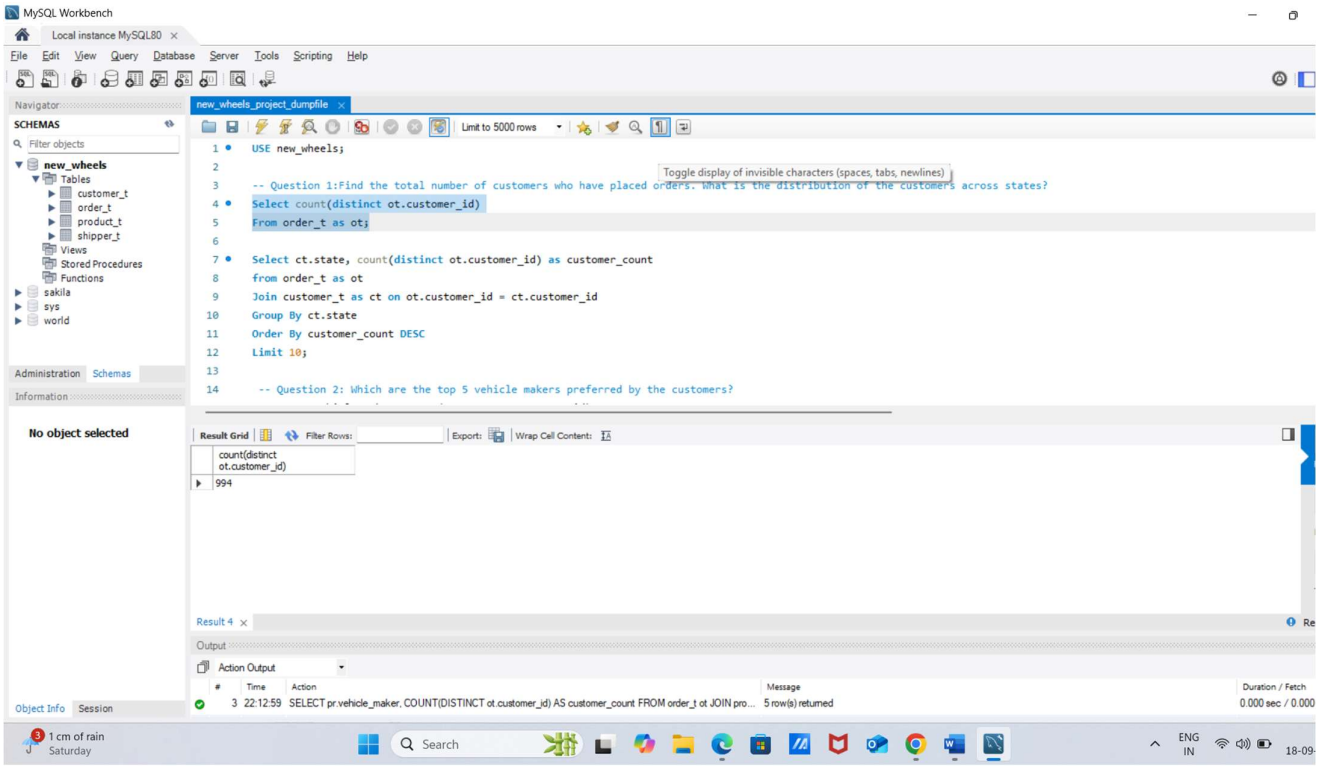
Business Questions

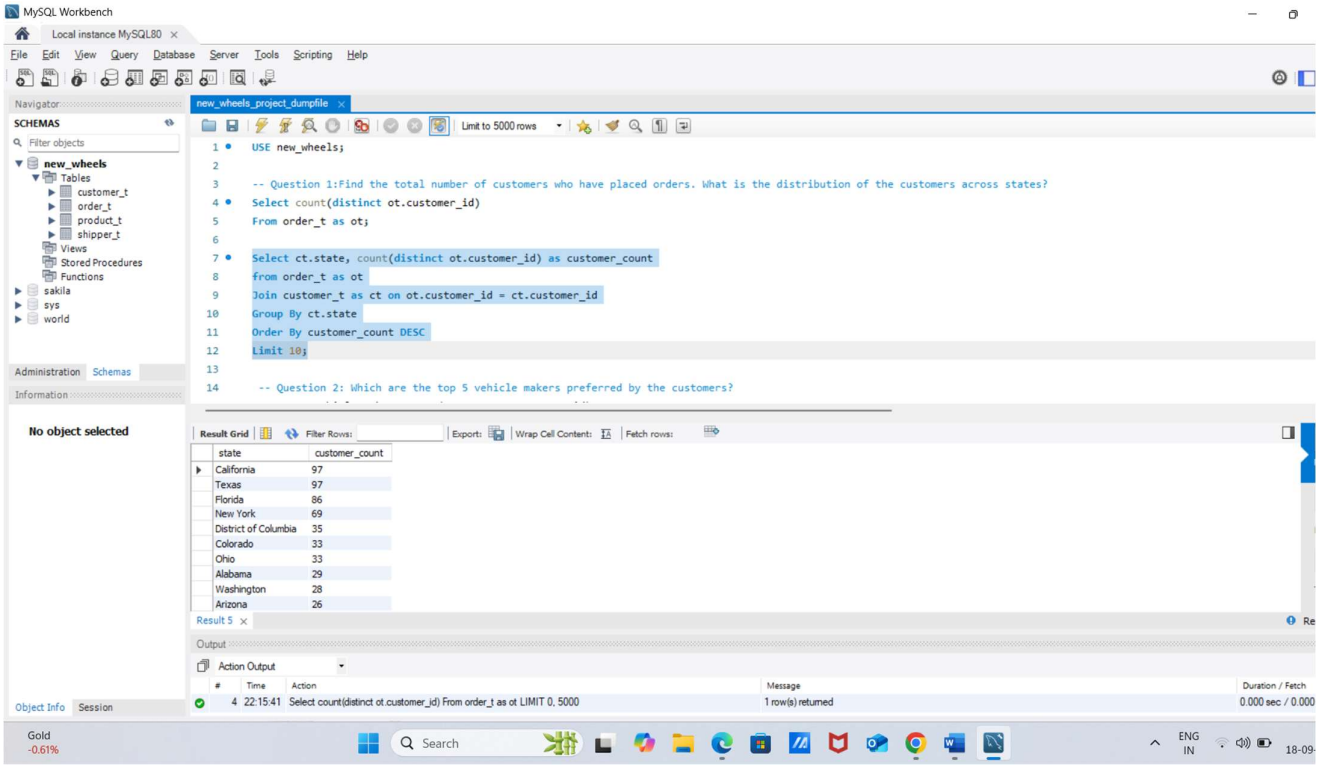
Question 1: Find the total number of customers who have placed orders. What is the distribution of the customers across states?

