1. **What is a primary key in a table?**

A **primary key** is a column (or combination of columns) in a table that uniquely identifies each row.
Example:

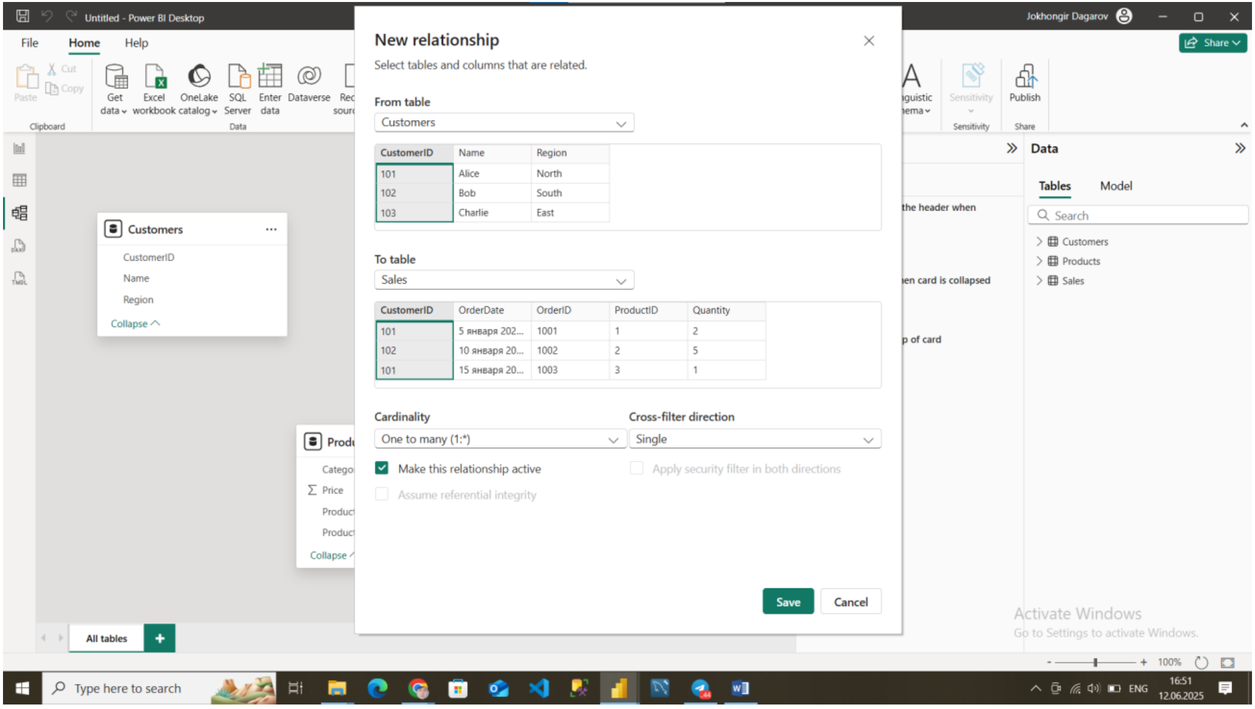
- In **Customer.csv**, `CustomerID` is the primary key — no two customers can share the same `CustomerID`.

2. **Name the two types of table relationships in Power BI:**

- **One-to-Many (1:*)** → Most common (e.g., one customer can have many sales)
- **Many-to-Many (:)** → Less ideal, can cause ambiguity (e.g., if both Customers and Products are linked directly through a Sales table without a fact table)

3. **How do you create a relationship between two tables in Power BI?**

- Go to **Model View**
- Drag the primary key from one table to the foreign key in the other table Example: drag `CustomerID` from **Customer.csv** to **Sales.csv**



New relationship

Select tables and columns that are related.

