# R.D.&S.H NATIONAL COLLEGE & S.WA. SCIENCE COLLEGE

**Bandra, Mumbai - 400050**

## DEPARTMENTOF COMPUTERSCIENCE

## M.Sc. Computer Science – Semester III

## Data Visualization

## JOURNAL  2024-2025

**Seat No.** _____

# R.D. & S.H. NATIONAL COLLEGE
# & S. W.A. SCIENCE COLLEGE,
**Bandra, Mumbai – 400050.**

**Department of Computer Science**

**CERTIFICATE**

This is to certify that    **Mr. Zubair Javed Qureshi**    of **M.Sc Part II (Sem III)** class has satisfactorily completed **IX** Practicals in the subject of **Data Visualization** as a part of M.Sc. Degree Course in Computer Science during the academic year 2024 – 2025.

**Date of Submission:**

**Faculty Incharge**

**Co-ordinator,**
**Department of Computer Science**

**Signature of External Examiner**

# Data-Visualization Journal

# Practical 1

**Practical: Creating Charts and Reports in Power BI**

**Objective**: Learn to create basic charts and reports in Power BI by connecting to a dataset, transforming data, and building simple visuals.

**Dataset: Sample Sales Data**

Provide students with a sample dataset (like an Excel file or .csv) with the following columns:

- **Date**: Transaction date

- **Product Category**: Category of products (e.g., Electronics, Apparel)

- **Product Name**: Name of the product

- **Region**: Region of sales (e.g., North, South)

- **Sales Amount**: Total sales amount for the transaction

- **Units Sold**: Number of units sold

**Step 1: Import Data into Power BI**

1. **Open Power BI Desktop**.

2. **Get Data**:

   o Go to **Home** > **Get Data** > **Excel** (or **CSV**).

   o Browse and select the sample dataset file, then click **Load**.

3. **Preview the Data**:

   o Verify that the data is loaded correctly by navigating to the **Data** view in Power BI.

**Step 2: Data Cleaning (Optional)**

- Check if the data needs cleaning. For example, look for any missing values or errors.

- If required, go to **Transform Data** to remove any unnecessary rows or columns or rename columns if needed.

**Step 3: Create Simple Visuals**

**Chart 1: Sales by Product Category (Column Chart)**

1. Go to the **Report** view.

2. In the **Fields** pane, check **Sales Amount** and **Product Category**.

3. Power BI will automatically create a bar chart. Change it to a column chart by selecting the **Clustered Column Chart** icon in the **Visualizations** pane.

4. Customize the chart:

   o Drag **Sales Amount** to the **Y-axis** and **Product Category** to the **X-axis**.

   o In the **Visualizations** pane, adjust formatting options like **Data Labels** for easy viewing of values.
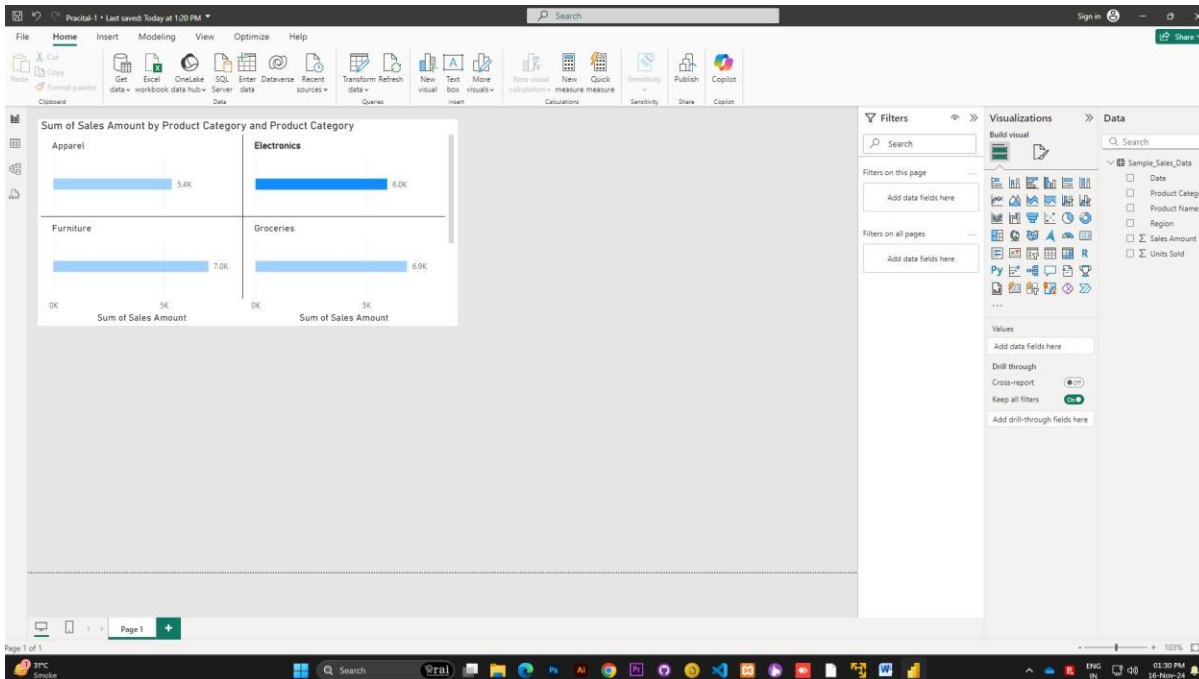
**Chart 2: Sales Trend Over Time (Line Chart)**

1. In the **Fields** pane, check **Date** and **Sales Amount**.

2. In the **Visualizations** pane, select the **Line Chart** icon.

3. Customize the chart:

   o Drag **Date** to the **X-axis** and **Sales Amount** to the **Y-axis**.

   o Under **Formatting**, enable **Data Labels** and format the chart as needed.
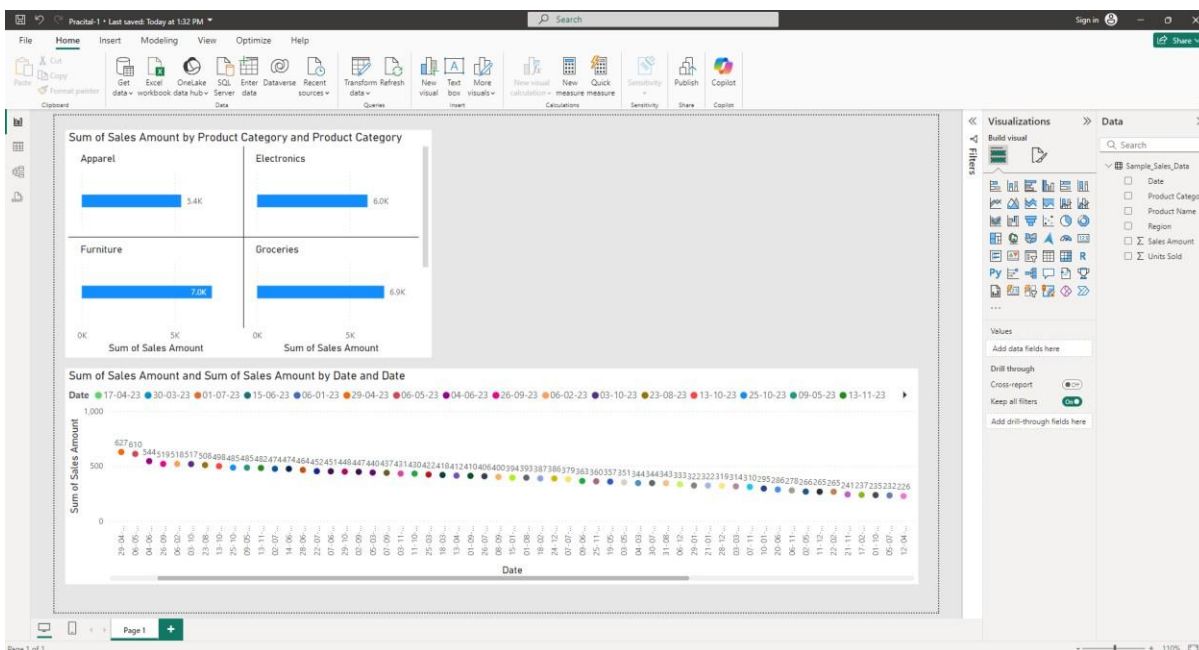


**Chart 3: Regional Sales Distribution (Map)**

1. Check **Region** and **Sales Amount** in the **Fields** pane.

2. Select the **Map** visualization icon in the **Visualizations** pane.

3. Customize the map:

   o Drag **Region** to the **Location** field and **Sales Amount** to **Size**.

   o Enable **Location Data** in the settings to let Power BI recognize the regions.



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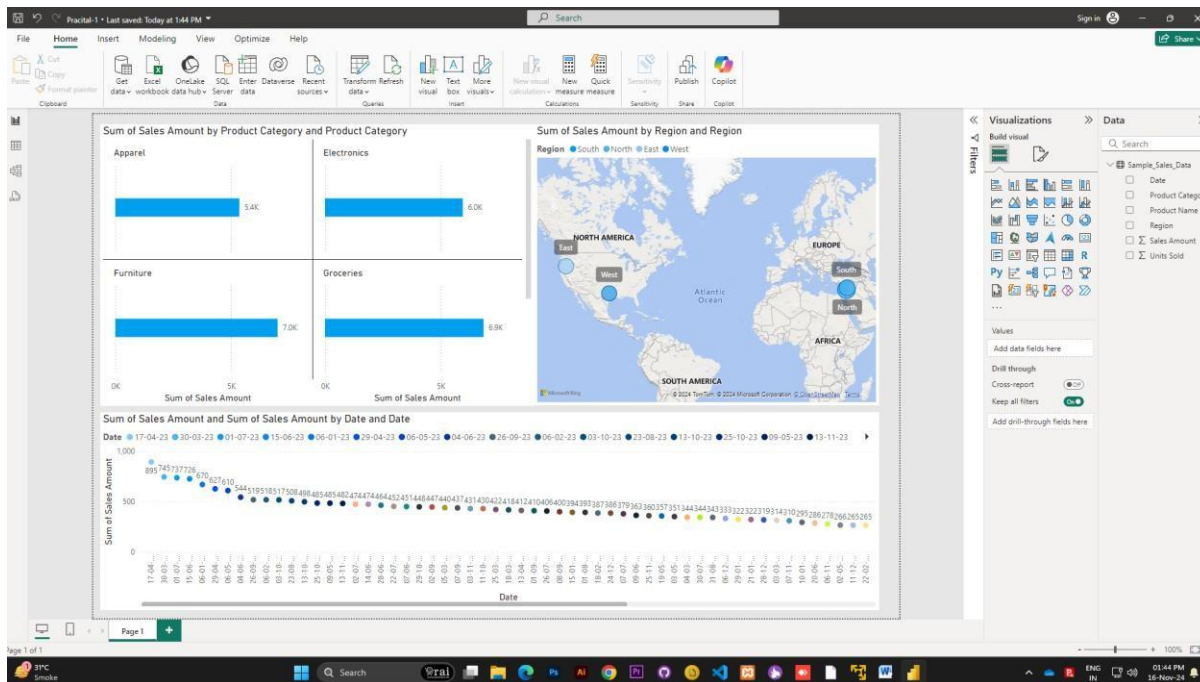
**Step 4: Create a Slicer (Filter)**

1. Select the **Slicer** visualization from the **Visualizations** pane.

2. Drag the **Product Category** field to the **Field** section of the slicer.

3. Place the slicer above the charts. This allows users to filter the report based on the selected product category.
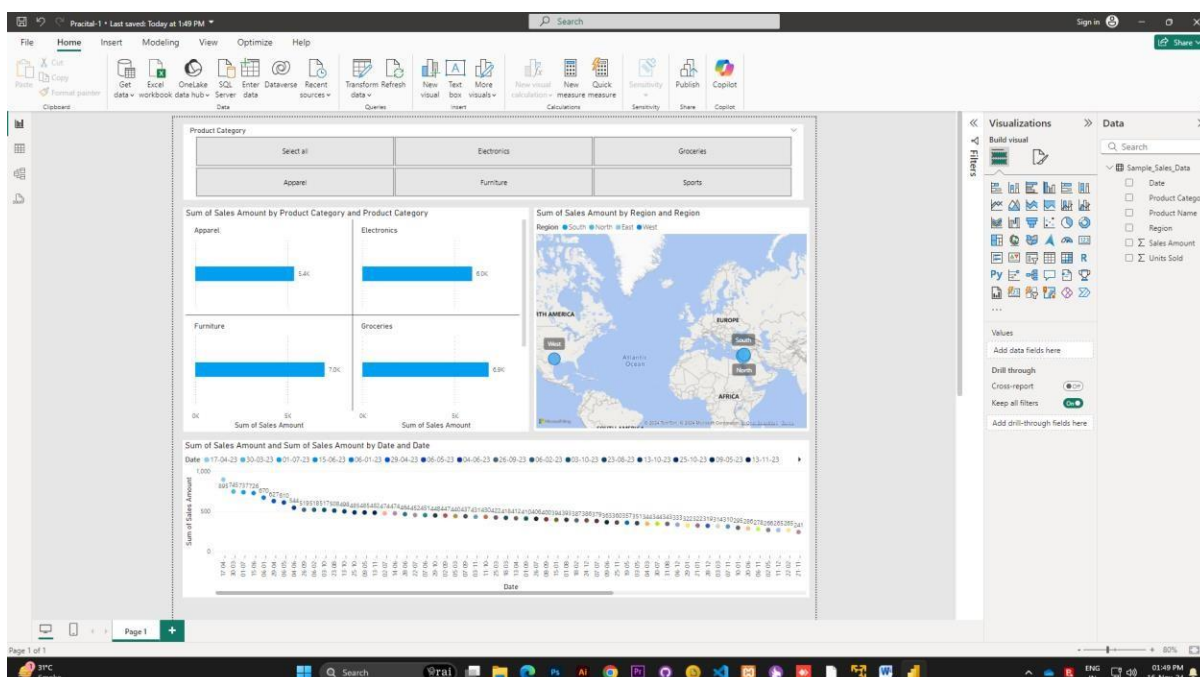
**Step 5: Design the Report Layout**

1.  Arrange visuals neatly on the report canvas for a clean, organized look.

2.  Customize titles, background colors, and font sizes under **Formatting** to match your desired style.

**Step 6: Add a Summary Card (Optional)**

1.  Select the **Card** visualization from the **Visualizations** pane.

2.  Drag **Sales Amount** into the card to show total sales.

3.  Customize the card with a descriptive title, such as **Total Sales**.

**Step 7: Publish and Share the Report**

1.  **Save** your Power BI report locally.

2.  Click on **Publish** in the top-right corner to share it to Power BI Service (cloud).

3.  Choose your workspace, then click **Select**.

4.  In Power BI Service, you can share the report link or embed it in websites, if needed.
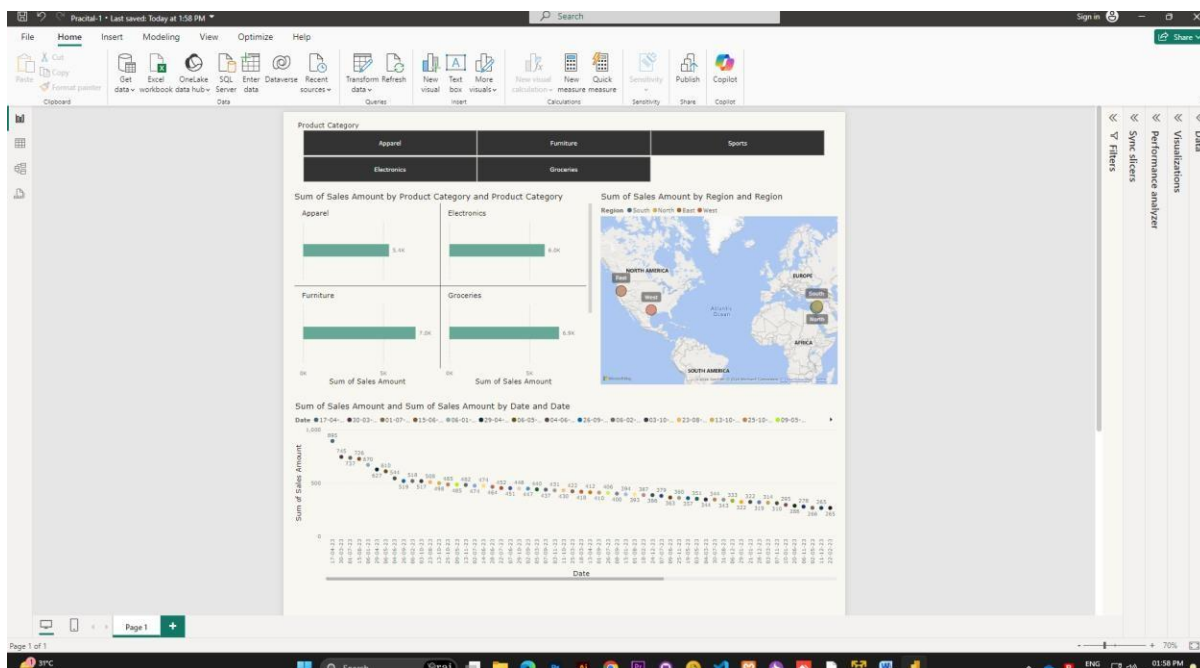
# Practical 2

**Practical: Time Intelligence and data analysis Functions with DAX**

**Step: Importing Data Set**

1. Load Dataset into Power BI

   o  Open Power BI Desktop.

   o  Click on Get Data > Excel and load your dataset.

