1. Dimensions and Facts

1. Create a fact table and at least three dimension tables for a sales dataset. Populate them with sample data.
2. Write SQL queries to calculate:
    - Total sales amount for all stores.
    - Sales amount for a specific product category.

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2. Data Cubes

1. Create a data cube from sales data with dimensions: `Product`, `Time`, and `Region`. The measure is `Sales Amount`.
2. Write queries to calculate:
    - Total sales for all regions (aggregation across the `Region` dimension).
    - Sales per product category across all months.

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3. Hierarchies

1. Create a hierarchy for the `Time` dimension: `Year > Quarter > Month > Day`. Write queries to roll up and drill down sales data along this hierarchy.
2. Define a hierarchy for the `Product` dimension: `Category > Sub-Category > Product`. Analyze sales at each level.

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4. Distributive and Algebraic Functions

1. Use distributive functions (SUM, COUNT) to calculate:
    - Total sales.
    - Count of transactions per store.
2. Use algebraic functions (AVERAGE) to find the average sales per customer.

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5. Summarisability

1. Create a sales dataset with measures `Quantity Sold` and `Sales Amount`.
2. Write queries to check if the data is summarizable by comparing aggregate values for `Region` and `Store`.

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6. Roll Up and Drill Down

1. Roll up sales data from `Day` to `Month` and then to `Year`. Analyze how the aggregation changes.
2. Drill down from `Region` to `City` and analyze sales trends.

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7. Drill Across

Objective: Compare measures across different dimensions.
Questions:

1. Write a query to drill across `Product` and `Region` dimensions to compare sales trends.
2. Analyze sales for two different time periods (e.g., 2023 vs. 2024) across all regions.

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8. Slice and Dice

1. Slice the data cube for sales in `2024` only.
2. Dice the data cube to select sales data for `Electronics` in the `North` region during `Q4`.

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9. Pivot

1. Pivot the sales data cube to view `Region` as rows and `Product Category` as columns.
2. Analyze which region and category combination generated the highest sales.

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10. Range Query and Range Sum Query

1. Write a query to retrieve sales data for all transactions between two dates.
2. Calculate the range sum of sales for a specific product category over a given time period.

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11. Lattice of Cuboids

1. Create a 3-dimensional data cube with `Product`, `Region`, and `Time`. Identify and construct all possible cuboids in the lattice.
2. Write SQL queries to extract data from the apex cuboid, one-dimensional cuboids, and base cuboid.