From table

Customers

CustomerID	Name	Region
101	Alice	North
102	Bob	South
103	Charlie	East

To table

Sales

CustomerID	OrderDate	OrderID	ProductID	Quantity
101	5 января 202...	1001	1	2
102	10 января 20...	1002	2	5
101	15 января 20...	1003	3	1

Cardinality: One to many (1:*)

Cross-filter direction: Single

☑ Make this relationship active

□ Apply security filter in both directions

□ Assume referential integrity

Save | Cancel

4. **What is a star schema?**

A **star schema** is a data model design where:

- A **fact table** (e.g., Sales) is at the center
- Connected to multiple **dimension tables** (e.g., Customers, Products, Date)

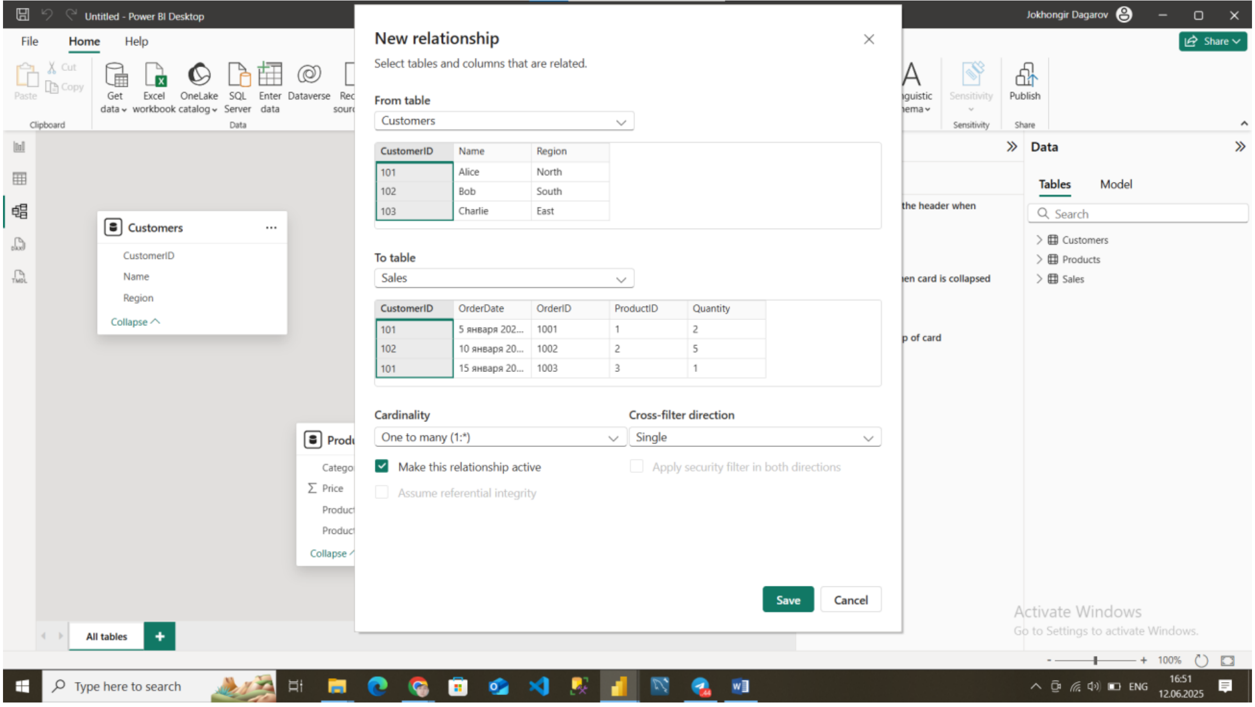
Visually forms a *star shape* when diagrammed.

5. **Which table is typically the fact table in a sales dataset?**

Sales.csv — it contains measurable transactional data (quantity sold, dates, prices via lookup)

6. **Link Sales.csv to Customers.csv using `CustomerID` (one-to-many)**

- In Power BI Model View:
  - Drag `CustomerID` from **Customer** to **Sales**
  - Ensure it’s **One-to-Many (1:*)**
  - Single-direction filter is preferred



New relationship

Select tables and columns that are related.

