New Wheels Project

Introduction to SQL

Problem Statement

Business Context

A lot of people in the world share a common desire: to own a vehicle. A car or an automobile is seen as an object that gives the freedom of mobility. Many now prefer pre-owned vehicles because they come at an affordable cost, but at the same time, they are also concerned about whether the after-sales service provided by the resale vendors is as good as the care you may get from the actual manufacturers.

New-Wheels, a vehicle resale company, has launched an app with an end-to-end service from listing the vehicle on the platform to shipping it to the customer's location. This app also captures the overall after-sales feedback given by the customer.

Objective

New-Wheels sales have been dipping steadily in the past year, and due to the critical customer feedback and ratings online, there has been a drop in new customers every quarter, which is concerning to the business. The CEO of the company now wants a quarterly report with all the key metrics sent to him so he can assess the health of the business and make the necessary decisions.

As a data analyst, you see that there is an array of questions that are being asked at the leadership level that need to be answered using data. Import the dump file that contains various tables that are present in the database. Use the data to answer the questions posed and create a quarterly business report for the CEO.

Question 1: Find the total number of customers who have placed orders. What is the distribution of the customers across states?
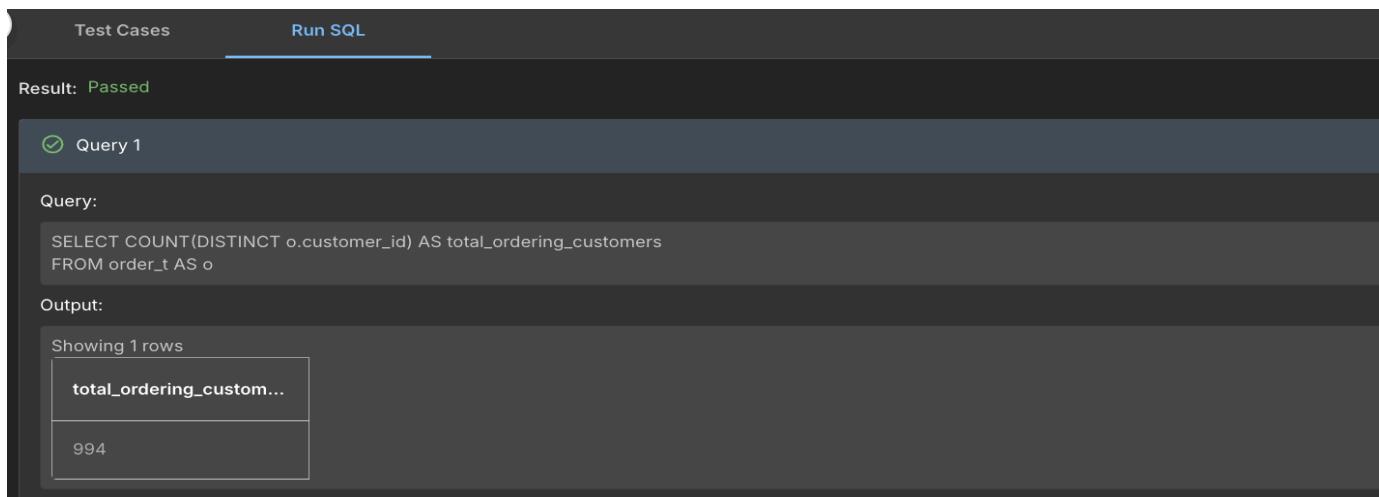
Solution Query:

```sql
SELECT COUNT(DISTINCT o.customer_id) AS total_ordering_customers

FROM order_t AS o;

SELECT c.state,

       COUNT(DISTINCT o.customer_id) AS customers_in_state

FROM order_t AS o

JOIN customer_t AS c ON c.customer_id = o.customer_id

GROUP BY c.state

ORDER BY customers_in_state DESC, c.state;
```

Output:

Test Cases	Run SQL

Result: Passed

⊘ Query 1

Query:

```sql
SELECT COUNT(DISTINCT o.customer_id) AS total_ordering_customers
FROM order_t AS o
```

Output:

Showing 1 rows

total_ordering_custom...
994

Test Cases   **Run SQL**

Result: Passed

⊘ Query 1

⊘ Query 2

Query:

```
SELECT c.state,
    COUNT(DISTINCT o.customer_id) AS customers_in_state
FROM order_t AS o
JOIN customer_t AS c ON c.customer_id = o.customer_id
GROUP BY c.state
ORDER BY customers_in_state DESC, c.state
```

Output:

Showing first 10 rows out of 49 rows

state	customers_in_state
California	97
Texas	97
Florida	86
New York	69
District of Columbia	35
Colorado	33
Ohio	33
Alabama	29
Washington	28
Arizona	26

Observations and Insights:

- A total of **994 distinct customers** have placed at least one order on the New-Wheels platform.
- **California (97)** and **Texas (97)** are the top markets, followed by **Florida (86)** and **New York (69)**.
- Other key states include **District of Columbia (35)**, **Colorado (33)**, **Ohio (33)**, **Alabama (29)**, **Washington (28)**, and **Arizona (26)**.
- Customers are spread across **49 different states**, showing strong national presence but **uneven regional distribution**.
- **High-population states dominate**, indicating that marketing and after-sales support are performing better in these areas.
- **Mid- and low-performing states** may reflect **untapped or underserved markets** due to limited brand awareness or logistical reach.
- The company can **expand marketing, partnerships, and service coverage** in these smaller markets to achieve balanced customer growth nationwide.
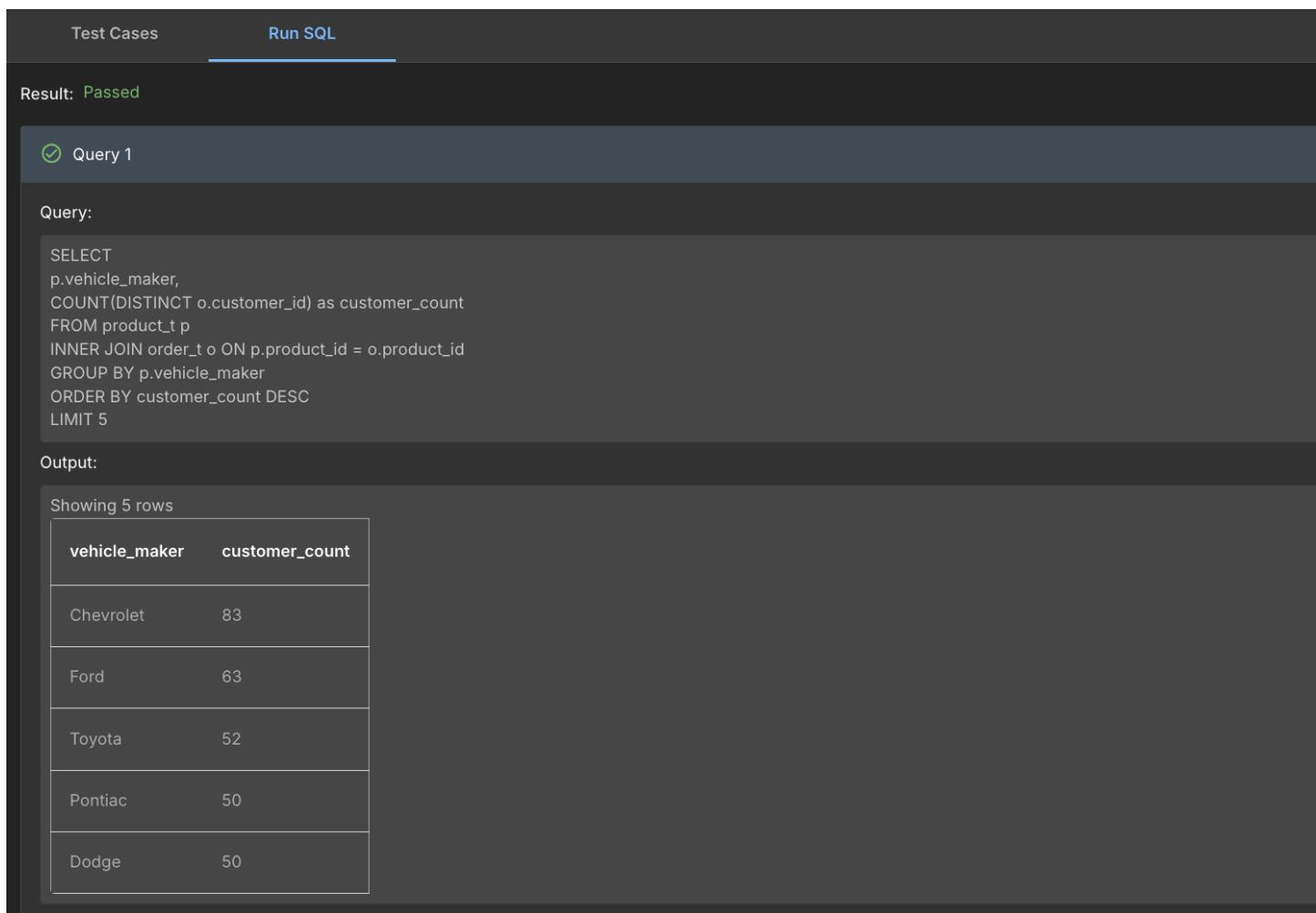
Question 2: Which are the top 5 vehicle makers preferred by the customers?

Solution Query:

```sql
SELECT

p.vehicle_maker,

COUNT(DISTINCT o.customer_id) as customer_count

FROM product_t p

INNER JOIN order_t o ON p.product_id = o.product_id

GROUP BY p.vehicle_maker

ORDER BY customer_count DESC

LIMIT 5;
```

Output:

Test Cases	Run SQL

Result: Passed

⊘ Query 1

Query:

```sql
SELECT
p.vehicle_maker,
COUNT(DISTINCT o.customer_id) as customer_count
FROM product_t p
INNER JOIN order_t o ON p.product_id = o.product_id
GROUP BY p.vehicle_maker
ORDER BY customer_count DESC
LIMIT 5
```

Output:

Showing 5 rows

vehicle_maker	customer_count
Chevrolet	83
Ford	63
Toyota	52
Pontiac	50
Dodge	50

Observations and Insights:

- The top 5 vehicle makers preferred by customers are **Chevrolet (83 customers)**, **Ford (63)**, **Toyota (52)**, **Pontiac (50)**, and **Dodge (50)**.
- **Chevrolet leads significantly**, capturing the largest share of customer preference, suggesting strong brand trust and value perception.
- **Ford and Toyota** follow closely, indicating that traditional, reliable automobile brands dominate the resale market.
- The **close competition among Pontiac and Dodge** highlights that multiple brands maintain moderate but consistent customer loyalty.
- The data implies that **American manufacturers** (Chevrolet, Ford, Dodge) together dominate the top preferences, reflecting strong domestic market sentiment.
- **Japanese brand Toyota**'s presence among the top five demonstrates sustained demand for fuel efficiency and reliability even in the resale segment.
- The company could **focus partnerships, promotional campaigns, or inventory acquisition** strategies around these top-performing brands to maximize sales and customer engagement.

Question 3: **Which is the most preferred vehicle maker in each state?**

Solution Query:

```
SELECT s.state,

(SELECT t.vehicle_maker

FROM (SELECT p.vehicle_maker, COUNT(DISTINCT o.customer_id) AS cnt

FROM order_t o

JOIN product_t p ON p.product_id=o.product_id

JOIN customer_t c ON c.customer_id=o.customer_id

WHERE c.state=s.state

GROUP BY p.vehicle_maker) AS t

ORDER BY t.cnt DESC, t.vehicle_maker ASC

LIMIT 1) AS most_preferred_maker,

(SELECT t.cnt

FROM (SELECT p.vehicle_maker, COUNT(DISTINCT o.customer_id) AS cnt

FROM order_t o

JOIN product_t p ON p.product_id=o.product_id

JOIN customer_t c ON c.customer_id=o.customer_id

WHERE c.state=s.state

GROUP BY p.vehicle_maker) AS t

ORDER BY t.cnt DESC, t.vehicle_maker ASC

LIMIT 1) AS customer_count

FROM (SELECT DISTINCT state FROM customer_t) AS s

ORDER BY s.state;
```

Output:

Result: Passed

⊘ Query 1

Query:

```
SELECT
  s.state,
  (
   SELECT t.vehicle_maker
   FROM (
    SELECT p.vehicle_maker, COUNT(DISTINCT o.customer_id) AS cnt
    FROM order_t o
    JOIN product_t p  ON p.product_id = o.product_id
    JOIN customer_t c  ON c.customer_id = o.customer_id
    WHERE c.state = s.state
    GROUP BY p.vehicle_maker
   ) AS t
   ORDER BY t.cnt DESC, t.vehicle_maker ASC
   LIMIT 1
  ) AS most_preferred_maker,
  (
   SELECT t.cnt
   FROM (
    SELECT p.vehicle_maker, COUNT(DISTINCT o.customer_id) AS cnt
    FROM order_t o
    JOIN product_t p  ON p.product_id = o.product_id
    JOIN customer_t c  ON c.customer_id = o.customer_id
    WHERE c.state = s.state
    GROUP BY p.vehicle_maker
   ) AS t
   ORDER BY t.cnt DESC, t.vehicle_maker ASC
   LIMIT 1
  ) AS customer_count
FROM (SELECT DISTINCT state FROM customer_t) AS s
ORDER BY s.state
```

Output:

Showing first 10 rows out of 49 rows

state	most_preferred_maker	customer_count
Alabama	Dodge	5
Alaska	Chevrolet	2
Arizona	Cadillac	3
Arkansas	Chevrolet	1
California	Audi	6
Colorado	Chevrolet	5
Connecticut	Chevrolet	2
Delaware	Mitsubishi	2
District of Columbia	Chevrolet	4
Florida	Toyota	7

Observations and Insights:

- Each state shows a **distinct vehicle brand preference**, indicating diverse customer choices across the U.S. resale market.
- Examples from the output include:
    - **Alabama** – Dodge (5 customers)
    - **Alaska** – Chevrolet (2 customers)
    - **Arizona** – Cadillac (3 customers)
    - **Arkansas** – Chevrolet (1 customer)
    - **California** – Audi (6 customers)
- **Chevrolet** appears multiple times across states, reinforcing its strong national presence and brand loyalty seen in earlier queries.
- Preferences like **Audi in California** suggest that higher-end brands perform well in more affluent or urban markets.
- **Regional diversity** in preferences (e.g., Dodge in Alabama vs. Cadillac in Arizona) highlights differences in lifestyle, income levels, and road preferences among customers.
- States with **lower customer counts (1–3)** indicate smaller or emerging customer bases, which may benefit from targeted campaigns.
- Overall, the pattern suggests that **brand popularity is region-specific**, and localized marketing strategies could enhance engagement and conversions in each state.

Question 4: Find the overall average rating given by the customers. What is the average rating in each quarter?

