🧠 SQL 100 Days Challenge – Day 70 Reflection

🗓️ Dataset Theme:

Customers, Products, Sales & Returns

This dataset simulated an end-to-end **retail sales ecosystem**, connecting customers, transactions, product pricing, and returns — an excellent combination to test **business-level SQL analytics**.

💡 Key Learnings:

1. **Multi-table Joins:**
   Practiced combining 4 related tables — *Customers*, *Products*, *Sales*, and *Returns* — to build comprehensive analytical queries.
2. **CTEs for Profit Analysis:**
   Gained deeper understanding of **Common Table Expressions (CTEs)** while calculating total, gross, and net profit per category.
3. **Advanced Subqueries:**
   Used **correlated subqueries** to detect customers who bought items later returned by others — real-world fraud prevention logic.
4. **Analytical & Ranking Functions:**
   Strengthened skills using RANK(), DENSE_RANK(), and LAG() for ranking and customer purchase interval tracking.
5. **CASE Statements for Segmentation:**
   Used conditional logic to classify customers as **High**, **Medium**, and **Low Value**, based on total spending.
6. **Window Functions:**
   Practiced time gap analysis with LAG() and handled **regional contribution percentages** using **partitioned SUM()** windows.
7. **Business-Focused KPIs:**
   Derived metrics like **Customer Retention**, **Profitability by Region**, and **Return-Adjusted Net Margin**, mirroring real business dashboards.

⚙️ Challenges Faced:

- Writing **nested CTEs** for category profit and loss tracking was tedious and required precise aliasing.
- The **Bonus challenge** — *most profitable region after adjusting for returns* — was extremely complex but rewarding.
- Queries from **7th to Bonus** took significant time and demanded strong logical flow and mathematical accuracy.
- Initially struggled with calculating **Net Profit Margin (%)**, but later refined the formula using proper handling for NULL and division-by-zero cases.

🔍 **Concepts Strengthened:**

- CTEs and nested logic
- Ranking & analytical functions (RANK, LAG)
- Conditional CASE statements
- Aggregation and subqueries
- Profitability and margin analysis
- Return-adjusted revenue computation

🌟 **Key Takeaway:**

Day 70 tested both **logic depth** and **query structuring skills**. Long, multi-layered queries were challenging, but also highlighted how SQL can replicate **real-world business intelligence** — from **sales performance tracking** to **profit analysis** and **customer retention**.

The progress since Day 60 is clearly visible — complex analytical thinking now feels more natural.