From table: Customers

CustomerID	Name	Region
101	Alice	North
102	Bob	South
103	Charlie	East

To table: Sales

CustomerID	OrderDate	OrderID	ProductID	Quantity
101	5 января 202...	1001	1	2
102	10 января 20...	1002	2	5
101	15 января 20...	1003	3	1

Cardinality: One to many (1:*)

Cross-filter direction: Single

☑ Make this relationship active

□ Apply security filter in both directions

□ Assume referential integrity

7. **Why is `ProductID` in Sales.csv a foreign key?**

A **foreign key** in one table points to a **primary key** in another table. Here, `ProductID` in **Sales.csv** references the `ProductID` in **Products.csv**

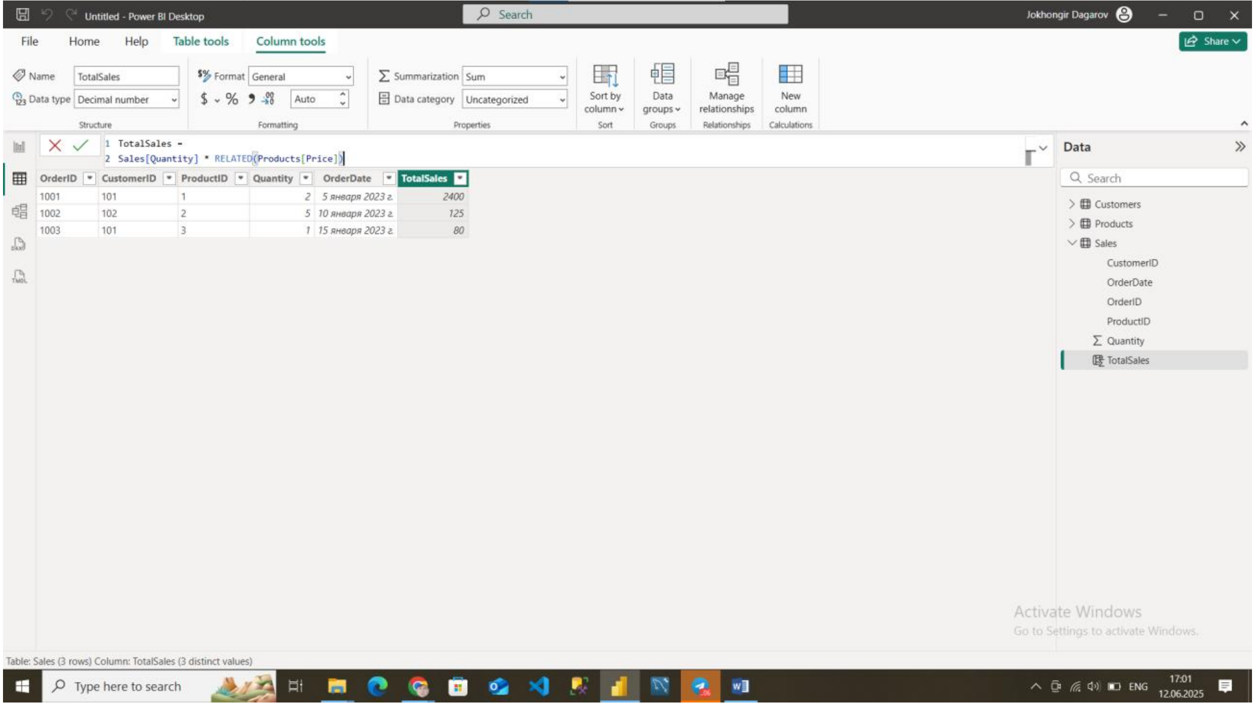
8. **Fix a relationship error where `ProductID` has mismatched data types:**

- Go to **Model View** → **Data View**
- Ensure both columns have the same data type (e.g., both should be **whole number**)
- If needed:
  - Select column → **Modeling** tab → Change Data Type

9. **Explain why a star schema improves performance:**

Star schema simplifies relationships, reduces query complexity, avoids bidirectional filters and many-to-many joins, Power BI’s VertiPaq engine compresses and queries star schemas more efficiently.

