Advanced Task:

Building a Data Analysis Dashboard for Sales Performance Prediction

Objective:

Create a **Sales Performance Prediction Dashboard** by integrating SQL, Power BI, and Excel to analyze and forecast sales trends.

Task Requirements:

Part 1: SQL Database (pgAdmin)

1. **Create Database and Tables**
    - Design and implement a database schema for a sales system with the following tables:
        - **Customers** (CustomerID, Name, Age, Gender, Region, Email).
        - **Products** (ProductID, ProductName, Category, Price, StockQuantity).
        - **Sales** (SaleID, Date, CustomerID, ProductID, Quantity, TotalAmount).
        - **Returns** (ReturnID, SaleID, ReturnDate, Reason).
2. **Insert Data**
    - Populate tables with at least **1000 rows** of sample data for realistic analysis.
3. **SQL Queries:**
    - **Complex Queries**
        - Write a query to calculate **monthly sales trends** for each region and product category.
        - Identify **top 5 customers** contributing to revenue using **window functions**.
        - Create a query to predict **stock-out risks** based on sales trends using **aggregate and ranking functions**.

        - Find products with **highest return rates** by percentage and classify reasons for returns.
        - Implement a **trigger** to update stock automatically after each sale or return.

Part 2: Excel Data Transformation and Analysis

1. Import SQL query outputs into Excel as CSV files.
2. Perform **Data Cleaning** using Excel formulas and functions:
    - Handle missing values, duplicates, and outliers.
    - Use **Pivot Tables** and **VLOOKUP** to cross-reference data between tables.
3. Perform **What-If Analysis** using **Goal Seek** and **Scenario Manager** to test sales performance based on variable changes.

Part 3: Power BI Dashboard

1. **Data Integration**
    - Connect Power BI to the SQL database and Excel files.
    - Import the cleaned data into Power BI.
2. **Visualizations**
    - Build interactive charts:
        - **Line Chart:** Monthly sales trends by region and category.
        - **Bar Chart:** Top customers and revenue contribution.
        - **Heatmap:** Stock-out risk analysis.
        - **Pie Chart:** Product return reasons distribution.

3. **Key Metrics and KPIs**
    - Calculate **Customer Lifetime Value (CLV)** based on purchase patterns.
    - Forecast future sales using **time-series forecasting models** in Power BI.
    - Display **Return on Investment (ROI)** and profit margins.
4. **Advanced Features**
    - Use **DAX formulas** to create custom metrics, e.g., percentage growth, moving averages, and cumulative sales.
    - Implement **drill-through pages** for detailed insights into customer and product performance.
    - Add a **What-If Parameter** to simulate changes in pricing or sales volume.

Deliverables:

1. SQL scripts for database creation, data insertion, and complex queries.
2. Excel sheets with cleaned data, pivot tables, and scenario analyses.
3. Power BI Dashboard (.pbix file) with visualizations and predictive analytics.

Evaluation Criteria:

- **Database Design**: Proper schema, relationships, and constraints.
- **SQL Queries**: Complexity, optimization, and accuracy.
- **Excel Analysis**: Data cleaning, analysis techniques, and visual summaries.
- **Power BI Dashboard**: Design quality, interactivity, and insights presented.
- **Forecast Accuracy**: Model predictions and scenario testing.