Solution Query:

```
Select count(distinct ot.customer_id)

From order_t as ot;

Select ct.state, count(distinct ot.customer_id) as customer_count

from order_t as ot

Join customer_t as ct on ot.customer_id = ct.customer_id

Group By ct.state

Order By customer_count DESC

Limit 10;
```

Output:





Observations and Insights:

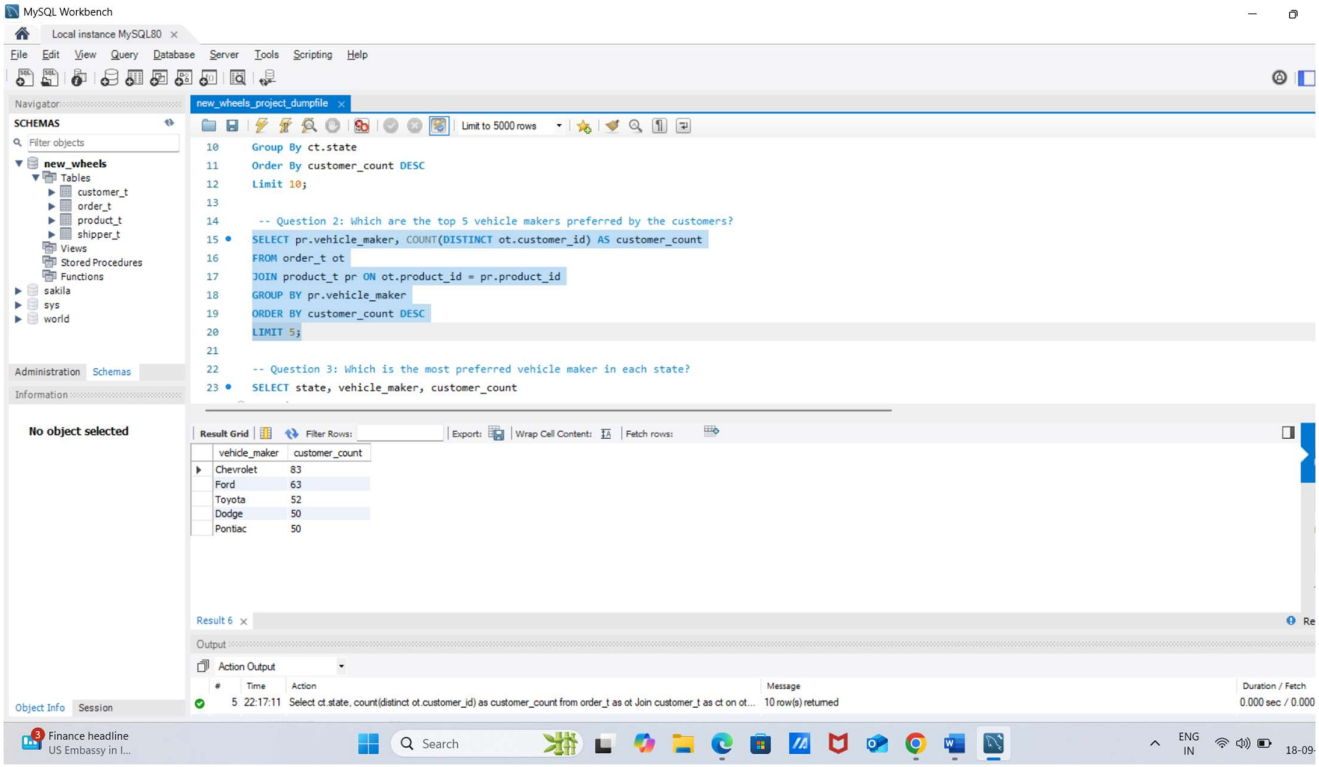
- There are total 994 Unique Customers in the New Wheels Data Base who have made at least 1 Purchase.
- States with Highest Number of Customers to Purchase Vehicles are from California and Texas having 97 Customers each. Florida comes next with 86 Customers and New York after it with 69 Customers.
- Arizona has the least customer base of 26 Customers above it is Washington with 28 Customers and Alabama with 29 Customers. These 3 States are at bottom of the Table.

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

Solution Query:

```
SELECT pr.vehicle_maker, COUNT(DISTINCT ot.customer_id) AS customer_count

FROM order_t ot

JOIN product_t pr ON ot.product_id = pr.product_id

GROUP BY pr.vehicle_maker

ORDER BY customer_count DESC

LIMIT 5;
```

Output:



Observations and Insights:

- Chevrolet is the most preferred Used Car Brands by the Customers. Total 83 Customers have made purchase of Chevrolet Brands Car.
- Ford comes in second place with total 63 Customers.
- At third Toyota has 52 Customers followed by Dodge and Pontiac with 50 Customers each.

- These 5 Brands alone constitute to almost 30% of the Business of New Wheels across different states.

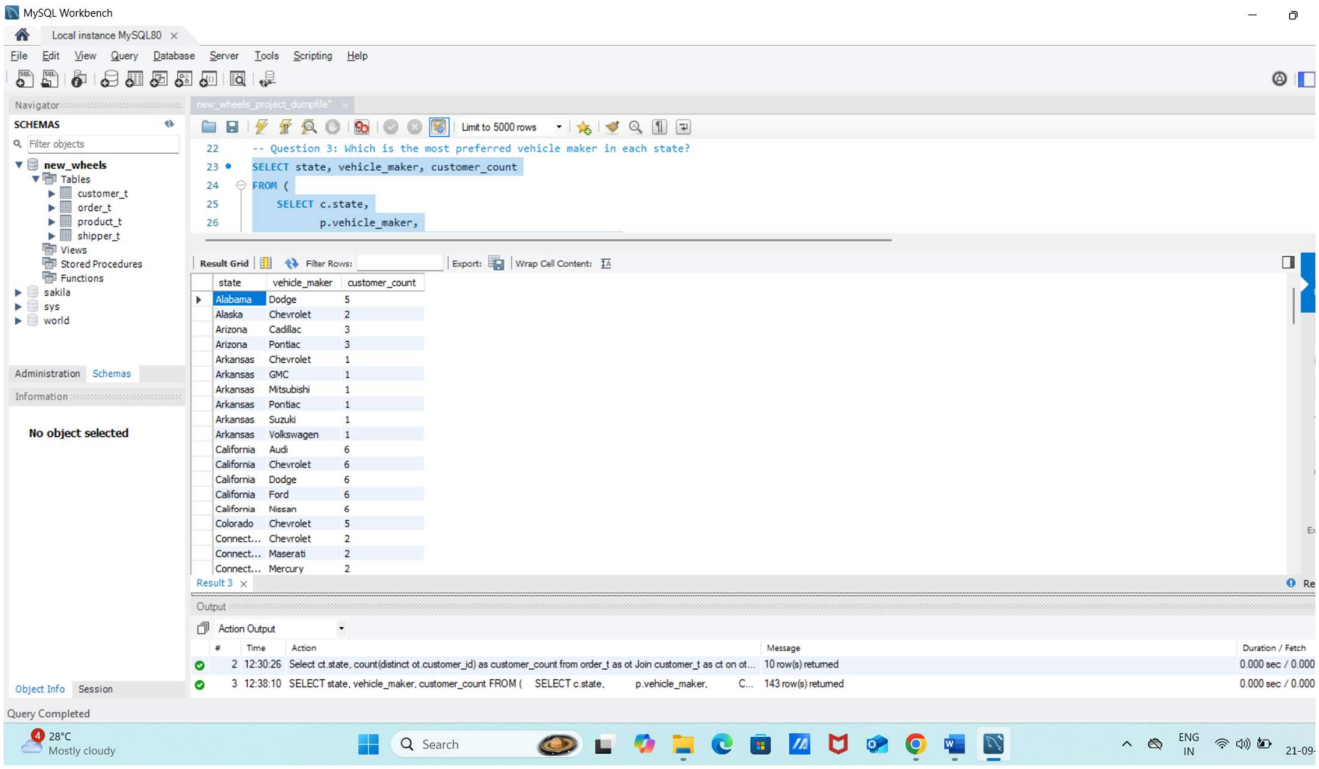
Question 3: Which is the most preferred vehicle maker in each state?