10. Add a new column `TotalSales` in Sales (`Quantity` × `Price` from Products)



Name: TotalSales
Data type: Decimal number
Format: General
Summarization: Sum
Data category: Uncategorized

```
1 TotalSales =
2 Sales[Quantity] * RELATED(Products[Price])
```

OrderID	CustomerID	ProductID	Quantity	OrderDate	TotalSales
1001	101	1	2	5 января 2023 г.	2400
1002	102	2	5	10 января 2023 г.	125
1003	101	3	1	15 января 2023 г.	80

Table: Sales (3 rows) Column: TotalSales (3 distinct values)

11. Optimize a model with circular relationships—how would you resolve it?

- Remove or re-design one of the problematic relationships
- Introduce a **bridge table** if needed
- Avoid **bidirectional filters** unless essential
- Prefer **single-direction filtering**

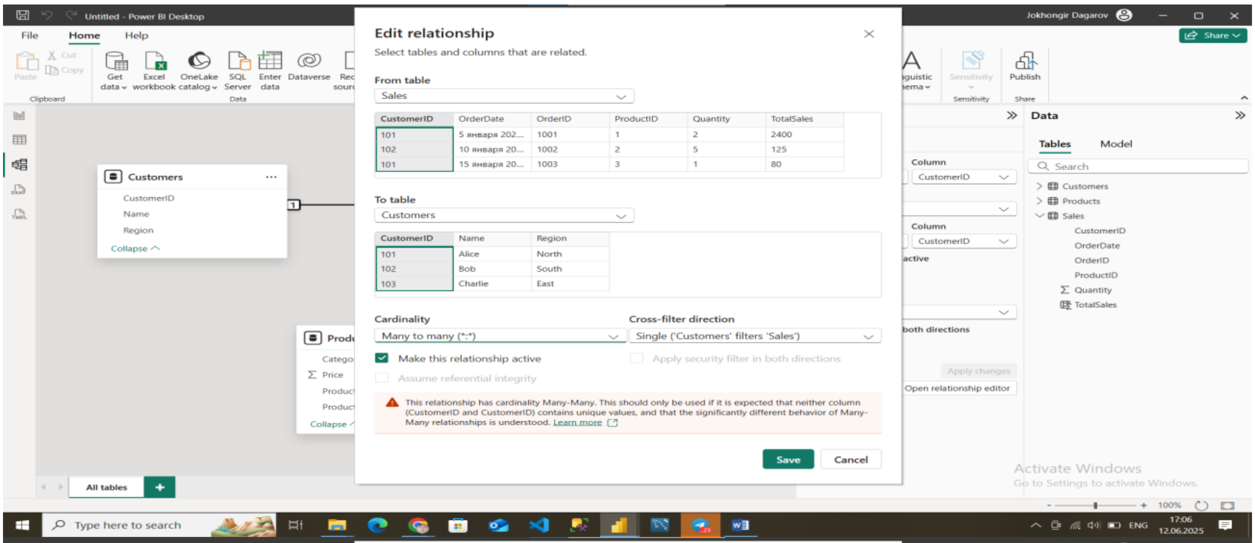
12. Create a role-playing dimension for `OrderDate` and `ShipDate`

- Duplicate your **Date table**
  Example: `Date` (for OrderDate) and `ShipDateTable` (for ShipDate)
- Relate:
  - **Sales[OrderDate] → Date[Date]**
  - **Sales[ShipDate] → ShipDateTable[Date]**

Each can now serve different date-based analyses.

13. Handle a many-to-many relationship between Customers and Products

- Introduce an intermediary **Sales (FactSales)** table that breaks the direct many-to-many link
- Avoid direct many-to-many where possible as it complicates filter propagation



Edit relationship

Select tables and columns that are related.

