

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.

Business Questions

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

Solution Query:

```

● ● ●

WITH
total_count AS (
  SELECT COUNT(DISTINCT customer_id) AS total_customers FROM order_t
),
customer_counts AS (
  SELECT
    c.state,
    COUNT(DISTINCT o.customer_id) AS customers_count
  FROM order_t o
  JOIN customer_t c ON c.customer_id = o.customer_id
  GROUP BY c.state
)
SELECT
  cc.state,
  cc.customers_count,
  ROUND(cc.customers_count * 100.0 / tc.total_customers, 2) AS percentage
FROM customer_counts cc, total_count tc
ORDER BY customers_count DESC;

```

```

WITH total_count AS (
  SELECT COUNT(DISTINCT customer_id) AS total_customers FROM order_t
),
customer_counts AS (
  SELECT
    c.state,
    COUNT(DISTINCT o.customer_id) AS customers_count
  FROM order_t o
  JOIN customer_t c ON c.customer_id = o.customer_id
  GROUP BY c.state
)
SELECT
  cc.state,
  cc.customers_count,
  ROUND(cc.customers_count * 100.0 / tc.total_customers, 2) AS percentage
FROM customer_counts cc, total_count tc
ORDER BY customers_count DESC;

```

Output:

	state	customers_count	percentage
▶	California	97	9.76
	Texas	97	9.76
	Florida	86	8.65
	New York	69	6.94
	District of Columbia	35	3.52
	Colorado	33	3.32
	Ohio	33	3.32
	Alabama	29	2.92
	Washington	28	2.82
	Arizona	26	2.62
	Illinois	25	2.52
	Pennsylvania	25	2.52
	Virginia	24	2.41
	Missouri	23	2.31
	Tennessee	23	2.31
	Connecticut	22	2.21
	Indiana	21	2.11
	North Carolina	20	2.01


Additional

Total number of customers who placed orders:

```
SELECT
    COUNT(DISTINCT customer_id) as total_customers
FROM order_t;
```

Output:

	total_customers
▶	994

Distribution of customers across state

```
SELECT
    state,
    COUNT(*) AS customer_count
FROM customer_t
GROUP BY state
ORDER BY customer_count DESC;
```

Output :

	state	customer_count
▶	California	97
	Texas	97
	Florida	86
	New York	69
	District of Columbia	35
	Colorado	33
	Ohio	33
	Alabama	29
	Washington	28
	Arizona	26
	Illinois	25
	Pennsylvania	25
	Virginia	24
	Tennessee	23
	Missouri	23
	Connecticut	22
	Indiana	21
	Louisiana	20



Observations and Insights:

- California and Texas are tied as the leading markets, each contributing nearly 10% of total ordering customers.
- Florida and New York follow closely, while District of Columbia represents a smaller but notable segment.
- Top 4 states (CA, TX, FL, NY) account for ~35% of all ordering customers, showing high geographic concentration
- Notable drop between NY (6.94%) and DC (3.52%), suggesting a clear tier difference between major and mid-size markets

Considerations:

- This distribution suggests focusing resources and marketing efforts on maintaining dominance in the top states (ie California, Texas, etc) while exploring growth opportunities in mid-tier markets.
- Also a potential to expand reach in underperforming regions (such as Mississippi, North Dakota, etc)

Question 2: Which are the top 5 vehicle makers preferred by the customers?