Solution Query:

```
SELECT state, vehicle_maker, customer_count

FROM (

    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 rnk

    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
) t
WHERE rnk = 1
ORDER BY state;
```

Output:



Observations and Insights:

- It can be seen all the customers from different states have varied choices for selection of car makers.

- For Alabama State Dodge is most preferred on the other for Colorado its Chevrolet. For Texas its Chevrolet and for Arizona its Pontiac.
- California has preference to 5 Brands together having equal customers for those Brands; Audi, Chevrolet, Dodge, Ford and Nissan.
- Each Brands have 6 customers each in California State.
- This buying pattern is varied as customers from California not only opt for durable car segments but also opt for Luxury segments too.

- Carolina (North and South) has the customer base who prefer Luxury brands more than the mid segment brands. Volvo, Acura, BMW, Jaguar are some of the brands along with other luxury brands customers in this state.
- It shows about high spending power of the customers in this state.
- If a single Brand has to be selected over all the states with a uniform preference, it will be Chevrolet as it has got is customer base in almost all the states.

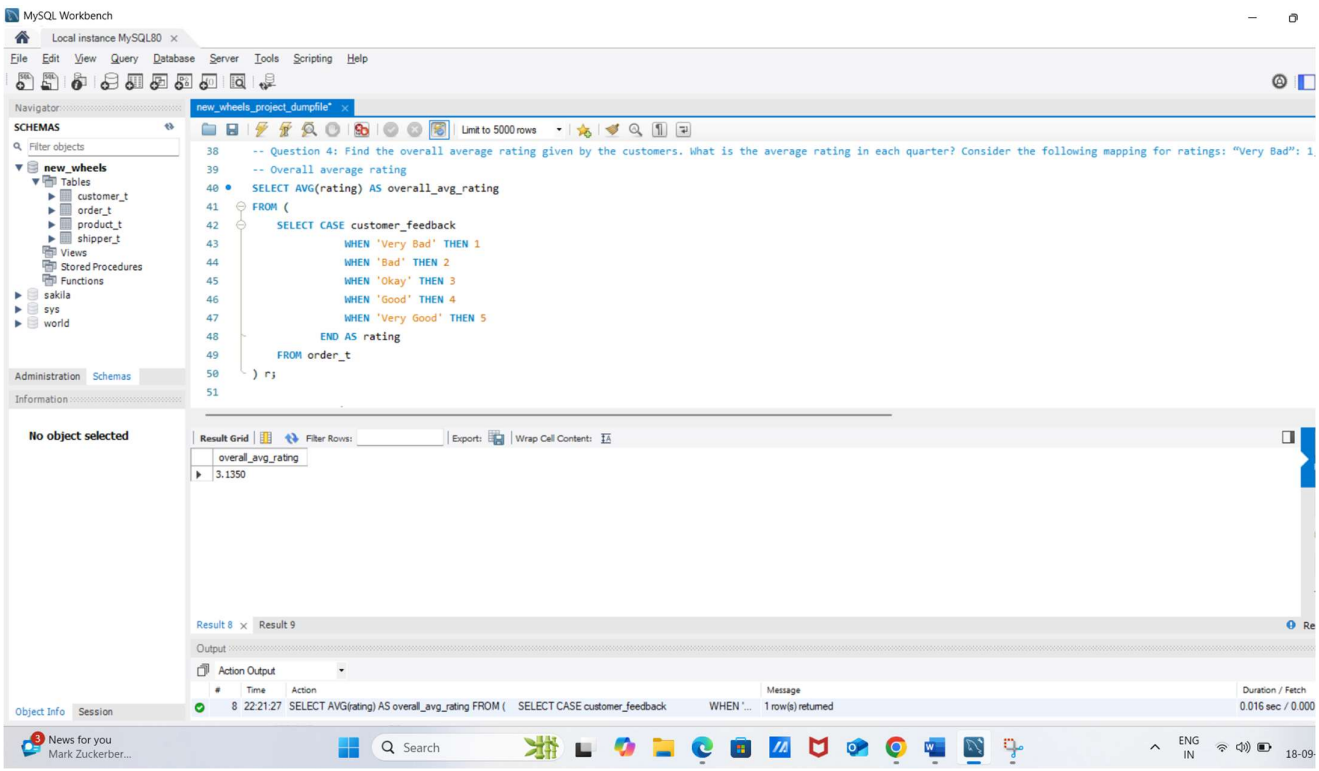
Question 4: Find the overall average rating given by the customers. What is the average rating in each quarter?Consider the following mapping for ratings: “Very Bad”: 1, “Bad”: 2, “Okay”: 3, “Good”: 4, “Very Good”: 5