**Step 2: Creating a Date Table**

Time Intelligence functions require a Date table. If not already available, create a Date table in Power BI:

1. Go to **Modeling** > **New Table**.

2. Enter the DAX formula below to create a Date table with date ranges.

**DAX**

**DateTable =**

  **CALENDAR(DATE(2023, 1, 1), DATE(2024, 12, 31))**

3. Add calculated columns for **Year**, **Month**, **Quarter**, and **Month Name** for grouping data by these time periods:

**DateTable =**

  **ADDCOLUMNS(**

   **CALENDAR(DATE(2023, 1, 1), DATE(2024, 12, 31)),**

   **"Year", YEAR([Date]),**

   **"Month", MONTH([Date]),**

   **"Quarter", QUARTER([Date]),**

   **"MonthName", FORMAT([Date], "MMMM")**

  **)**

4. Mark this table as the Date Table by selecting it in **Modeling** > **Mark as Date Table**.

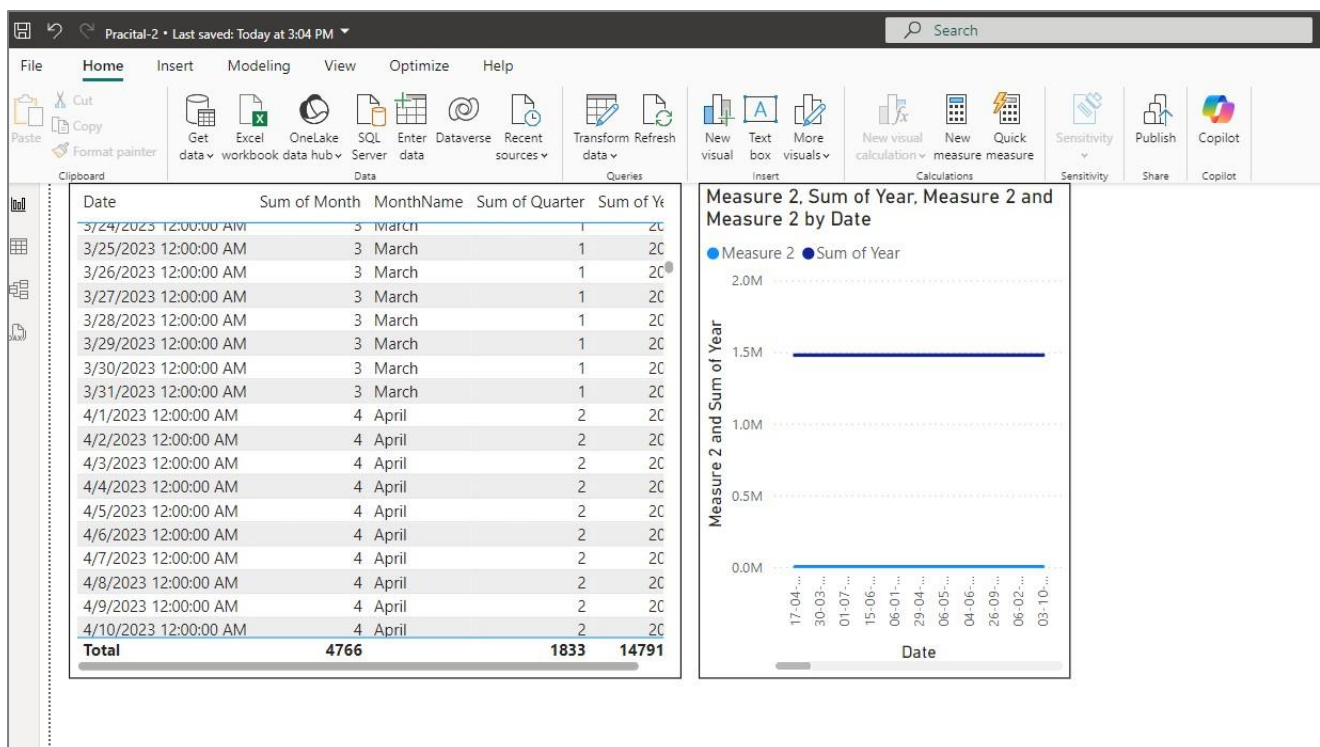**Step 3: Calculating Year-To-Date Sales**

1. Go to the **Modeling** tab > **New Measure**.

2. Enter the following DAX formula to calculate Year-To-Date (YTD) sales:

DAX

**Measure 2 =**

   **TOTALYTD(SUM(Sample_Sales_Data[Sales Amount]), DateTable[Date])**

3. Use **Sales YTD** in a visual, such as a line chart or table, to see cumulative sales over the year.



**Step 4: Calculating Month-To-Date and Quarter-To-Date Sales**

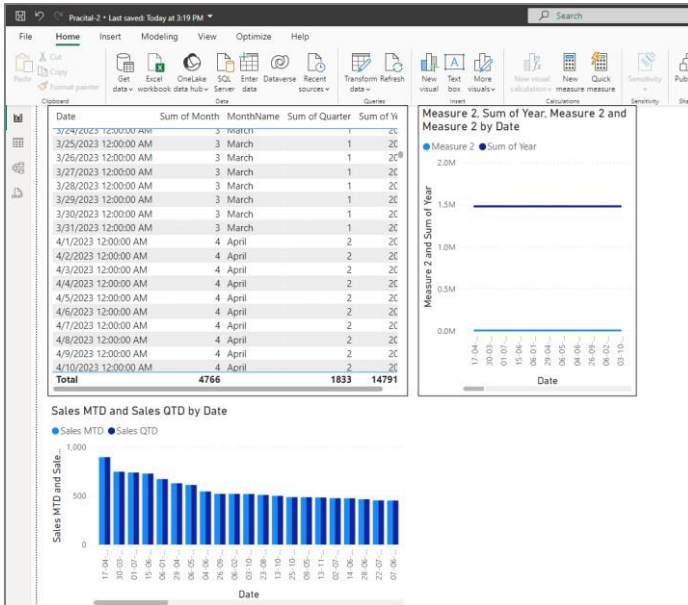1. Create two more measures to calculate MTD and QTD sales.

DAX

**Sales MTD =**

   **TOTALMTD(SUM(Sample_Sales_Data[Sales Amount]), DateTable[Date])**

**Sales QTD =**

   **TOTALQTD(SUM(Sample_Sales_Data[Sales Amount]), DateTable[Date])**

2. Use these measures to see how sales accumulate over months and quarters.

## Step 5: Year-Over-Year (YoY) Comparison

1. Create a measure to calculate the prior year's sales for comparison.

DAX

**Sales Previous Year =**

　**CALCULATE(SUM(Sample_Sales_Data[Sales Amount]),**
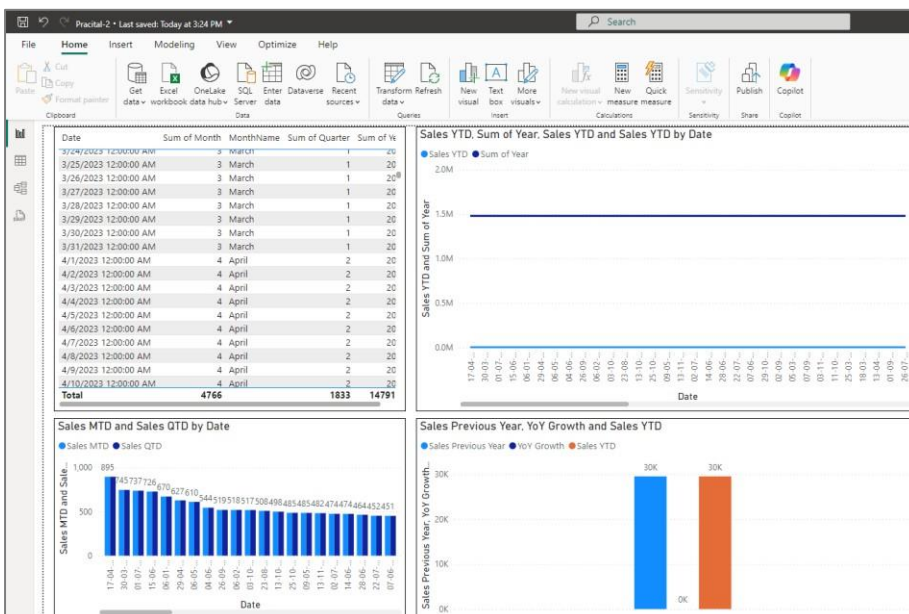**SAMEPERIODLASTYEAR(DateTable[Date]))**

2. Create a Year-over-Year growth measure.

DAX

**YoY Growth =**

　**DIVIDE([Sales YTD] - [Sales Previous Year], [Sales Previous Year], 0)**

3. Add YoY Growth to a visual alongside Sales YTD and Sales Previous Year to show growth percentages.
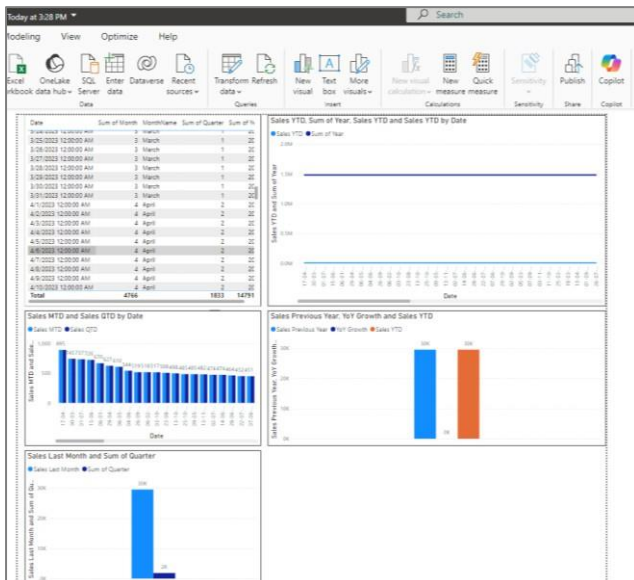
## Step 6: Using DATEADD for Custom Time Shifts

1. The DATEADD function is flexible for shifting dates by any period (days, months, quarters, years).

DAX

**Sales Last Month =**

**CALCULATE(SUM(Sales[SalesAmount]), DATEADD(DateTable[Date], -1, MONTH))**

2. This formula shifts the date back one month to calculate sales for the previous month.


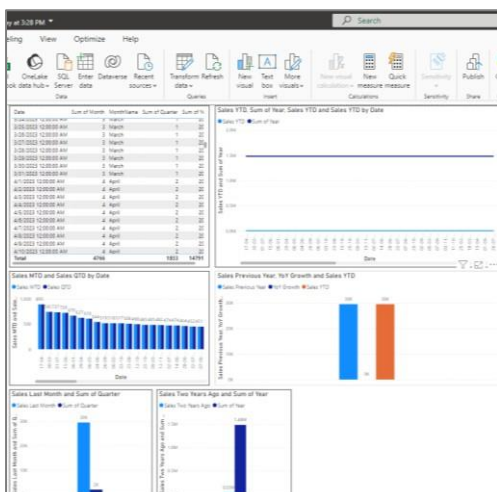
## Step 7: ParallelPeriod for Period Offset Comparisons

1. PARALLELPERIOD allows offsets similar to DATEADD, often used to compare the same period across different years.

DAX

Sales Two Years Ago =

CALCULATE(SUM(Sales[SalesAmount]), PARALLELPERIOD(DateTable[Date], -2, YEAR))

2. This formula shifts the date back by two years to calculate sales from two years ago.



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## Step 8: Custom Period Aggregations with CALCULATE and FILTER

Sometimes, custom calculations don't fit predefined DAX functions. Use CALCULATE and FILTER to create custom aggregations.

1. **Rolling 3-Month Sales**: Calculate the last three months' sales dynamically.

DAX

```
Sales Last 3 Months =
    CALCULATE(SUM(Sales[SalesAmount]),
        DATESINPERIOD(DateTable[Date],
        LASTDATE(DateTable[Date]), -3, MONTH))
```
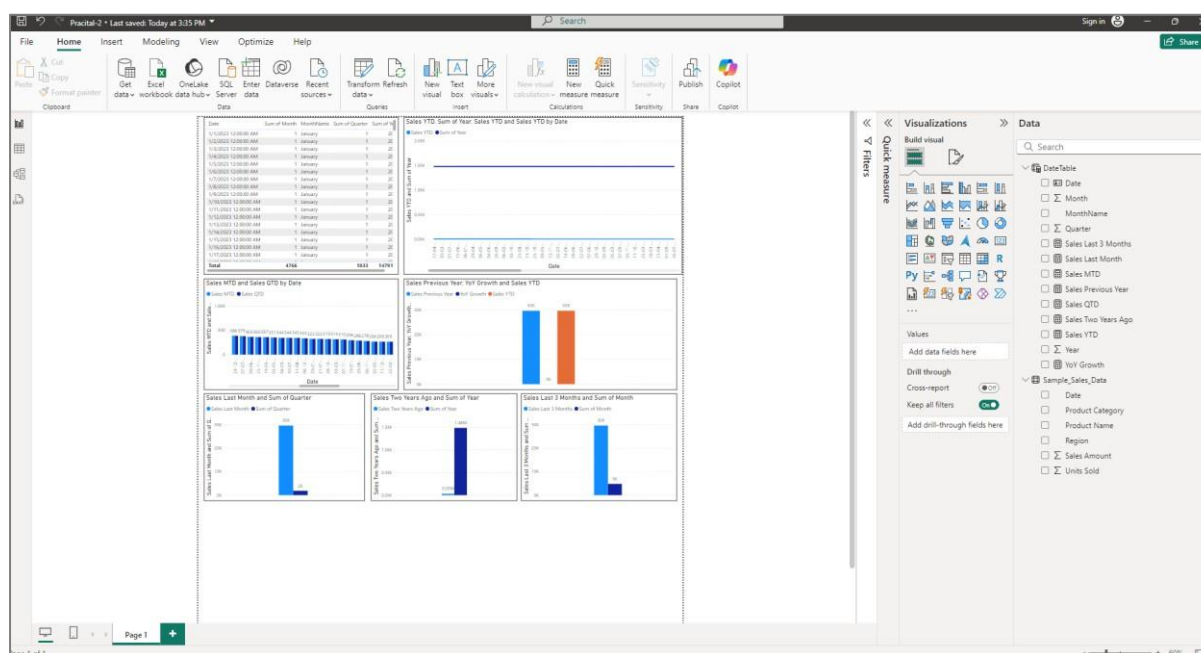


## Step 9: Adding These Measures to a Power BI Report

1. Visualize each measure in Power BI:

    o **Sales YTD, MTD, QTD**: Use line charts for trend analysis.

    o **Sales Previous Year and YoY Growth**: Use bar or line and bar combo charts.

    o **Rolling 3-Month Sales**: A line chart or KPI card for insights on recent sales trends.

2. Encourage students to customize visuals by adding slicers for Year, Quarter, and Month.

## Step 10: Recap and Analysis

Encourage students to use their DAX measures to analyze:

- Seasonal trends, such as quarterly and monthly performance.

- Long-term growth by examining YoY Growth.