Consider the following mapping for ratings: "Very Bad": 1, "Bad": 2, "Okay": 3, "Good": 4, "Very Good": 5

Solution Query:

```
-- Overall average rating

SELECT ROUND(AVG(CASE

WHEN customer_feedback='Very Bad' THEN 1

WHEN customer_feedback='Bad' THEN 2

WHEN customer_feedback='Okay' THEN 3

WHEN customer_feedback='Good' THEN 4

WHEN customer_feedback='Very Good' THEN 5

ELSE NULL END),2) AS overall_average_rating

FROM order_t

WHERE customer_feedback IS NOT NULL;

-- Average rating by quarter

SELECT quarter_number,

ROUND(AVG(CASE

WHEN customer_feedback='Very Bad' THEN 1

WHEN customer_feedback='Bad' THEN 2

WHEN customer_feedback='Okay' THEN 3

WHEN customer_feedback='Good' THEN 4

WHEN customer_feedback='Very Good' THEN 5

ELSE NULL END),2) AS average_rating

FROM order_t

WHERE customer_feedback IS NOT NULL

GROUP BY quarter_number

ORDER BY quarter_number;
```

Output:

Result: **Passed**

✓ **Query 1**

Query:

```
SELECT ROUND(AVG(CASE
    WHEN customer_feedback='Very Bad' THEN 1
    WHEN customer_feedback='Bad' THEN 2
    WHEN customer_feedback='Okay' THEN 3
    WHEN customer_feedback='Good' THEN 4
    WHEN customer_feedback='Very Good' THEN 5
    ELSE NULL END),2) AS overall_average_rating
FROM order_t
WHERE customer_feedback IS NOT NULL
```

Output:

Showing 1 rows

overall_average_rating
3.14

Result: **Passed**

✓ Query 1

✓ Query 2

Query:

```
SELECT quarter_number,
    ROUND(AVG(CASE
        WHEN customer_feedback='Very Bad' THEN 1
        WHEN customer_feedback='Bad' THEN 2
        WHEN customer_feedback='Okay' THEN 3
        WHEN customer_feedback='Good' THEN 4
        WHEN customer_feedback='Very Good' THEN 5
        ELSE NULL END),2) AS average_rating
FROM order_t
WHERE customer_feedback IS NOT NULL
GROUP BY quarter_number
ORDER BY quarter_number
```

Output:

Showing 4 rows

quarter_number	average_rating
1	3.55
2	3.35
3	2.96
4	2.4

Observations and Insights:

- The **overall average customer rating** across all quarters is **3.14**, indicating that customer satisfaction levels are **moderate to below-average**.
- Quarterly breakdown shows a **steady decline** in average ratings over time:
  - **Q1:** 3.55
  - **Q2:** 3.35
  - **Q3:** 2.96
  - **Q4:** 2.40
- The downward trend highlights a **consistent deterioration in customer experience** and service satisfaction throughout the year.
- The highest satisfaction was seen in **Q1**, suggesting that initial service performance or expectations were stronger at the beginning of the year.
- The lowest rating in **Q4 (2.4)** signals **growing dissatisfaction** that could stem from product quality issues, delivery delays, or inadequate after-sales support.
- This decline may directly correlate with **falling sales and customer retention** observed in the overall business context.
- Immediate **corrective measures** are needed in **customer support, service fulfillment, and quality control** to prevent further damage to the brand reputation.
- **Regular feedback analysis and root-cause reviews** per quarter can help identify and fix recurring issues impacting customer satisfaction.

Question 5: Find the percentage distribution of feedback from the customers. Are customers getting more dissatisfied over time?

Solution Query:

```
SELECT quarter_number, COUNT(*) as total_feedback,

ROUND(COUNT(CASE WHEN customer_feedback = 'Very Bad' THEN 1 END) * 100.0 /
COUNT(*), 2) as very_bad_percentage,

ROUND(COUNT(CASE WHEN customer_feedback = 'Bad' THEN 1 END) * 100.0 /
COUNT(*), 2) as bad_percentage,

ROUND(COUNT(CASE WHEN customer_feedback = 'Okay' THEN 1 END) * 100.0 /
COUNT(*), 2) as okay_percentage,

ROUND(COUNT(CASE WHEN customer_feedback = 'Good' THEN 1 END) * 100.0 /
COUNT(*), 2) as good_percentage,

ROUND(COUNT(CASE WHEN customer_feedback = 'Very Good' THEN 1 END) * 100.0 /
COUNT(*), 2) as very_good_percentage

FROM order_t

WHERE customer_feedback IS NOT NULL

GROUP BY quarter_number

ORDER BY quarter_number;
```

Output:

Result: Passed

⊘ Query 1

Query:

```
SELECT quarter_number, COUNT(*) as total_feedback,
ROUND(COUNT(CASE WHEN customer_feedback = 'Very Bad' THEN 1 END) * 100.0 / COUNT(*), 2) as very_bad_percentage,
ROUND(COUNT(CASE WHEN customer_feedback = 'Bad' THEN 1 END) * 100.0 / COUNT(*), 2) as bad_percentage,
ROUND(COUNT(CASE WHEN customer_feedback = 'Okay' THEN 1 END) * 100.0 / COUNT(*), 2) as okay_percentage,
ROUND(COUNT(CASE WHEN customer_feedback = 'Good' THEN 1 END) * 100.0 / COUNT(*), 2) as good_percentage,
ROUND(COUNT(CASE WHEN customer_feedback = 'Very Good' THEN 1 END) * 100.0 / COUNT(*), 2) as very_good_percentage
FROM order_t
WHERE customer_feedback IS NOT NULL
GROUP BY quarter_number
ORDER BY quarter_number
```