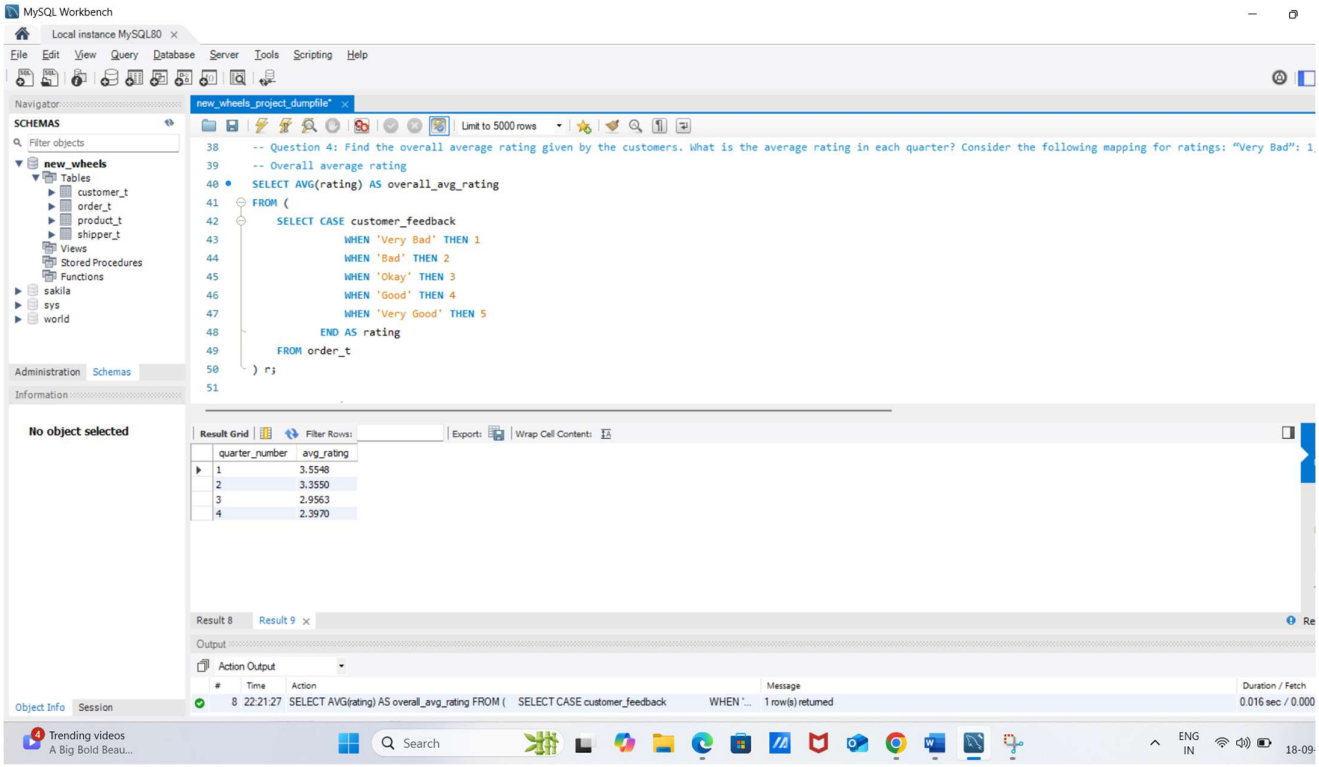
Solution Query:

```
SELECT AVG(rating) AS overall_avg_rating
FROM (
   SELECT 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
         END AS rating
   FROM order_t
) r;

-- Average rating per quarter
```

```
SELECT quarter_number, AVG(rating) AS avg_rating
FROM (
    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
        END AS rating
    FROM order_t
) r
GROUP BY quarter_number
ORDER BY quarter_number;
```

Output:





Observations and Insights:

- The Overall average ratings across the year is 3.14
- Highest Average rating was received in Second Quarter with 3.555 and in First Quarter it was marginally lower at 3.5548
- Worst ratings were given in Fourth quarter with 2.397 and in third it was 2.956
- This is a varied response from the customers as during 1st and 2nd quarter ratings are good or okay but in the third and fourth quarter suddenly these ratings fall to Bad or Very Bad.
- New Wheels should analyze the feedbacks for these drops in ratings. Mostly Third and Fourth Quarters are when Holiday Season begins or is about to end, may be customers are not satisfied either with the post sales service, availability of the preferred brands or even delay in shipments can also make a major impact on reviews.

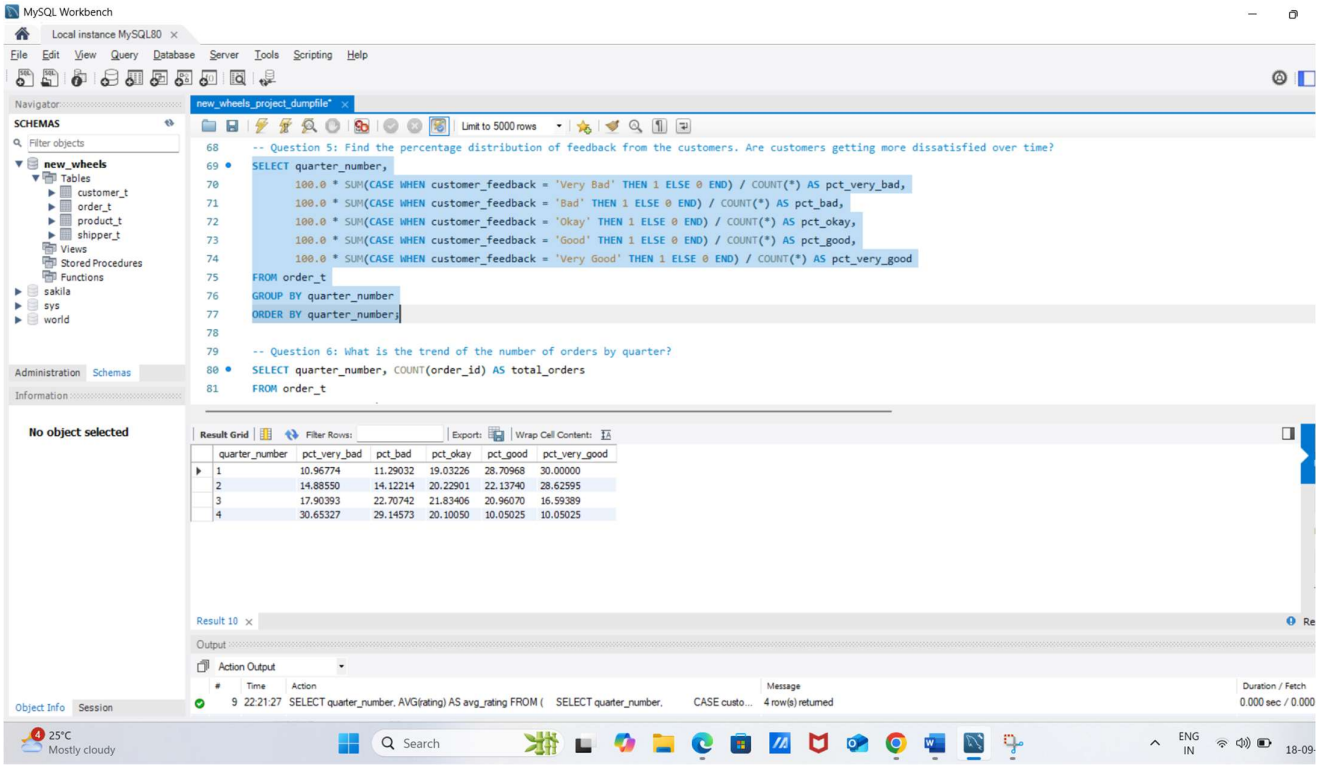
Question 5: Find the percentage distribution of feedback from the customers. Are customers getting more dissatisfied over time?