- Recent changes in performance with rolling averages.

| Date | Sum of Month | MonthName | Sum of Quarter | Sum of Y |
|---|---|---|---|---|
| 1/1/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/2/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/3/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/4/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/5/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/6/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/7/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/8/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/9/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/10/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/11/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/12/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/13/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/14/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/15/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/16/2023 12:00:00 AM | 1 | January | 1 | 20 |
| 1/17/2023 12:00:00 AM | 1 | January | 1 | 20 |
| **Total** | **4766** | | **1833** | **14791** |

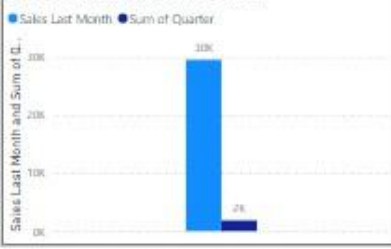Sales YTD, Sum of Year, Sales YTD and Sales YTD by Date
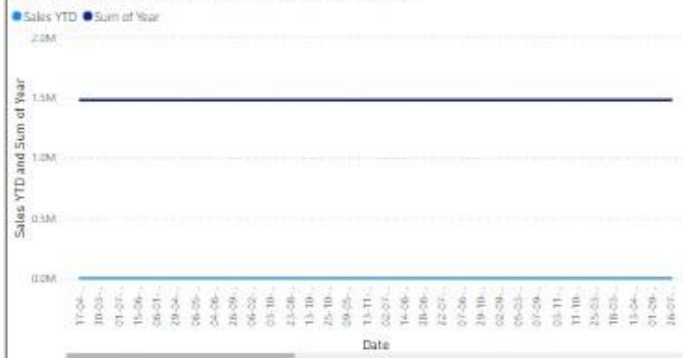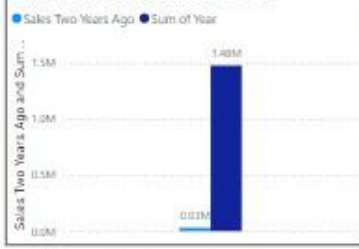
Sales MTD and Sales QTD by Date
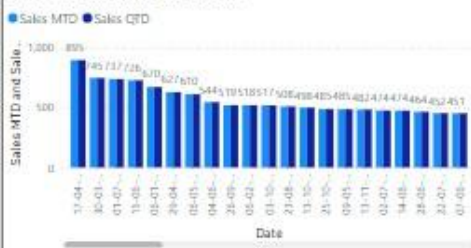
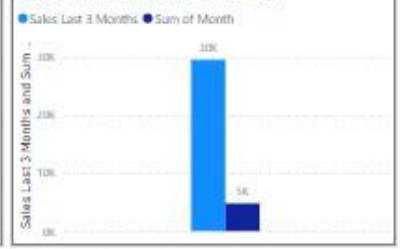Sales Previous Year, YoY Growth and Sales YTD
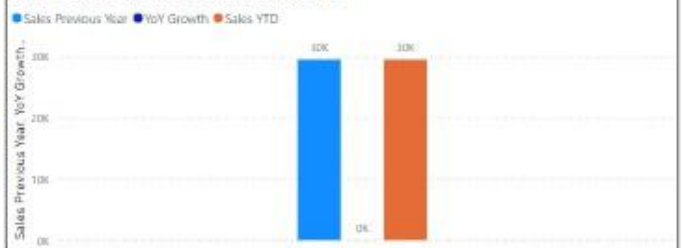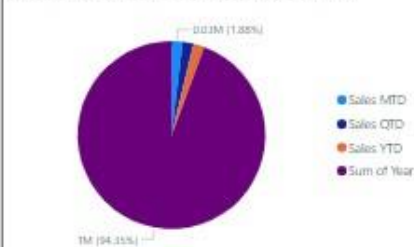
Sales Last Month and Sum of Quarter

Sales Two Years Ago and Sum of Year

Sales Last 3 Months and Sum of Month

Sales MTD, Sales QTD, Sales YTD and Sum of Year

Sales Last Month, Sales Last 3 Months and Sum of Month by Product Name

| Quarter | |
|---|---|
| 1 | 3 |
| 2 | 4 |

# Practical 3

**Practical: Create one-dimensional data using series and perform various operations on it**

**Step 1:** Open Power BI go to Get data and click more          **Step 2:** Search python and click connect
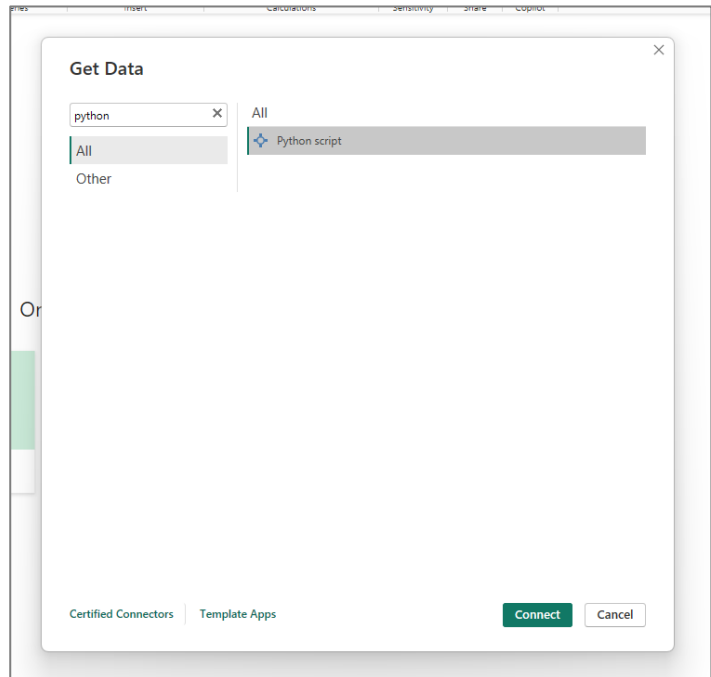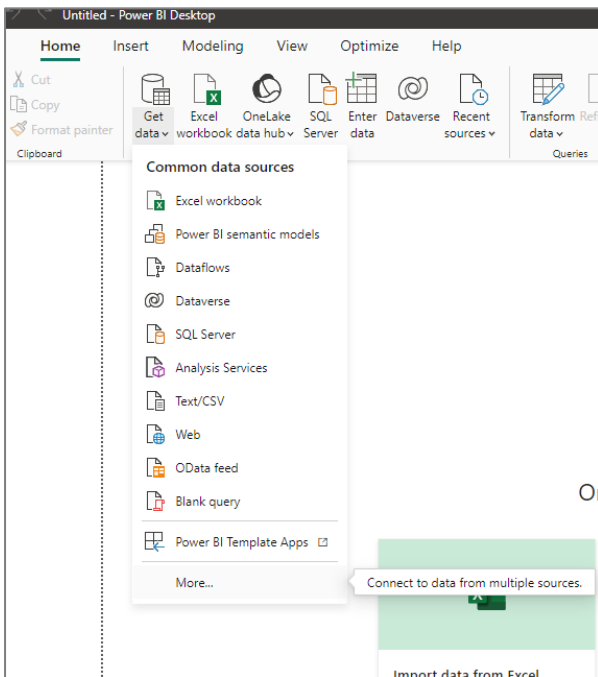


**Step 3: P**ython script dialogue box will open type your python code here (Make sure you have python installed in your system)
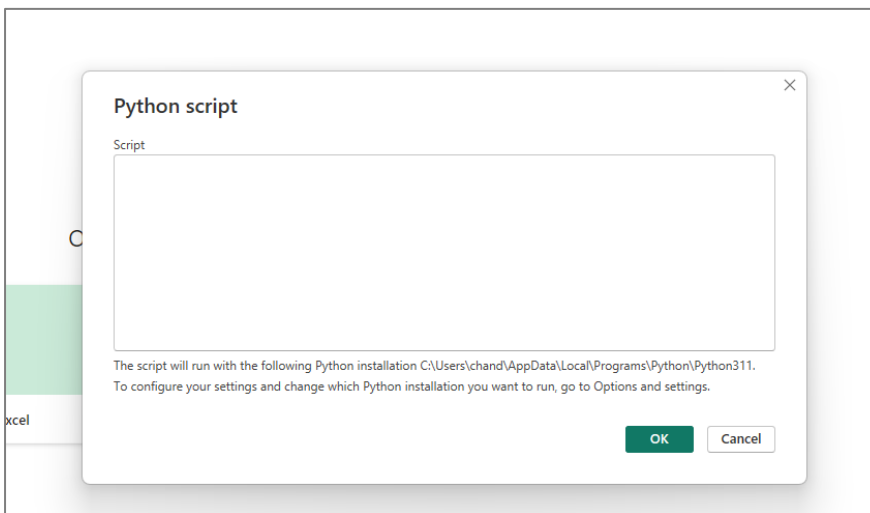


**Step 4 code:**

```
import pandas as pd

import numpy as np

data = pd.DataFrame({'values': [10, 20, 30, 40, 50]})

data['Addition'] = data['values'] + 5

data['Multiplication'] = data['values'] * 2
```

```python
data['Subtraction'] = data['values'] - 10

data['Division'] = data['values'] / 5

def square(x):

    return x * x

data['Squared'] = data['values'].apply(square)

statistics = {

    'Sum': [data['values'].sum()],

    'Mean': [data['values'].mean()],

    'Max': [data['values'].max()],

    'Min': [data['values'].min()]

}

stats_df = pd.DataFrame(statistics)

filtered_data = data[data['values'] > 25]

data_with_nan = pd.DataFrame({'values': [10, 20, np.nan, 40, 50]})

data_with_nan['Is_NaN'] = data_with_nan['values'].isna()

data_with_nan['Filled'] = data_with_nan['values'].fillna(0)

data['Sorted_Ascending'] = data['values'].sort_values().reset_index(drop=True)

data['Sorted_Descending'] = data['values'].sort_values(ascending=False).reset_index(drop=True)

output = pd.concat([data, stats_df], axis=1)
```

**output:**

# Practical 4
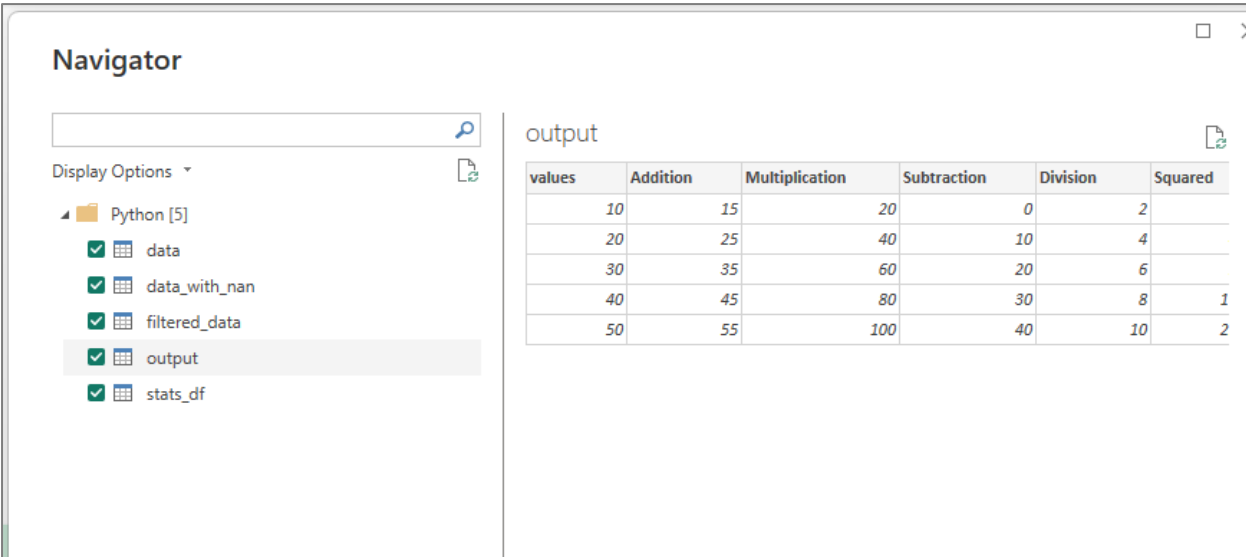
**Practical: Perform Reshaping of the hierarchical data and pivoting data frame data**

**Step 1:** Open Power BI go to Get data and click more          **Step 2:** Search python and click connect
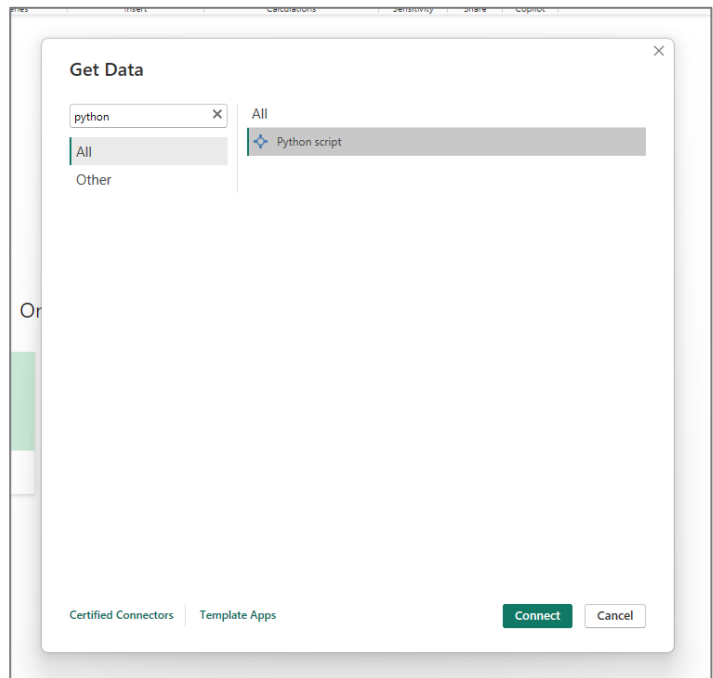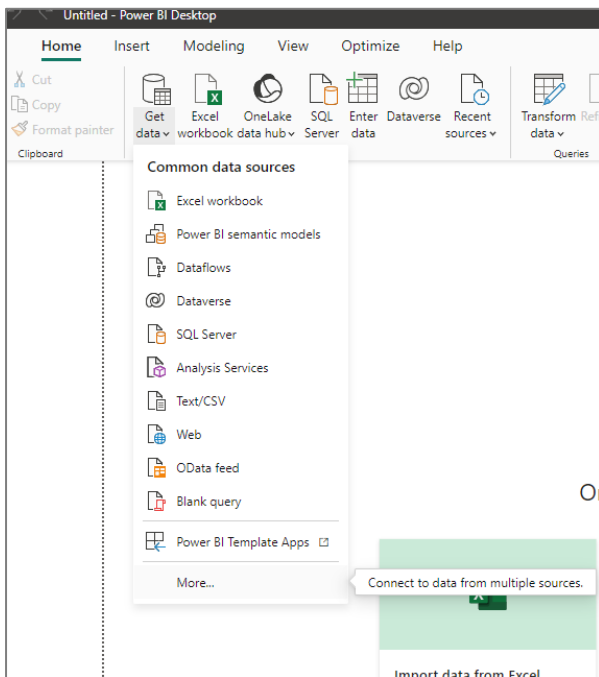


**Step 3:** Python script dialogue box will open type your python code here (Make sure you have python installed in your system)
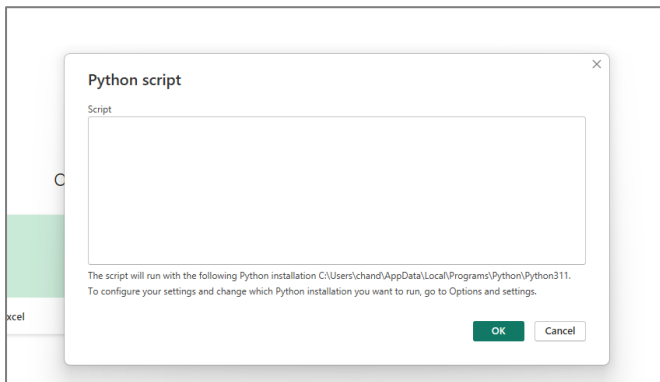


**Step 4 code:**

```
import pandas as pd
import numpy as np

# Create a MultiIndex DataFrame (Hierarchical Data)
arrays = [
    ['A', 'A', 'A', 'B', 'B', 'B'],
    ['X', 'Y', 'Z', 'X', 'Y', 'Z']
]
index = pd.MultiIndex.from_arrays(arrays, names=('Letter', 'Symbol'))
data = pd.DataFrame({
    'Value1': [10, 20, 30, 40, 50, 60],
```

```python
    'Value2': [15, 25, 35, 45, 55, 65]
}, index=index)

print("Original DataFrame (Hierarchical Data):")
print(data)
print("\n")


# ---------------- Stack Operation ----------------

# Stack the DataFrame (Convert Columns to Rows)
stacked = data.stack()
print("Stacked DataFrame:")
print(stacked)
print("\n")


# ---------------- Unstack Operation ----------------

# Unstack the DataFrame (Convert Rows to Columns)
unstacked = stacked.unstack()
print("Unstacked DataFrame:")
print(unstacked)
print("\n")


# ---------------- Pivoting Data ----------------

# Create DataFrame for Pivoting
data_for_pivot = pd.DataFrame({
    'Date': ['2024-01-01', '2024-01-01', '2024-01-02', '2024-01-02'],
    'City': ['New York', 'Los Angeles', 'New York', 'Los Angeles'],
    'Temperature': [32, 75, 30, 77]
})

print("Original Data for Pivoting:")
print(data_for_pivot)
print("\n")


# Pivot the DataFrame to make cities as columns and dates as rows
pivoted_data = data_for_pivot.pivot(index='Date', columns='City', values='Temperature')
print("Pivoted DataFrame (Cities as Columns):")
print(pivoted_data)
print("\n")


# ---------------- Pivot Table Data ----------------

# Create DataFrame for Pivot Table
data_for_pivot_table = pd.DataFrame({
    'Date': ['2024-01-01', '2024-01-01', '2024-01-02', '2024-01-02'],
    'City': ['New York', 'Los Angeles', 'New York', 'Los Angeles'],
    'Temperature': [32, 75, 30, 77],
    'Humidity': [80, 20, 85, 18]
})
```

```
print("Original Data for Pivot Table:")
print(data_for_pivot_table)
print("\n")

# Pivot Table to calculate the average temperature and humidity per city and date
pivot_table_data = data_for_pivot_table.pivot_table(
    index='Date',
    columns='City',
    values=['Temperature', 'Humidity'],
    aggfunc=np.mean
)

print("Pivot Table DataFrame (Average Temperature and Humidity):")
print(pivot_table_data)
```
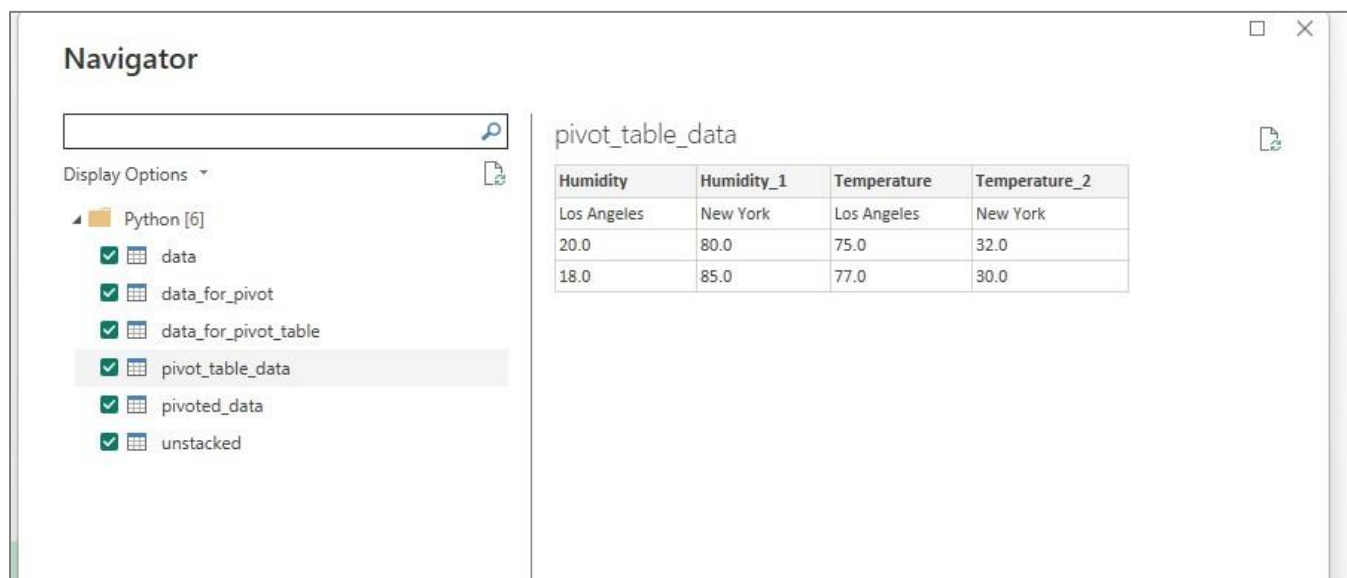
**Output:**