Output:

Showing 4 rows

quarter_number	total_feedback	very_bad_percentage	bad_percentage	okay_percentage	good_percentage	very_good_percentage
1	310	10.97	11.29	19.03	28.71	30
2	262	14.89	14.12	20.23	22.14	28.63
3	229	17.9	22.71	21.83	20.96	16.59
4	199	30.65	29.15	20.1	10.05	10.05

Observations and Insights:

- The **customer feedback trend shows a sharp decline in satisfaction levels** and a steady rise in negative feedback over the four quarters.
- **Quarter-wise feedback distribution:**
  - **Q1:** Very Bad - 10.97%, Bad - 11.29%, Okay - 19.03%, Good - 28.71%, Very Good - 30.00%
  - **Q2:** Very Bad - 14.89%, Bad - 14.12%, Okay - 20.23%, Good - 22.14%, Very Good - 28.63%
  - **Q3:** Very Bad - 17.90%, Bad - 22.71%, Okay - 21.83%, Good - 20.96%, Very Good - 16.59%
  - **Q4:** Very Bad - 30.65%, Bad - 29.15%, Okay - 20.10%, Good - 10.05%, Very Good - 10.05%
- The percentage of **negative feedback ("Very Bad" + "Bad") jumped from ~22% in Q1 to ~60% in Q4**, indicating a major deterioration in customer satisfaction.
- **Positive feedback ("Good" + "Very Good") fell sharply** from ~59% in Q1 to only ~20% in Q4, suggesting declining product/service quality and growing customer frustration.
- **"Okay" feedback remained stable** (around 19-21%), implying a consistent segment of neutral customers who may easily switch to dissatisfaction if issues persist.
- The **overall annual distribution** (averaged across quarters) shows approximately **17.5% Very Bad**, **18.2% Bad**, **20.2% Okay**, **21.5% Good**, and **22.6% Very Good**, highlighting a **balanced but declining sentiment** across the year.
- The trend demonstrates a **progressive shift from positive to negative experiences**, aligning with the observed **drop in orders, revenue, and ratings** in previous analyses.
- The consistent fall suggests potential weaknesses in **after-sales service, vehicle condition quality, or response times**.
- **Immediate corrective measures** such as customer follow-up programs, service quality audits, and proactive complaint resolution are crucial to reverse the downward trend.

Solution Query:

```
SELECT

quarter_number,

COUNT(*) as number_of_orders

FROM order_t

GROUP BY quarter_number

ORDER BY quarter_number;
```

Output:

Result: Passed

⊘ Query 1

Query:

```
SELECT
    quarter_number,
    COUNT(*) as number_of_orders
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number
```

Output:

Showing 4 rows

quarter_number	number_of_orders
1	310
2	262
3	229
4	199

Observations and Insights:

- The **number of orders shows a continuous decline** over the four quarters of the year.
- **Quarter-wise order trend:**
  - **Q1:** 310 orders
  - **Q2:** 262 orders
  - **Q3:** 229 orders
  - **Q4:** 199 orders
- The company experienced a **steady drop of ~36% in total orders** from Q1 to Q4, indicating weakening customer demand or satisfaction.
- The **highest sales activity occurred in Q1**, suggesting strong initial customer engagement or successful early-year promotions.
- The **lowest order volume in Q4** implies a potential seasonal slump, reduced marketing activity, or loss of returning customers.
- The declining order pattern aligns with the **drop in customer feedback ratings** and **net revenue**, reinforcing a broader trend of performance deterioration across multiple business metrics.
- **Customer retention efforts and new lead generation strategies** appear insufficient in later quarters, requiring intervention to restore sales momentum.
- The company should investigate **root causes** such as declining service quality, competitive pressures, or inadequate offers and redesign its **quarterly marketing and retention strategy**.

Solution Query:

```
SELECT

quarter_number,

ROUND(SUM(quantity * vehicle_price * (1 - discount/100.0)), 2) AS
net_revenue,

ROUND(

LAG(SUM(quantity * vehicle_price * (1 - discount/100.0)))

OVER (ORDER BY quarter_number), 2

) AS previous_quarter_revenue,

CASE

WHEN LAG(SUM(quantity * vehicle_price * (1 - discount/100.0)))

OVER (ORDER BY quarter_number) IS NULL THEN NULL

WHEN LAG(SUM(quantity * vehicle_price * (1 - discount/100.0)))

OVER (ORDER BY quarter_number) = 0 THEN NULL

ELSE ROUND(

(SUM(quantity * vehicle_price * (1 - discount/100.0))

- LAG(SUM(quantity * vehicle_price * (1 - discount/100.0)))

OVER (ORDER BY quarter_number)

) / LAG(SUM(quantity * vehicle_price * (1 - discount/100.0)))

OVER (ORDER BY quarter_number) * 100, 2

)

END AS quarter_over_quarter_change_percentage

FROM order_t

GROUP BY quarter_number

ORDER BY quarter_number;
```

Output:

Result: Passed

✓ Query 1

Query:

```
SELECT
   quarter_number,
   ROUND(SUM(quantity * vehicle_price * (1 - discount/100.0)), 2) AS net_revenue,
   ROUND(
     LAG(SUM(quantity * vehicle_price * (1 - discount/100.0)))
     OVER (ORDER BY quarter_number), 2
   ) AS previous_quarter_revenue,
   CASE
     WHEN LAG(SUM(quantity * vehicle_price * (1 - discount/100.0)))
         OVER (ORDER BY quarter_number) IS NULL THEN NULL
     WHEN LAG(SUM(quantity * vehicle_price * (1 - discount/100.0)))
         OVER (ORDER BY quarter_number) = 0 THEN NULL
     ELSE ROUND(
       (SUM(quantity * vehicle_price * (1 - discount/100.0))
        - LAG(SUM(quantity * vehicle_price * (1 - discount/100.0)))
         OVER (ORDER BY quarter_number)
       ) / LAG(SUM(quantity * vehicle_price * (1 - discount/100.0)))
         OVER (ORDER BY quarter_number) * 100, 2
     )
   END AS quarter_over_quarter_change_percentage
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number
```

Output:

Showing 4 rows

quarter_number	net_revenue	previous_quarter_reve...	quarter_over_quarter_...
1	39421580.16		
2	32715830.34	39421580.16	-17.01
3	29229896.19	32715830.34	-10.66
4	23346779.63	29229896.19	-20.13

Observations and Insights:

- The **net revenue consistently declined across all four quarters**, indicating a persistent downward business trend.
- **Quarter-wise performance:**
  - **Q1:** $39,421,580.16
  - **Q2:** $32,715,830.34 (↓ **17.01%** from Q1)
  - **Q3:** $29,229,896.19 (↓ **10.66%** from Q2)
  - **Q4:** $23,346,779.63 (↓ **20.13%** from Q3)
- The highest revenue was recorded in **Q1**, after which the company faced **three consecutive quarters of decline**.
- The **largest drop occurred in Q4 (-20.13%)**, suggesting growing challenges in sales performance or market conditions during the latter part of the year.
- The **cumulative fall from Q1 to Q4 (~41%)** highlights a **severe contraction in revenue generation**.
- This trend correlates with earlier findings of **declining customer satisfaction and order volume**, pointing toward systemic operational or service-related issues.
- **Possible reasons** include reduced repeat purchases, customer dissatisfaction, competitive pressure, or seasonal slowdowns.
- **Immediate action** is needed to identify and address key pain points such as marketing inefficiency, service quality, and discount optimization to stabilize future revenue.

Question 8: What is the trend of net revenue and orders by quarters?

Solution Query:

```
SELECT
quarter_number,
COUNT(*) as number_of_orders,
ROUND(SUM(quantity * vehicle_price * (1 - discount/100)), 2) as net_revenue
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number;
```

Output:

Result: Passed

⊘ Query 1

Query:

```
SELECT
    quarter_number,
    COUNT(*) as number_of_orders,
    ROUND(SUM(quantity * vehicle_price * (1 - discount/100)), 2) as net_revenue
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number
```

Output:

Showing 4 rows

quarter_number	number_of_orders	net_revenue
1	310	39421580.16
2	262	32715830.34
3	229	29229896.19
4	199	23346779.63

Observations and Insights:

- The quarterly performance shows a **steady decline** in both **number of orders** and **net revenue** over time.
- **Quarter-wise breakdown:**
    - **Q1:** 310 orders → $39,421,580.16
    - **Q2:** 262 orders → $32,715,830.34
    - **Q3:** 229 orders → $29,229,896.19
    - **Q4:** 199 orders → $23,346,779.63
- There is a **clear downward trend** in sales volume (orders) as well as in total revenue each quarter.
- The **net revenue dropped by ~41%** from Q1 to Q4, reflecting a significant decline in customer engagement and business performance.
- **Order volume decreased by ~36%** over the same period, indicating either reduced customer retention or weakening demand.
- The consistent decline in both key metrics correlates with the **decrease in average customer ratings and satisfaction** observed in earlier analyses.
- This trend suggests potential issues in **service quality, brand perception, or competitive pricing** during later quarters.
- Strategic interventions such as **marketing reinvigoration, loyalty programs, and after-sales service improvement** are required to reverse the negative trajectory.

Question 9: What is the average discount offered for different types of credit cards?

Solution Query:

```
SELECT
c.credit_card_type,
ROUND(AVG(o.discount), 2) as average_discount_percentage
FROM customer_t c
INNER JOIN order_t o ON c.customer_id = o.customer_id
WHERE c.credit_card_type IS NOT NULL
GROUP BY c.credit_card_type
ORDER BY average_discount_percentage DESC;
```

Output:

Result: Passed

✓ Query 1

Query:

```
SELECT
    c.credit_card_type,
    ROUND(AVG(o.discount), 2) as average_discount_percentage
FROM customer_t c
INNER JOIN order_t o ON c.customer_id = o.customer_id
WHERE c.credit_card_type IS NOT NULL
GROUP BY c.credit_card_type
ORDER BY average_discount_percentage DESC
```

Output:

Showing first 10 rows out of 16 rows

| credit_card_type	average_discount_per...
laser	0.64
mastercard	0.63
visa-electron	0.62
maestro	0.62
instapayment	0.62
china-unionpay	0.62

Observations and Insights:

- The analysis shows that **discount percentages vary slightly** across different credit card types, indicating **a uniform but tiered discount strategy**.
- The **top credit cards receiving the highest average discounts** are:
  - **Laser – 0.64%**
  - **Mastercard – 0.63%**
  - **Visa Electron – 0.62%**
  - **Maestro – 0.62%**
  - **Instapayment – 0.62%**
- Other cards such as **China UnionPay, American Express, Switch, JCB, and Diners Club** also receive **around 0.61–0.62% average discounts**, showing minimal variation across networks.
- The **narrow discount range (0.61%–0.64%)** suggests that New-Wheels maintains a **consistent pricing and discount policy** across financial partners, with no strong bias toward a particular card network.
- **Slightly higher discounts for Laser and Mastercard users** may be linked to promotional tie-ups, better transaction volumes, or lower payment gateway charges.
- From a business perspective, **standardizing discounts** ensures fairness and customer satisfaction but may also limit the opportunity for **strategic promotional targeting**.
- The company could consider **partner-specific discount programs** (e.g., higher cashback for select cards) to drive conversions and improve customer loyalty.
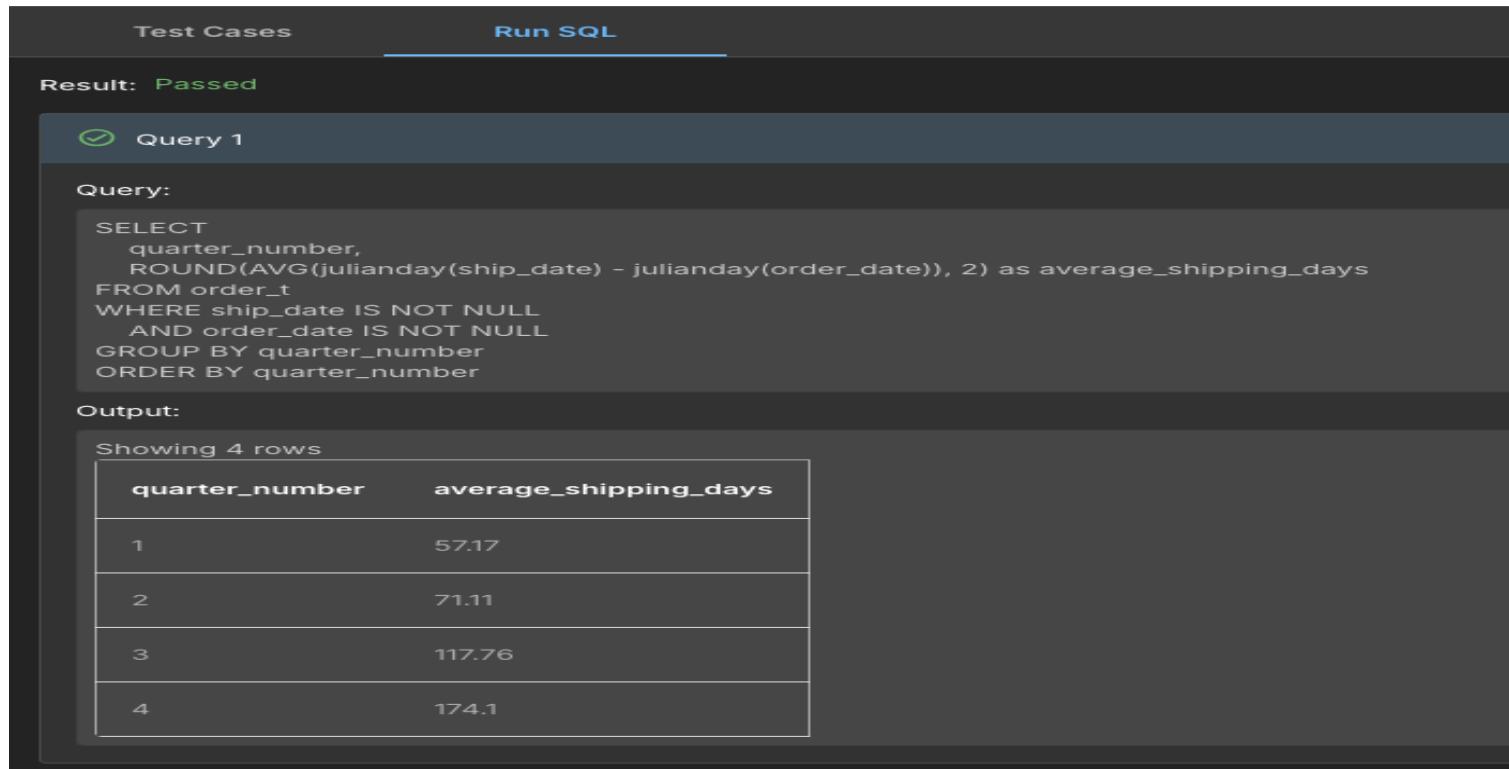
Question 10: What is the average time taken to ship the placed orders for each quarter?