Solution Query:

```

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

```

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

Output:

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



Observations and Insights:

- American brands dominate the top preferences
 - o Chevrolet leads significantly with 83 customers
 - o Ford follows as second (63 customers)
 - o Only one non-American brand (Toyota) in top 5
- Interesting tie between Dodge and Pontiac (50 customers each), suggesting similar market appeal
- Notable gap between market leader Chevrolet (83) and second-place Ford (63), indicating Chevrolet's strong market dominance in the pre-owned vehicle segment

Considerations:

- These top 5 makers contribute a significant chunk of orders - targeted promotions on these brands could drive quicker wins

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

Solution Query:

```

    ● ○ ●

WITH vehicle_preference AS (
  SELECT
    c.state,
    p.vehicle_maker,
    COUNT(DISTINCT o.customer_id) AS customer_count,
    RANK() OVER (
      PARTITION BY c.state
      ORDER BY COUNT(DISTINCT o.customer_id) DESC
    ) AS position
  FROM order_t o
  JOIN customer_t c ON o.customer_id = c.customer_id
  JOIN product_t p ON o.product_id = p.product_id
  GROUP BY c.state, p.vehicle_maker
)
SELECT
  state,
  vehicle_maker AS top_vehicle_maker,
  customer_count
FROM vehicle_preference
WHERE position = 1
-- ORDER BY state;
-- ORDER BY customer_count DESC;

```

REMEMBER: it's absolutely possible to have ties - multiple vehicle makers could have the same customer count in a state. In this case, RANK() would give the same rank (1) to tied makers, which is exactly what we want to see

Using RANK() was crucial as it revealed these important market share ties that would have been hidden with ROW_NUMBER()

```

WITH vehicle_preference AS (
  SELECT
    c.state,
    p.vehicle_maker,
    COUNT(DISTINCT o.customer_id) AS customer_count,
    RANK() OVER (
      PARTITION BY c.state
      ORDER BY COUNT(DISTINCT o.customer_id) DESC
    ) AS position
  FROM order_t o
  JOIN customer_t c ON o.customer_id = c.customer_id
  JOIN product_t p ON o.product_id = p.product_id
  GROUP BY c.state, p.vehicle_maker
)
SELECT
  state,
  vehicle_maker AS top_vehicle_maker,
  customer_count
FROM vehicle_preference
WHERE position = 1
-- ORDER BY state;
-- ORDER BY customer_count DESC;
  
```

Output:

	state	top_vehicle_maker	customer_count
▶	Alabama	Dodge	5
	Alaska	Chevrolet	2
	Arizona	Cadillac	3
	Arizona	Pontiac	3
	Arkansas	Chevrolet	1
	Arkansas	GMC	1
	Arkansas	Mitsubishi	1
	Arkansas	Pontiac	1
	Arkansas	Suzuki	1
	Arkansas	Volkswagen	1
	California	Audi	6
	California	Chevrolet	6
	California	Dodge	6
	California	Ford	6
	California	Nissan	6
	Colorado	Chevrolet	5
	Connect...	Chevrolet	2
	Connect...	Maserati	2

Observations and Insights:

- California has a perfect 5-way tie (Nissan, Ford, Dodge, Chevrolet, Audi) with 6 customers each.
- Arizona has a 2-way tie (Cadillac, Pontiac) with 3 customers each.
- Arkansas shows 6-way tie with 1 customer each.

Market dynamics vary significantly

- Some states have clear leaders (Colorado: Chevrolet with 5 customers)
- Some states show highly fragmented preferences (Arkansas with 6 different makers tied)

Business Insights & Considerations

- **Preferences vary widely by state** - even within a state like California, there's a tie among 5 brands with equal popularity.
- States like **Arkansas** show **diverse, evenly split preferences** - no dominant brand, suggesting a fragmented market.
- Using this insight, **regional marketing campaigns** can be tailored to focus on each state's leading brands or tackle fragmented preferences with targeted promotions.

This data suggests highly varied brand preferences across states, with some markets being highly competitive (multiple tied brands) and others having clear leaders.