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# Practical 5

**Practical: Connecting and extracting with various data resources in tableau and Perform calculations and creating parameters in Tableau.**

1. Connecting to Data Sources

Steps:

- o Open Tableau:
- o On the "Connect" pane, select your data source (e.g., Excel, CSV, SQL Server, etc.).
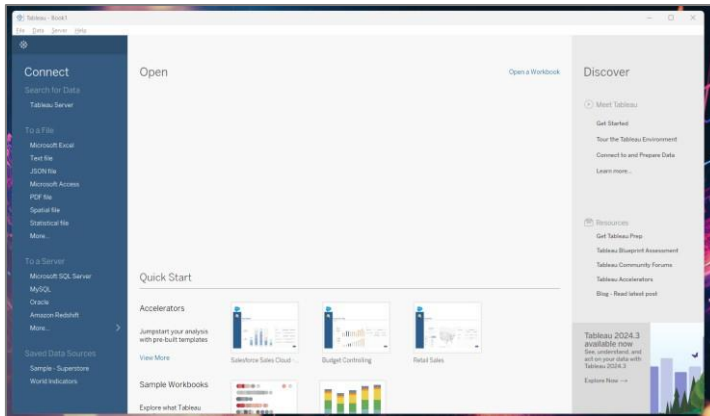


2. Connect to a File:
- o Choose Microsoft Excel for an example.
- o Browse to the desired file and click Open.
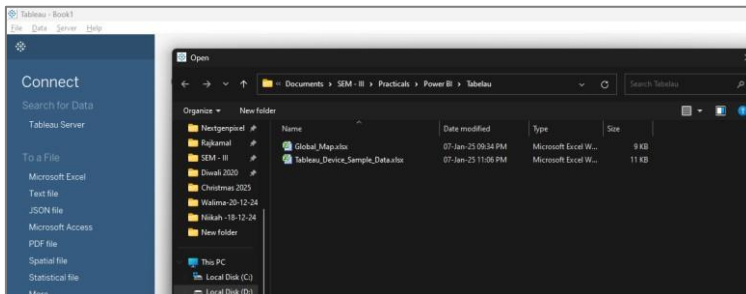


3. Preview the Data:
- o The data preview will appear. Drag the sheet to the canvas.
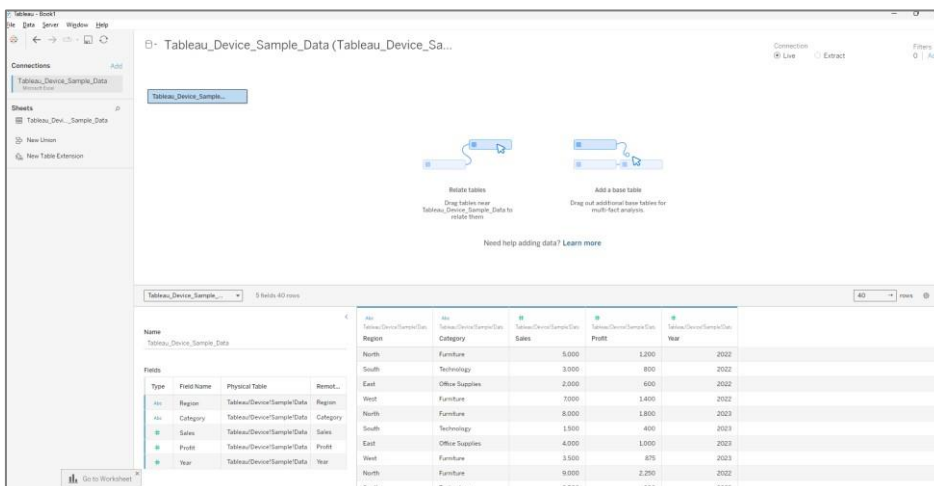
4. Extract Data:

o In the top-right corner of the data source screen, choose Extract.



o Click on Sheet 1 to proceed.

## 2. Creating Calculations

Calculations in Tableau are used for custom computations or field transformations.

Example 1: Calculated Field

1. Go to the Data Pane (left sidebar) and right-click.
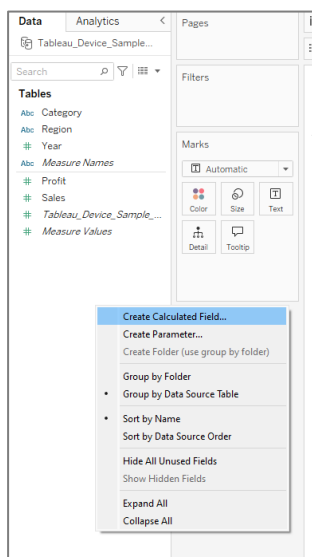


2. Select Create Calculated Field.
3. Give it a name (e.g., "Sales Growth").
4. Enter the formula:

**(SUM([Current Year Sales]) - SUM([Previous Year Sales])) / SUM([Previous Year Sales])**

**(SUM([Sales]) - LOOKUP(SUM([Sales]), -1)) / LOOKUP(SUM([Sales]), -1)**

5. Click OK.

**Example 2: Conditional Calculation**

1. Create another calculated field, name it "Category Performance".
2. Use the following formula

**IF SUM([Sales]) > 100000 THEN "High"**

**ELSEIF SUM([Sales]) > 50000 THEN "Medium"**

**ELSE "Low"**

**END**
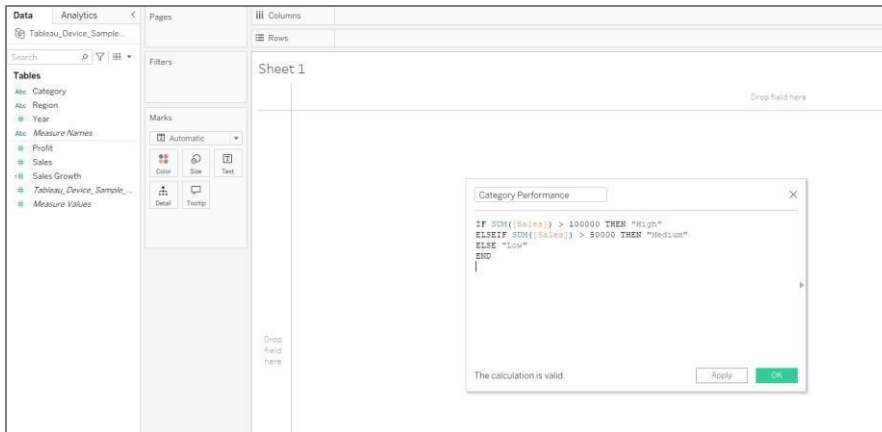
## 3. Creating Parameters

Parameters let users dynamically control values.

**Example: Dynamic Sales Filter**

1. Go to the **Data Pane** and right-click.

2. Choose **Create Parameter**.
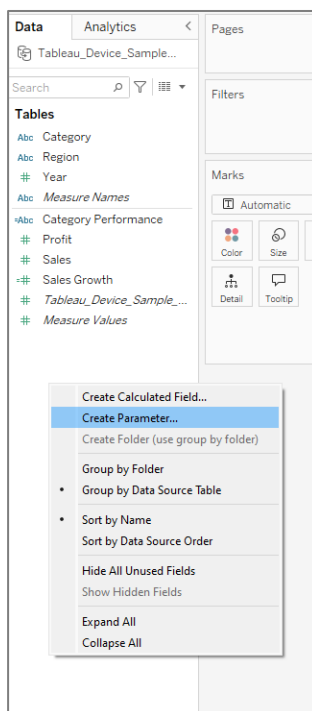


3. Name the parameter (e.g., "Sales Threshold").

4. Set the following:

   o **Data Type:** Float

   o **Current Value:** 50000

   o **Allowable Values:** Range

   o **Minimum:** 10000

   o **Maximum:** 200000

   o **Step Size:** 10000

5. Click **OK**.

6. Create a calculated field using this parameter:

**IF SUM([Sales]) > [Sales Threshold] THEN "Above Threshold"**

**ELSE "Below Threshold"**

**END**



Add the parameter to your dashboard and observe the interactivity.

**4. Visualizing Data**

1. Drag dimensions and measures to Rows and Columns for visualizations.

2. Use filters, marks, and colors to enhance the chart.

Custom fields

1. Sales Growth

2. Category Performance

3. Sales Threshold
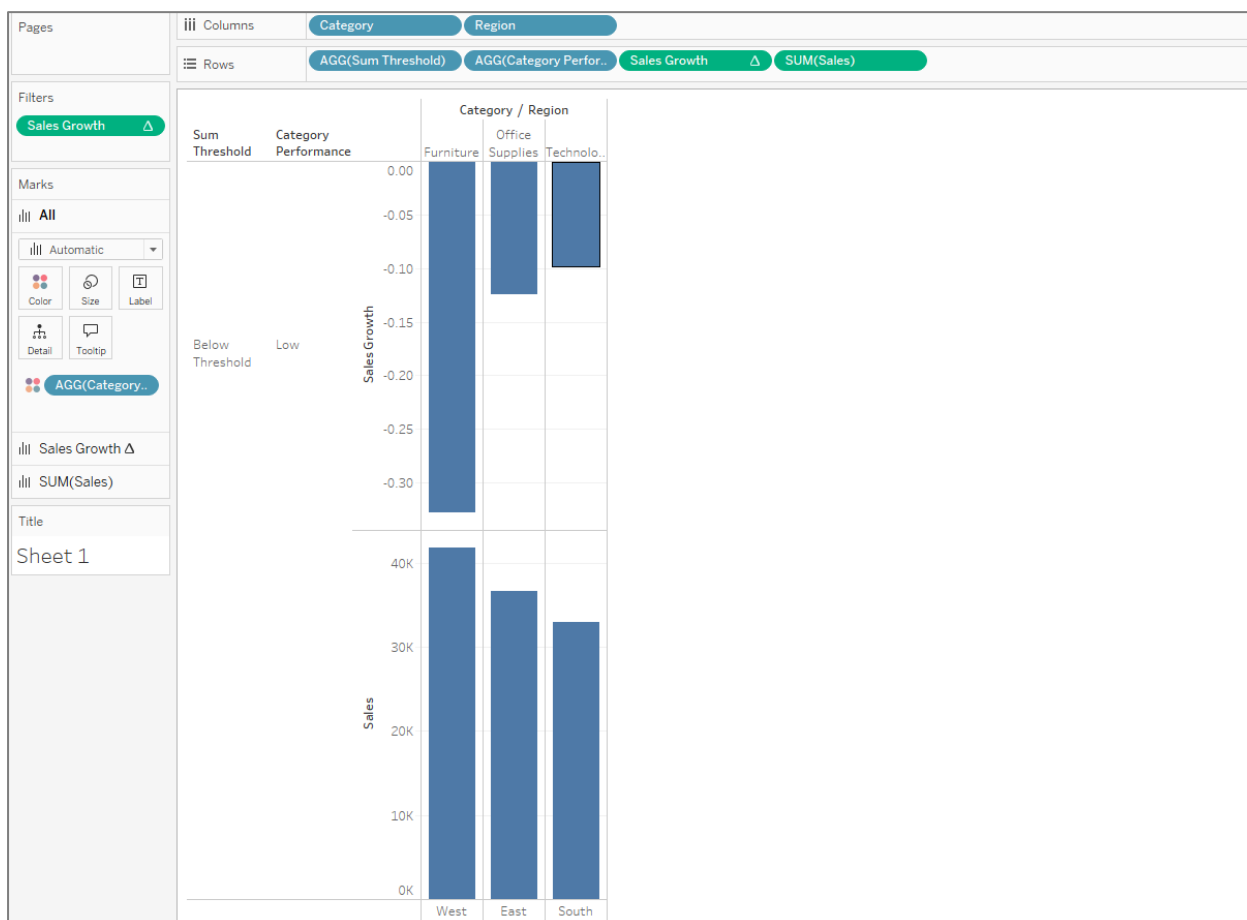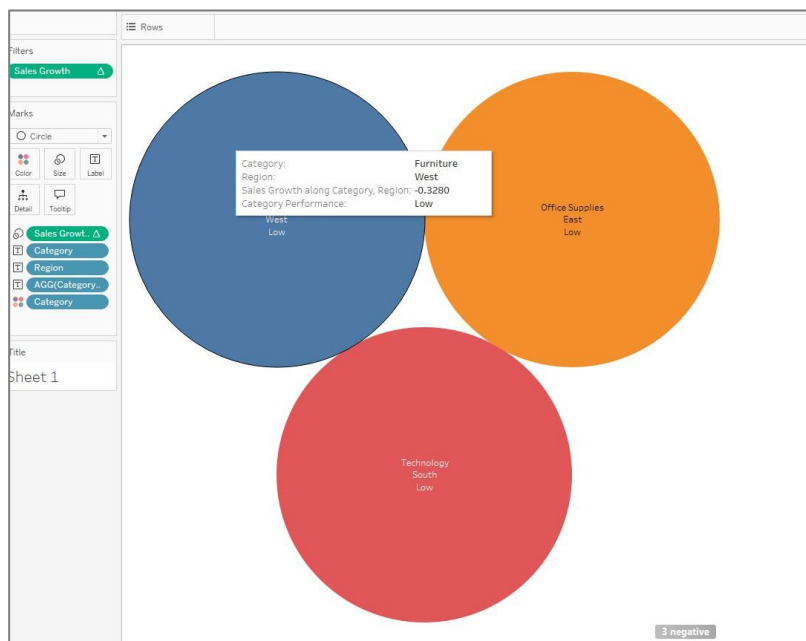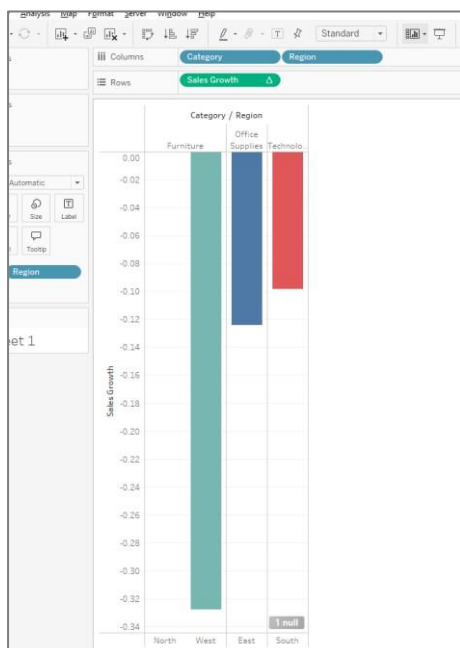
# Practical 6

