DSWR

SQL Math Functions Worksheet

1. POWER Function (Financial Analysis)

Scenario: A bank wants to calculate the compound interest for each customer's fixed deposit.

Question: Write an SQL query to calculate the future value of deposits in the `accounts` table using the formula:

$$FV = P \times (1 + \frac{r}{n})^{(n \times t)}$$

where:

- P = principal amount (`deposit_amount`)
- r = interest rate (`interest_rate` as a decimal)
- n = number of times interest is compounded per year (assume 12)
- t = time in years (`years`)

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2. ROUND Function (E-commerce Analytics)

Scenario: An e-commerce company wants to display product prices with only two decimal places for proper formatting.

Question: Write an SQL query to round the `price` column in the `products` table to 2 decimal places.

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3. MOD Function (Inventory Management)

Scenario: A warehouse manager needs to group products into boxes where each box can hold exactly 5 items.

Question: Write an SQL query to find:

1. The number of full boxes (`total_items / 5`)
2. The number of leftover items (`total_items % 5`)

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4. POWER Function (Physics Simulation)

Scenario: A research lab is calculating the kinetic energy of different moving objects stored in a table.

Formula:

$$E_k = \frac{1}{2} \times m \times v^2$$

where:

- m = mass (`mass_kg`)
- v = velocity (`velocity_mps`)

Question: Write an SQL query to calculate the kinetic energy using the POWER function.

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5. ROUND Function (Sales Tax Calculation)

Scenario: A retail store wants to apply 18% GST on all purchases and round the final price to the nearest whole number.

Question: Write an SQL query to:

1. Calculate the tax amount (`price * 0.18`)
2. Compute the final price (`price + tax`)
3. Round the final price to the nearest whole number

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6. MOD Function (Even-Odd Customer Segmentation)

Scenario: A business wants to segment customers based on their `customer_id` being even or odd.

Question: Write an SQL query that:

- Labels customers with even IDs as "Group A"
- Labels customers with odd IDs as "Group B"

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7. POWER Function (Exponential Growth in Social Media)

Scenario: A social media company wants to estimate future followers assuming exponential monthly growth.

$$Followers = initial\_followers \times 2^n$$

Question: Write an SQL query to predict future followers for each user based on their `initial_followers` in the `users` table.

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8. ROUND Function (Performance Score Calculation)

Scenario: A university calculates students' final scores based on weighted marks.

$$Final\_Score = (Exam\_Marks \times 0.7) + (Assignment\_Marks \times 0.3)$$

Question: Write an SQL query to compute and round the final score to one decimal place.

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9. MOD Function (Shift Assignment for Employees)

Scenario: A company assigns morning and evening shifts based on employee IDs.
Question: Write an SQL query to assign:

- Morning Shift if `employee_id % 3 = 0`
- Evening Shift otherwise

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10. POWER & ROUND (Predicting Future Profits)

Scenario: A company's profits grow by 5% per year:

$$Future\_Profit = Current\_Profit \times (1.05)^n$$

Question: Write an SQL query to predict and round future profits to two decimal places.

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11. POWER Function (Financial Analysis – Interest Calculation)

Scenario: You are analyzing a loan dataset with columns: `loan_id, principal_amount, interest_rate, years.`

$$A = P \times (1 + r)^t$$

Question: Write an SQL query to calculate compound interest and display `loan_id`, `principal_amount`, and `total_amount`.

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12. ROUND Function (Rounding Sales Data)

Scenario: Round the `total_price` and `tax_amount` columns in the `sales` table to two decimal places.

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13. ROUND Function (Order Discounts – Nearest 100)

Scenario: In an e-commerce company, bulk order prices are rounded to the nearest 100.
Question: Write an SQL query to round `order_amount` to the nearest 100.
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14. MOD Function (Customer Segmentation)

Scenario: A company assigns customers into two groups:

- Group A – Even IDs
- Group B – Odd IDs

Question: Use MOD to categorize customers and display `customer_id`, `customer_name`, and `group_name`.
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15. POWER Function (Electricity Bill Calculation)

$$P = \frac{V^2}{R}$$

Scenario: Compute power consumed for each device using `POWER(voltage, 2) / resistance`.
Expected Output: `device_id, voltage, resistance, power_consumed.`
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16. ROUND Function (Warehouse Stock Management)

Scenario: Round stock quantities to the nearest 10 for easier counting.
Expected Output: `product_id, original_stock_quantity, rounded_stock_quantity.`
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17. MOD Function (Salary Payment Scheduling)

Scenario: A company pays salaries every 15 days.
Question: Find remaining days until next payout using `MOD(days_worked, 15)`.
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18. POWER & ROUND Function (EMI Calculation)

Scenario: A bank calculates EMI using:

$$EMI = \frac{P \times r \times (1+r)^n}{(1+r)^n - 1}$$

where:

- P = loan amount
- r = monthly rate (`annual_interest_rate / 12 / 100`)
- n = number of months

Expected Output: `loan_id, loan_amount, emi_amount.`

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19. MOD Function (Product Discount Eligibility)

Scenario: Apply a 10% discount to products where `MOD(product_id, 5) = 0`.

Expected Output: `product_id, original_price, discounted_price.`

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20. ROUND Function (Attendance Management)

Scenario: Round student attendance to the nearest multiple of 7 (weeks).

Expected Output: `student_id, original_days_present, rounded_attendance_week.`