From table

Sales

CustomerID	OrderDate	OrderID	ProductID	Quantity	TotalSales
101	5 января 202...	1001	1	2	2400
102	10 января 20...	1002	2	5	125
101	15 января 20...	1003	3	1	80

To table

Customers

CustomerID	Name	Region
101	Alice	North
102	Bob	South
103	Charlie	East

Cardinality

Many to many (*:*)

Cross-filter direction

Single ('Customers' filters 'Sales')

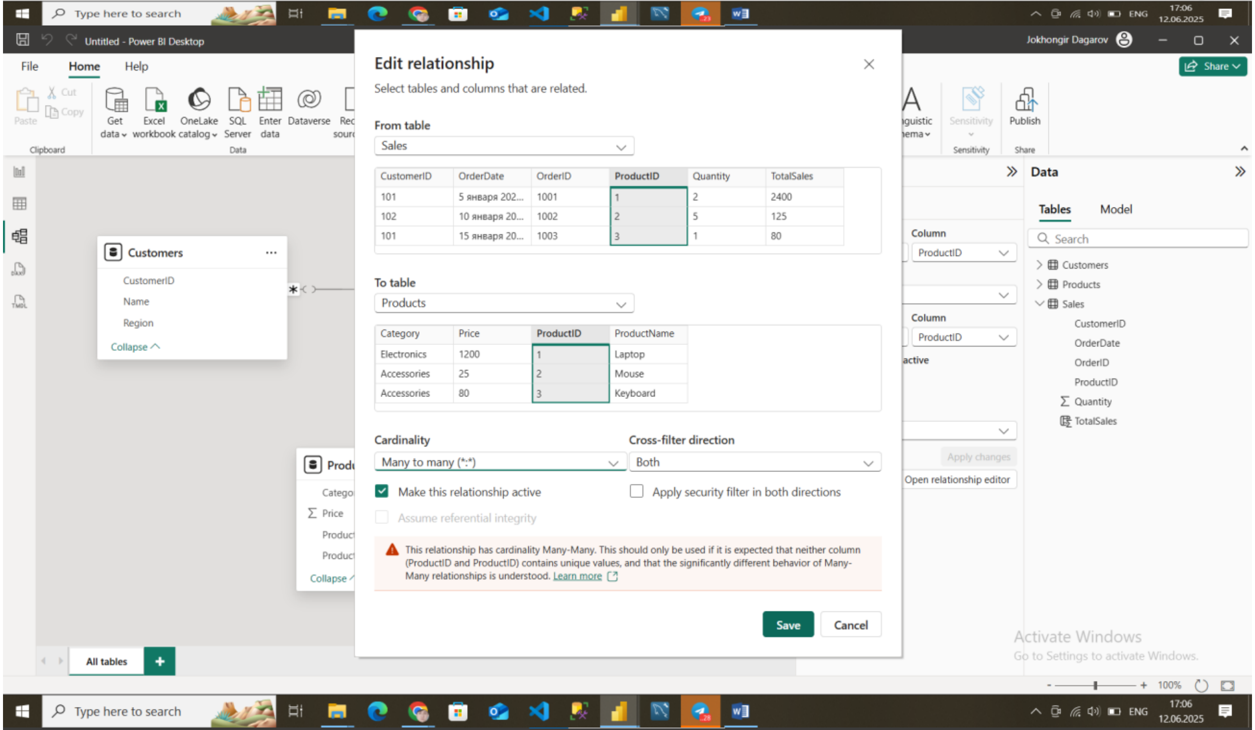
☑ Make this relationship active

□ Apply security filter in both directions

□ Assume referential integrity

This relationship has cardinality Many-Many. This should only be used if it is expected that neither column (CustomerID and CustomerID) contains unique values, and that the significantly different behavior of Many-Many relationships is understood. Learn more

Save Cancel



Edit relationship

Select tables and columns that are related.

