**List of all 100 questions**

**1. Basic SELECT Queries (Single Table)**

1. Retrieve all columns from DimCustomer.
2. List only FirstName, LastName, and EmailAddress from DimCustomer.
3. Find all products where ClassName is Luxury in DimProduct.
4. Count how many employees are salaried (SalariedFlag = 1) in DimEmployee.
5. List promotions with a DiscountPercent > 10% from DimPromotion.
6. Find stores that are currently open (Status = 'Open') in DimStore.
7. List all currencies (CurrencyName) and their labels (CurrencyLabel).
8. Find machines with MachineType containing 'POS' in DimMachine.
9. List outage types (OutageType) and their descriptions from DimOutage.
10. Retrieve products with a UnitPrice > $100 from DimProduct.

**2. Filtering and Sorting**

1. List customers sorted by YearlyIncome (highest to lowest).
2. Find employees hired in the last 5 years (HireDate filter).
3. List products with AvailableForSaleDate in 2023.
4. Find promotions that ended before 2024 (EndDate filter).
5. List stores in 'United States' (join DimStore + DimGeography).
6. Find customers with TotalChildren > 2 and HouseOwnerFlag = 1.
7. List products with Size = 'Large' and ColorName = 'Red'.
8. Find outages that lasted more than 60 minutes (DownTime in FactITSLA).
9. List employees with VacationHours < 10 (sorted by LastName).
10. Retrieve sales transactions with ReturnQuantity > 0.

**3. Joins (Multi-Table Queries)**

1. List ProductName and SalesAmount (join FactSales + DimProduct).
2. Find customers and their geography (CityName, Country).
3. List employees and their manager’s name (self-join on ParentEmployeeKey).
4. Show StoreName + SalesTerritoryRegion (join DimStore + DimSalesTerritory).
5. List products with their ProductCategoryName (join DimProduct + DimProductCategory).
6. Find machines and their associated store locations.
7. List promotions applied to sales (join FactSales + DimPromotion).
8. Show ProductName + InventoryQuantity (join DimProduct + FactInventory).
9. List customers who made online purchases (join DimCustomer + FactOnlineSales).
10. Find sales with currency conversion details (join FactSales + DimCurrency).

**4. Aggregations (GROUP BY, SUM, AVG, etc.)**

1. Calculate total SalesAmount by ProductKey.
2. Count sales transactions per StoreKey.
3. Find average YearlyIncome by Education level.
4. Sum OnHandQuantity by product category.
5. Calculate total DownTime by OutageType.
6. Find the most common ProductColor in sales.
7. Calculate average DiscountPercent by PromotionCategory.
8. Sum ReturnAmount by customer.
9. Count employees per DepartmentName.
10. Find the highest UnitPrice per ProductCategory.

**5. Subqueries and Nested Queries**

1. Find customers who spent more than $1000 (subquery on FactOnlineSales).
2. List products never sold (NOT IN FactSales).
3. Find stores with above-average SellingAreaSize.
4. List employees earning more than their department’s average salary.
5. Find promotions with the highest DiscountPercent.
6. List customers who made purchases in the last 30 days.
7. Find products with inventory below safety stock (OnHandQuantity < SafetyStockQuantity).
8. List outages affecting more than 5 machines.
9. Find the top 3 best-selling products.
10. List employees who are also customers (exists in DimCustomer).

**6. Date and Time Queries**

1. Find sales from Q1 2023 (DateKey filter).
2. List promotions active on New Year’s Day 2024.
3. Calculate total sales by month.
4. Find machines decommissioned in the last year.
5. List holidays (HolidayName) from DimDate.
6. Find employees hired on a weekend (CalendarDayOfWeek).
7. Calculate average sales per day of the week.
8. List products discontinued (StopSaleDate) in 2023.
9. Find the longest outage duration per month.
10. List customers who made their first purchase (DateFirstPurchase) in 2024.

**7. Advanced SQL (CTEs, Window Functions, Pivots)**

1. Rank products by sales quantity (using RANK()).
2. Calculate a 3-month moving average of sales.
3. Compare actual sales vs. quota (FactSales vs. FactSalesQuota).
4. Find the percentage of total sales per product.
5. Pivot sales by ProductCategory and year.
6. Use a CTE to find customers with lifetime value > $5000.
7. Calculate YoY growth in sales.
8. Find the top 5% of customers by spending.
9. Identify consecutive days with outages.
10. Use LAG() to compare monthly sales.

**8. Data Modification (INSERT, UPDATE, DELETE)**

1. Insert a new customer into DimCustomer.
2. Update UnitPrice for all products in 'Electronics' category.
3. Delete inactive promotions (EndDate < today).
4. Merge new inventory data into FactInventory.
5. Archive old sales data (before 2020) to a history table.

**9. Optimization and Performance**

1. Write an indexed query for fast customer lookup.
2. Optimize a slow-running sales report query.
3. Rewrite a subquery as a JOIN for better performance.
4. Use EXISTS instead of IN for a customer filter.
5. Partition FactSales by year for faster queries.

**10. Complex Business Logic**

1. Calculate gross margin (SalesAmount - TotalCost).
2. Identify customers likely to churn (no purchases in 6 months).
3. Forecast inventory needs based on sales trends.
4. Detect fraud (high-value returns by the same customer).
5. Analyze seasonal sales patterns by region.
6. Find underperforming stores (sales below quota).
7. Track employee sales performance vs. target.
8. Identify cross-selling opportunities (frequently bought together).
9. Calculate customer lifetime value (CLV).
10. Build a customer segmentation query (RFM analysis).

**11. Error Handling and Validation**

1. Find NULL GeographyKey values in DimCustomer.
2. Validate that EndDate > StartDate in promotions.
3. Detect duplicate ProductKey entries.
4. Ensure SalesAmount >= 0 in FactSales.
5. Flag customers with invalid email formats.

**12. Dynamic SQL and Stored Procedures**

1. Write a stored procedure to fetch sales by date range.
2. Dynamically generate a report based on user-input parameters.
3. Create a script to back up old data.
4. Automate daily sales summary emails.
5. Build a query to generate a product catalog PDF.