Solution Query:

```
SELECT quarter_number,

    100.0 * SUM(CASE WHEN customer_feedback = 'Very Bad' THEN 1 ELSE 0 END) / COUNT(*) AS pct_very_bad,

    100.0 * SUM(CASE WHEN customer_feedback = 'Bad' THEN 1 ELSE 0 END) / COUNT(*) AS pct_bad,
```

```
100.0 * SUM(CASE WHEN customer_feedback = 'Okay' THEN 1 ELSE 0 END) / COUNT(*) AS pct_okay,

100.0 * SUM(CASE WHEN customer_feedback = 'Good' THEN 1 ELSE 0 END) / COUNT(*) AS pct_good,

100.0 * SUM(CASE WHEN customer_feedback = 'Very Good' THEN 1 ELSE 0 END) / COUNT(*) AS pct_very_good

FROM order_t

GROUP BY quarter_number

ORDER BY quarter_number;
```

Output:



Observations and Insights:

- Quarter 1 has highest level of satisfied customers with over 58% of customers in the Good and Very Good category.
- With slight decrease in the satisfaction level Second Quarter has over 50% of satisfied customer in Good and Very Good category.
- Third and Fourth Quarter have highest number of dissatisfied customers with around 62% in third quarter are from Very Bad to Okay category and over 40% in Very Bad to Bad category. Fourth Quarter is worst with 60% in Very Bad and Bad Category and 80% in Very Bad to Okay Category.

- This clearly indicates that Customers Dissatisfaction level gradually increases from Quarter 1 and reaches its peak in the Fourth Quarter.

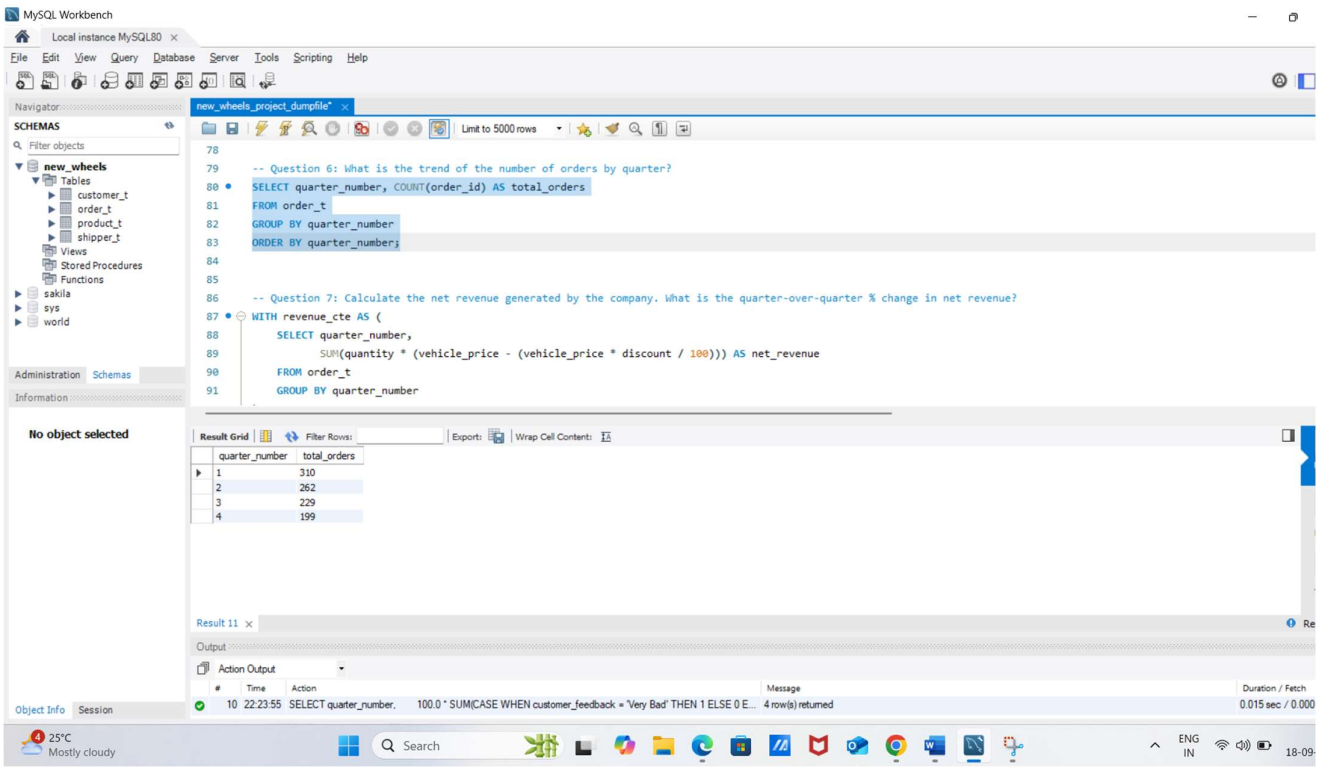
- As it can be seen from above question also with the average ratings there is major issue with New Wheels Operational aspects either because of Shipment Delivery or due to availability of the required brand models and with the Post Sales Services.
- This can impact the overall sales of New Wheels in the coming years and need to be worked on.

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

Solution Query:

```
SELECT quarter_number, COUNT(order_id) AS total_orders
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number;
```

Output:



Observations and Insights:

- The number of Orders is highest in First Quarter with 310 Orders out of the total 1000 orders which constitute to 31% of the Total order over the year.
- Quarter 2 saw a decline in orders and sales dropped to 262 orders.
- Third Quarter again saw a drop and Sales further dipped to 229.