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:

```

WITH feedback_ratings AS (
    SELECT
        quarter_number,
        CASE customer_feedback
            WHEN 'Very Bad' THEN 1
            WHEN 'Bad' THEN 2
            WHEN 'Okay' THEN 3
            WHEN 'Good' THEN 4
            WHEN 'Very Good' THEN 5
            ELSE NULL
        END AS rating_score
    FROM order_t
    WHERE customer_feedback IS NOT NULL
)
SELECT
    COALESCE(CONCAT('Quarter ', quarter_number), 'Overall') AS period,
    ROUND(AVG(rating_score), 2) AS avg_rating
FROM feedback_ratings
GROUP BY quarter_number WITH ROLLUP;

```

Quick Guide:

- feedback_ratings CTE transforms feedback text → numeric rating.
- GROUP BY quarter_number WITH ROLLUP gives:
 - **Quarter-wise average** (quarter_number = 1,2,3,4)
 - **Overall average** in the row where quarter_number = NULL.

Note if there exists diff case version then we may need to use lower() or upper() in case clause !

```

WITH feedback_ratings AS (
  SELECT
    quarter_number,
    CASE customer_feedback
      WHEN 'Very Bad' THEN 1
      WHEN 'Bad' THEN 2
      WHEN 'Okay' THEN 3
      WHEN 'Good' THEN 4
      WHEN 'Very Good' THEN 5
      ELSE NULL
    END AS rating_score
  FROM order_t
  WHERE customer_feedback IS NOT NULL
)
SELECT
  COALESCE(CONCAT('Quarter ', quarter_number), 'Overall') AS period,
  ROUND(AVG(rating_score), 2) AS avg_rating
FROM feedback_ratings
GROUP BY quarter_number WITH ROLLUP;
  
```

Output:

	period	avg_rating
▶	Quarter 1	3.55
	Quarter 2	3.35
	Quarter 3	2.96
	Quarter 4	2.40
	Overall	3.14

Observations and Insights:

- Clear declining trend in customer satisfaction:
 - o Q1 started strong (3.55)
 - o Each quarter shows progressive decline
 - o Q4 significantly lower (2.40)
- Overall average rating is just 3.14 (between Okay and Good), hinting at moderate service quality.
- The drop from Q1 to Q4 could reflect deteriorating after-sales service, shipping issues, or customer experience degradation over time.

Critical insight: ~30% drop in satisfaction from Q1 (3.55) to Q4 (2.40) suggests serious service quality issues that need immediate attention

Business Implications / Considerations:

- Immediate need to investigate **what changed across quarters** — possibly in shipping, service response, or vendor quality.
- Conduct a deeper **driver analysis** for negative feedback (esp. Q3 & Q4) to prioritize **corrective actions**.
- Consider launching **customer retention or apology campaigns** to rebuild trust in low-rating cohorts.

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

Solution Query:

```

WITH feedback_counts AS (
  SELECT
    quarter_number,
    COUNT(*) as total_feedbacks,
    COUNT(CASE WHEN customer_feedback = 'Very Good' THEN 1 END) as very_good,
    COUNT(CASE WHEN customer_feedback = 'Good' THEN 1 END) as good,
    COUNT(CASE WHEN customer_feedback = 'Okay' THEN 1 END) as okay,
    COUNT(CASE WHEN customer_feedback = 'Bad' THEN 1 END) as bad,
    COUNT(CASE WHEN customer_feedback = 'Very Bad' THEN 1 END) as very_bad
  FROM order_t
  WHERE customer_feedback IS NOT NULL
  GROUP BY quarter_number
)
SELECT
  quarter_number,
  ROUND(very_good * 100.0 / total_feedbacks, 2) as very_good_pct,
  ROUND(good * 100.0 / total_feedbacks, 2) as good_pct,
  ROUND(okay * 100.0 / total_feedbacks, 2) as okay_pct,
  ROUND(bad * 100.0 / total_feedbacks, 2) as bad_pct,
  ROUND(very_bad * 100.0 / total_feedbacks, 2) as very_bad_pct
FROM feedback_counts
ORDER BY quarter_number;

```

Mindset (CTE approach):

matrix-style result

1. Need counts by feedback type → used CASE for each category (Very Good to Very Bad)
2. Need percentages → total count needed as denominator for each quarter
3. Want wide format → each feedback type as separate column (ie matrix-style result)
4. Group by quarter → see trend over time