**Practical: Designing Tableau Dashboards for different displays and devices**

1. Dashboard Creation Basics

   1. Open Tableau Desktop and create a new workbook.

   2. Click Dashboard > New Dashboard.
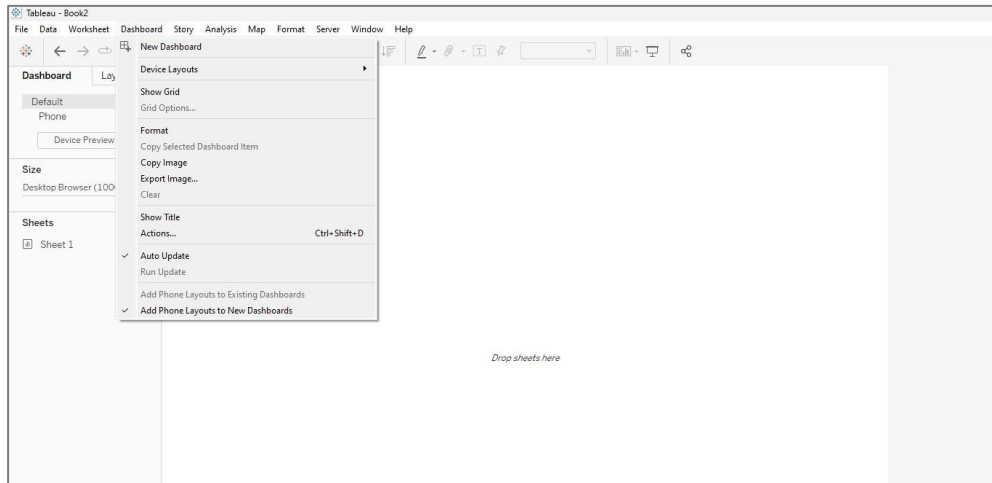


   3. In the dashboard pane:

      o Set the Size dropdown to Automatic or a specific size like Desktop (1024 x 768).
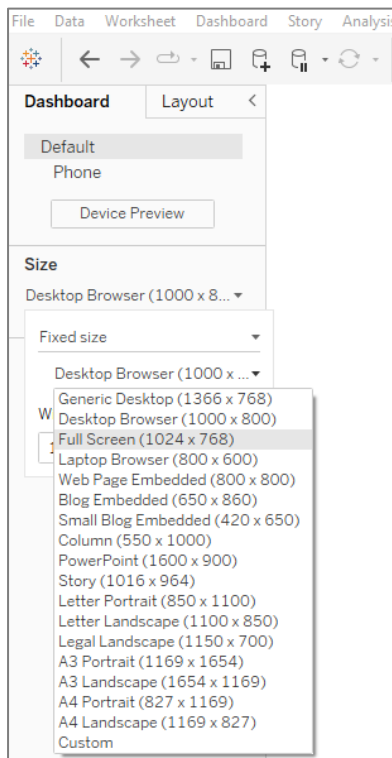


2. Adding Content to the Dashboard

   1. Drag and drop Sheets (visualizations) onto the dashboard canvas.

   2. Arrange the components (e.g., charts, filters, legends) to fit the design goals.
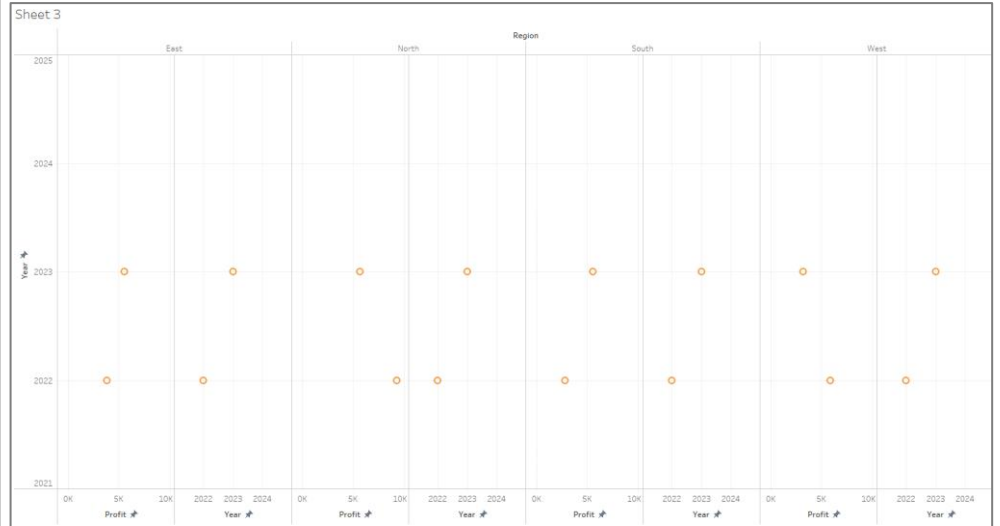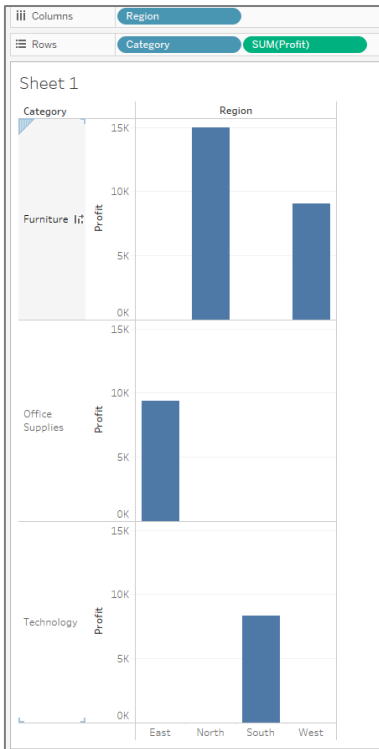
Sheet 1

Sheet 3

Sheet 2

| Category | | |
|---|---|---|
| Furniture | | 24,000 |
| Office Supplies | | 9,350 |
| Technology | | 8,350 |

Sheet 4

Category: **Furniture**
Sales: 104,000
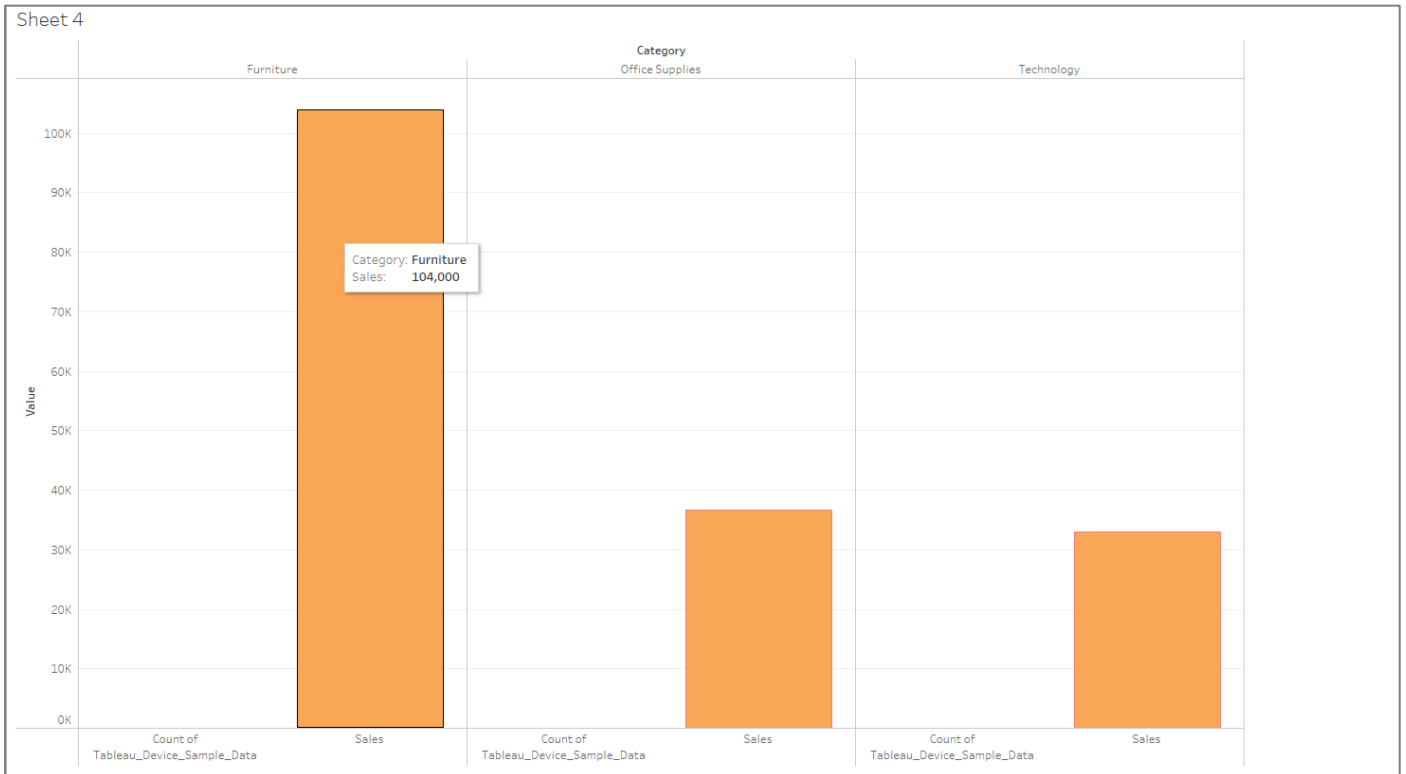
Dashboard

3. Enabling Device-Specific Dashboards

1. In the Dashboard Pane, click Device Preview.

2. Select Add a Device Layout.

3. Choose from the available devices:

o Phone                                                    Tablet



o Desktop



o
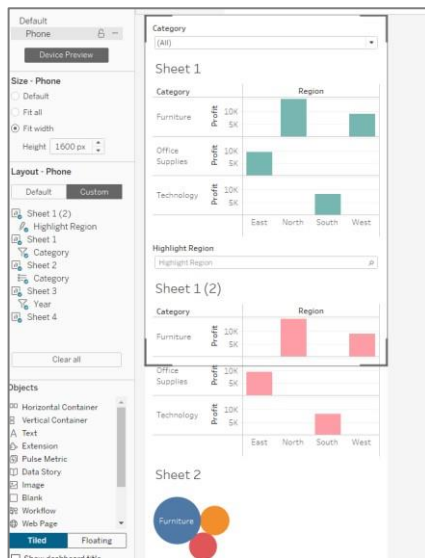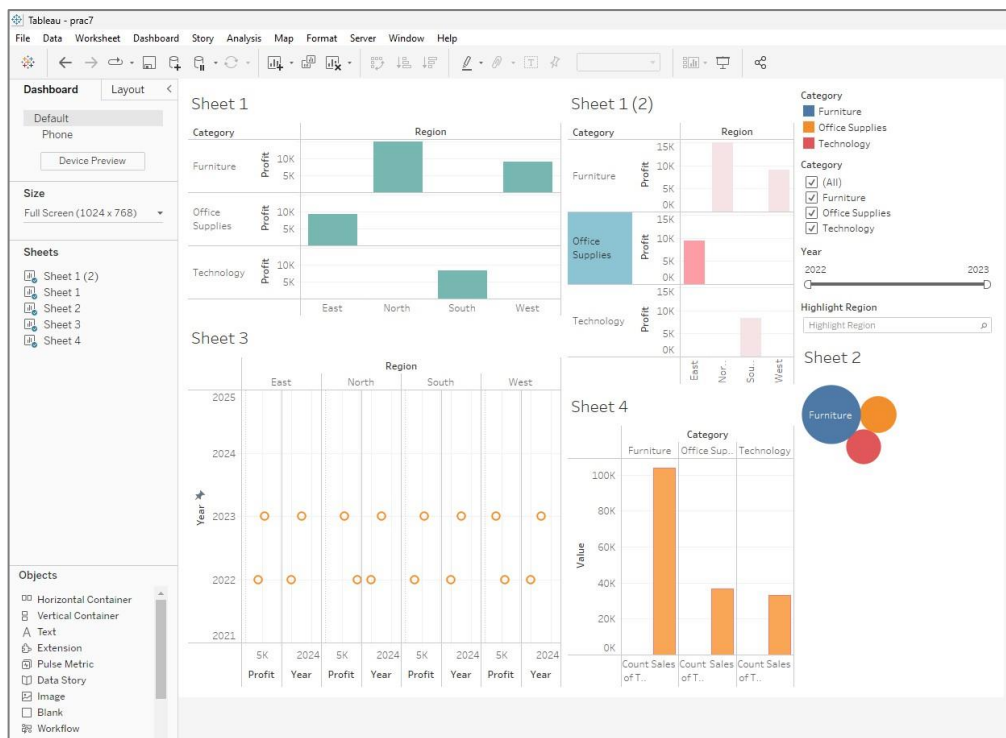
4. Customize each layout:

o Phone Layout:

▪ Adjust for narrow screens by stacking charts vertically.

- Remove unnecessary elements to keep it simple.
  - Tablet Layout:
- Use moderate-sized elements.

  Balance interactivity and detail.
  - Desktop Layout:
- Add full-sized visuals and interactive features.



4. Best Practices for Responsive Design

- Use containers (horizontal or vertical) for better alignment and spacing.

- Optimize font sizes and colors for readability across devices.
- Avoid overcrowding the dashboard by prioritizing key metrics.
- Test on actual devices to ensure usability.