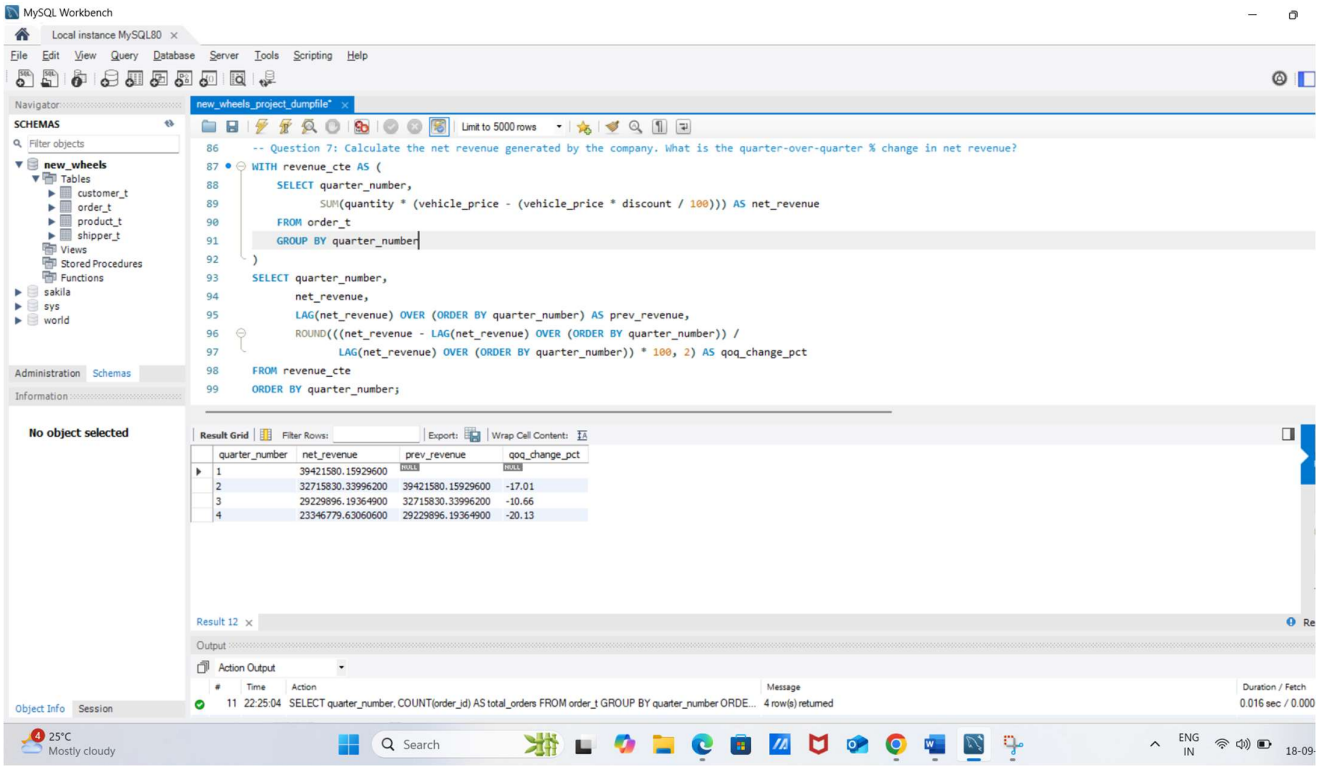
- Fourth Quarter was hit majorly with sales dropping to below 200 throughout the year. Fourth Quarter saw a decline of sales of 35.8% in comparison to First Quarter which is a very High Percentage downfall for a company.

Question 7: Calculate the net revenue generated by the company. What is the quarter-over-quarter % change in net revenue?

Solution Query:

```
WITH revenue_cte AS (
    SELECT quarter_number,
        SUM(quantity * (vehicle_price - (vehicle_price * discount / 100))) AS net_revenue
    FROM order_t
    GROUP BY quarter_number
)
SELECT quarter_number,
    net_revenue,
    LAG(net_revenue) OVER (ORDER BY quarter_number) AS prev_revenue,
    ROUND(((net_revenue - LAG(net_revenue) OVER (ORDER BY quarter_number)) /
        LAG(net_revenue) OVER (ORDER BY quarter_number)) * 100, 2) AS
qoq_change_pct
FROM revenue_cte
ORDER BY quarter_number;
```

Output:



Observations and Insights:

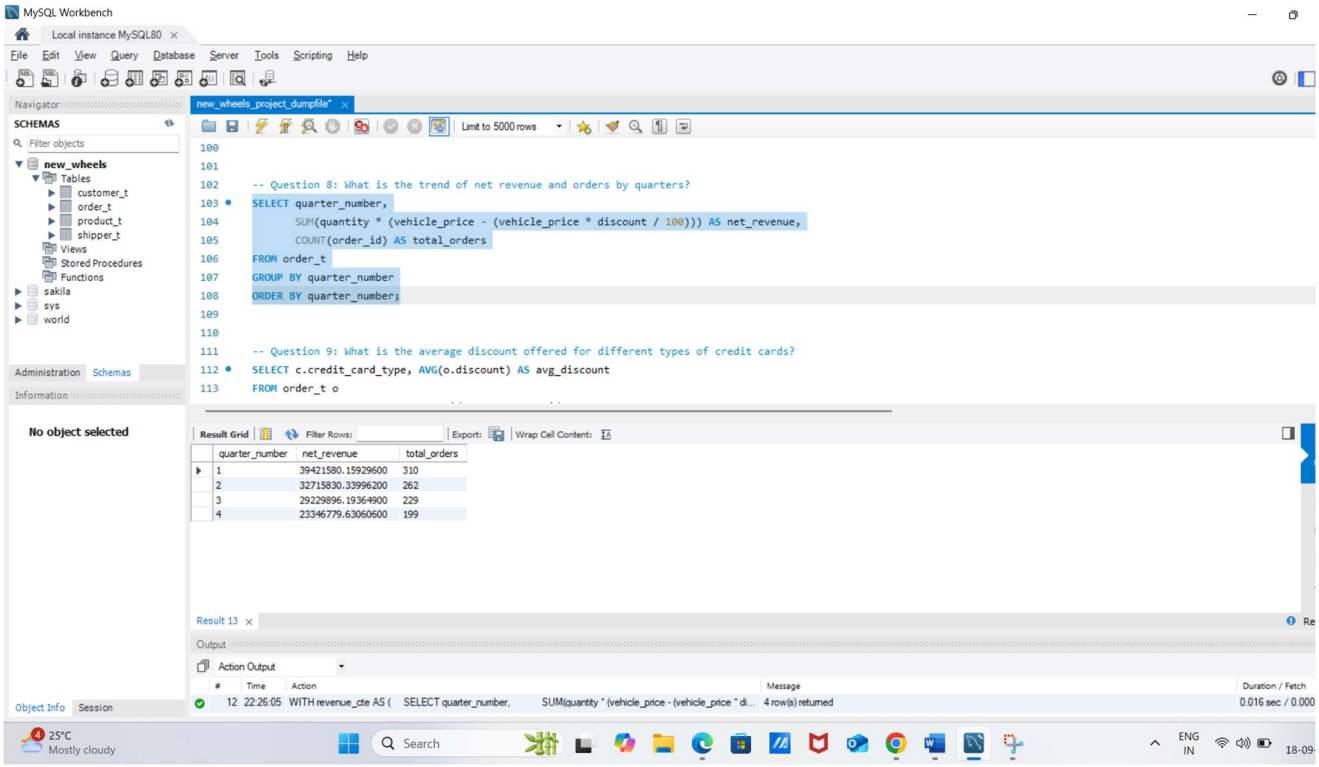
- The Net Revenue was highest in Quarter 1 with 30.4 Million of Sales.
- Quarter 2 started showing a decline in Sales with 32.71 Million of Sales with a drop of 17.01%.
- In Third Quarter it got further declined with 29.22 Million of Sales and drop of 10.66% in comparison to Second Quarter.
- Fourth Quarter saw a sharp decline in the orders with Sales dipping below 25 Million and reaching 23.34 Million with a drop of 20.13% over the Third Quarter.
- Overall the Sales saw a continuous decline over the year with the sales dipping by almost 41% from Quarter 1 to Quarter 4.
- In consideration with the above Question Total Order declined by 35.8% and Sales Declined by 41% from the First Quarter to Fourth.