We needed to count feedback distribution by type. So, we used CASE WHEN for each category (Very Good to Very Bad) to create separate columns per type, grouped by quarter.

```

WITH feedback_counts AS (
  SELECT
    quarter_number,
    COUNT(*) as total_feedbacks,
    COUNT(CASE WHEN customer_feedback = 'Very Good' THEN 1 END) as very_good,
    COUNT(CASE WHEN customer_feedback = 'Good' THEN 1 END) as good,
    COUNT(CASE WHEN customer_feedback = 'Okay' THEN 1 END) as okay,
    COUNT(CASE WHEN customer_feedback = 'Bad' THEN 1 END) as bad,
    COUNT(CASE WHEN customer_feedback = 'Very Bad' THEN 1 END) as very_bad
  FROM order_t
  WHERE customer_feedback IS NOT NULL
  GROUP BY quarter_number
)
SELECT
  quarter_number,
  ROUND(very_good * 100.0 / total_feedbacks, 2) as very_good_pct,
  ROUND(good * 100.0 / total_feedbacks, 2) as good_pct,
  ROUND(okay * 100.0 / total_feedbacks, 2) as okay_pct,
  ROUND(bad * 100.0 / total_feedbacks, 2) as bad_pct,
  ROUND(very_bad * 100.0 / total_feedbacks, 2) as very_bad_pct
FROM feedback_counts
ORDER BY quarter_number;
  
```

Output:

	quarter_number	very_good_pct	good_pct	okay_pct	bad_pct	very_bad_pct
▶	1	30.00	28.71	19.03	11.29	10.97
	2	28.63	22.14	20.23	14.12	14.89
	3	16.59	20.96	21.83	22.71	17.90
	4	10.05	10.05	20.10	29.15	30.65

Observations and Insights:

- Clear deterioration in customer satisfaction:
 - o Q1: ~59% positive (Very Good + Good)
 - o Q4: ~20% positive, with ~60% negative (Bad + Very Bad)
- Critical shift in Q3:
 - o First time negative feedback exceeds positive
 - o Almost equal distribution across all categories (~20% each)
- Dramatic Q4 decline:
 - o Very Good/Good dropped to 10% each
 - o Very Bad increased to 30.65%
 - o Suggests urgent need for intervention

- Drop in +ve sentiments
 - o Very Good feedback declined from 30% in Q1 to 10% in Q4
 - o Good also dropped significantly, from 28.7% to 10%
- Surge in Negative Sentiment:
 - o Very Bad increased 3x from 11% to 30.65% by Q4
 - o Bad also doubled from 11.29% to 29.15%

Overall Trend (Implications):

- There is a clear deterioration in customer satisfaction over time (showing specific shift from positive to negative feedback)
- Signals potential issues with product quality, shipping, or post-sale service

Question 6: What is the trend of the number of orders by quarter?

Solution Query:

```
SELECT
    quarter_number,
    COUNT(order_id) as order_count,
    ROUND(COUNT(order_id) * 100.0 / SUM(COUNT(order_id))) OVER (), 2) as
percentage_of_total
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number;
```

REMEMBER:

- ✓ Here empty over() is used to get window of entire table so that sum() can be used !!

OVER() is used to turn an aggregate function into a window function, so you can

- Compute totals or averages across entire table or partition
- Without collapsing rows like GROUP BY does

```
SELECT
    quarter_number,
    COUNT(order_id) as order_count,
    ROUND(COUNT(order_id) * 100.0 / SUM(COUNT(order_id))) OVER (), 2) as
percentage_of_total
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number;
```

Output:

	quarter_number	order_count	percentage_of_total
▶	1	310	31.00
	2	262	26.20
	3	229	22.90
	4	199	19.90

Observations and Insights:

- Clear declining trend in order volume:
 - o Q1 started strong (310 orders, 31%)
 - o Q4 ended significantly lower (199 orders, 19.9%)
 - o ~36% drop in orders from Q1 to Q4
 - o This aligns with the business concern around declining sales.
- Consistent quarter-over-quarter decline:
 - o Q1→Q2:  15.5%
 - o Q2→Q3:  12.6%
 - o Q3→Q4:  13.1%

Note:

This order decline aligns with previous findings of decreasing customer satisfaction, suggesting a direct correlation between customer dissatisfaction and reduced order volume

Question 7: Calculate the net revenue generated by the company.