From table

Sales

CustomerID	OrderDate	OrderID	ProductID	Quantity	TotalSales
101	5 января 202...	1001	1	2	2400
102	10 января 20...	1002	2	5	125
101	15 января 20...	1003	3	1	80

To table

Products

Category	Price	ProductID	ProductName
Electronics	1200	1	Laptop
Accessories	25	2	Mouse
Accessories	80	3	Keyboard

Cardinality

Many to many (*:*)

Cross-filter direction

Both

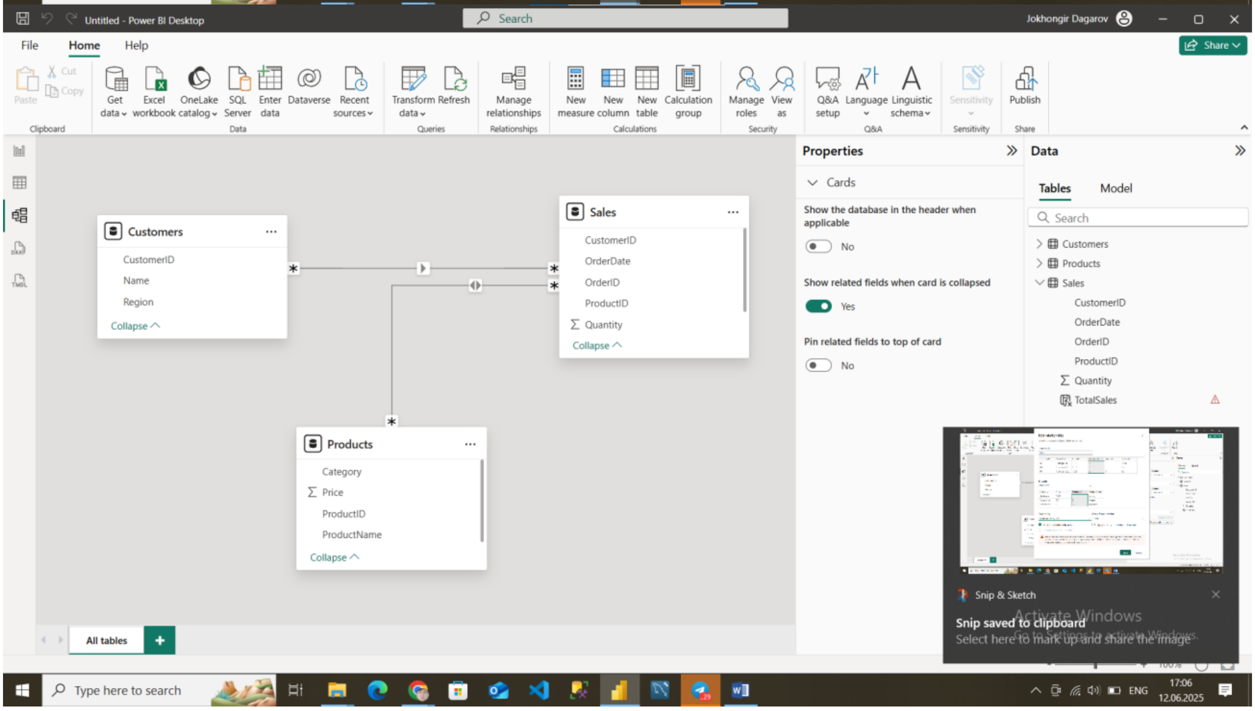
☑ Make this relationship active

□ Apply security filter in both directions

□ Assume referential integrity

This relationship has cardinality Many-Many. This should only be used if it is expected that neither column (ProductID and ProductID) contains unique values, and that the significantly different behavior of Many-Many relationships is understood. Learn more