5. Exporting and Sharing

1. Save the workbook as a .twbx file to include data.
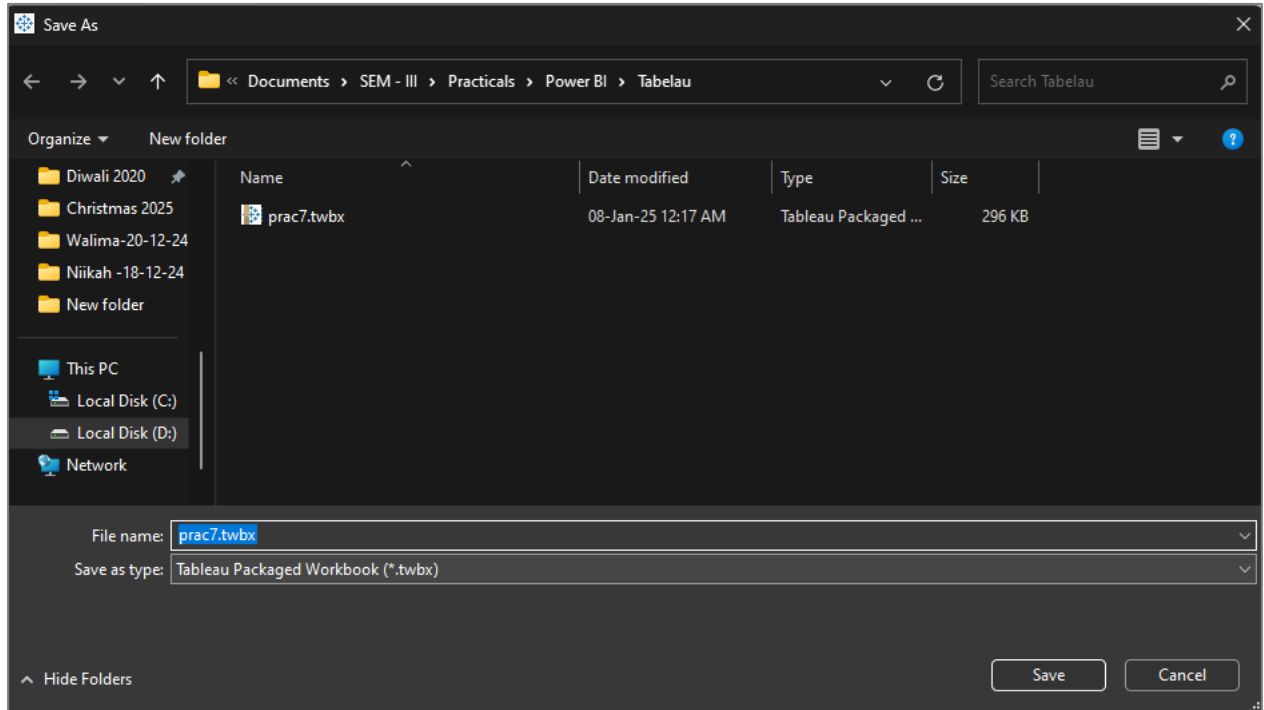


2. Publish to Tableau Server or Tableau Public for accessibility across devices.
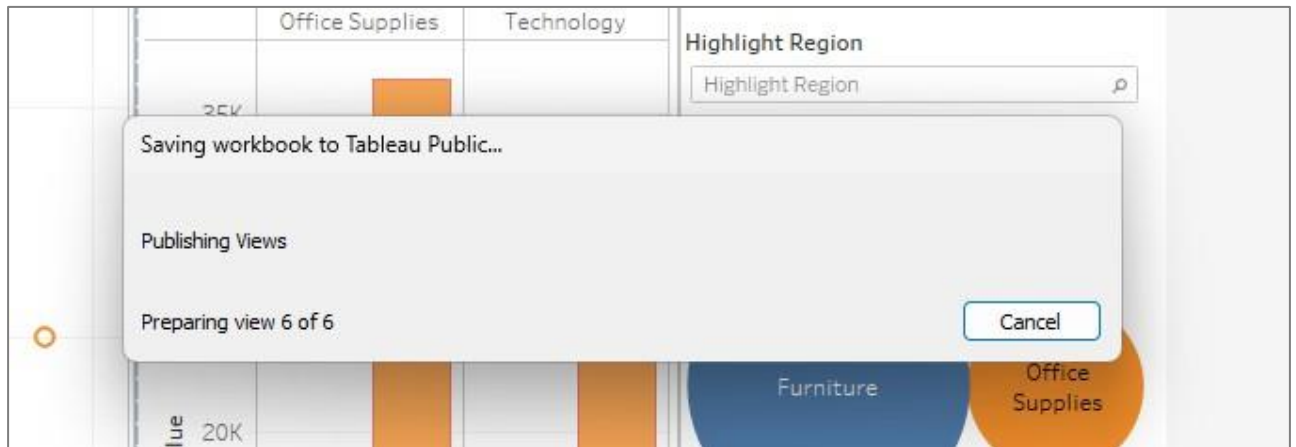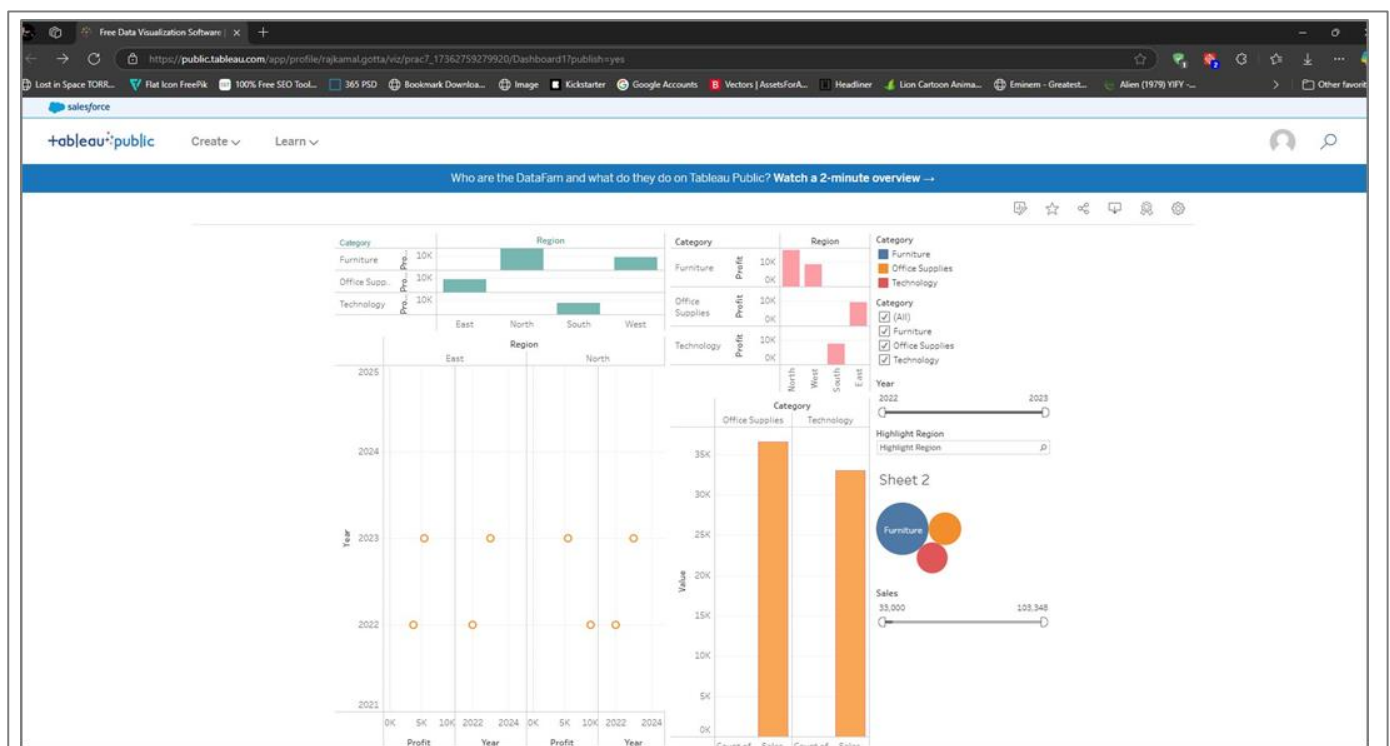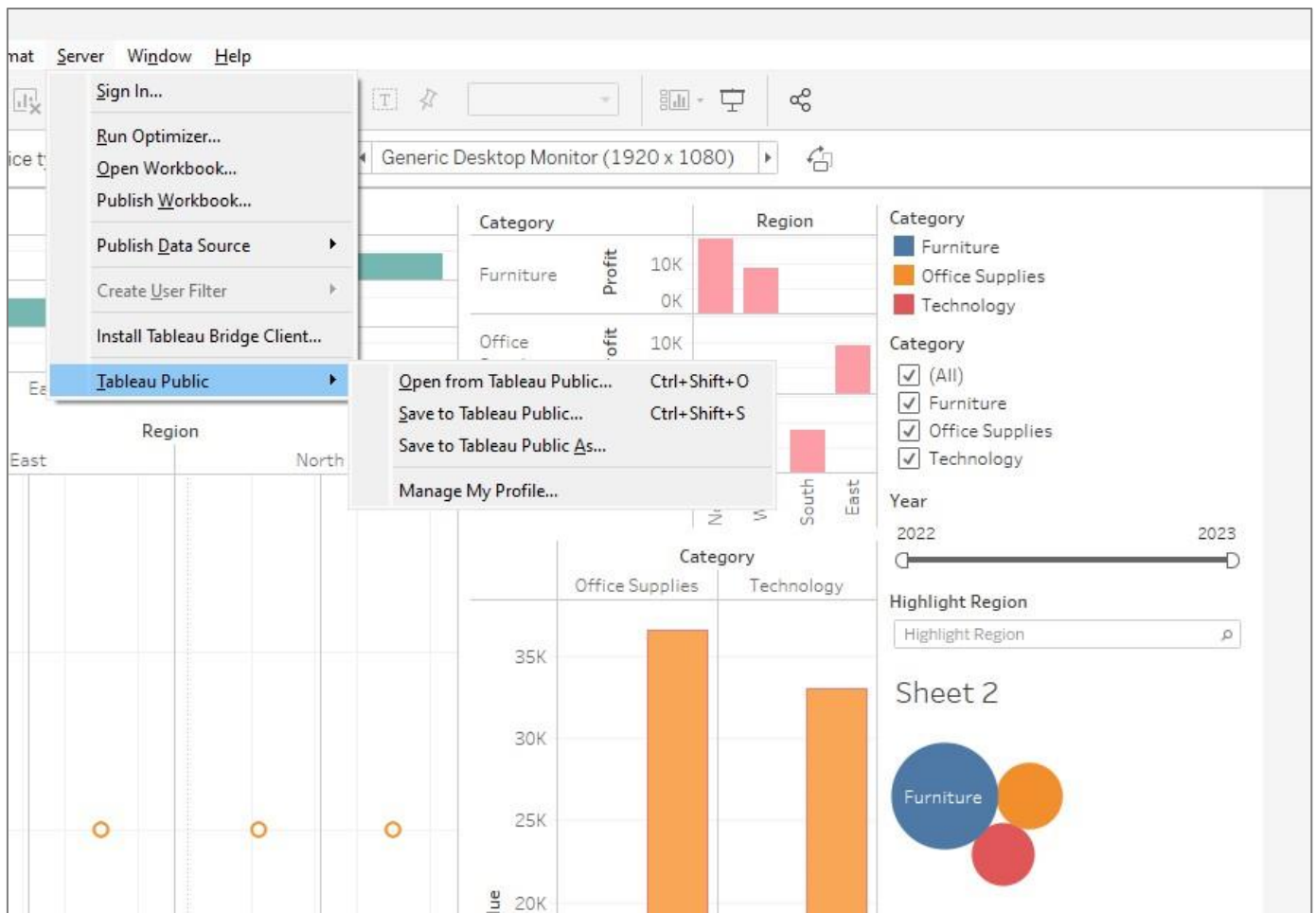
https://public.tableau.com/app/profile/mansi.gotta/viz/prac7_17362759279920/Dashboard1?publish=yes

# Practical 7

**Practical: Create a Trend model using data, Analyse-it and use it for forecasting.**

## 1. Prepare the Dataset

We will create a simple dataset containing monthly sales data for two years. This data will serve as the foundation for trend analysis.



## 2. Load Data into the Tool

- **In Tableau**: Import the dataset by connecting to the CSV file.
- **In Analyze-it** (Excel Add-In): Open the CSV file in Excel and use Analyze-it to build the mode

| Month | Sales |
|---|---|
| 01-01-2022 | 2960 |
| 01-02-2022 | 3411 |
| 01-03-2022 | 3264 |
| 01-04-2022 | 3247 |
| 01-05-2022 | 3807 |
| 01-06-2022 | 4355 |
| 01-07-2022 | 2670 |
| 01-08-2022 | 3459 |
| 01-09-2022 | 2569 |
| 01-10-2022 | 3738 |
| 01-11-2022 | 4408 |
| 01-12-2022 | 5210 |
| 01-01-2023 | 2438 |
| 01-02-2023 | 4011 |
| 01-03-2023 | 3112 |
| 01-04-2023 | 4751 |
| 01-05-2023 | 3893 |
| 01-06-2023 | 5248 |
| 01-07-2023 | 4846 |
| 01-08-2023 | 3645 |
| 01-09-2023 | 3402 |
| 01-10-2023 | 4789 |
| 01-11-2023 | 3666 |
| 01-12-2023 | 2959 |

*(Top of page: Excel worksheet screenshot showing the Month/Sales data with a Histogram, Sales line chart, Residual Plot, Line Fit Plot, Normal Probability Plot, Exponential Smoothing chart, SUMMARY OUTPUT regression statistics, ANOVA table, coefficients, RESIDUAL OUTPUT and PROBABILITY OUTPUT.)*

## 3. Visualize the Trend

**In Tableau:**

1. Drag **Date** to the Columns shelf (ensure it is set to "Month-Year").

2. Drag **Sales** to the Rows shelf.

3. Use a **Line Chart** to show the trend over time.

*(Screenshot of Tableau worksheet with a line chart of Sales over Year of Month.)*
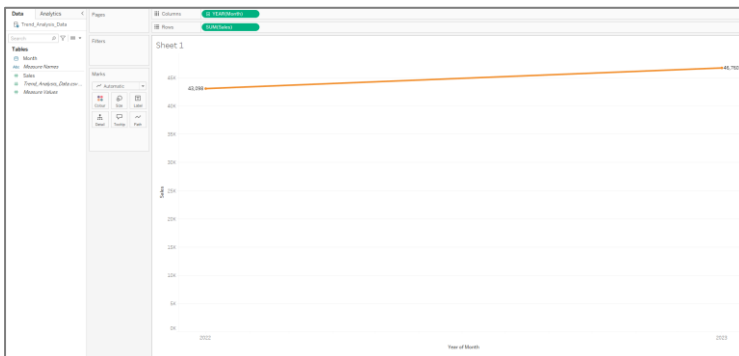
**In Analyze-it:**

1. Highlight the date and sales columns.

2. Use **Analyze-it** > **Regression** to analyze the trend.

*(Screenshot of Excel with the Regression dialog box, showing Input Y Range $A$2:$A$25, Input X Range $B$2:$B$25, Labels checked, Output Range $E$1, and the Month/Sales data in columns A and B.)*

**Regression Statistics**

| | |
|---|---|
| Multiple R | 0.256146 |
| R Square | 0.065611 |
| Adjusted R Square | 0.021116 |
| Standard Error | 204.1759 |
| Observations | 23 |

**ANOVA**

| | df | SS | MS | F | gnificance F |
|---|---|---|---|---|---|
| Regression | 1 | 61471.74 | 61471.74 | 1.474574 | 0.238105 |
| Residual | 21 | 875443.6 | 41687.79 | | |
| Total | 22 | 936915.3 | | | |

| | Coefficients | andard Err | t Stat | P-value | Lower 95% | Upper 95% | ower 95.0% | pper 95.0% |
|---|---|---|---|---|---|---|---|---|
| Intercept | 44681.64 | 205.8274 | 217.0831 | 1.12E-36 | 44253.6 | 45109.68 | 44253.6 | 45109.68 |
| 2960 | 0.064723 | 0.0533 | 1.21432 | 0.238105 | -0.04612 | 0.175566 | -0.04612 | 0.175566 |

**RESIDUAL OUTPUT**      **PROBABILITY OUTPUT**

| Observation | edicted 445 | Residuals | dard Residuals | Percentile | 44562 |
|---|---|---|---|---|---|
| 1 | 44902.41 | -309.409 | -1.55107 | 2.173913 | 44593 |
| 2 | 44892.89 | -271.895 | -1.36301 | 6.521739 | 44621 |
| 3 | 44891.79 | -239.795 | -1.20209 | 10.86957 | 44652 |
| 4 | 44928.04 | -246.04 | -1.2334 | 15.21739 | 44682 |
| 5 | 44963.51 | -250.508 | -1.25579 | 19.56522 | 44713 |
| 6 | 44854.45 | -111.449 | -0.5587 | 23.91304 | 44743 |
| 7 | 44905.52 | -131.516 | -0.65929 | 28.26087 | 44774 |
| 8 | 44847.91 | -42.9124 | -0.21512 | 32.6087 | 44805 |
| 9 | 44923.57 | -88.5737 | -0.44402 | 36.95652 | 44835 |
| 10 | 44966.94 | -100.938 | -0.506 | 41.30435 | 44866 |
| 11 | 45018.85 | -122.846 | -0.61583 | 45.65217 | 44896 |
| 12 | 44839.43 | 87.56637 | 0.43897 | 50 | 44927 |
| 13 | 44941.24 | 16.75685 | 0.084002 | 54.34783 | 44958 |
| 14 | 44883.06 | 102.943 | 0.516053 | 58.69565 | 44986 |
| 15 | 44989.14 | 27.86172 | 0.139671 | 63.04348 | 45017 |
| 16 | 44933.61 | 113.3942 | 0.568444 | 67.3913 | 45047 |
| 17 | 45021.31 | 56.69431 | 0.284208 | 71.73913 | 45078 |
| 18 | 44995.29 | 112.713 | 0.56503 | 76.08696 | 45108 |
| 19 | 44917.55 | 221.4455 | 1.110105 | 80.43478 | 45139 |
| 20 | 44901.83 | 268.1732 | 1.344351 | 84.78261 | 45170 |

## 4. Add a Trend Line

### In Tableau:

1. Right-click on the chart and select **Trend Line** > **Show Trend Lines**.
2. Choose the type of trend model (Linear, Logarithmic, or Polynomial).
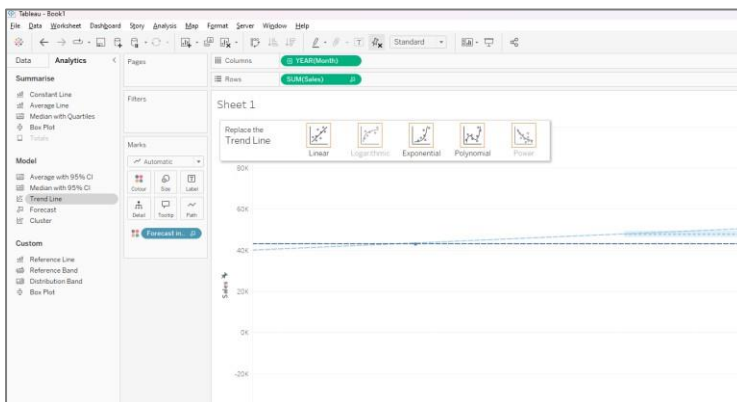
**In Analyze-it:**