What is the quarter-over-quarter % change in net revenue?

NOTE: Since the discount column already holds the decimal values (ie 0.4, 0.8, etc...), we directly use it as percentage fraction without dividing by 100

Formula for revenue : qty * price * (1 - discount)

Also, price will be used from order table as it indicates actual price at time of an order.

Solution Query:

```

WITH revenue_per_quarter AS (
  SELECT
    quarter_number,
    ROUND(SUM(quantity * (vehicle_price * (1 - discount))), 2) AS net_revenue
  FROM order_t
  GROUP BY quarter_number
),
revenue_with_change AS (
  SELECT
    quarter_number,
    net_revenue,
    LAG(net_revenue) OVER (ORDER BY quarter_number) AS prev_revenue
  FROM revenue_per_quarter
)
SELECT
  quarter_number,
  net_revenue,
  ROUND(
    CASE
      WHEN prev_revenue IS NULL THEN NULL
      ELSE ((net_revenue - prev_revenue) / prev_revenue) * 100
    END, 2
  ) AS qoq_percentage_change
FROM revenue_with_change
ORDER BY quarter_number;

```

Mindset

1. Calculate net revenue = quantity × price × (1 - discount%), for each quarter
 - o Use group by on quarter
2. Track prev quarter revenue at each given quarter
 - o Use LAG to get previous quarter's revenue
3. Calculate QoQ change = ((current - previous)/previous) × 100

```

WITH revenue_per_quarter AS (
  SELECT
    quarter_number,
    ROUND(SUM(quantity * (vehicle_price * (1 - discount))), 2) AS net_revenue
  FROM order_t
  GROUP BY quarter_number
),
revenue_with_change AS (
  SELECT
    quarter_number,
    net_revenue,
    LAG(net_revenue) OVER (ORDER BY quarter_number) AS prev_revenue
  FROM revenue_per_quarter
)
SELECT
  quarter_number,
  net_revenue,
  ROUND(
    CASE
      WHEN prev_revenue IS NULL THEN NULL
      ELSE ((net_revenue - prev_revenue) / prev_revenue) * 100
    END, 2
  ) AS qoq_percentage_change
FROM revenue_with_change
ORDER BY quarter_number;
  
```

Output:

	quarter_number	net_revenue	qoq_percentage_change
▶	1	18032549.90	NULL
	2	13122995.76	-27.23
	3	8882298.84	-32.32
	4	8573149.28	-3.48

Additional

Net revenue generated by company

```
SELECT
    ROUND(SUM(quantity * vehicle_price * (1 - discount)), 2) AS total_net_revenue
FROM order_t;
```

	total_net_revenue
▶	48610993.78

Observations and Insights:

- Significant revenue decline throughout the year:
 - o Q1: \$18.03M (highest)
 - o Q4: \$8.57M (lowest)
 - o Total decline: ~52% from Q1 to Q4
- QoQ decline accelerating:
 - o Q1→Q2: -27.23%
 - o Q2→Q3: -32.32% (steepest decline)
 - o Q3→Q4: -3.48% (decline slowed)
- Revenue trend insights:
 - o Sharpest drop in middle quarters (Q2 – Q3)
 - o Q4 shows smallest decline
 - o Still align with declining order volumes and customer satisfaction

This paints a concerning picture of accelerating business decline requiring immediate intervention.