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

Solution Query:

```
SELECT quarter_number,
    SUM(quantity * (vehicle_price - (vehicle_price * discount / 100))) AS net_revenue,
    COUNT(order_id) AS total_orders
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number;
```

Output:



Observations and Insights:

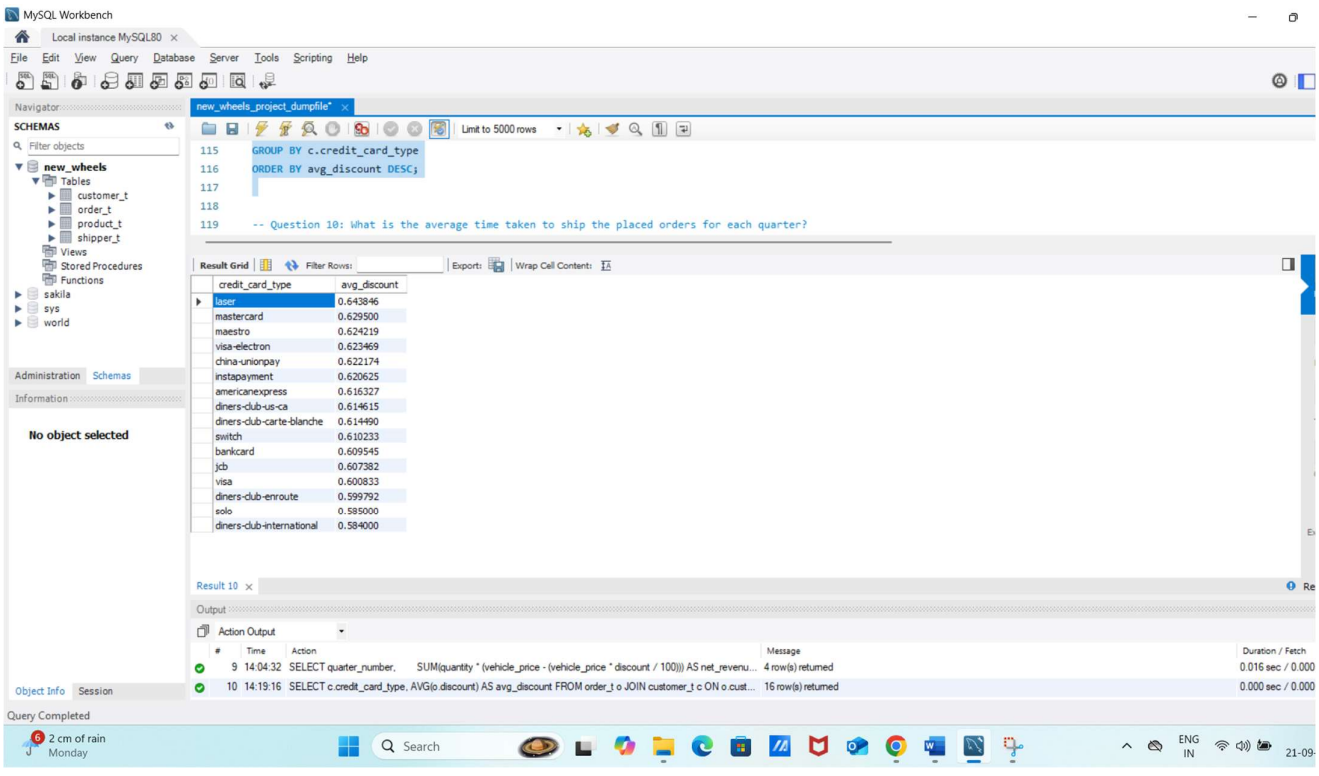
- Net Revenue and Orders are highest in Quarter 1.
- Second Quarter showed a decline in Net Revenue as well as the Orders.
- Third and Fourth Quarter showed a sharp fall in Revenue as well as the Orders.
- Considering the Per Order Revenue over the Quarters it remained almost same from 127166 in First Quarter, 124869 in Second Quarter, 127641 in Third quarter,117320 in Fourth Quarter.

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

Solution Query:

```
SELECT c.credit_card_type, AVG(o.discount) AS avg_discount
FROM order_t o
JOIN customer_t c ON o.customer_id = c.customer_id
GROUP BY c.credit_card_type
ORDER BY avg_discount DESC;
```

Output:



Observations and Insights:

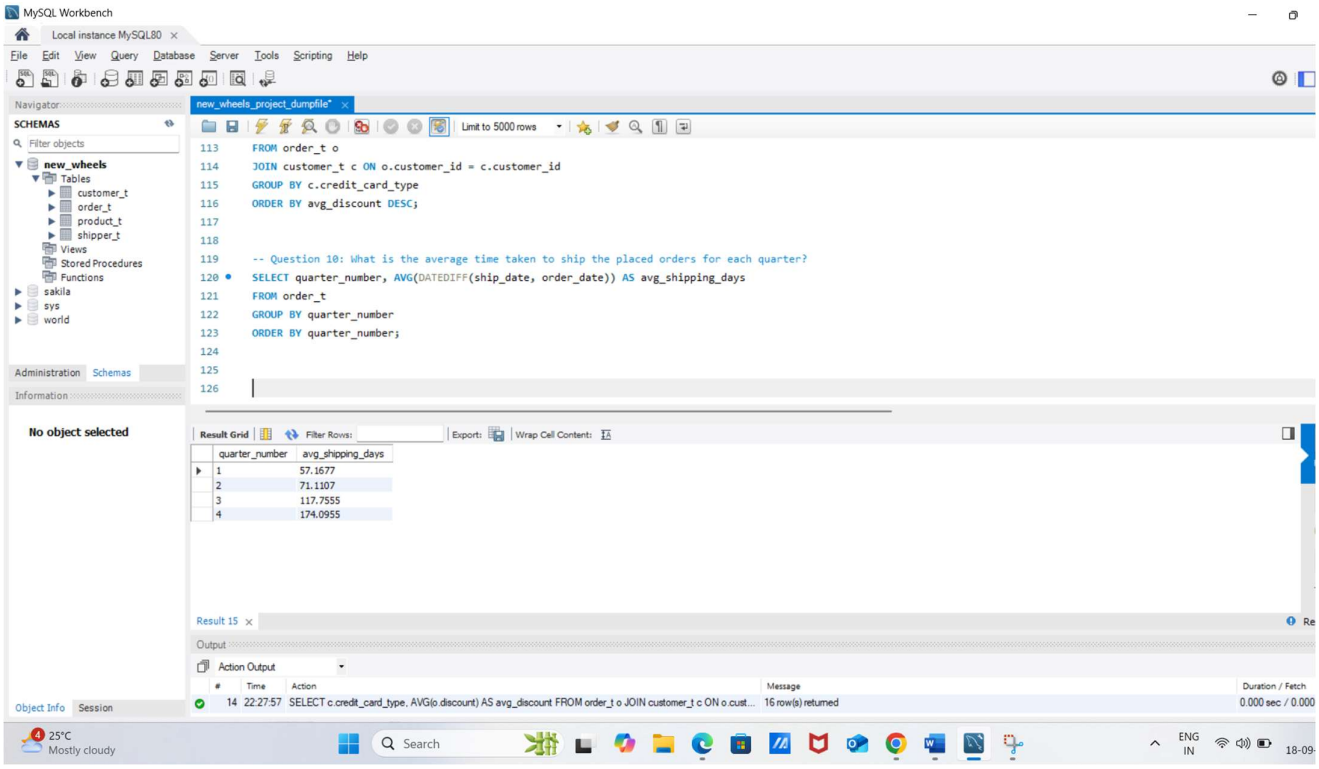
- The Highest Discount is offered by Laser which is of around 0.64.
- Lowest Discount is offered by Diner-Club-International which is around 0.58.
- Discounts offered by various service providers do not have major difference and ranges from 0.58 to 0.64
- Except Solo and Diner-Club-International all the providers offers a discount of 0.60 or more up to 0.64