1. After running the regression, view the output for the trend equation (e.g., y = mx + c).

**5. Forecast Future Values**

**In Tableau:**

1. Right-click on the chart and choose **Forecast** > **Show Forecast**.

2. Customize the forecast length (e.g., 6 months).

3. Analyze the confidence interval and projected values.
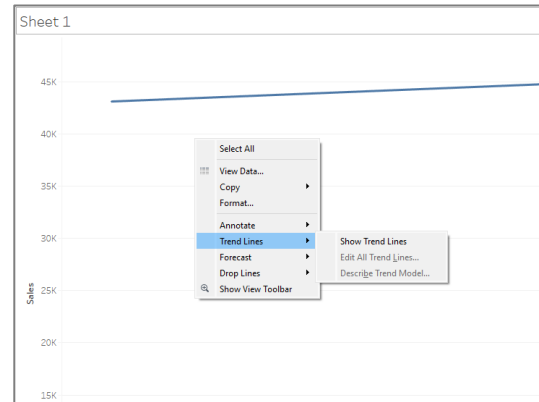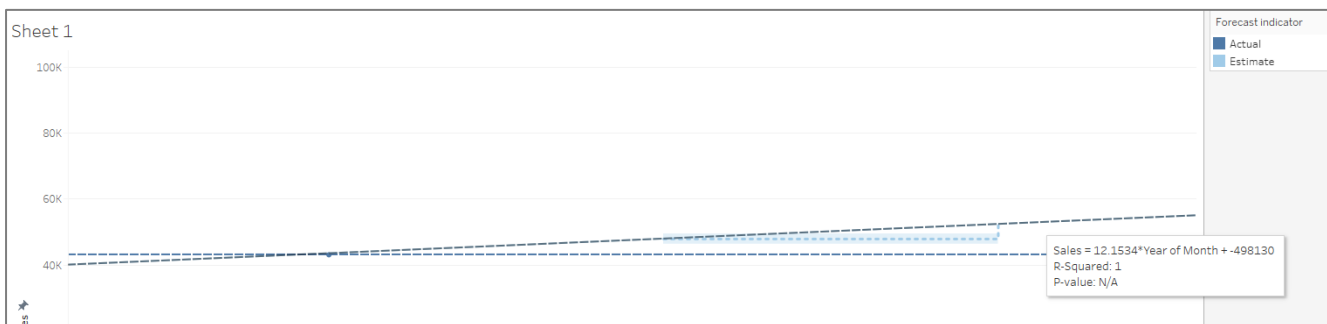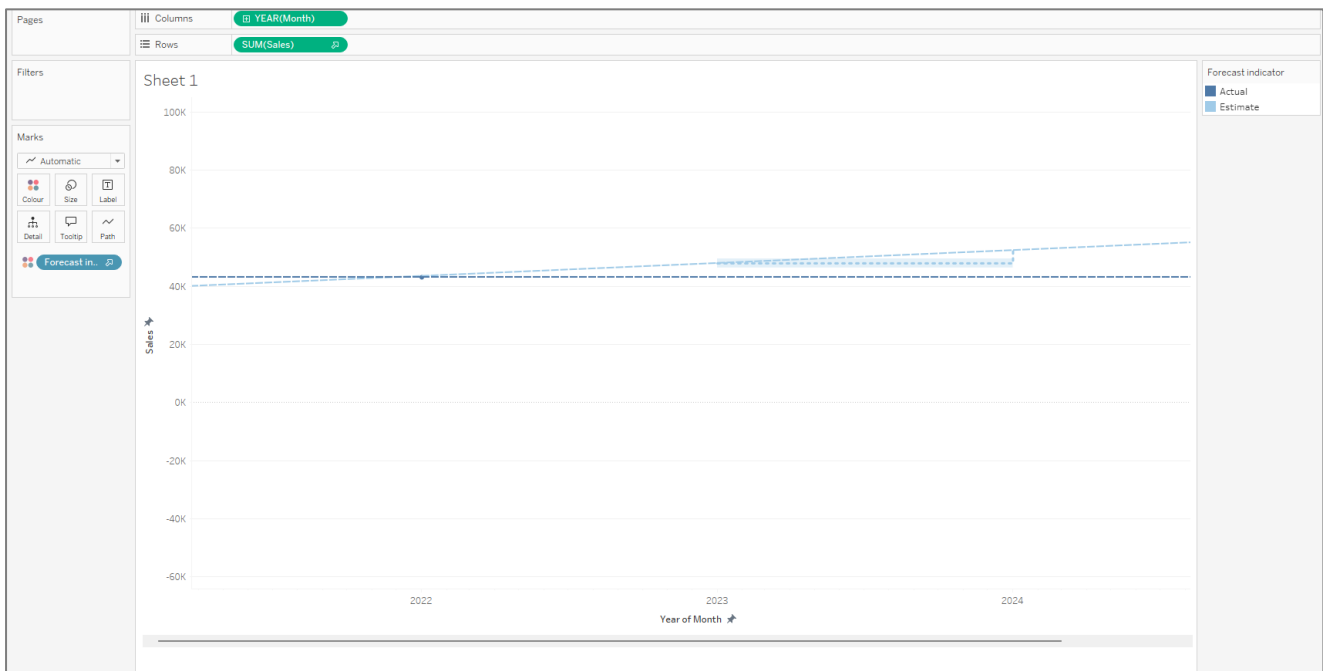




**Options Used to Create Forecasts**

**Time series:** Year of Month

**Measures:** Sum of Sales

**Forecast forward:**

**Forecast based on:** January 2022 – November 2023

**Ignore last:** 1 month (December 2023)

**Seasonal pattern:** None (Not enough data to search for a seasonal pattern recurring every 12 Months)

**Sum of Sales**

| | Change From Initial | Seasonal Effect | | Contribution | | |
| Initial | December 2023 – December 2024 | High | Low | Trend | Season | Quality |
| December 2023 | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| 4,086 ± 1,551 | 516 | None | | 100.0% | 0.0% | OK |

**In Analyze-it:**

1. Use the trend equation from the regression output.
2. Add future dates in Excel and compute forecasts using the equation.

| | A | B |
| --- | --- | --- |
| 1 | Month | Sales |
| 2 | 01-01-2022 | 2960 |
| 3 | 01-02-2022 | 3411 |
| 4 | 01-03-2022 | 3264 |
| 5 | 01-04-2022 | 3247 |
| 6 | 01-05-2022 | 3807 |
| 7 | 01-06-2022 | 4355 |
| 8 | 01-07-2022 | 2670 |
| 9 | 01-08-2022 | 3459 |
| 10 | 01-09-2022 | 2569 |
| 11 | 01-10-2022 | 3738 |
| 12 | 01-11-2022 | 4408 |
| 13 | 01-12-2022 | 5210 |
| 14 | 01-01-2023 | 2438 |
| 15 | 01-02-2023 | 4011 |
| 16 | 01-03-2023 | 3112 |
| 17 | 01-04-2023 | 4751 |
| 18 | 01-05-2023 | 3893 |
| 19 | 01-06-2023 | 5248 |
| 20 | 01-07-2023 | 4846 |
| 21 | 01-08-2023 | 3645 |
| 22 | 01-09-2023 | 3402 |
| 23 | 01-10-2023 | 4789 |
| 24 | 01-11-2023 | 3666 |
| 25 | 01-12-2023 | 2959 |
| 26 | 01-01-2024 | 4186.420419 |
| 27 | 01-02-2024 | 4186.698188 |
| 28 | 01-03-2024 | 4213.962132 |
| 29 | 01-04-2024 | 4225.934118 |
| 30 | 01-05-2024 | 4226.928512 |
| 31 | 01-06-2024 | 4271.228727 |

**RESIDUAL OUTPUT** | | | | **PROBABILITY OUTPUT**

| Observation | Predicted 44562 | Residuals | Standard Residuals | Percentile | 44562 |
| --- | --- | --- | --- | --- | --- |
| 1 | 44902.40926 | -309.4092603 | -1.551067044 | 2.173913 | 44593 |
| 2 | 44892.89496 | -271.8949571 | -1.363008034 | 6.521739 | 44621 |
| 3 | 44891.79466 | -239.7946635 | -1.202089426 | 10.86957 | 44652 |
| 4 | 44928.03963 | -246.0396282 | -1.233395402 | 15.21739 | 44682 |
| 5 | 44963.50792 | -250.5079151 | -1.255794901 | 19.56522 | 44713 |
| 6 | 44854.44941 | -111.4494053 | -0.5586953 | 23.91304 | 44743 |
| 7 | 44905.51597 | -131.5159716 | -0.659288895 | 28.26087 | 44774 |
| 8 | 44847.91237 | -42.91236699 | -0.215119477 | 32.6087 | 44805 |
| 9 | 44923.57373 | -88.57373079 | -0.444019661 | 36.95652 | 44835 |
| 10 | 44966.93824 | -100.9382421 | -0.506002893 | 41.30435 | 44866 |
| 11 | 45018.84621 | -122.8462094 | -0.615827421 | 45.65217 | 44896 |
| 12 | 44839.43363 | 87.56636582 | 0.438969745 | 50 | 44927 |
| 13 | 44941.24315 | 16.75684892 | 0.084001998 | 54.34783 | 44958 |
| 14 | 44883.05704 | 102.9429619 | 0.516052543 | 58.69565 | 44986 |
| 15 | 44989.13828 | 27.861717 | 0.139670645 | 63.04348 | 45017 |
| 16 | 44933.60582 | 113.3941808 | 0.56844445 | 67.3913 | 45047 |
| 17 | 45021.30569 | 56.69431083 | 0.284208291 | 71.73913 | 45078 |
| 18 | 44995.28698 | 112.7130176 | 0.565029783 | 76.08696 | 45108 |
| 19 | 44917.55448 | 221.4455223 | 1.110105274 | 80.43478 | 45139 |
| 20 | 44901.82675 | 268.173248 | 1.344351125 | 84.78261 | 45170 |
| 21 | 44991.59776 | 208.4022372 | 1.044719353 | 89.13043 | 45200 |
| 22 | 44918.91366 | 312.0863361 | 1.564487212 | 93.47826 | 45231 |
| 23 | 44873.1544 | 387.845604 | 1.944268035 | 97.82609 | 45261 |

=FORECAST(x, known_y's, known_x's

**6. Interpret the Results**

- Observe the overall trend (e.g., increasing or decreasing).
- Discuss the reliability of the forecast based on historical data.

# Practical 8

**Practical: Creating Geospatial feature maps in Tableau using Geospatial Data.**

**Steps to Create Geospatial Maps in Tableau**

1. **Prepare Your Data**:
   - Use a dataset that includes geospatial data, such as latitude, longitude, or geographical regions (e.g., city names, states, or countries).
   - Ensure the data is clean and organized in a CSV or Excel format.



| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| | City | Country | Latitude | Longitude | Sales ($) | Population | |
| | New York | USA | 40.7128 | -74.006 | 1500000 | 8419600 | |
| | London | UK | 51.5074 | -0.1278 | 1200000 | 8982000 | |
| | Tokyo | Japan | 35.6895 | 139.6917 | 2000000 | 37400068 | |
| | Mumbai | India | 19.076 | 72.8777 | 900000 | 20411000 | |

2. **Load Data into Tableau**:
   - Open Tableau and connect to your dataset by clicking **Connect > Text File** or **Microsoft Excel**, then select your file.

3. **Assign Geographic Roles**:
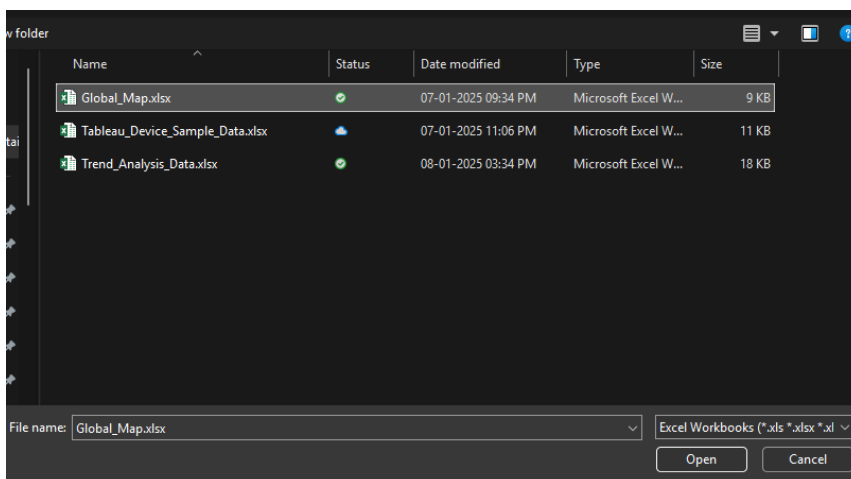


   - Tableau often automatically assigns geographic roles based on column names (e.g., "City," "Country"). If it doesn't, right-click the field in the Data pane, select **Geographic Role**, and choose the appropriate role.

| Type | Field Name | Physical Table | Remote Field Name |
|------|-----------|----------------|-------------------|
| ⊕ | City | Sheet1 | City |
| ⊕ | Country | Sheet1 | Country |
| ⊕ | Latitude | Sheet1 | Latitude |
| ⊕ | Longitude | Sheet1 | Longitude |
| # | Sales ($) | Sheet1 | Sales ($) |
| # | Population | Sheet1 | Population |

| | City | Country | Latitude | Longitude | Sales ($) | Population |
|--|------|---------|----------|-----------|-----------|-----------|
| | New York | USA | 40.7128 | -74.006 | 1,500,000 | 8,419,600 |
| | London | UK | 51.5074 | -0.128 | 1,200,000 | 8,982,000 |
| | Tokyo | Japan | 35.6895 | 139.692 | 2,000,000 | 37,400,068 |
| | Mumbai | India | 19.0760 | 72.878 | 900,000 | 20,411,000 |

4.  **Create a Map View**:

o   Drag the geographic field (e.g., City or Country) onto the **Rows** or **Columns** shelf.

o   Tableau will automatically generate a map with data points.
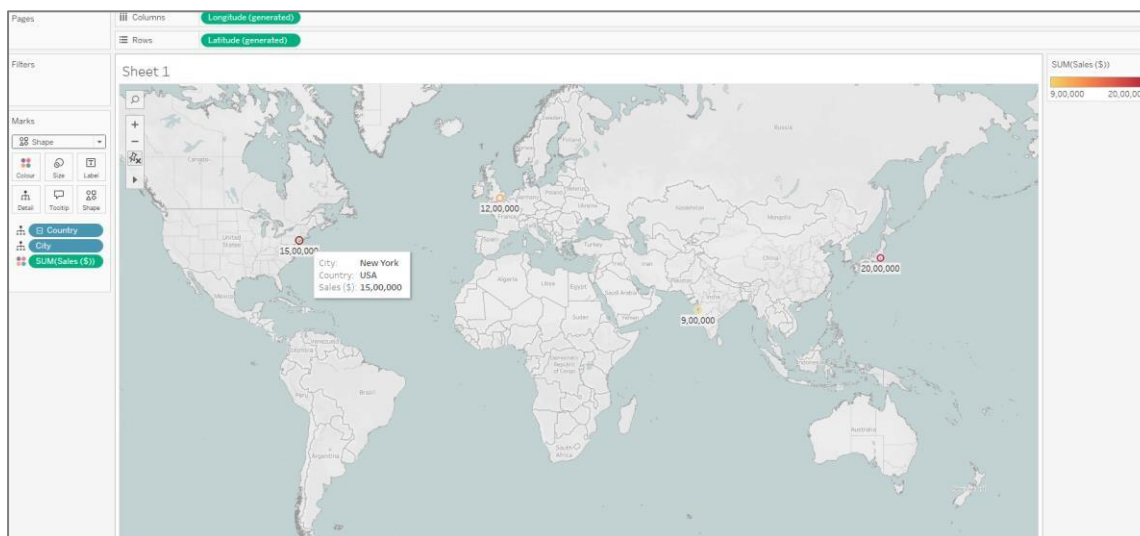
5.  **Enhance the Map with Data**:

o   Drag a measure (e.g., Sales, Population) to **Color** or **Size** on the **Marks** card to visualize data distribution.
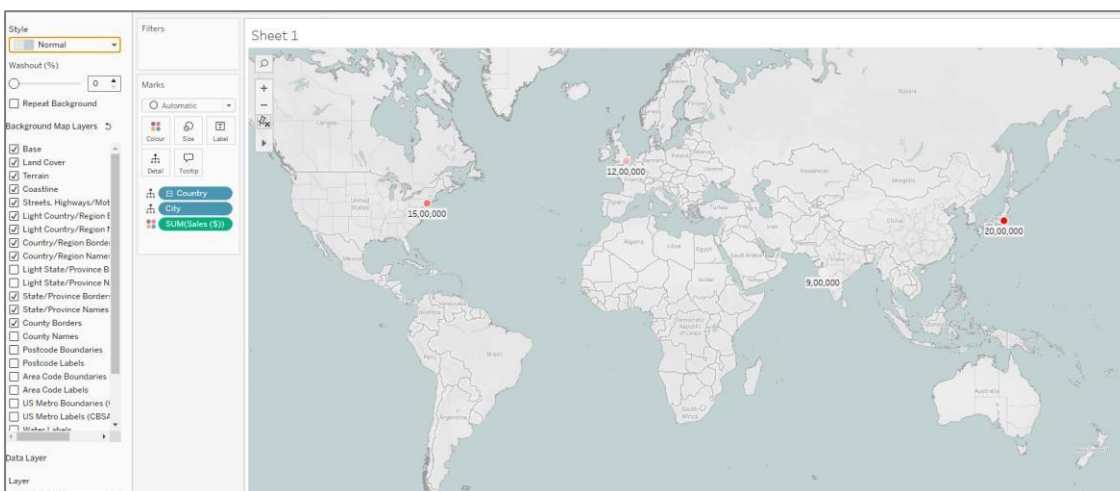




o   Use the **Filter** card to focus on specific regions or categories.

6. **Customize the Map**:

   o Click **Map** > **Map Layers** to adjust map styles, such as borders, terrain, or dark mode.

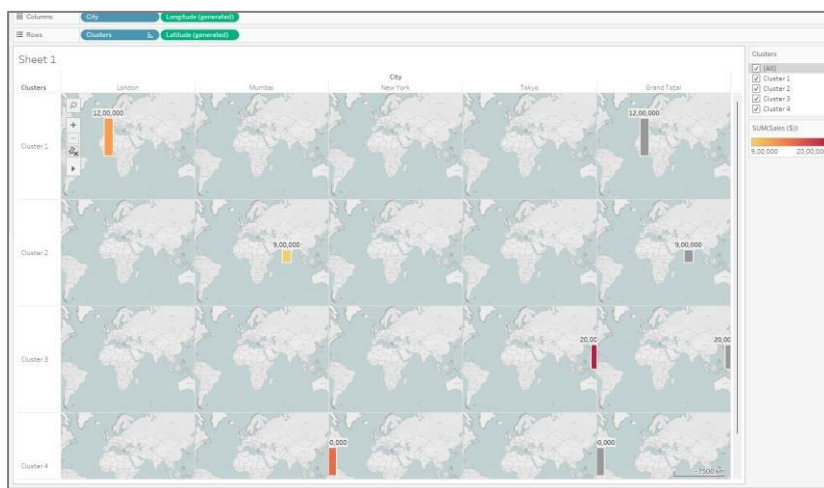   o Add tooltips, labels, or additional measures for a richer display.