Business Recommendations:

- Investigate causes behind this consistent decline:
 - o Was there a drop in orders or a change in discounting strategy?
 - o Was customer sentiment (feedback) worsening across quarters?
- Consider running targeted campaigns or reviewing pricing/discounting models to recover revenue.

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

Solution Query:

```

WITH computed_orders AS (
    SELECT
        quarter_number,
        quantity * vehicle_price * (1 - discount) AS net_revenue_per_order
    FROM order_t
)
SELECT
    quarter_number,
    COUNT(*) AS order_count,
    ROUND(SUM(net_revenue_per_order), 2) AS net_revenue,
    ROUND(SUM(net_revenue_per_order) / COUNT(*), 2) AS avg_revenue_per_order
FROM computed_orders
GROUP BY quarter_number
ORDER BY quarter_number;
  
```

```

WITH computed_orders AS (
    SELECT
        quarter_number,
        quantity * vehicle_price * (1 - discount) AS net_revenue_per_order
    FROM order_t
)
SELECT
    quarter_number,
    COUNT(*) AS order_count,
    ROUND(SUM(net_revenue_per_order), 2) AS net_revenue,
    ROUND(SUM(net_revenue_per_order) / COUNT(*), 2) AS avg_revenue_per_order
FROM computed_orders
GROUP BY quarter_number
ORDER BY quarter_number;
  
```

Output:

	quarter_number	order_count	net_revenue	avg_revenue_per_order
▶	1	310	18032549.90	58169.52
	2	262	13122995.76	50087.77
	3	229	8882298.84	38787.33
	4	199	8573149.28	43081.15

Observations and Insights:

- Parallel decline in both orders and revenue:
 - o Orders: 310 → 199 ( 36%)
 - o Revenue: \$18.03M → \$8.57M ( 52%)
- Average revenue per order show significant decline:
 - o Q1: \$58,169 (highest)
 - o Q3: \$38,787 (lowest)
 - o Q4: Slight recovery to \$43,081
- Critical insights:
 - o Steepest drop in avg order value Q1 → Q3 (33% decline)
 - o Q4 shows slight recovery in avg order value (+11% from Q3)
 - o Double impact: losing both order volume and order value
 - o Unlike previous analysis, Q4 shows small improvement in avg order value despite lowest total orders.
 - o Suggests losing both volume AND high-value customers

Insights

- Quarter 1 had the highest revenue and most orders ie peak business period.
- Monitoring average revenue per order can help detect discount impact or pricing strategy effectiveness over time.

This revised view shows some severe revenue impact than earlier analysis, though with an interesting uptick in average order value in Q4.

NOTE: Since the **discount** column already holds the decimal values (ie 0.4, 0.8, etc...), we directly use it as percentage fraction without dividing by 100

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 avg_discount_pct,
    COUNT(DISTINCT o.customer_id) as customer_count,
    COUNT(*) as order_count
FROM order_t o
JOIN customer_t c ON c.customer_id = o.customer_id
GROUP BY c.credit_card_type
ORDER BY avg_discount_pct DESC;
```

```
SELECT
    c.credit_card_type,
    ROUND(AVG(o.discount), 2) as avg_discount_pct,
    COUNT(DISTINCT o.customer_id) as customer_count,
    COUNT(*) as order_count
FROM order_t o
JOIN customer_t c ON c.customer_id = o.customer_id
GROUP BY c.credit_card_type
ORDER BY avg_discount_pct DESC;
```

Output:

	credit_card_type	avg_discount_pct	customer_count	order_count
▶	laser	0.64	26	26
	mastercard	0.63	79	80
	americanexpress	0.62	49	49
	china-unionpay	0.62	45	46
	instapayment	0.62	16	16
	maestro	0.62	63	64
	visa-electron	0.62	48	49
	bankcard	0.61	44	44
	diners-dub-carte-blanche	0.61	48	49
	diners-dub-us-ca	0.61	13	13
	jcb	0.61	423	424
	switch	0.61	43	43
	diners-dub-enroute	0.60	48	48
	visa	0.60	36	36
	solo	0.59	8	8
	diners-dub-international	0.58	5	5

Observations and Insights:

- Discount variation is minimal across cards:
 - o Highest: Laser (0.64%)
 - o Lowest: Diners-Club-International (0.58%)
 - o Very narrow range (only 0.06% difference)
- JCB dominates market share:
 - o 423 customers (largest by far)
 - o 424 orders (suggesting consistent usage)
 - o Other cards average 30-80 customers each
- Customer loyalty patterns:
 - o Most cards show 1:1 customer-to-order ratio
 - o Few cards (Mastercard, Maestro) show slight repeat purchases
 - o Suggests limited repeat business across all card types

Takeaways

- Laser, Mastercard, and American Express received the highest average discounts
- The minimal discount variation suggests credit card type isn't a major factor in pricing strategy.

Question 10: What is the average time taken to ship the placed orders for each quarter?

Solution Query:

```
SELECT
    quarter_number,
    ROUND(AVG(DATEDIFF(ship_date, order_date)), 0) as avg_days_to_ship,
    COUNT(*) as total_orders
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number;
```

```
SELECT
    quarter_number,
    ROUND(AVG(DATEDIFF(ship_date, order_date)), 0) as avg_days_to_ship,
    COUNT(*) as total_orders
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number;
```

Output:

	quarter_number	avg_days_to_ship	total_orders
▶	1	57	310
	2	71	262
	3	118	229
	4	174	199



Observations and Insights:

- Severe deterioration in shipping performance:
 - o Q1: 57 days average
 - o Q4: 174 days average (3x longer than Q1)
 - o Consistent quarter-over-quarter increase in delays
- Correlation with order volume:
 - o Orders decreased (310 → 199)
 - o Yet shipping times increased dramatically
 - o Suggests operational issues beyond just volume

- Critical trend:
 - o Q1→Q2: +14 days
 - o Q2→Q3: +47 days
 - o Q3→Q4: +56 days
 - o Accelerating deterioration in service levels

Insights

- Consistent quarter-over-quarter increase in delays
- This indicates progressively slower logistics or fulfillment issues over time - a potential red flag for customer satisfaction.
- Trend suggests decreasing operational efficiency in order processing and shipping across quarters.

This explains earlier findings of declining customer satisfaction and reduced orders - shipping delays are getting significantly worse.

Takeaways

- Laser, Mastercard, and American Express received the highest average discounts
- The minimal discount variation suggests credit card type isn't a major factor in pricing strategy.

Business Metrics Overview

Total Revenue

NOTE: Since the discount column already holds the decimal values (ie 0.4, 0.8, etc...), we directly use it as percentage fraction without dividing by 100

```
SELECT
    ROUND(SUM(quantity * vehicle_price * (1 - discount)), 2) AS total_revenue
FROM order_t;
```

	total_revenue
▶	48610993.78

Total Orders

```
SELECT
    COUNT(*) AS total_orders
FROM order_t;
```

	total_orders
▶	1000

Total Customers

```
SELECT
    COUNT(DISTINCT customer_id) as customer_count
from order_t
```

	customer_count
▶	994

NOTE: This ensures only customers with actual orders are counted. (ie customers active for business)
 When calculating business metrics (like Total Customers), we usually focus on customers who have placed at least one order, because:

- They contributed to revenue and activity
- It reflects engaged users, not just sign-ups or entries in a database.
- Most downstream metrics (like retention, conversion, CLV) are based on purchasing behavior.

Average Ratings

```

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

	avg_rating
▶	3.14

Last Quarter Revenue

```

SELECT
  ROUND(SUM(quantity * vehicle_price * (1 - discount)), 2) as last_quarter_revenue
FROM order_t
WHERE quarter_number = 4;
  
```

	last_quarter_revenue
▶	8573149.28

Last Quarter Orders

```

SELECT
  COUNT(*) as last_quarter_orders
FROM order_t
WHERE quarter_number = 4;
  