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

Solution Query:

```
SELECT quarter_number, AVG(DATEDIFF(ship_date, order_date)) AS avg_shipping_days

FROM order_t

GROUP BY quarter_number

ORDER BY quarter_number;
```

Output:



Observations and Insights:

- Minimum Shipping Days required in in Quarter 1 with 57 Days.
- Maximum Shipping Days required is in Quarter 4 with 174 Days.
- Quarter 2 and 3 have 71 and 118 Shipping Days respectively.
- This provides clear reason for the continuous decline in Orders, Net Revenue and Increase in Customer Dissatisfaction Level.
- If the Shipping of vehicle is going to take almost Half a Year, then Customers will be dissatisfied.

Business Metrics Overview

Total Revenue	Total Orders	Total Customers	Average Rating
124.71 Millions	1000	994	3.1350
Last Quarter Revenue	**Last quarter Orders**	**Average Days to Ship**	**% Good Feedback**
23.346 Millions	199	97.9640	21.5

Total Revenue: 124.71 Millions

Query:

```
SELECT
   SUM(quantity * (vehicle_price - (vehicle_price * discount / 100))) AS total_revenue
FROM order_t;
```

Total Orders: 1000
Query:

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

Total Customers: 994
Query:

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

Average Rating: 3.1350
Query:

```
SELECT AVG(rating) AS overall_avg_rating
FROM (
   SELECT 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
         END AS rating
   FROM order_t
) r;
```

Last Quarter Revenue: 23.346 Millions
Query:

```
SELECT SUM(quantity * (vehicle_price - (vehicle_price * discount / 100))) AS last_quarter_revenue
FROM order_t
WHERE quarter_number = (SELECT MAX(quarter_number) FROM order_t);
```

Last Quarter Orders: 199
Query:

```
SELECT COUNT(order_id) AS last_quarter_orders
FROM order_t
WHERE quarter_number = (SELECT MAX(quarter_number) FROM order_t);
```

Average Days to Ship: 97.964 Days
Query:

```
SELECT AVG(DATEDIFF(ship_date, order_date)) AS avg_days_to_ship
FROM order_t;
```

% Good Feedback: 21.5%
Query:

```
SELECT
  (100.0 * SUM(CASE WHEN customer_feedback = 'Good' THEN 1 ELSE 0 END) / COUNT(*)) AS pct_good_feedback
FROM order_t;
```

Business Recommendations

- Out of 994 Unique Customers of New Wheels above mentioned 4 States share approximately 35% of Total Customers Base.
- These areas should be targeted more with Marketing and Promotional Offers.
- Post Sales Services to the existing customers in these regions should be target more to spread awareness about the company through Word of Mouth.
- This will also create purchase of vehicles by existing customers as well.

- From the regions with Low Customer Base more Discounts, add on facilities should be provided to attract more customers.
- Regions like Carolina, Kentucky, Connecticut, Louisiana belong to Customers who have inclination towards Premium Brands. These types of Brands should be more of available in these Places along with their Promotions.
- Discounts in these place will not make a huge difference as Premium Customers will not be attracted by Discounts. Here by saving on Discounts, New Wheels can generate more revenue for the same models.
- Regions with very low count of customers should be pitched with affordable car segments with a higher discounts in order to increase the sales.

- New Wheels should track down Sales, Order and Sales v/s Order analysis on Monthly basis rather than Quarterly basis as this which highlight them with the Problem in depth.

- As per the Analysis through Queries, it was found that major setback for New Wheels came in Quarter 4 where sales dropped by 23% in order count. The main reason as identified for this downfall was Shipping Days.

- If Shipping Days are 174 Days, which is almost Half a Year, Customers wont wait for that long or they wont start placing order 6 months back just to continue with New Wheels. These Days needs to be brought down to at least 30 Days.

- 174 Days Shipping is like waiting time period and If a customer has to wait for these many days to buy Old Used Cars they would rather switch to New Cars where delivery time period is smaller and in line with their expectations.

- Other Potential Reason for the drop in Sales may be due to Competition in Market where same brands are available in cheaper rates.

- Market Penetration can be one of the Factors as many states have only 1 customer which clearly shows lack of customer reach in those areas.

- Variants of the available brands in the selected locations. No Market trends have been studied and dump inventory stock has been created in locations where no sales of those particular Brand or Variant has occurred.

- New Wheels can also create an agreement with some of the Credit Card Service Providers in order to provide with higher discounts if a customer purchase vehicles from them. This will pull customers towards them.

- Identification of time period where maximum orders are booked towards the available inventory. Basically, having understanding of Demand and Supply will help them boost their sales.

- Trying to approach customers who have either given Very Bad/Bad feedback and understanding their issues will help New Wheels sort out the actual problems.

- One more area where New Wheels should work, is their repetitive customers; Out of 1000 Orders over the Year 994 Orders were from New Customers. Means maximum 6 customers have repeated their purchase from New Wheels. It may be customers might be 1 who has purchased 6 additional vehicles or any combination is possible, but repetitive customers are 6 only, considering 6 o of them purchased 1 more vehicle each.

- New Wheels should work on strategies to increase their sales from existing customers also.