7. **Analyze Geospatial Features**:

   o Use Tableau's **Analytics pane** to overlay trends or clusters.

   o Implement filters to allow interactive exploration of the data.
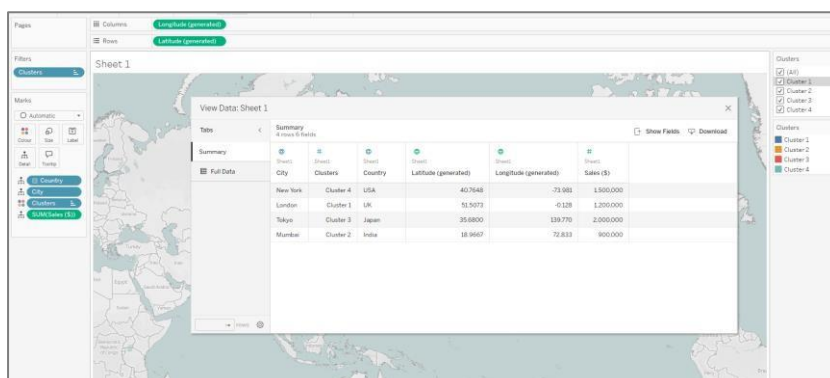


8. **Save and Share**:

   o Save your workbook or export it as a packaged workbook (.twbx) to include data and visualization.

# Practical 9

**Practical: Create Dashboard and Storytelling using tableau.**

## 1. Prepare Your Data

- Use a dataset with multiple dimensions and measures (e.g., sales, region, category, profit).

  Example dataset: Sales_Performance_Data.xlsx

| Region | Product Category | Sales ($) | Profit ($) | Month |
|--------|------------------|-----------|-----------|-------|
| North | Electronics | 150000 | 30000 | January 2024 |
| South | Furniture | 90000 | 10000 | February 2024 |
| East | Apparel | 120000 | 25000 | March 2024 |
| West | Electronics | 170000 | 35000 | April 2024 |

## 2. Load the Data

1. Open Tableau and click **Connect > Microsoft Excel** or another format.
2. Choose your file and load the data.



## 3. Create Sheets for the Dashboard

- **Sheet 1: Sales by Region**

  o Drag Region to Rows and Sales to Columns.

  o Add Sales to the **Color** shelf for a heat map effect.

  o Use a bar or pie chart.

- **Sheet 2: Profit by Product Category**

  o Drag Product Category to Rows and Profit to Columns.

  o Choose a tree map for better visualization.
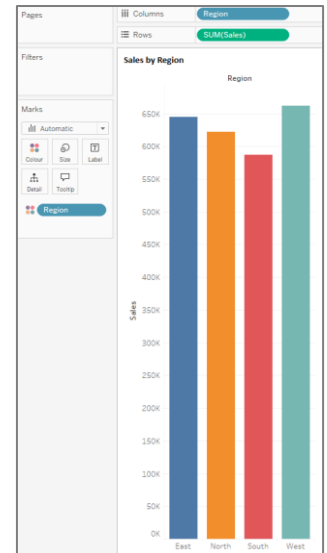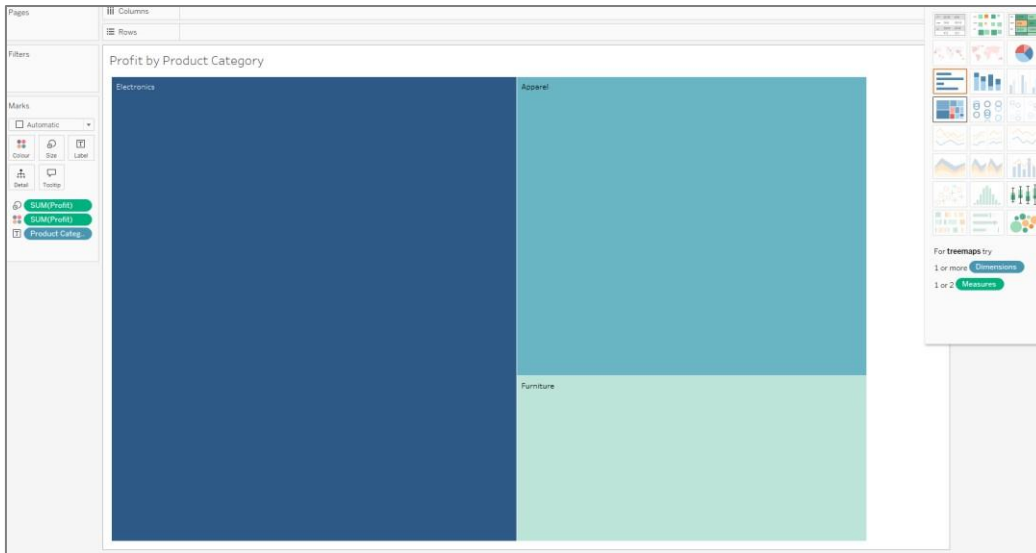
- **Sheet 3: Monthly Trends**
  - Drag Month to Columns and Sales to Rows.
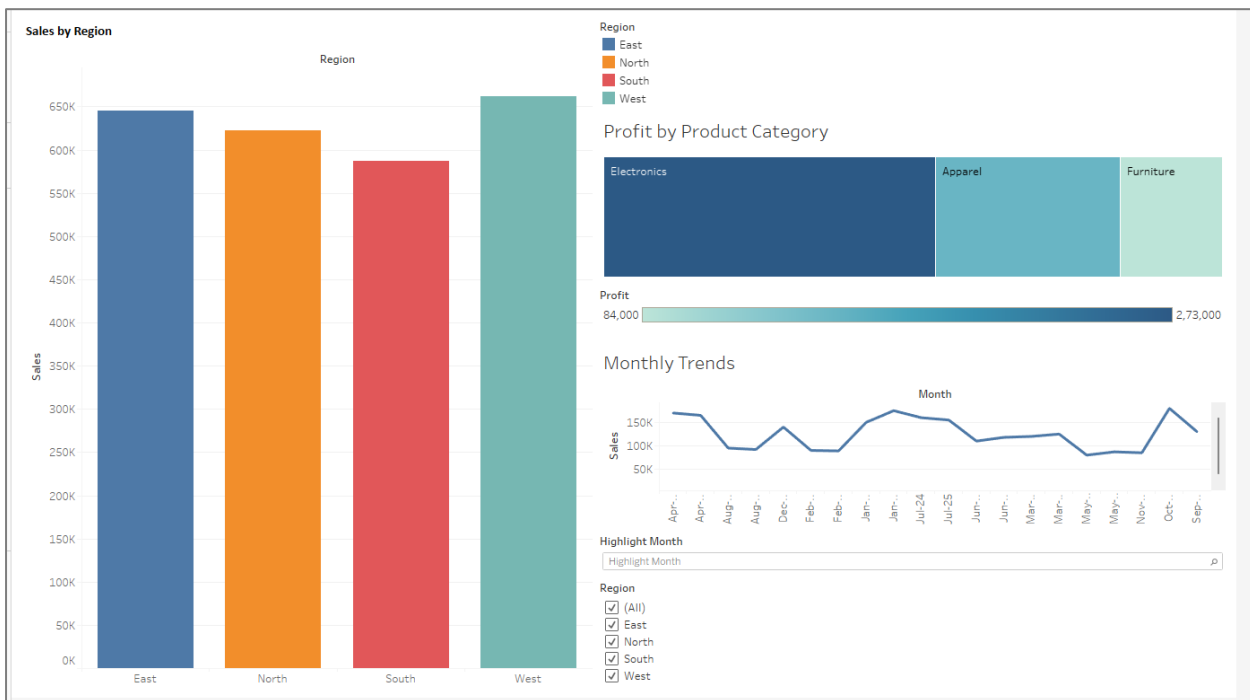  - Choose a line chart to show trends over time.
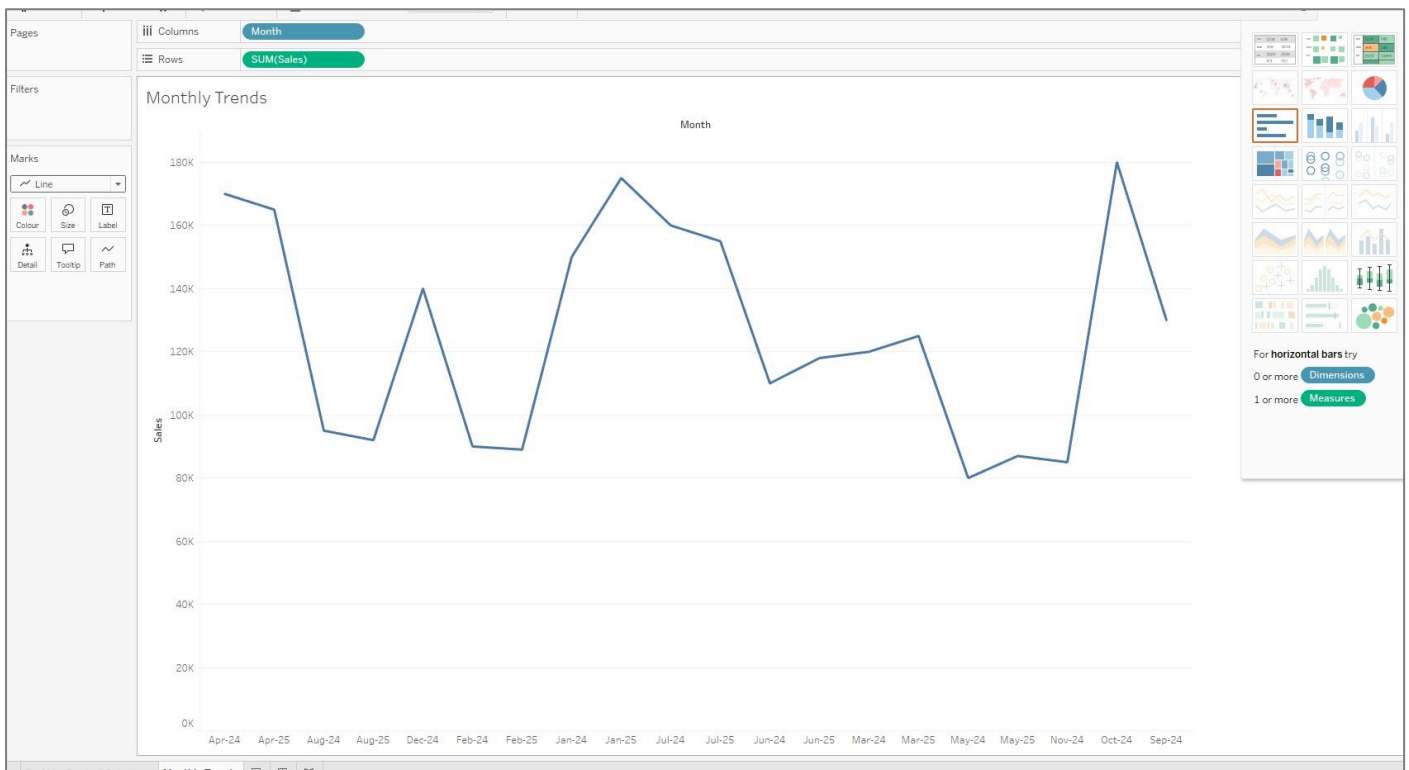


## 4. Build the Dashboard

1. Go to the **Dashboard** tab.
2. Drag and drop your created sheets (e.g., Sheet 1, Sheet 2) into the dashboard.
3. Add filters (e.g., Region filter) for interactivity:
   - Drag the filter to the dashboard for user input.
4. Customize:
   - Add text boxes, titles, or images.

o Adjust the layout for clarity.



**Steps to Create a Story in Tableau**

**1. Prepare a Story**

1. Click **Story** in the Tableau toolbar.

2. Select **New Story**.

**2. Add Sheets to the Story**

1. Drag dashboard views or individual sheets to the story area.

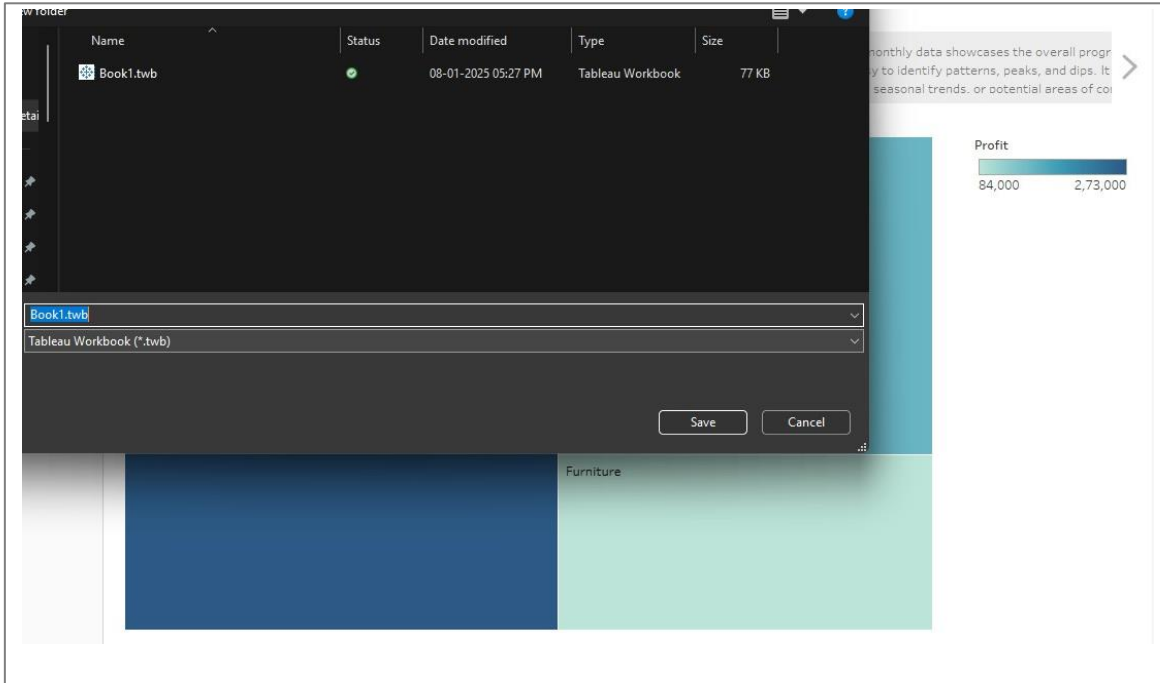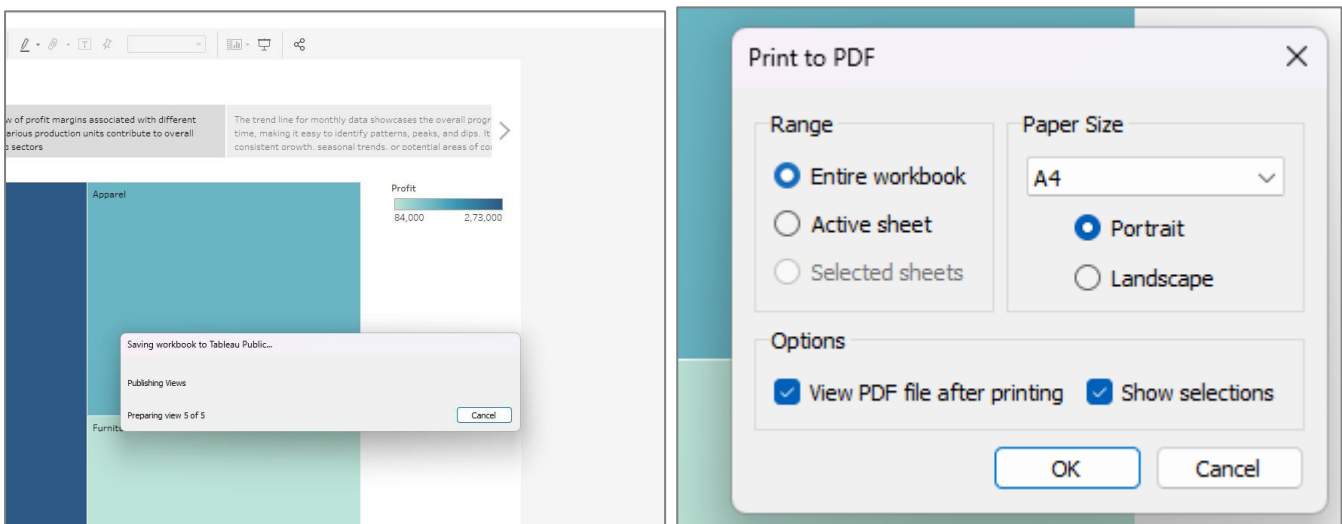2. Add captions to explain insights for each step.

### 3. Customize the Story

1. Adjust the size and layout of each story point.
2. Add annotations to highlight key findings.

### 4. Save and Share

1. Save the workbook as .twbx to include data and visuals.



2. Export as PDF or share on Tableau Public for easy access.



**https://public.tableau.com/app/profile/mansi.gotta/viz/Book1_17363377098700/Story1?publish=yes**