```

	last_quarter_orders
▶	199

Average Days to Ship

```

SELECT
  ROUND(AVG(DATEDIFF(ship_date, order_date)), 0) AS avg_days_to_ship
FROM order_t
WHERE ship_date IS NOT NULL AND order_date IS NOT NULL;
  
```

	avg_days_to_ship
▶	98

% Good Feedback

```

SELECT
  ROUND(
    COUNT(CASE WHEN customer_feedback IN ('Good', 'Very Good') THEN 1 END) * 100.0 /
    COUNT(customer_feedback)
  , 2) as good_feedback_percentage
FROM order_t
WHERE customer_feedback IS NOT NULL;
  
```

	good_feedback_percentage
▶	44.10

Gist:

Total Revenue	Total Orders	Total Customers	Average Rating
48610993.78 = \$48.61M	1000	994	3.14
Last Quarter Revenue	Last quarter Orders	Average Days to Ship	% Good Feedback
8573149.28 = \$8.57M	199	98	44.10

Business Recommendations

1. Urgent: Address Shipping Delays

- Improve shipping efficiency
- Current 98-day average shipping time is unacceptable
- Q4's 174-day average needs immediate intervention

Recommendations

- Consider additional shipping partners or logistics optimization
- Optimize logistics or vendor SLAs to reduce delays and enhance customer satisfaction.

2. Implement Customer Retention Program

- Focus on high-value states (CA, TX, FL, NY)
- Target repeat purchases (currently minimal across all payment types)
- Develop loyalty rewards program

3. Address Declining Customer Satisfaction

- Average rating fell from 3.55 (Q1) to 2.40 (Q4);
- only 44.10% feedback is positive (Good/Very Good).

Recommendation:

- Initiate a structured feedback loop, improve post-purchase services, and act on complaints.

4. Revamp Quality Assurance

- Address 52% revenue drop from Q1 to Q4
- Focus on Q3-Q4 service issues where satisfaction plummeted
- Implement customer feedback action plan

5. Revamp Product or Pricing Strategy

- Net revenue declined each quarter along with orders count

Recommendation:

- Reevaluate marketing effectiveness, product appeal, or pricing vs competition.

6. Geographic Expansion Strategy

- Strengthen presence in top 4 states (35% of customers)
- Develop growth plan for mid-tier markets
- Address underperforming states
- States like California and Texas lead in customer count and orders.

Recommendation:

- Focus marketing spend and fulfillment infrastructure in top-performing states.

7. Brand Portfolio Optimization

- Leverage Chevrolet's market leadership
- Strengthen American brands portfolio (Ford, Dodge)
- Evaluate Toyota's success as only top foreign brand
- Chevrolet, Ford, and Toyota are top choices, but preferences vary by state.

Recommendation:

- Personalize inventory by region to improve conversion and reduce overstock.

8. Service Level Improvements

- Target bringing shipping time back to Q1 levels (57 days)
- Improve good feedback rate (currently only 44.10%)
- Set quarterly performance targets

9. Payment Strategy Review

- Evaluate discount strategy (currently minimal variation 0.58-0.64)
- Consider targeted promotions for high-value customers
- Develop card-specific partnerships

10. Leverage Loyal Payment Channels

- Majority of users use JCB, Mastercard, Maestro, Visa with average discounts 0.6.

Recommendation:

- Partner with top card providers for exclusive promotions to increase conversions.

11. Customer Experience Enhancement

- Focus on reversing Q4 trends (*lowest orders, highest delays*)
- Implement satisfaction monitoring system
- Develop rapid response to negative feedback

12. Combat Customer Churn

- Launch retention programs (e.g., loyalty points, targeted re-engagement campaigns).

13. Track Dissatisfaction Patterns

- “Very Bad” and “Bad” feedbacks rose sharply in later quarters.

Recommendation:

- Monitor feedback by product/vendor and blacklist underperforming sources.