_amount) AS avg_total
    FROM customer_totals
)
SELECT cust_id, total_amount
FROM customer_totals, avg_total_amount
WHERE total_amount > avg_total;
```