Save Cancel



Properties

Cards

Show the database in the header when applicable

No

Show related fields when card is collapsed

Yes

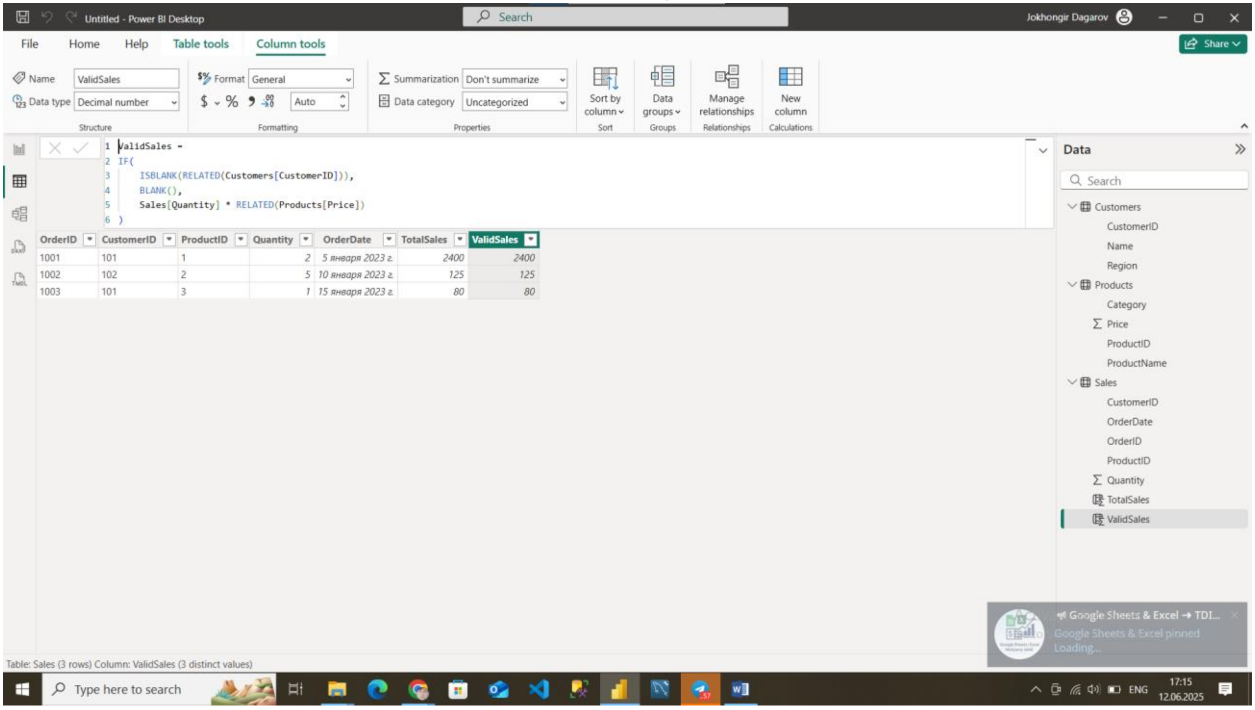
Pin related fields to top of card

No

14. Use bidirectional filtering sparingly — when is it appropriate?

- When you need to filter in both directions for correct calculations (e.g., financial allocations or balances)
- Otherwise, prefer **single-direction filtering** for performance and predictability

15. Write DAX to enforce referential integrity if a `CustomerID` is deleted



Name: ValidSales
Data type: Decimal number
Format: General
Auto
Summarization: Don't summarize
Data category: Uncategorized

```
ValidSales =
IF(
    ISBLANK(RELATED(Customers[CustomerID])),
    BLANK(),
    Sales[Quantity] * RELATED(Products[Price])
)
```

OrderID	CustomerID	ProductID	Quantity	OrderDate	TotalSales	ValidSales
1001	101	1	2	5 января 2023 г.	2400	2400
1002	102	2	5	10 января 2023 г.	125	125
1003	101	3	1	15 января 2023 г.	80	80

Table: Sales (3 rows) Column: ValidSales (3 distinct values)