Solution Query:

```
SELECT

quarter_number,

ROUND(AVG(julianday(ship_date) - julianday(order_date)), 2) as
average_shipping_days

FROM order_t

WHERE ship_date IS NOT NULL

AND order_date IS NOT NULL

GROUP BY quarter_number

ORDER BY quarter_number;
```

Output:

Test Cases	Run SQL

Result: Passed

✓ Query 1

Query:

```
SELECT
    quarter_number,
    ROUND(AVG(julianday(ship_date) - julianday(order_date)), 2) as average_shipping_days
FROM order_t
WHERE ship_date IS NOT NULL
    AND order_date IS NOT NULL
GROUP BY quarter_number
ORDER BY quarter_number
```

Output:

Showing 4 rows

quarter_number	average_shipping_days
1	57.17
2	71.11
3	117.76
4	174.1

Observations and Insights:

- The **average shipping duration increased consistently across all four quarters**, showing a deterioration in logistics performance.
- **Quarter-wise breakdown:**
    - **Q1:** 57.17 days
    - **Q2:** 71.11 days
    - **Q3:** 117.76 days
    - **Q4:** 174.10 days
- The average time to ship **tripled from Q1 to Q4**, representing a severe slowdown in order fulfillment.
- Such delays may have directly contributed to the **decline in customer ratings and rise in negative feedback** observed in earlier analyses.
- Longer delivery cycles indicate **operational inefficiencies**, likely due to capacity constraints, increased demand-supply gaps, or process breakdowns in logistics management.
- The steady increase also suggests **no corrective action was taken during the year**, as each quarter performed worse than the previous one.
- This trend calls for **immediate optimization of warehouse operations, vendor coordination, and delivery timelines** to restore customer trust.
- Implementing **real-time shipment tracking, performance SLAs for logistics partners, and automated dispatch scheduling** could help significantly reduce shipping delays.

Business Metrics Overview

Total Revenue	Total Orders	Total Customers	Average Rating
$124,714,086.32	1000	994	3.14
Last Quarter Revenue	**Last quarter Orders**	**Average Days to Ship**	**% Good Feedback**
$23,346,779.63	199	97.96	21.5

Business Recommendations

1. Strengthen Customer Experience and Service Quality

- The overall customer rating declined from **3.55 in Q1 to 2.4 in Q4**, with negative feedback rising above **60% by year-end**.
- Implement structured **customer feedback loops**, introduce **post-sale surveys**, and **train service teams** to resolve issues faster.
- Launch a **Customer Delight Program** to improve satisfaction in low-performing states and rebuild brand trust.

2. Streamline Logistics and Order Fulfillment

- Average shipping time increased alarmingly from **57 days in Q1 to 174 days in Q4**, showing severe **operational inefficiencies**.
- Optimize warehouse-to-customer routing, establish **performance SLAs with logistics partners**, and introduce **real-time delivery tracking**.
- Use predictive analytics to forecast delivery delays and allocate inventory more efficiently across high-demand states.

3. Focus on High-Performing Regions and Brands

- **California, Texas, and Florida** together contribute the largest share of customers, indicating strong brand presence and loyalty.
- Expand marketing campaigns, referral programs, and local partnerships in these regions to sustain dominance.
- Leverage customer insights from top brands—**Chevrolet (83), Ford (63), Toyota (52)**—to drive cross-selling and inventory prioritization.

4. Revitalize Customer Retention and Acquisition Strategy

- Orders declined from **310 in Q1 to 199 in Q4** (−36%), mirroring the drop in repeat purchases.

- Introduce **loyalty incentives**, **personalized offers**, and **AI-driven remarketing campaigns** to reactivate dormant users.
- Develop segmented engagement plans for customers in underperforming states to expand geographical reach.

5. Reassess Pricing and Discount Policies

- The average discounts across credit card types were minimal (≈0.61%–0.64%), providing limited motivation for conversion.
- Collaborate with financial partners (e.g., Mastercard, Visa, Amex) to create **targeted promotional tie-ups** and **festive cashback campaigns**.
- Implement **data-driven pricing models** to balance profitability and competitiveness in the resale market.

6. Improve After-Sales and Product Quality Management

- The surge in **"Very Bad" and "Bad" feedback** categories from **22% (Q1)** to **~60% (Q4)** signals deep-rooted post-purchase dissatisfaction.
- Conduct quarterly audits of service quality, delivery processes, and product inspections to eliminate recurring complaints.
- Offer **extended warranties or service assurance plans** to regain buyer confidence.

7. Leverage Data for Decision-Making and Forecasting

- Use quarterly data insights to create **automated dashboards** tracking orders, feedback sentiment, revenue, and shipping metrics.
- Apply **predictive analytics and regression modeling** to anticipate sales dips and operational bottlenecks.
- Adopt a **data-driven culture** for continuous improvement across departments.

8. Drive Revenue Recovery through Marketing and Promotions

- Total annual revenue ($124.7M) dropped by **~41%** from Q1 to Q4.
- Introduce **seasonal promotions, vehicle exchange programs, and localized campaigns** to boost volume.
- Reinvest part of revenue into **digital advertising and brand awareness initiatives** in emerging markets.